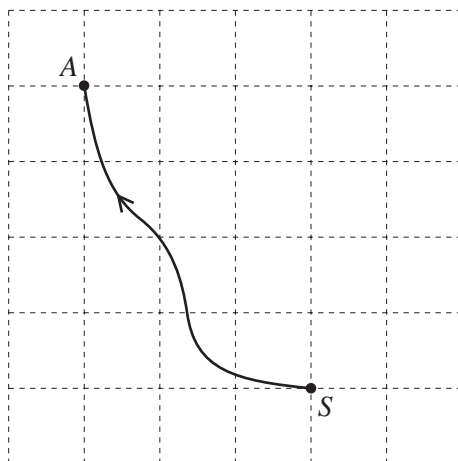


1



The diagram shows the map of part of an orienteering course.
Sanji runs from the start, S , to the point A .

Write \vec{SA} as a column vector.

Answer $\begin{pmatrix} \\ \end{pmatrix}$ [1]

- 2 When Ali takes a penalty, the probability that he will score a goal is $\frac{4}{5}$.

Ali takes 30 penalties.

Find how many times he is expected to score a goal.

Answer [2]

- 3 The ratio of Anne's height : Ben's height is 7 : 9.
Anne's height is 1.4 m.

Find Ben's height.

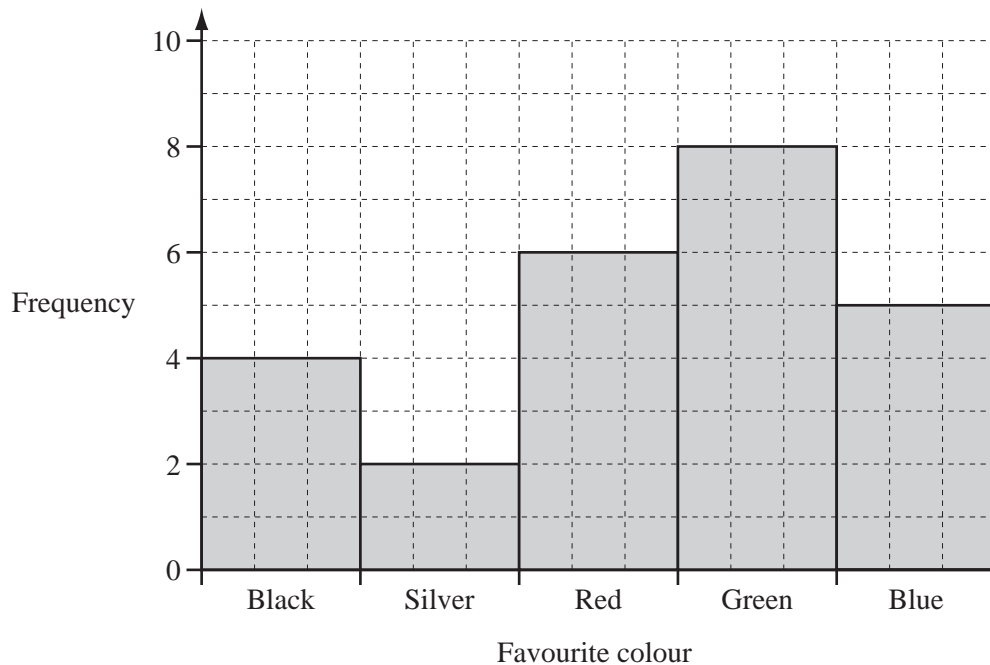
Answer m [2]

- 4 The distance between the centres of two villages is 8 km.
A map on which they are shown has a scale of 1 : 50 000.

Calculate the distance between the centres of the two villages on the map.
Give your answer in centimetres.

Answer cm [2]

5



The bar chart shows the favourite colours of students in a class.

- (a) How many students are in the class?

Answer(a) [1]

- (b) Write down the modal colour.

Answer(b) [1]

- 6 Use your calculator to find $\sqrt{\frac{45 \times 5.75}{3.1 + 1.5}}$.

Answer [2]

- 7 (a) Calculate 60% of 200.

Answer(a) [1]

- (b) Write 0.36 as a fraction.
Give your answer in its lowest terms.

Answer(b) [2]

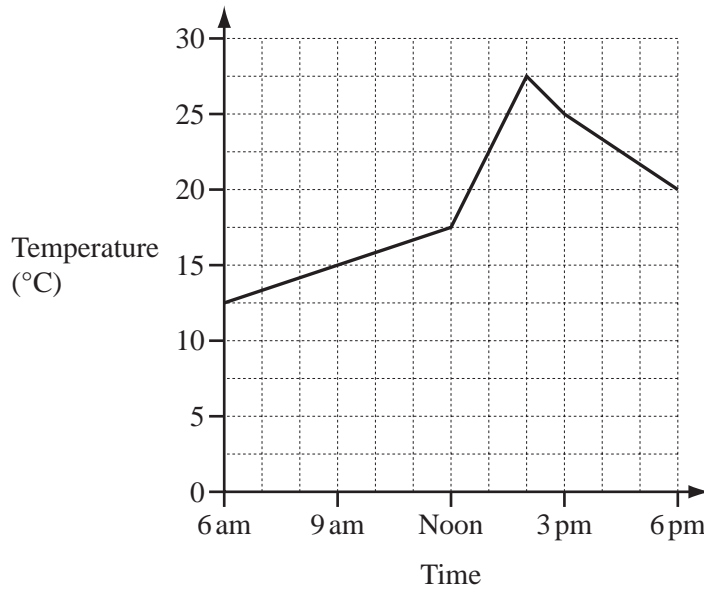
- 8 A circle has a radius of 50 cm.

- (a) Calculate the area of the circle in cm^2 .

Answer(a) cm^2 [2]

- (b) Write your answer to **part (a)** in m^2 .

Answer(b) m^2 [1]



The graph shows the temperature in Paris from 6 am to 6 pm one day.

(a) What was the temperature at 9 am?

Answer(a) °C [1]

(b) Between which two times was the temperature decreasing?

Answer(b) and [1]

(c) Work out the difference between the maximum and minimum temperatures shown.

Answer(c) °C [1]

10 (a) Write down the mathematical name of a quadrilateral that has exactly two lines of symmetry.

Answer(a) [1]

(b) Write down the mathematical name of a triangle with exactly one line of symmetry.

Answer(b) [1]

(c) Write down the order of rotational symmetry of a regular pentagon.

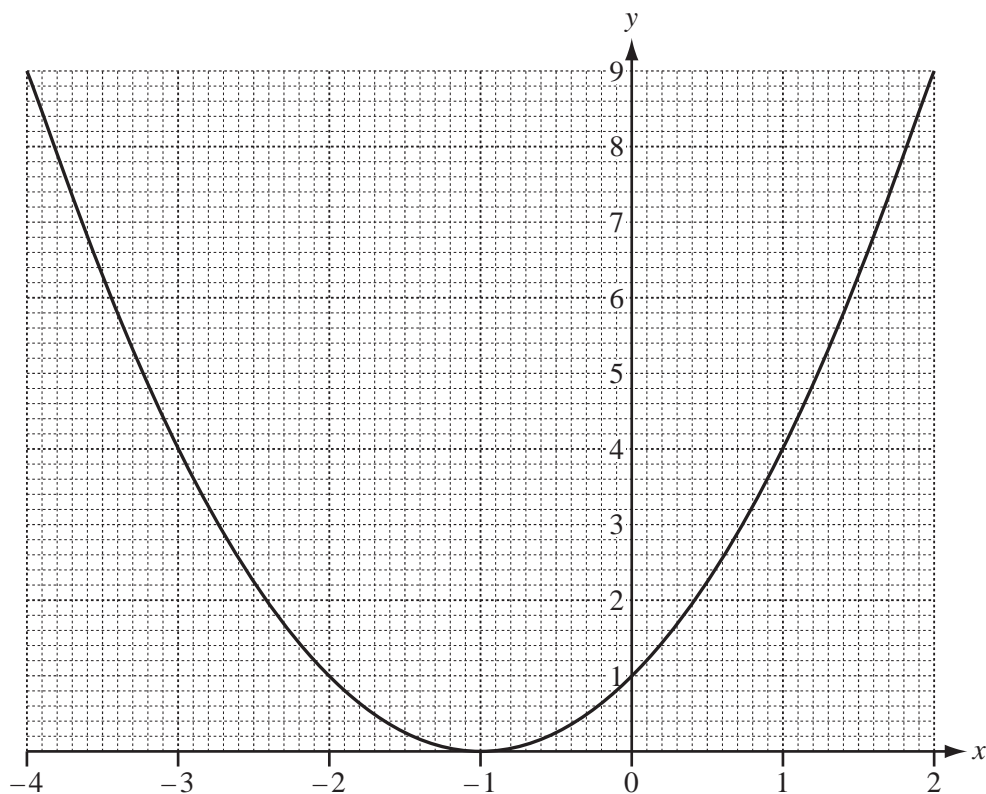
Answer(c) [1]

- 11 Without using your calculator, work out $\frac{1}{2}\left(\frac{2}{3} + \frac{1}{4}\right)$.

Show all your working clearly and give your answer as a fraction.

Answer [3]

12

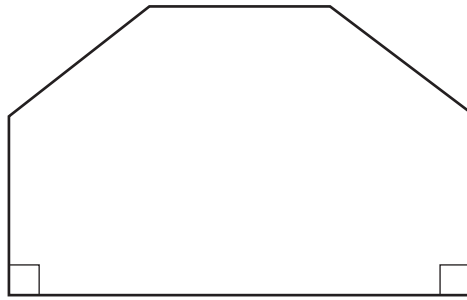


The diagram shows the graph of $y = (x + 1)^2$ for $-4 \leq x \leq 2$.

- (a) On the same grid, draw the line $y = 3$. [1]
- (b) Use your graph to find the solutions of $(x + 1)^2 = 3$.
Give each solution correct to 1 decimal place.

Answer(b) $x =$ or $x =$ [2]

13

NOT TO
SCALE

The front of a house is in the shape of a hexagon with two right angles.
The other four angles are all the same size.

Calculate the size of one of these angles.

Answer [3]

14 (a) Expand and simplify.

$$2(3x - 2) + 3(x - 2)$$

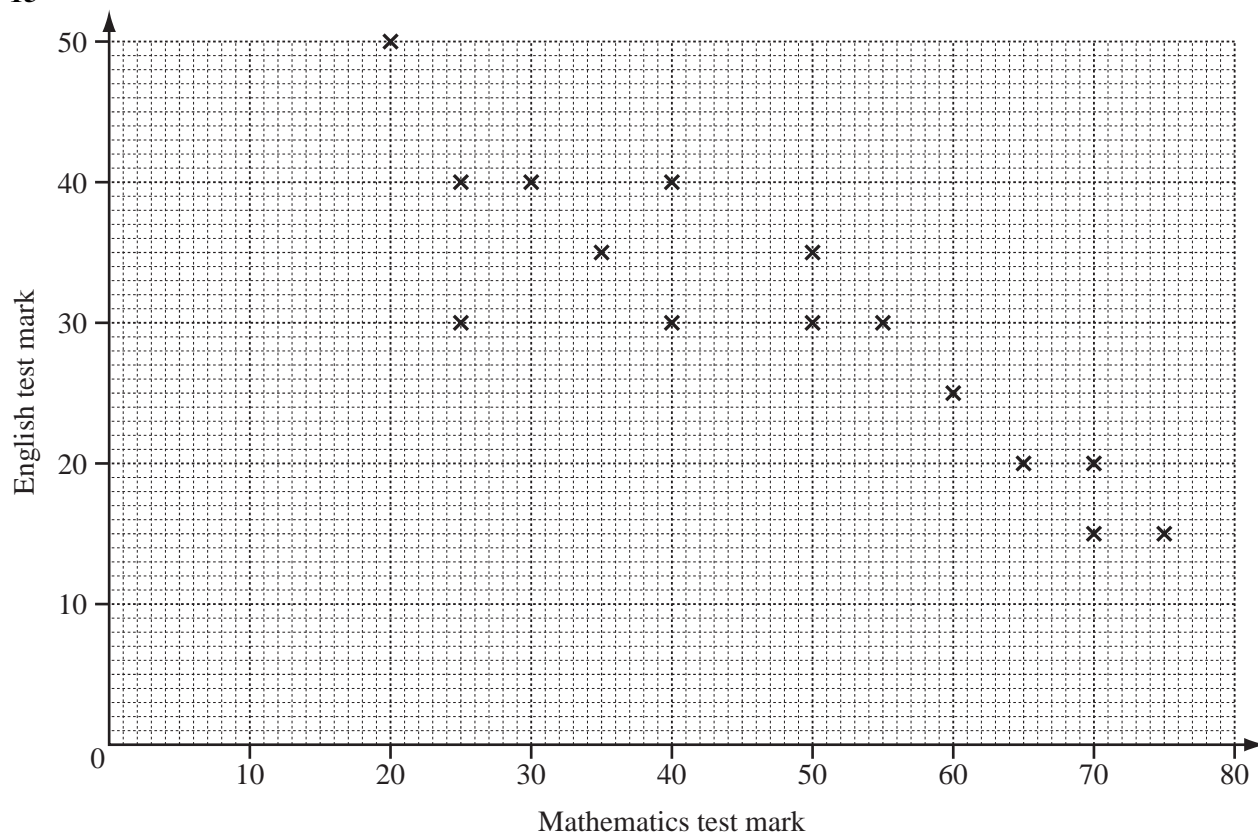
Answer(a) [2]

(b) Expand.

$$x(2x^2 - 3)$$

Answer(b) [2]

15



The scatter diagram shows the marks obtained in a Mathematics test and the marks obtained in an English test by 15 students.

(a) Describe the correlation.

Answer(a) [1]

(b) The mean for the Mathematics test is 47.3 .
The mean for the English test is 30.3 .

Plot the mean point (47.3, 30.3) on the scatter diagram above. [1]

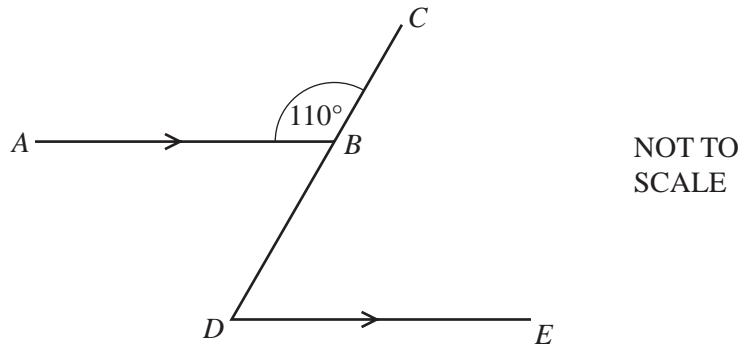
(c) (i) Draw the line of best fit on the diagram above. [1]

(ii) One student missed the English test.
She received 45 marks in the Mathematics test.

Use your line to estimate the mark she might have gained in the English test.

Answer(c)(ii) [1]

16 (a)

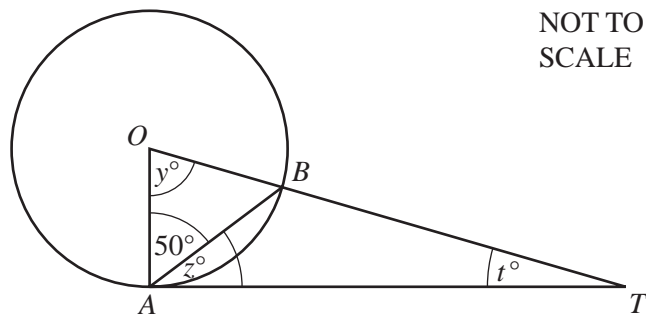


In the diagram, AB is parallel to DE .
Angle $ABC = 110^\circ$.

Find angle BDE .

Answer(a) Angle $BDE = \dots\dots\dots$ [2]

(b)



TA is a tangent at A to the circle, centre O .
Angle $OAB = 50^\circ$.

Find the value of

(i) y ,

Answer(b)(i) $y = \dots\dots\dots$ [1]

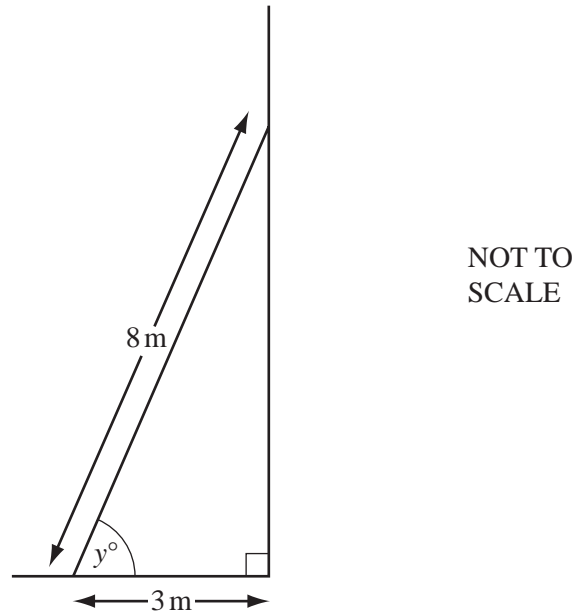
(ii) z ,

Answer(b)(ii) $z = \dots\dots\dots$ [1]

(iii) t .

Answer(b)(iii) $t = \dots\dots\dots$ [1]

17



The diagram shows a ladder, of length 8 m, leaning against a vertical wall. The bottom of the ladder stands on horizontal ground, 3 m from the wall.

- (a) Find the height of the top of the ladder above the ground.

Answer(a) m [3]

- (b) Use trigonometry to calculate the value of y .

Answer(b) $y =$ [2]

- 18 (a) Lucinda invests \$500 at a rate of 5% per year **simple** interest.

Calculate the interest Lucinda has after 3 years.

Answer(a) \$ [2]

- (b) Andy invests \$500 at a rate of 5% per year **compound** interest.

Calculate how much more interest Andy has than Lucinda after 3 years.

Answer(b) \$ [4]

- 1 The temperature on Monday is 3°C .
On Tuesday it is 5°C lower.

Find the temperature on Tuesday.

Answer $^{\circ}\text{C}$ [1]

- 2 Joseph changed 120 New Zealand dollars (NZ\$) into Australian dollars (A\$) when the exchange rate was

$$\text{NZ\$1} = \text{A\$0.796}.$$

Calculate the exact amount he received.

Answer A\$ [1]

- 3 A bus leaves a port every 15 minutes, starting at 09 00.
The last bus leaves at 17 30.

How many times does a bus leave the port during one day?

Answer [2]

- 4 Write the following in order of size, starting with the smallest.

$$\frac{9}{8} \quad 1.2 \quad 115\% \quad 1\frac{1}{6}$$

Answer < < < [2]

- 5 Mortar is a mixture of cement, sand and lime in the ratio

cement : sand : lime = 1 : 5 : 2.

Calculate how much sand there is in a 12 kg bag of this mortar.

Answer kg [2]

- 6 Find the cube root of 96.
Give your answer correct to 2 decimal places.

Answer [2]

- 7 Write these numbers in standard form.

(a) 734 000 000

Answer(a) [1]

(b) 0.000587

Answer(b) [1]

- 8 The population, P , of Brunei in 2008 was 400 000 correct to the nearest 1000.

Complete the statement about the value of P .

Answer $\leq P <$ [2]

- 9 Use your calculator to find the value of

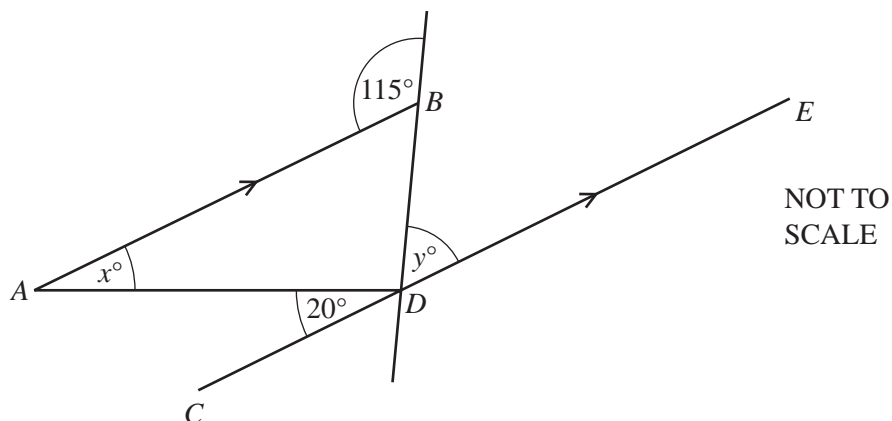
(a) $3^0 \times 2.5^2$,

Answer(a) [1]

(b) 2.5^{-2} .

Answer(b) [1]

10



In the diagram, AB is parallel to CDE .
Find the value of

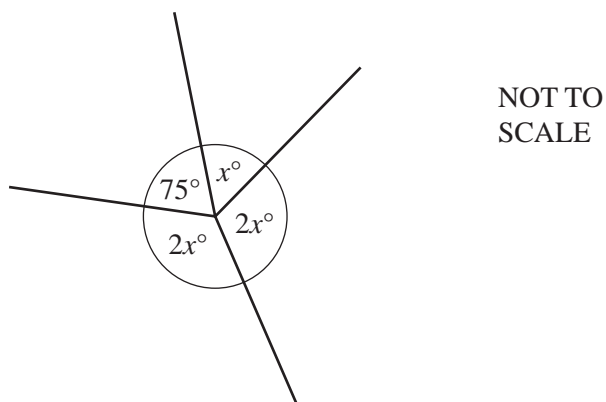
(a) x ,

Answer(a) $x = \dots\dots\dots$ [1]

(b) y .

Answer(b) $y = \dots\dots\dots$ [2]

11



(a) For the diagram above, write down an equation in x .

Answer(a) $\dots\dots\dots$ [1]

(b) Solve your equation.

Answer(b) $x = \dots\dots\dots$ [2]

- 12 Jiwan incorrectly wrote $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} = 1\frac{3}{9}$.

Show the correct working and write down the answer as a mixed number.

Answer [3]

- 13 Solve these simultaneous equations.

$$\begin{aligned} 5x - 2y &= 17 \\ 2x + y &= 5 \end{aligned}$$

Answer $x =$
 $y =$ [3]

- 14** A bag contains only red, yellow and blue counters.
Bashira picks a counter at random from the bag, records its colour, and puts it back in the bag.
She does this 60 times.

(a) Complete the table for her results.

| Colour | Frequency | Relative frequency |
|--------|-----------|--------------------|
| Red | 19 | |
| Yellow | | |
| Blue | 28 | |

[2]

(b) Gita picks a counter at random from the same bag.

Which colour counter is she most likely to pick?

Answer(b) [1]

- 15** A cruise ship travels at 22 knots.

[1 knot is 1.852 kilometres per hour.]

Convert this speed into metres per second.

Answer m/s [3]

16 (a) Write down a common multiple of 8 and 14.

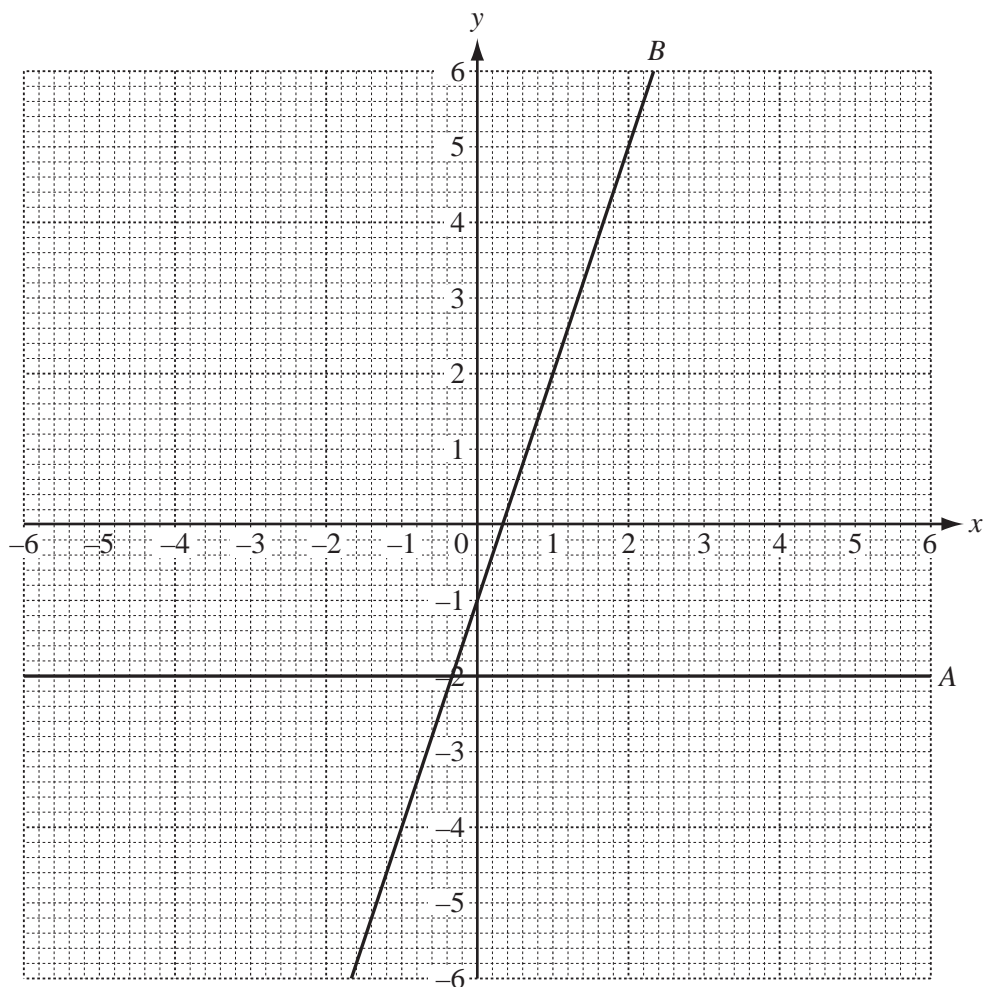
Answer(a) [1]

(b) (i) Complete the list of factors of 81.

1, , , , 81 [2]

(ii) Write down the prime factor of 81.

Answer(b)(ii) [1]



The diagram shows two straight lines, A and B , drawn on a grid.

- (a) Write down the equation of line A .

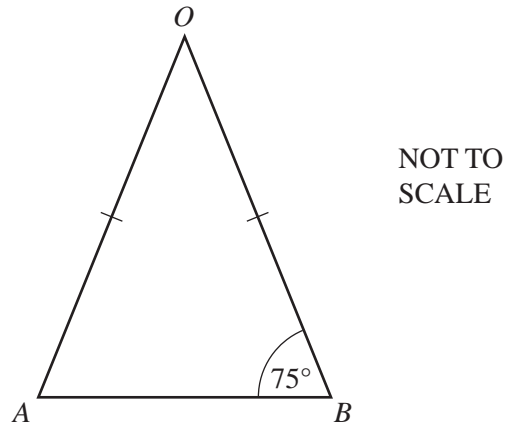
Answer(a) [1]

- (b) The equation of line B is $y = 3x - 1$.

- (i) Draw a line parallel to line B that passes through the point $(0, 2)$. [1]
- (ii) Write down the equation of your line in the form $y = mx + c$.

Answer(b)(ii) $y =$ [2]

18

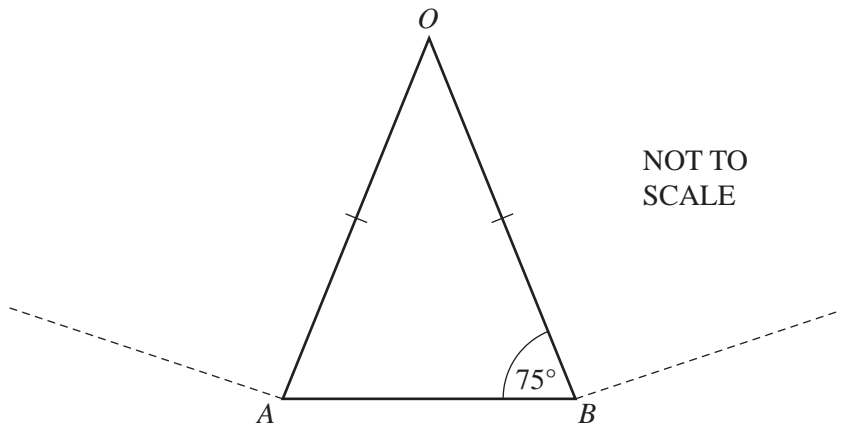


- (a) Triangle AOB is isosceles.
 $OA = OB$.

Calculate angle AOB .

Answer(a) Angle $AOB =$ [1]

(b)



AB is one side of a regular polygon with n sides.

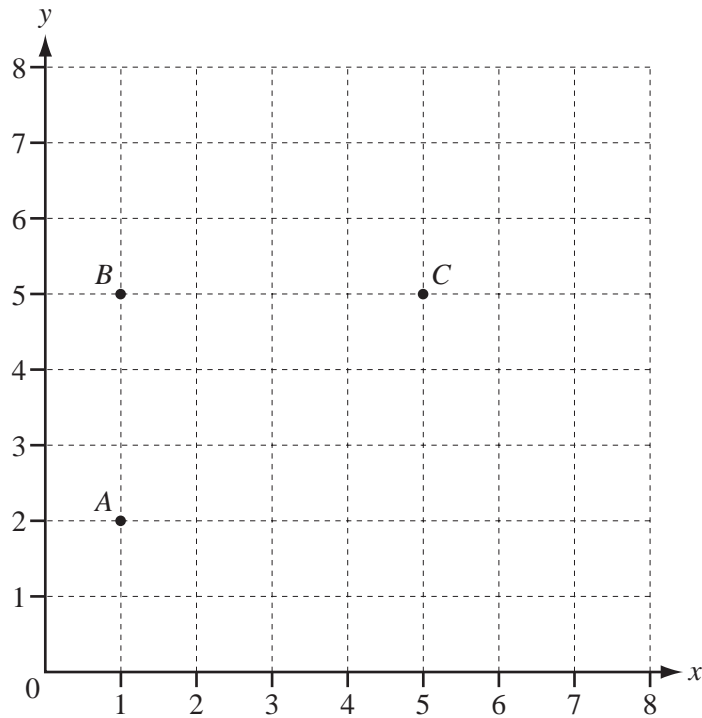
- (i) Calculate n .

Answer(b)(i) $n =$ [2]

- (ii) Find the size of an interior angle of this polygon.

Answer(b)(ii) [1]

19 (a)



Three vertices of the quadrilateral $ABCD$ are shown in the diagram.

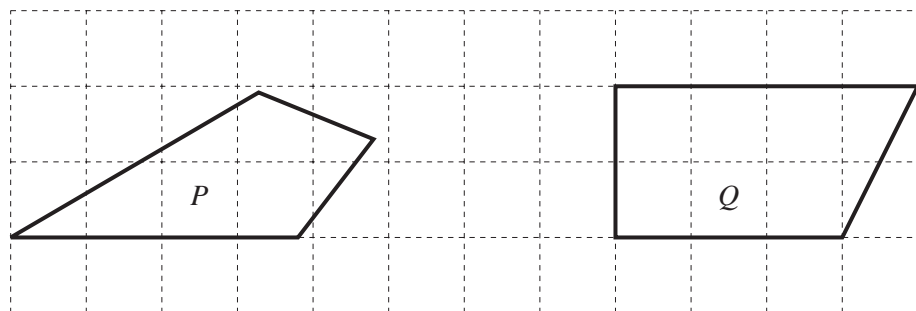
- (i) Write down the co-ordinates of the point B .

Answer(a)(i) (..... ,) [1]

- (ii) On the grid, plot and label the point D so that quadrilateral $ABCD$ has rotational symmetry of order 2. [1]

- (iii) Draw the quadrilateral $ABCD$.
Draw in all the lines of symmetry on your quadrilateral. [1]

- (b) Write down the mathematical names of these quadrilaterals.



Answer(b) P Q [2]

20 In a survey of 60 cars, the type of fuel that they use is recorded in the table below.

Each car only uses one type of fuel.

| Petrol | Diesel | Liquid Hydrogen | Electricity |
|--------|--------|-----------------|-------------|
| 40 | 12 | 2 | 6 |

(a) Write down the mode.

Answer(a) [1]

(b) Olav drew a pie chart to illustrate these figures.

Calculate the angle of the sector for Diesel.

Answer(b) [2]

(c) Calculate the probability that a car chosen at random uses Electricity.

Write your answer as a fraction in its simplest form.

Answer(c) [2]

- 1 During April the probability that it will rain on any one day is $\frac{5}{6}$.
On how many of the 30 days in April would it be expected to rain?

Answer [1]

- 2 (a) Write, in figures, the number

one hundred and five thousand and two.

Answer(a) [1]

- (b) Write your answer to **part (a)** correct to the nearest ten thousand.

Answer(b) [1]

- 3 Simplify the expression.

$$7x + 11y + x - 6y$$

Answer [2]

- 4 Insert **one** pair of brackets into each calculation to make the answer correct.

(a) $7 \times 6 - 3 + 5 = 26$ [1]

(b) $8 - 6 \times 4 - 1 = -10$ [1]

- 5 Write the following in order of size, starting with the smallest.

$$0.525 \quad \frac{11}{21} \quad \frac{111}{211} \quad 52.4\%$$

Answer < < < [2]

- 6 Thomas fills glasses from a jug containing 2.4 litres of water.
Each glass holds 30 centilitres.

How many glasses can Thomas fill?

Answer [2]

- 7 Martha divides \$240 between spending and saving in the ratio

$$\text{spending} : \text{saving} = 7 : 8.$$

Calculate the amount Martha has for spending.

Answer \$ [2]

8 210 211 212 213 214 215 216

From the list of numbers, find

(a) a prime number,

Answer(a) [1]

(b) a cube number.

Answer(b) [1]

9 Calculate the selling price of a bicycle bought for \$120 and sold at a profit of 15%.

Answer \$ [2]

10 Solve the simultaneous equations.

$$\begin{aligned}x + 5y &= 22 \\x + 3y &= 12\end{aligned}$$

Answer x =

y = [2]

- 11 Solve the equation.

$$\frac{2x-3}{2} = 2$$

Answer $x =$ [2]

- 12 The population of a city is 128 000, correct to the nearest thousand.

(a) Write 128 000 in standard form.

Answer(a) [1]

(b) Write down the upper bound of the population.

Answer(b) [1]

- 13 Pedro invested \$800 at a rate of 5% per year **compound** interest.
Calculate the **total** amount he has after 2 years.

Answer \$ [2]

- 14 Factorise completely.

$$5g^2h + 10hj$$

Answer [2]

- 15 For her holiday, Dina changed 500 Swiss francs (CHF) into pounds (£).
The rate was £1 = CHF 1.6734.

Calculate how much Dina received in pounds.
Give your answer correct to 2 decimal places.

Answer £ [2]

- 16 Simplify

$$4x^4 \times 5x^5.$$

Answer [2]

- 17 The scale of a map is 1 : 500 000.
On the map the centres of two cities are 26 cm apart.

Calculate the actual distance, in kilometres, between the centres of the two cities.

Answer km [2]

- 18 Show that $3^{-2} + 2^{-2} = \frac{13}{36}$.

Write down all the steps of your working.

Answer

[2]

- 19 In Vienna, the mid-day temperatures, in $^{\circ}\text{C}$, are recorded during a week in December.
This information is shown below.

-2 2 1 -3 -1 -2 0

Calculate

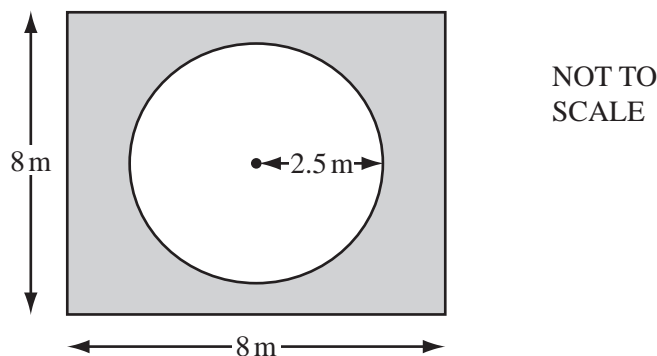
- (a) the difference between the highest temperature and the lowest temperature,

Answer(a) $^{\circ}\text{C}$ [1]

- (b) the mean temperature.

Answer(b) $^{\circ}\text{C}$ [2]

20

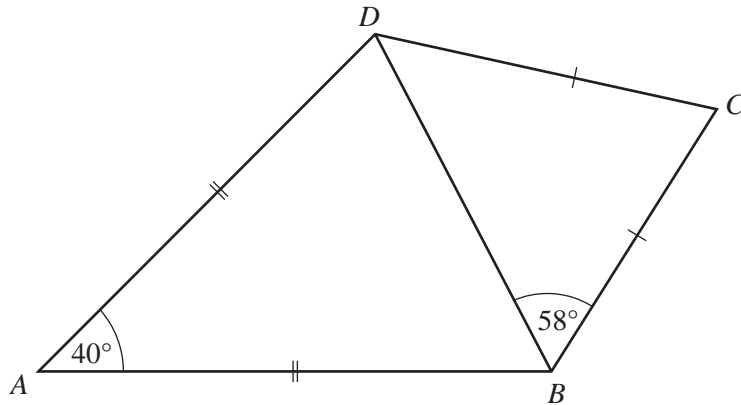


The diagram shows a circular pool of radius 2.5 m.
A square piece of land surrounds the pool.
Each side of the square is 8 m long.

Calculate the shaded area of the land that surrounds the pool.

Answer m^2 [3]

21

NOT TO
SCALE

In the quadrilateral $ABCD$, $AB = AD$ and $CB = CD$.

Angle $BAD = 40^\circ$ and angle $CBD = 58^\circ$.

(a) Calculate

(i) angle ABD ,

Answer(a)(i) Angle $ABD =$ [1]

(ii) angle BCD .

Answer(a)(ii) Angle $BCD =$ [1]

(b) Write down the mathematical name for the quadrilateral $ABCD$.

Answer(b) [1]

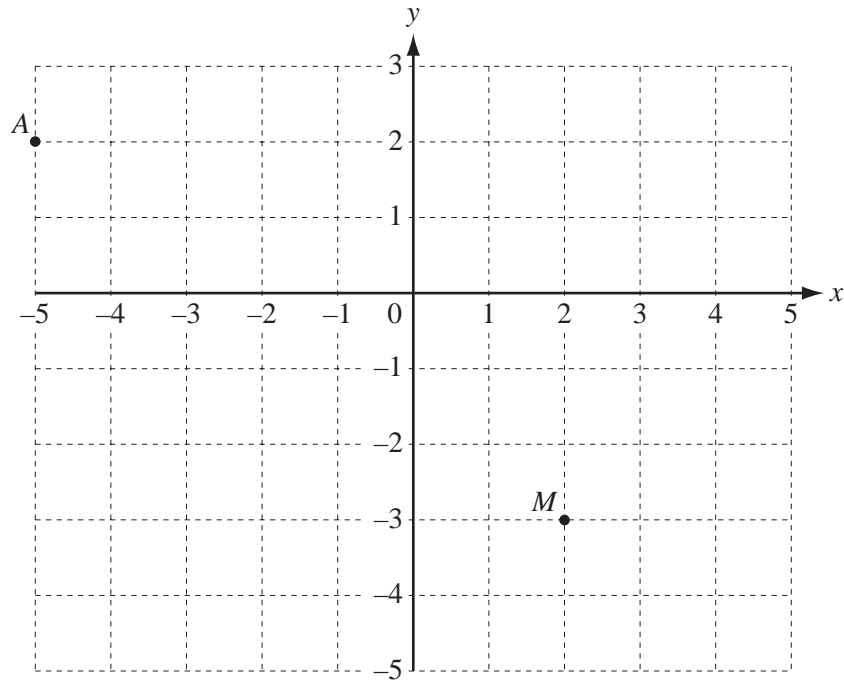
22 (a) Calculate $\frac{700}{28.6^3}$.

Answer(a) [1]

(b) Work out $(8 \times 10^6)^2$, giving your answer in standard form.

Answer(b) [2]

23



The diagram shows two points $A(-5, 2)$ and $M(2, -3)$.

(a) B is the point $(5, -2)$.

(i) On the grid, mark the point B .

[1]

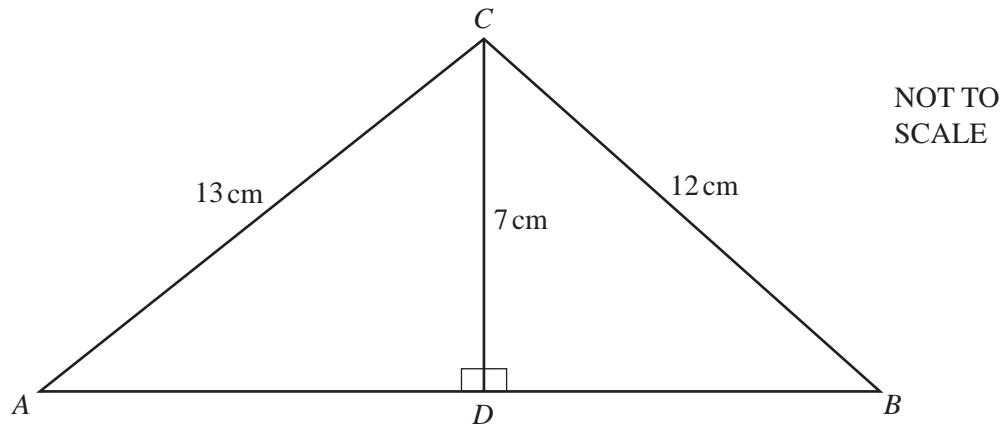
(ii) Write \vec{AB} as a column vector.

$$\text{Answer(a)(ii)} \quad \vec{AB} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(b) M is the midpoint of the line BD .

Find the co-ordinates of D .

Answer(b) (..... ,) [2]



In triangle ABC , D is on AB so that $\angle ADC = \angle BDC = 90^\circ$.

$AC = 13\text{ cm}$, $BC = 12\text{ cm}$ and $CD = 7\text{ cm}$.

(a) Calculate the length of DB .

Answer(a) $DB = \dots\dots\dots\text{ cm}$ [3]

(b) Use trigonometry to calculate angle CAD .

Answer(b) Angle $CAD = \dots\dots\dots$ [2]

- 1 (a) Write twenty five million in figures.

Answer(a) [1]

- (b) Write the following in order of size, starting with the smallest.

$$\frac{2}{3} \quad 65\% \quad 0.6$$

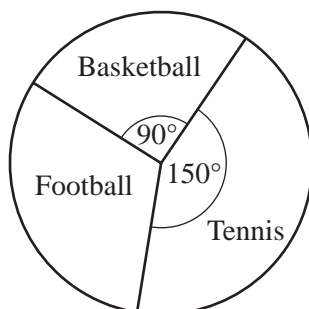
Answer(b) < < [1]

- (c) In a sale a coat costing \$250 is reduced to \$200.

Find the percentage decrease in the cost.

Answer(c) % [3]

- (d)



NOT TO
SCALE

120 students are asked to choose their favourite sport.
The results are shown in the pie chart.

Calculate the number of students who chose

- (i) basketball,

Answer(d)(i) [1]

- (ii) football.

Answer(d)(ii) [2]

2 The distance between Geneva and Gstaad is 150 km.

(a) Write 150 in standard form.

Answer(a) [1]

(b) A car took $1\frac{1}{2}$ hours to travel from Geneva to Gstaad.

Calculate the average speed of the car.

Answer(b) km/h [1]

(c) A bus left Gstaad at 10 15.
It arrived in Geneva at 12 30.

Calculate the time, in hours and minutes, that the bus took for the journey.

Answer(c) h min [1]

(d) Another bus left Geneva at 13 55.
It travelled at an average speed of 60 km/h.

Find the time it arrived in Gstaad.

Answer(d) [2]

(e) The distance of 150 km is correct to the nearest 10 km.

Complete the statement for the distance, d km, from Geneva to Gstaad.

Answer(e) $\leq d <$ [2]

3 36 29 41 45 15 10 13

Use the numbers in the list above to answer all the following questions.

(a) Write down

(i) two even numbers,

Answer(a)(i) , [1]

(ii) two prime numbers,

Answer(a)(ii) , [2]

(iii) a square number,

Answer(a)(iii) [1]

(iv) two factors of 90.

Answer(a)(iv) , [2]

(b) (i) Calculate the mean of the seven numbers.

Answer(b)(i) [2]

(ii) Find the median.

Answer(b)(ii) [2]

(iii) Find the range.

Answer(b)(iii) [1]

(c) A number from the list is chosen at random.

Find the probability that the number is

(i) even,

Answer(c)(i) [1]

(ii) a multiple of 5.

Answer(c)(ii) [1]

4 (a) Using the exchange rates

\$1 = 0.70 Euros and \$1 = 90 Yen

change

(i) \$100 to Euros,

Answer(a)(i) Euros [1]

(ii) 100 Yen to dollars.

Answer(a)(ii) \$ [2]

(b) Tania went on holiday to Switzerland.

The exchange rate was \$1 = 1.04 Swiss francs (CHF).

She changed \$1500 to Swiss francs and paid 1% commission.

(i) How much commission, in dollars, did she pay?

Answer(b)(i) \$ [1]

(ii) Show that she received CHF 1544.40.

Answer (b)(ii)

[2]

(c) Tania spent CHF 950 on her holiday.

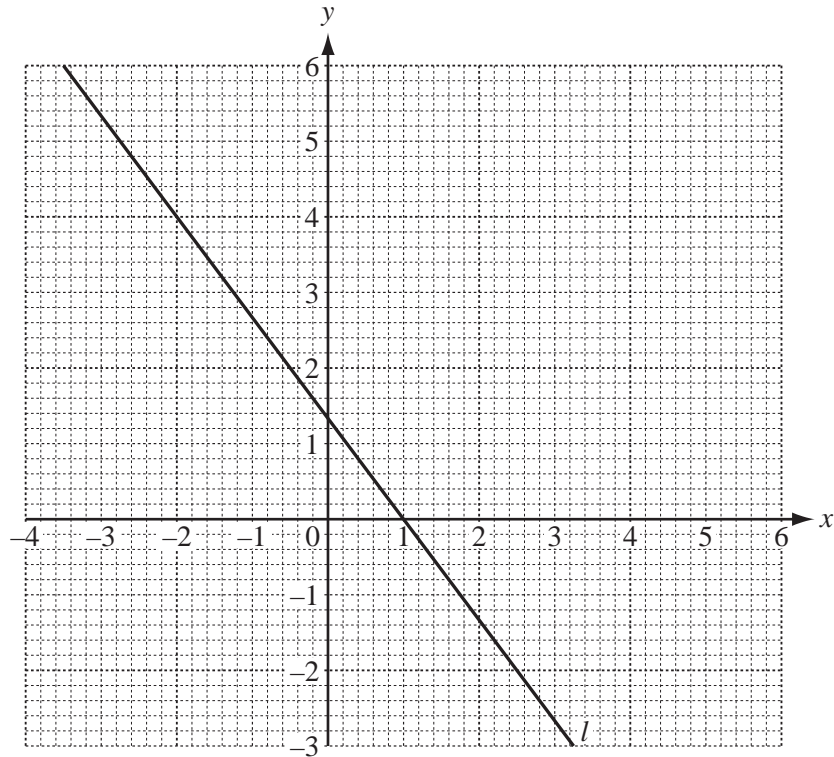
She converted the remaining Swiss francs back into dollars.

She paid CHF 10 to make the exchange.

Calculate the amount, in dollars, Tania received.

Answer(c) \$ [3]

5



- (a) Find the gradient of the line l .

Answer(a) [2]

- (b) (i) Complete the table below for $x + 2y = 6$.

| | | | |
|-----|---|---|---|
| x | 0 | 2 | |
| y | | | 0 |

[3]

- (ii) On the grid, draw the line $x + 2y = 6$ for $-4 \leq x \leq 6$. [2]

- (c) The equation of the line l is $4x + 3y = 4$.

Use your diagram to solve the simultaneous equations $4x + 3y = 4$ and $x + 2y = 6$.

Answer(c) $x =$

$y =$ [2]

6 (a)



The line AB is drawn above.

**Parts (i), (iii), and (v) must be completed using a ruler and compasses only.
All construction arcs must be clearly shown.**

(i) Construct triangle ABC with $AC = 7$ cm and $BC = 6$ cm. [2]

(ii) Measure angle BAC .

Answer(a)(ii) Angle $BAC =$ [1]

(iii) Construct the bisector of angle ABC . [2]

(iv) The bisector of angle ABC meets AC at T .

Measure the length of AT .

Answer(a)(iv) $AT =$ cm [1]

(v) Construct the perpendicular bisector of the line BC . [2]

(vi) Shade the region that is

- and**
- nearer to B than to C
 - nearer to BC than to AB . [1]

(b) A ship sails 40 km on a bearing of 040° from P to Q .

- (i)** Using a scale of 1 centimetre to represent 5 kilometres, make a scale drawing of the path of the ship.

Mark the point Q .



Scale: 1 cm = 5 km

[2]

- (ii)** At Q the ship changes direction and sails 30 km on a bearing of 160° to the point R .

Draw the path of the ship.

[2]

- (iii)** Find how far, in kilometres, the ship is from the starting position P .

Answer(b)(iii) km [1]

- (iv)** Measure the bearing of P from R .

Answer(b)(iv) [1]

- 7 (a) Solve the equation $2(x + 4) = 3(x + 2) + 8$.

Answer(a) $x =$ [3]

- (b) Make z the subject of $za + b = 3$.

Answer(b) $z =$ [2]

- (c) Find x when $2x^3 = 54$.

Answer(c) $x =$ [2]

- (d) A rectangular field has a length of x metres.
The width of the field is $(2x - 5)$ metres.

- (i) Show that the perimeter of the field is $(6x - 10)$ metres.

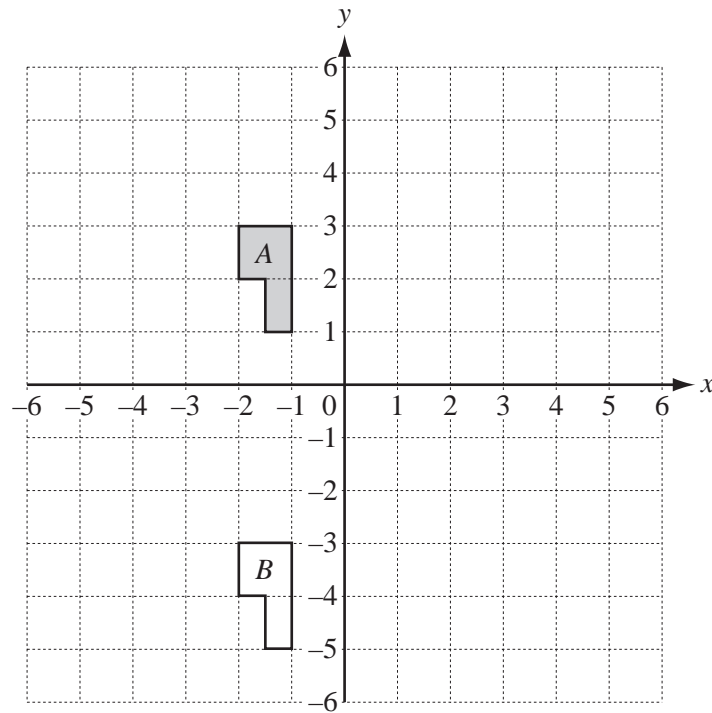
Answer (d)(i)

[2]

- (ii) The perimeter of the field is 50 metres.

Find the length of the field.

Answer(d)(ii) length = m [2]



The diagram shows two shapes A and B .

- (a) Describe fully the **single** transformation which maps A onto B .

Answer(a) [2]

- (b) On the grid, draw the line $x = 2$. [1]

- (c) On the grid, draw the image of shape A after the following transformations.

- (i) Reflection in the line $x = 2$. Label the image C . [1]

- (ii) Enlargement, scale factor 2, centre $(0, 0)$. Label the image D . [2]

- 9 (a) Factorise completely $3x^2 + 12x$.

Answer(a) [2]

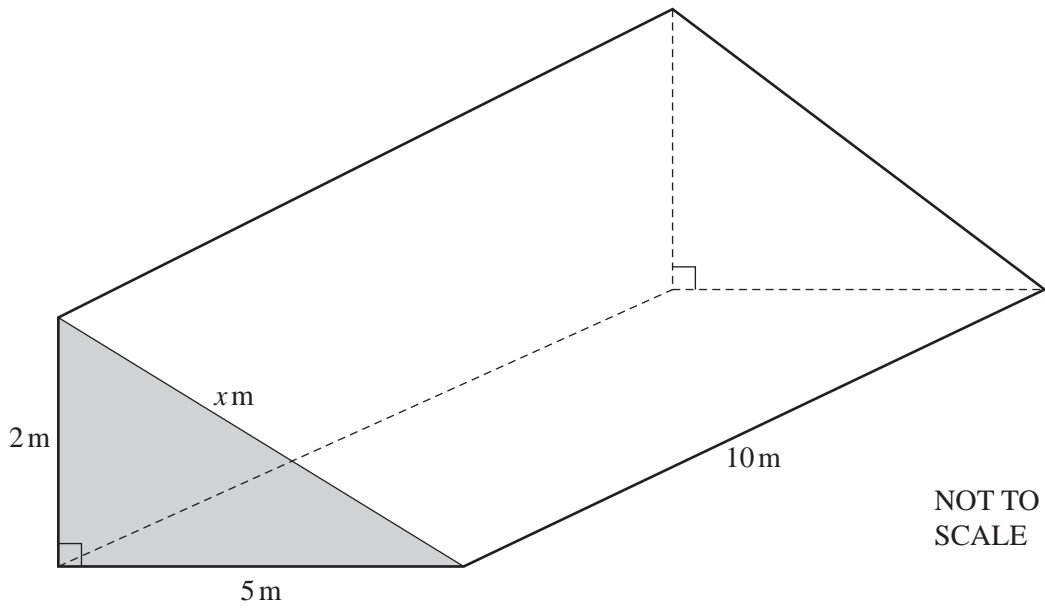
- (b) Find the value of $a^3 + 3b^2$ when $a = 2$ and $b = -2$.

Answer(b) [2]

- (c) Simplify $3x^4 \times 2x^3$.

Answer(c) [2]

10



The diagram shows a ramp in the form of a triangular prism.
The cross-section is a right-angled triangle of length 5 m and height 2 m.

- (a) Find the value of x .
Give your answer correct to 1 decimal place.

Answer(a) $x =$ [3]

- (b) Find the area of the cross-section.

Answer(b) m^2 [2]

- (c) The ramp is 10 m long.

Calculate the volume of the ramp.

Answer(c) m^3 [1]

- (d) Calculate the total surface area of all five faces of the ramp.

Answer(d) m² [3]

- (e) Each face of the ramp is painted.
Paint costs \$2.25 per square metre.

Calculate the total cost of the paint.

Answer(e) \$ [1]

11

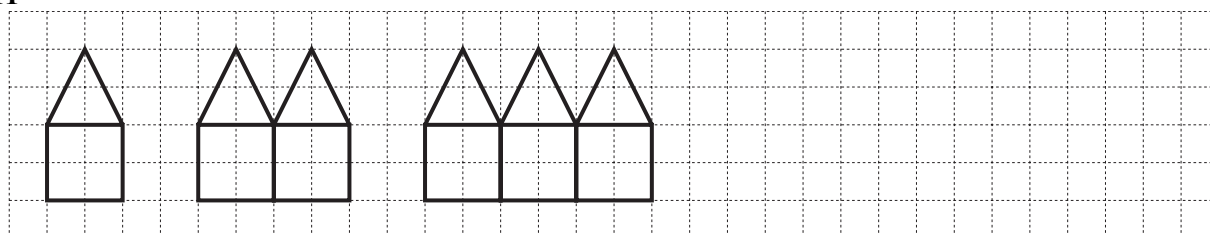


Diagram 1

Diagram 2

Diagram 3

The diagrams show a sequence of shapes.

(a) On the grid, draw Diagram 4.

[1]

(b) Complete the table showing the number of lines in each diagram.

| Diagram (n) | Number of lines |
|-----------------|-----------------|
| 1 | 6 |
| 2 | 11 |
| 3 | |
| 4 | |
| 5 | |

[3]

(c) Work out the number of lines in Diagram 8.

Answer(c) [1]

(d) Write down an expression, in terms of n , for the number of lines in Diagram n .

Answer(d) [2]

(e) Work out the number of lines in Diagram 100.

Answer(e) [1]

(f) The number of lines in Diagram p is 66.

Find the value of p .

Answer(f) $p =$ [2]

- 1** Mr and Mrs Sayed and their 3 children go on holiday.
They travel to the airport by train.

(a) The train departs at 16 20.

(i) They leave home 45 minutes before the train departs.

Find the time at which they leave home.

Answer(a)(i) [1]

(ii) Write 16 20 using the 12-hour clock.

Answer(a)(ii) [1]

(b) The train fare is \$24 for an adult.

The train fare for a child is $\frac{2}{3}$ of an adult fare.

Find

(i) the fare for a child,

Answer(b)(i) \$ [1]

(ii) the total fare for Mr and Mrs Sayed and their 3 children.

Answer(b)(ii) \$ [2]

2 Aminata buys a business costing \$23 000.

- (a) She pays part of this cost with \$12 000 of her own money.

Calculate what percentage of the \$23 000 this is.

Answer(a) % [1]

- (b) Aminata's brother gives her 32% of the remaining \$11 000.

Show that \$7 480 is still needed to buy the business.

Answer(b)

[2]

- (c) Aminata borrows the \$7 480 at a rate of 3.5 % per year **compound** interest.

Calculate how much money she owes at the end of 3 years.

Answer(c) \$ [3]

- (d) In the first year Aminata spent \$11 000 on salaries, equipment and expenses.

$\frac{2}{5}$ of this money was spent on salaries, 0.45 of this money was spent on equipment and the remainder was for expenses.

Calculate how much of the \$11 000 was spent on

- (i) salaries,

Answer(d)(i) \$ [1]

- (ii) equipment,

Answer(d)(ii) \$ [1]

- (iii) expenses.

Answer(d)(iii) \$ [1]

- (e) The three items in **part (d)** are in the ratio salaries : equipment : expenses = 0.4 : 0.45 : 0.15 .

Write this ratio in its simplest form.

Answer(e) : : [2]

3 (a)

$$\mathbf{r} = \begin{pmatrix} 3 \\ -2 \end{pmatrix} + \begin{pmatrix} -5 \\ -2 \end{pmatrix}$$

(i) Write down \mathbf{r} as a single vector.

$$\text{Answer(a)(i) } \mathbf{r} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(ii) The point $G(3, 2)$ is translated by the vector \mathbf{r} to the point H .

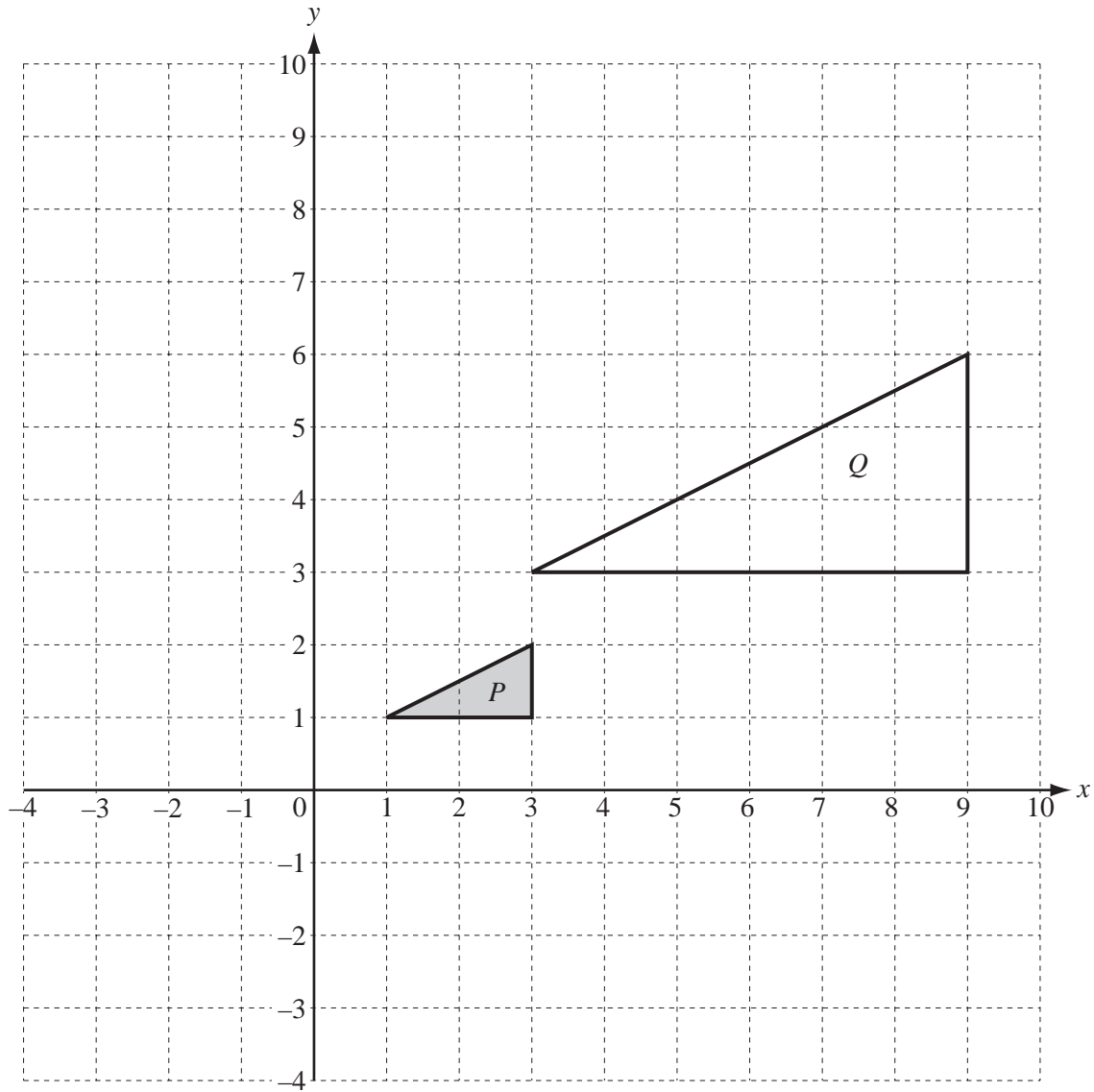
Find the co-ordinates of H .

$$\text{Answer(a)(ii) } (,) \quad [1]$$

(iii) Write down the vector of the translation that maps H onto G .

$$\text{Answer(a)(iii) } \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(b)



The diagram shows two triangles P and Q .

- (i) Describe fully the **single** transformation which maps P onto Q .

Answer(b)(i) [3]

- (ii) On the grid, draw the reflection of P in the line $x = 0$. Label this image R . [2]

- (iii) On the grid, rotate P through 180° about $(0, 0)$. Label this image S . [2]

- (iv) Describe fully the **single** transformation which maps triangle S onto triangle R .

Answer(b)(iv) [2]

- 4 (a) Expand and simplify $3(2x + y) + 5(x - y)$.

Answer(a) [2]

- (b) Expand $x^2(3x - 2y)$.

Answer(b) [2]

- (c) Factorise completely $4y^2 - 10xy$.

Answer(c) [2]

(d) $y = \frac{4x^2}{3}$

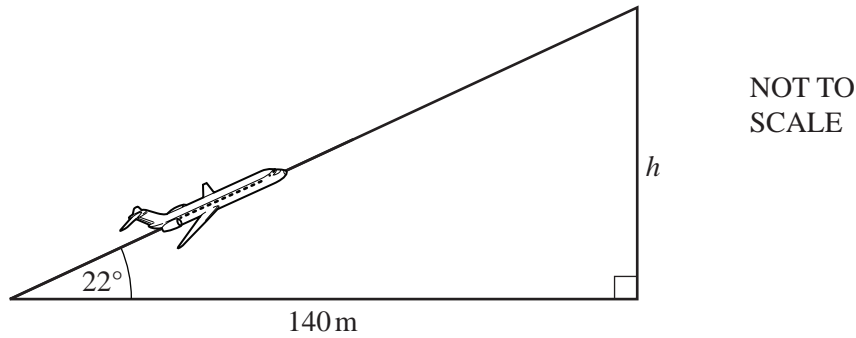
- (i) Find the value of y when $x = -3$.

Answer(d)(i) $y =$ [2]

- (ii) Make x the subject of the formula.

Answer(d)(ii) $x =$ [3]

- 5 (a) An aeroplane takes off 140 metres before reaching the end of the runway. It climbs at an angle of 22° to the horizontal ground.



Calculate the height of the aeroplane, h , when it is vertically above the end of the runway.

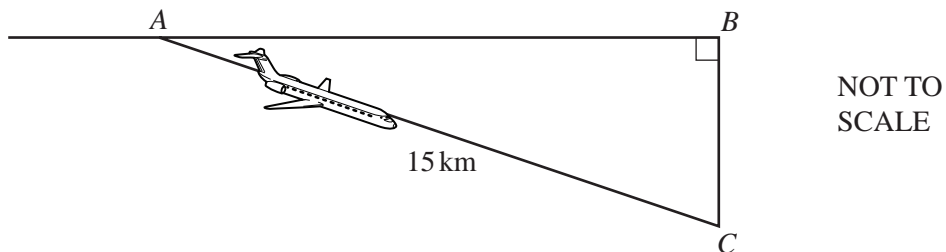
Answer(a) $h =$ m [2]

- (b) After 3 hours 30 minutes the aeroplane has travelled 1850 km.

Calculate the average speed of the aeroplane.

Answer(b) km/h [2]

- (c)



The aeroplane descends from A , at a height of 12 000 metres, to C , at a height of 8 300 metres.

- (i) Work out the vertical distance, BC , that the aeroplane descends.

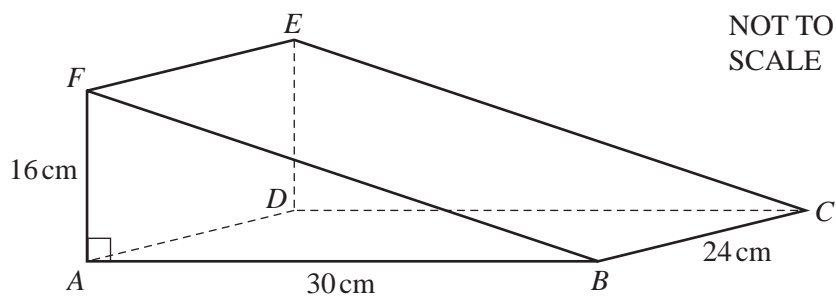
Answer(c)(i) m [1]

- (ii) The distance AC is 15 kilometres.

Calculate angle BAC .

Answer(c)(ii) Angle $BAC =$ [2]

6



The diagram shows a wedge in the shape of a triangular prism.

$AB = 30$ cm, $AF = 16$ cm and $BC = 24$ cm. Angle $BAF = 90^\circ$.

(a) Calculate

(i) the area of triangle ABF ,

Answer(a)(i) cm^2 [2]

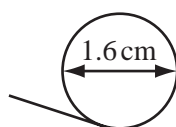
(ii) the volume of the wedge.

Answer(a)(ii) cm^3 [1]

(b) (i) Calculate BF .

Answer(b)(i) cm [2]

(ii)



NOT TO
SCALE

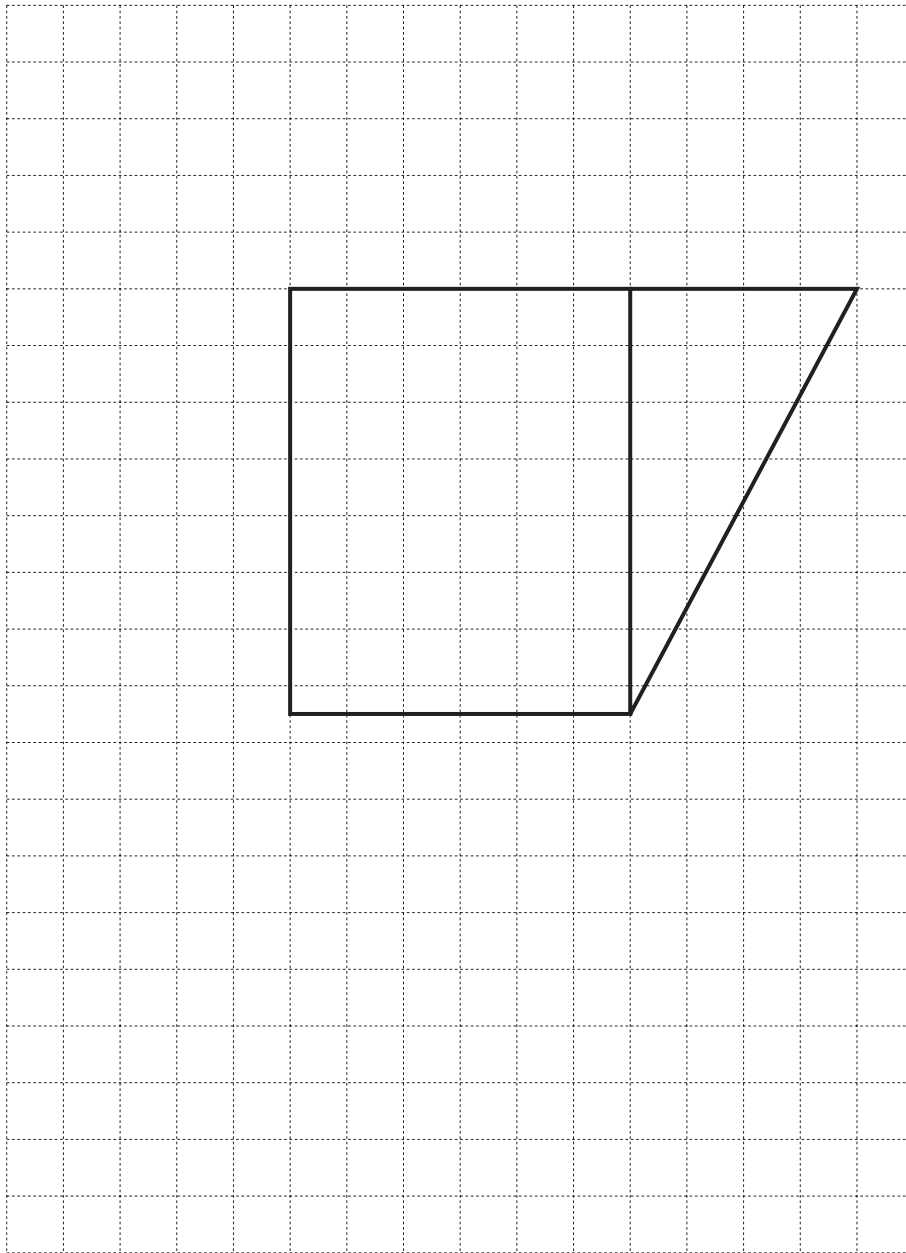
A coin with diameter 1.6 cm is rolled down the sloping surface of the wedge. It travels in a straight line parallel to BF , starting on FE and ending on BC .

Calculate the number of **complete** turns it makes.

Answer(b)(ii) [3]

- (c) On the grid, complete the net of the wedge.
The base and one of the triangles have been drawn for you.

Each square on the grid represents a square of side 4 centimetres.



[3]

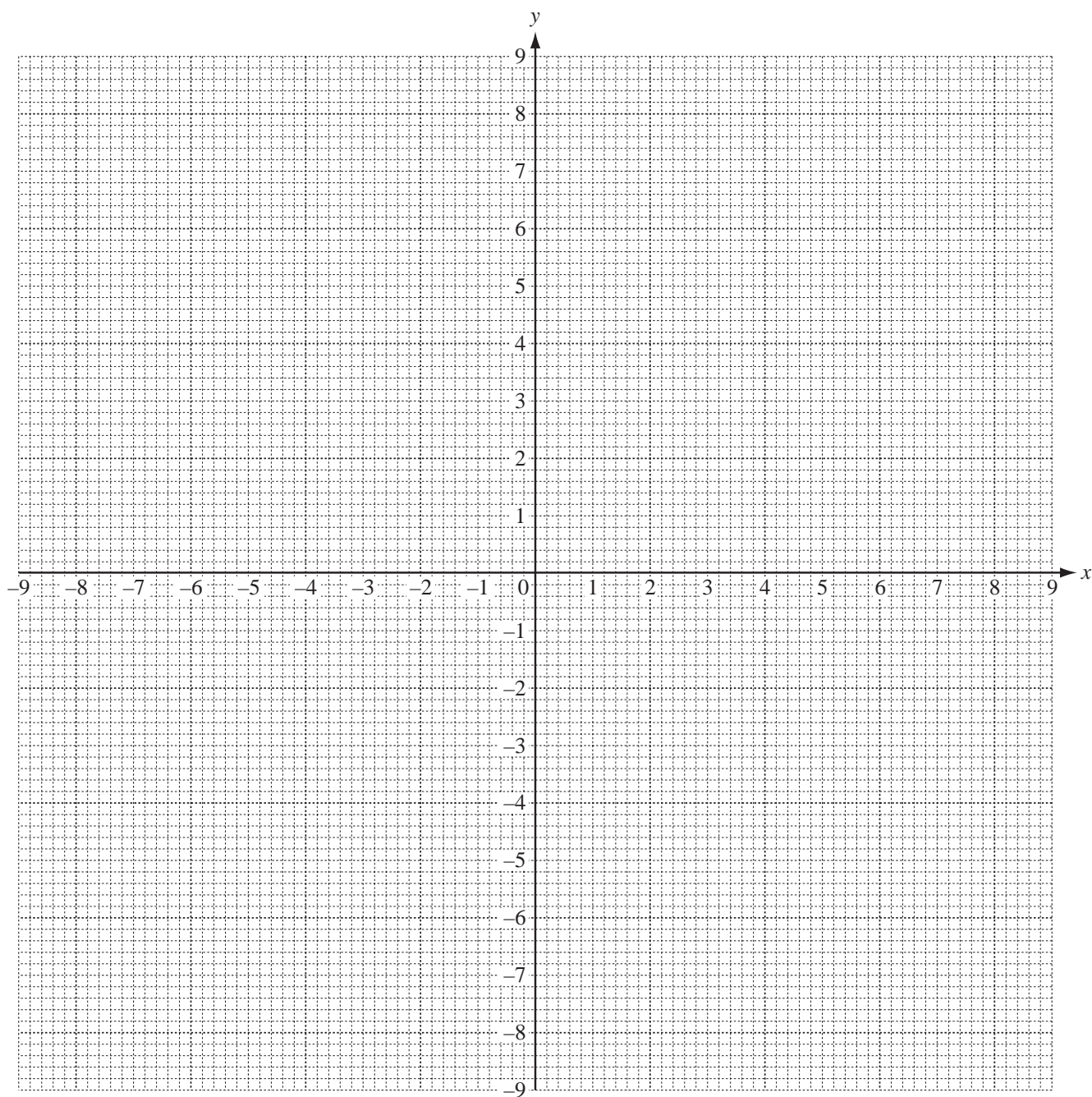
- (d) Calculate the surface area of the wedge.

Answer(d) cm^2 [3]

- 7 (a) The table shows some values for $y = \frac{18}{x}$.

| | | | | | | | | | | | |
|-----|----|----|------|----|----|--|---|---|-----|---|---|
| x | -9 | -6 | -4 | -3 | -2 | | 2 | 3 | 4 | 6 | 9 |
| y | -2 | | -4.5 | | -9 | | | | 4.5 | 3 | |

- (i) Complete the table. [2]
- (ii) On the grid, draw the graph of $y = \frac{18}{x}$ for $-9 \leq x \leq -2$ and $2 \leq x \leq 9$.



[4]

- (iii) Use your graph to solve the equation $\frac{18}{x} = -5$.

Answer(a)(iii) $x =$ [1]

- (b) (i) Complete the table of values for $y = 2x + 3$.

| | | | | |
|-----|----|----|---|---|
| x | -4 | -3 | 2 | 3 |
| y | -5 | | 7 | |

[2]

- (ii) On the grid, draw the graph of $y = 2x + 3$ for $-4 \leq x \leq 3$.

[1]

- (iii) Find the co-ordinates of the points of intersection of the graphs of

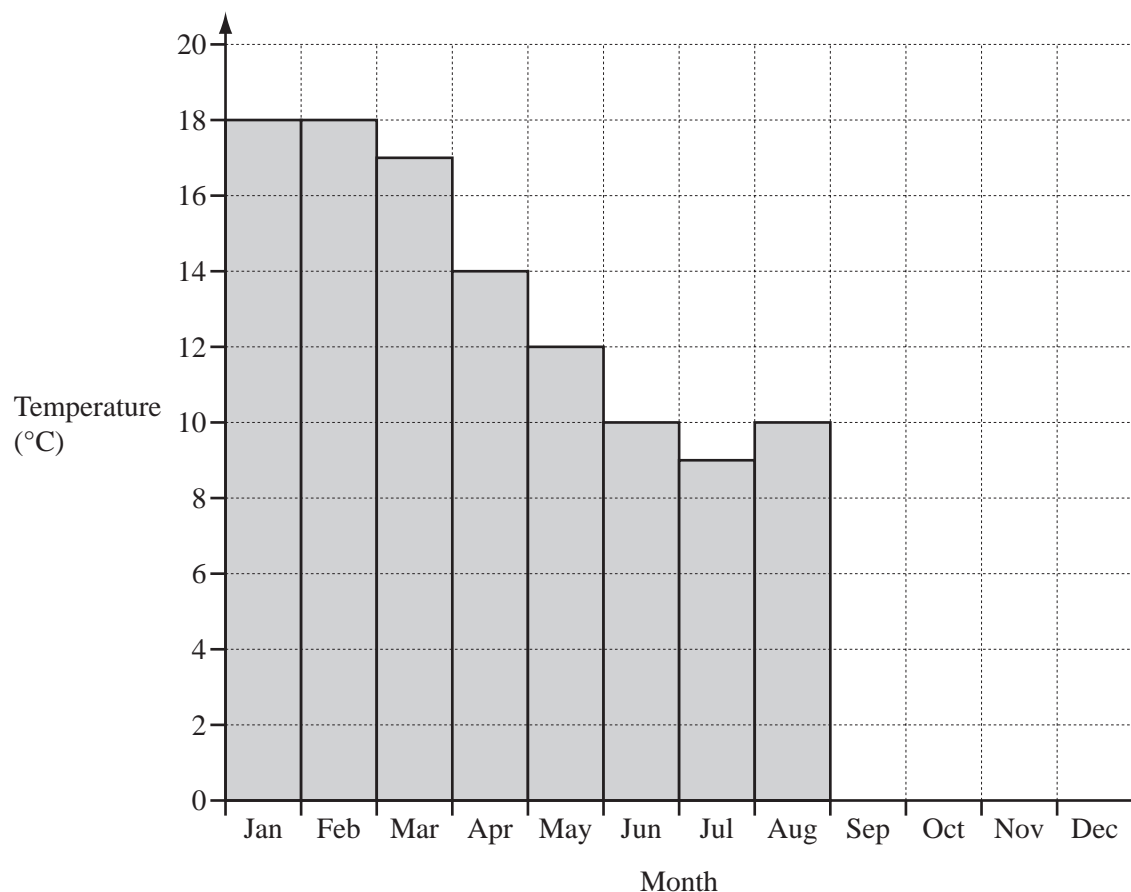
$$y = \frac{18}{x} \text{ and } y = 2x + 3.$$

Answer(b)(iii) (..... ,) and (..... ,) [2]

- 8 The table shows the average temperature and rainfall each month at Wellington airport.

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Temperature (°C) | 18 | 18 | 17 | 14 | 12 | 10 | 9 | 10 | 11 | 13 | 15 | 16 |
| Rainfall (mm) | 67 | 48 | 76 | 87 | 99 | 113 | 111 | 106 | 82 | 81 | 74 | 74 |

- (a) Complete the bar chart to show the **temperature** each month.



[2]

- (b) For the **rainfall** calculate

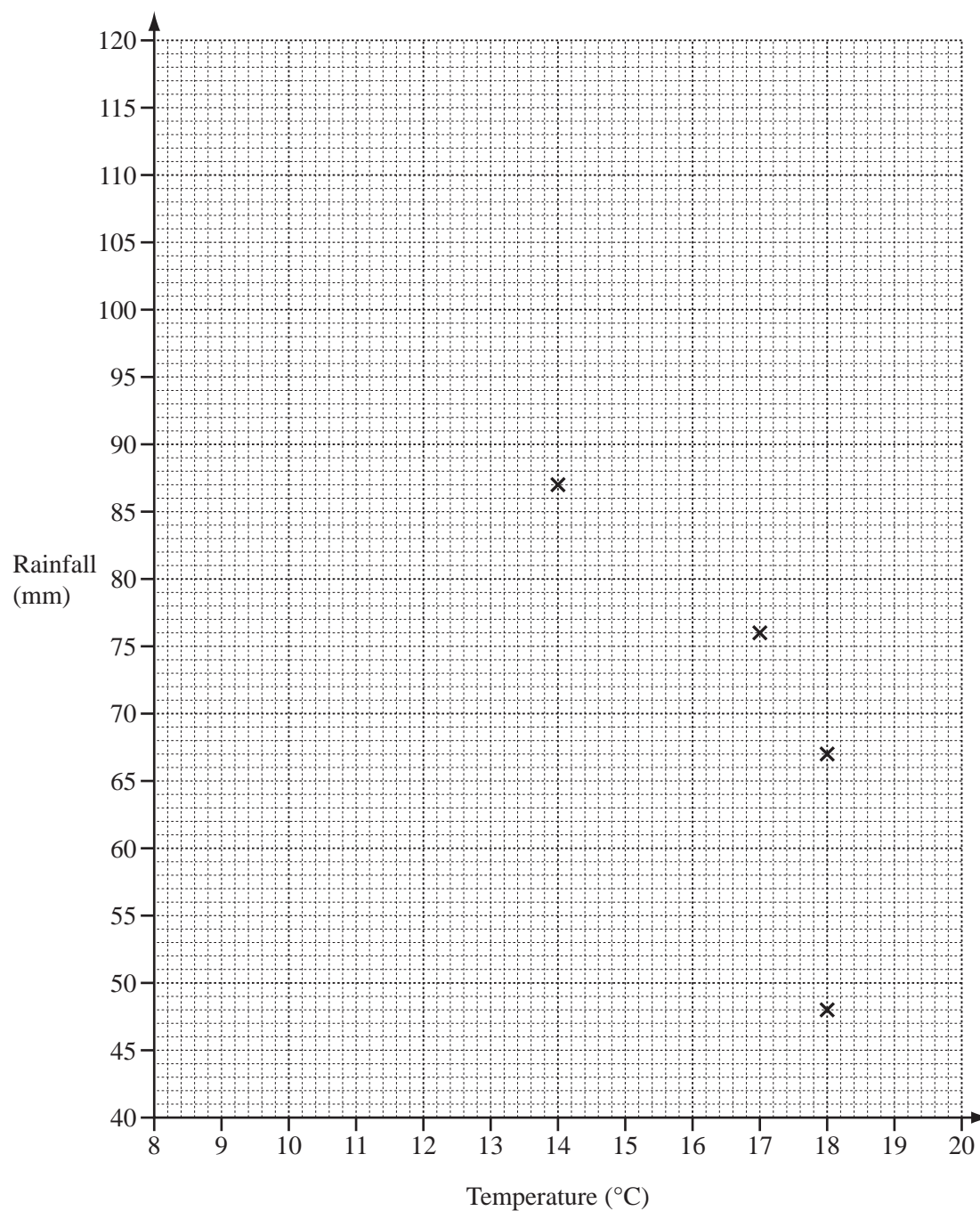
- (i) the mean,

Answer(b)(i) mm [2]

- (ii) the median.

Answer(b)(ii) mm [2]

(c) In the scatter diagram the rainfall for January to April is plotted against temperature.



- (i) Complete the scatter diagram by plotting the values for the months May to December. [3]
- (ii) Draw the line of best fit on the scatter diagram. [1]
- (iii) What type of correlation does the scatter diagram show?

Answer(c)(iii) [1]

- 9 On the scale drawing opposite, point A is a port.
 B and C are two buoys in the sea and L is a lighthouse.

The scale is 1 cm = 3 km.

- (a) A boat leaves port A and follows a straight line course that bisects angle BAC .

Using a straight edge and compasses only, construct the bisector of angle BAC on the scale drawing. [2]

- (b) When the boat reaches a point that is equidistant from B and from C , it changes course.
 It then follows a course that is equidistant from B and from C .

- (i) Using a straight edge and compasses only, construct the locus of points that are equidistant from B and from C .

Mark the point P where the boat changes course. [2]

- (ii) Measure the distance AP in centimetres.

Answer(b)(ii) cm [1]

- (iii) Work out the actual distance AP .

Answer(b)(iii) km [1]

- (iv) Measure the **obtuse** angle between the directions of the two courses.

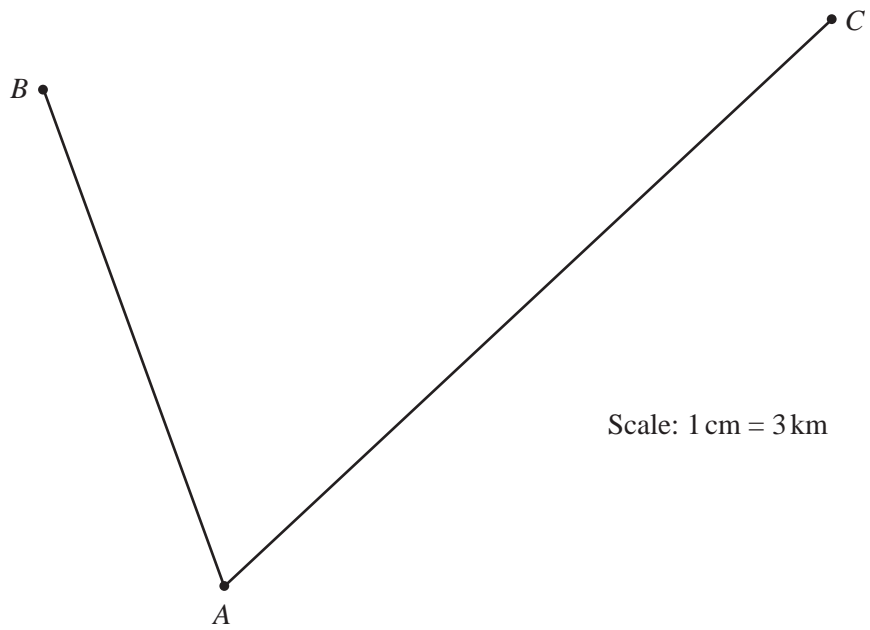
Answer(b)(iv) [1]

- (c) Boats must be more than 9 kilometres from the lighthouse, L .

- (i) Construct the locus of points that are 9 kilometres from L . [2]

- (ii) Mark the point R where the course of the boat meets this locus.
 Work out the actual straight line distance, AR , in kilometres.

Answer(c)(ii) km [1]

L •

10 (a) Write down the next term in each of the following sequences.

(i) 2, 9, 16, 23, [1]

(ii) 75, 67, 59, 51, [1]

(iii) 2, 5, 9, 14, [1]

(iv) 2, 1, $\frac{1}{2}$, $\frac{1}{4}$, [1]

(v) 2, 4, 8, 16, [1]

(b) For the sequence in **part (a)(i)** write down

(i) the 10th term,

Answer(b)(i) [1]

(ii) the n th term.

Answer(b)(ii) [2]

(c) The n th term of the sequence in **part (a)(iii)** is $\frac{n^2 + 3n}{2}$.

Calculate the 50th term of this sequence.

Answer(c) [2]

(d) The n th term of the sequence in **part (a)(v)** is 2^n .

Calculate the 12th term of this sequence.

Answer(d) [1]

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- 1 Caroline goes to a shop.

The shopping bill shows the items she buys.

| Item | Cost (\$) |
|-----------------------------------|-----------|
| 1 packet of cereal | 1.20 |
| 3 bottles of water at \$0.45 each | 1.35 |
| 2 cartons of milk at \$0.82 each | |
| 4 kg of rice at \$0.90 per kg | |
| 0.7 kg of apples at \$2.40 per kg | |

- (a) Complete the shopping bill. [3]

- (b) (i) Calculate the total amount of money Caroline spends at the shop.

Answer(b)(i) \$ [1]

- (ii) Caroline pays with a \$10 note.

Calculate how much change she receives.

Answer(b)(ii) \$ [1]

- (c) Caroline arrived at the shop at 09 48.
 She was in the shop for 18 minutes.
 She then took 5 minutes to walk to a café.
 She was in the café for 20 minutes.

(i) At what time did Caroline leave the café?

Answer(c)(i) [2]

- (ii) Caroline then went to the library.
 She was in the library for 45 minutes.

Work out the ratio

time in the shop : time in the library.

Give your answer in its simplest form.

Answer(c)(ii) : [2]

- (d) When Caroline left home she had \$36.50.
 She returned home with \$12.74.

Calculate \$12.74 as a percentage of \$36.50.

Answer(d) % [1]

- 2 James takes 12 science tests during one school term.
These are his marks.

18 11 20 15 15 12 15 9 11 15 14 13

(a) Find

(i) the range,

Answer(a)(i) [1]

(ii) the mode,

Answer(a)(ii) [1]

(iii) the median,

Answer(a)(iii) [2]

(iv) the mean.

Answer(a)(iv) [2]

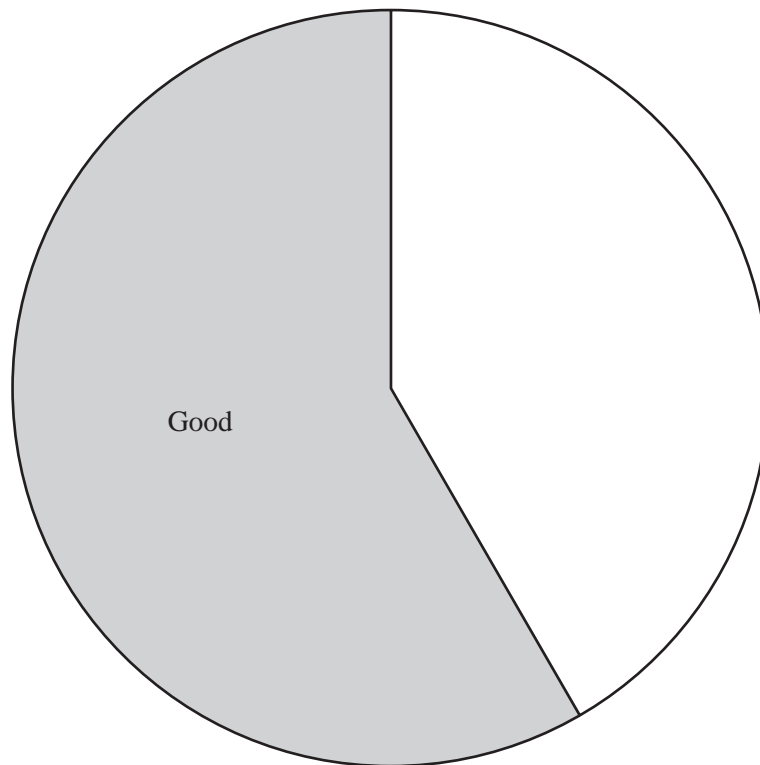
- (b) James sorts his marks into three levels.
The levels are Satisfactory (less than 12), Good (12 to 16) and Excellent (more than 16).

(i) Complete the frequency table to show this information.

| Level | Satisfactory | Good | Excellent |
|-----------|--------------|------|-----------|
| Frequency | | 7 | |

[1]

(ii) Complete the pie chart accurately and label each sector.

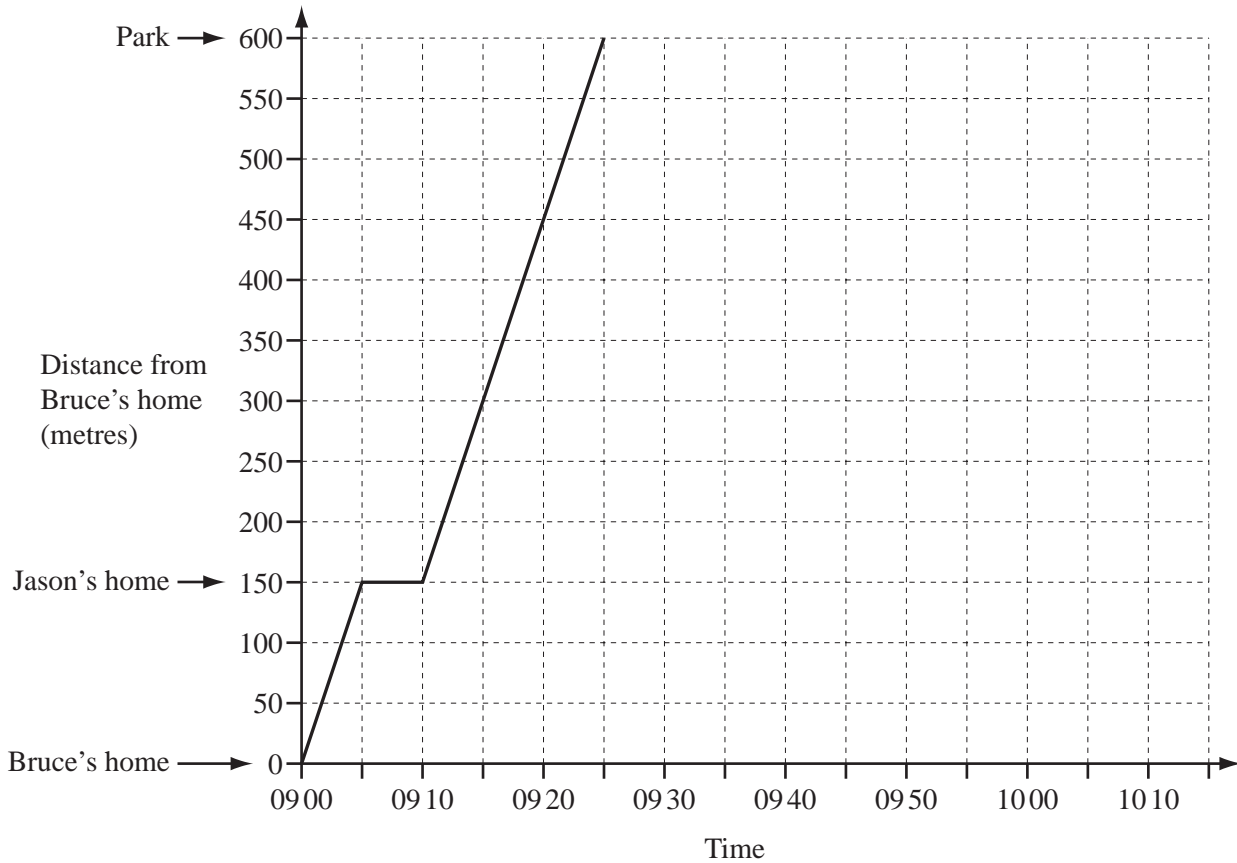


[2]

- (c) What fraction of the marks were Satisfactory or Good?
Give your answer in its lowest terms.

Answer(c) [2]

3



One morning, Bruce walked from his home to Jason's home and the two boys walked to the park. The distance-time graph shows Bruce's journey.

- (a) How many minutes was Bruce at Jason's home?

Answer(a) min [1]

- (b) How far **from the park** were Bruce and Jason at 09 20?

Answer(b) m [2]

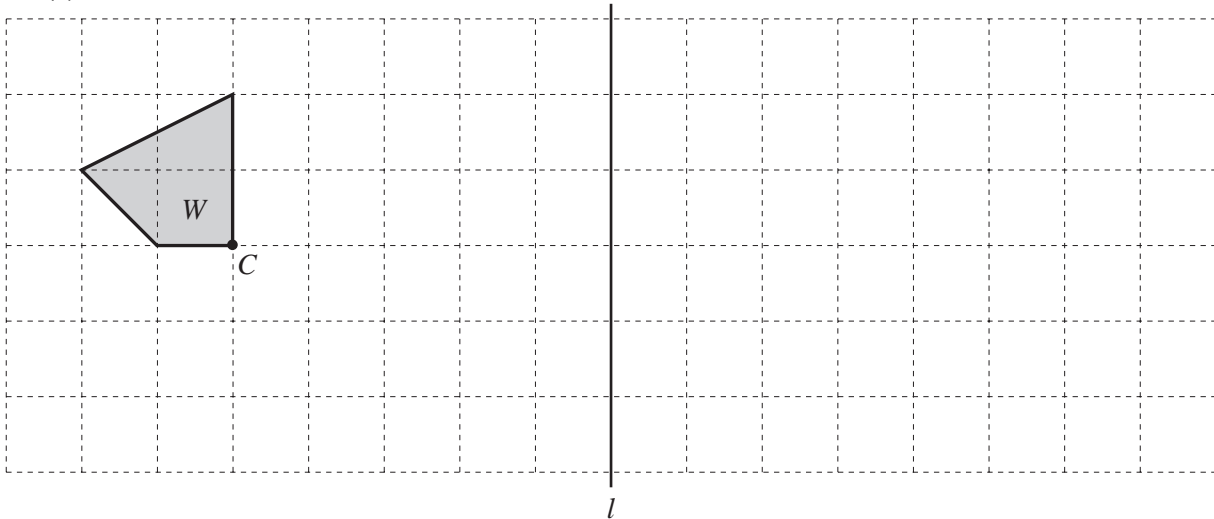
- (c) Work out the speed at which Bruce and Jason walked to the park. Give your answer in km/h.

Answer(c) km/h [3]

- (d) Bruce stayed at the park for 35 minutes. He then walked home at a speed of 60 metres per minute.

Complete the graph to show Bruce's time at the park and his journey home. [3]

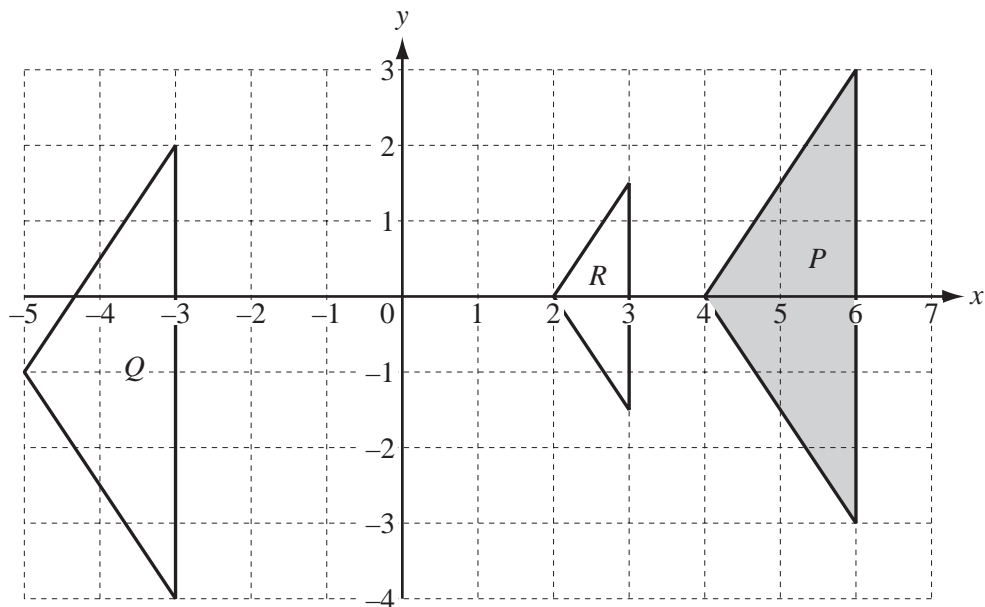
4 (a)



On the grid,

- (i) draw the reflection of W in the line l , [2]
- (ii) rotate W anticlockwise through 90° , about the point C . [2]

(b)



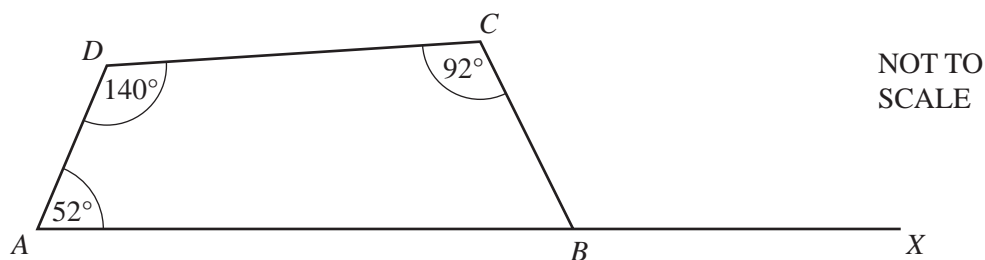
- (i) Describe fully the **single** transformation that maps P onto Q .

Answer(b)(i) [2]

- (ii) Describe fully the **single** transformation that maps P onto R .

Answer(b)(ii) [3]

5 (a)



In the quadrilateral $ABCD$, angle $BAD = 52^\circ$, angle $ADC = 140^\circ$ and angle $DCB = 92^\circ$.
 AB is extended to X .

(i) Calculate angle CBX .

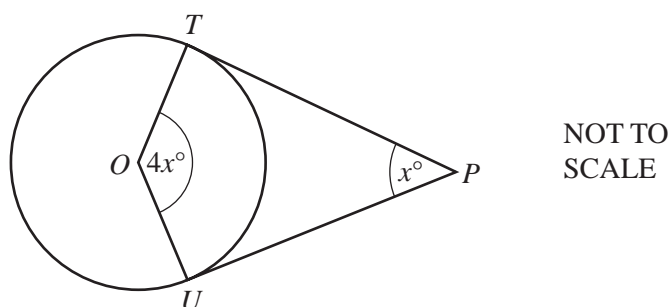
Answer(a)(i) Angle $CBX =$ [2]

(ii) The line BY bisects angle CBX .
 Complete the statement.

The lines BY and AD are

because [2]

(b)



The diagram shows a circle, centre O .
 PT and PU are tangents to the circle at T and U .
 Angle $TPU = x^\circ$ and angle $TOU = 4x^\circ$.

Calculate the value of x .

Answer(b) $x =$ [3]

(c) The exterior angle of a regular polygon is 20° .

Calculate the number of sides of the polygon.

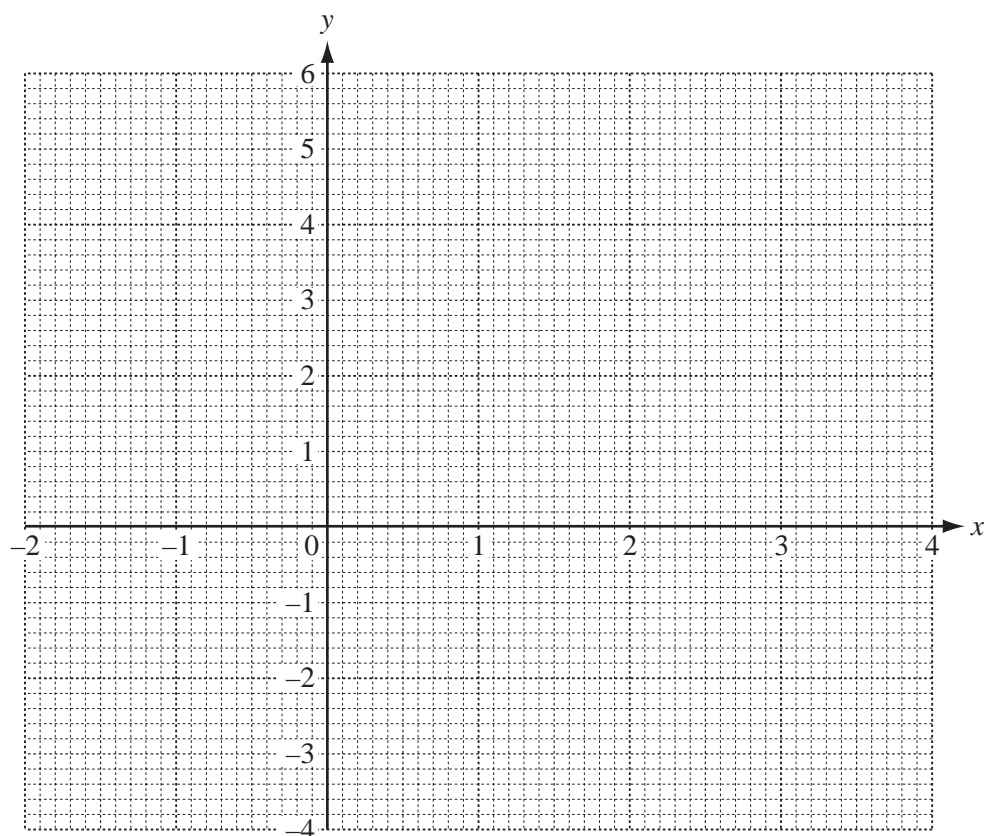
Answer(c) [2]

- 6 (a) Complete the table for $y = 4 + 2x - x^2$.

| | | | | | | | |
|-----|----|----|---|---|---|---|---|
| x | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| y | | 1 | | 5 | | 1 | |

[2]

- (b) On the grid, draw the graph of $y = 4 + 2x - x^2$ for $-2 \leq x \leq 4$.



[4]

- (c) (i) Draw the line of symmetry of the graph.

[1]

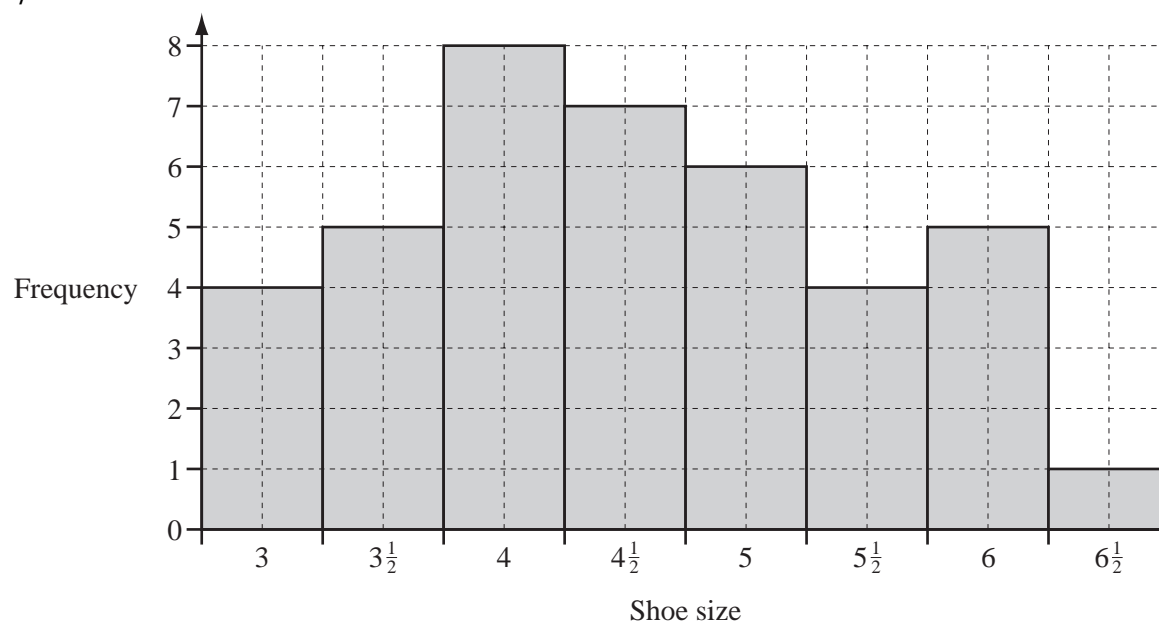
- (ii) Write down the equation of this line of symmetry.

Answer(c)(ii) [1]

- (d) Use your graph to solve the equation $4 + 2x - x^2 = 0$.

Answer(d) $x =$ or $x =$ [2]

7



The bar chart shows the frequencies of the shoe sizes for a group of students.

(a) Use the information in the bar chart to complete the frequency table.

| | | | | | | | | |
|-----------|---|----------------|---|----------------|---|----------------|---|----------------|
| Shoe size | 3 | $3\frac{1}{2}$ | 4 | $4\frac{1}{2}$ | 5 | $5\frac{1}{2}$ | 6 | $6\frac{1}{2}$ |
| Frequency | 4 | | | | | | | 1 |

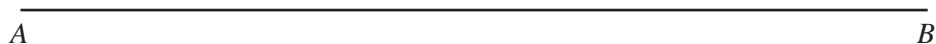
[2]

(b) How many students are in the group?

Answer(b) [1]

(c) Calculate the mean shoe size.

Answer(c) [3]



- (a) Construct triangle ABC accurately, with $AC = 10$ cm and $BC = 8$ cm.
The line AB has been drawn for you. [2]

- (b) (i) Using a straight edge and compasses only, construct the bisector of angle A . [2]

- (ii) The bisector of angle A meets BC at X .

Measure the length of BX .

Answer(b)(ii) $BX =$ cm [1]

- (c) (i) Using a straight edge and compasses only, construct the perpendicular bisector of AB . [2]

- (ii) The perpendicular bisector of AB meets AC at Y and AX at Z .

Measure angle CYZ .

Answer(c)(ii) Angle $CYZ =$ [1]

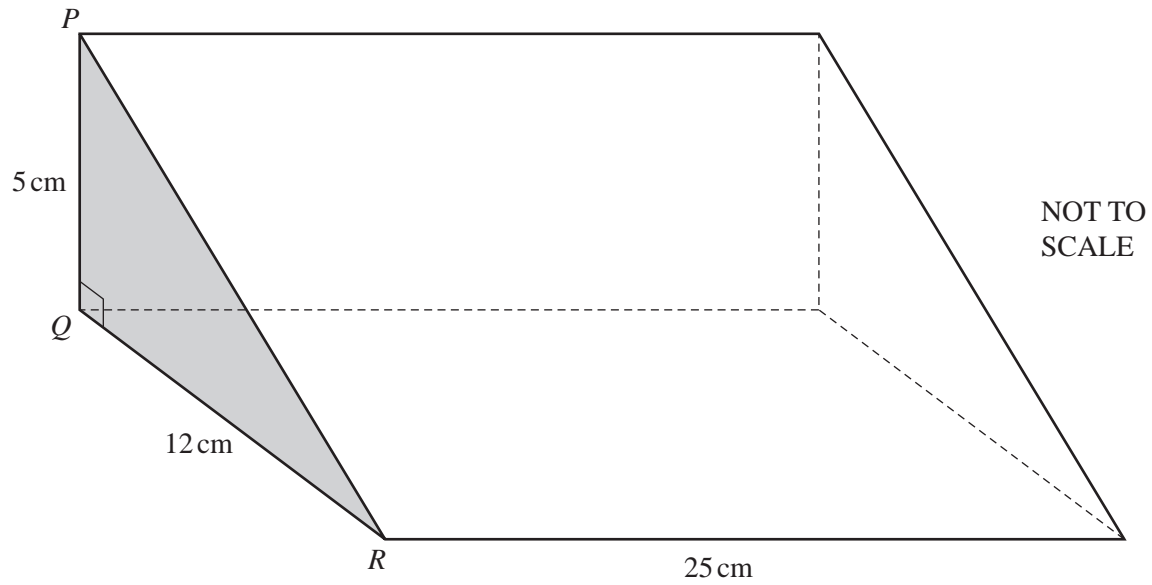
- (d) Shade the region inside triangle ABC which is

and

- nearer to AB than to AC
- nearer to B than to A .

[1]

9



The diagram shows a solid triangular prism of length 25 cm.
 The cross-section of the prism is triangle PQR .
 $PQ = 5$ cm, $QR = 12$ cm and angle $PQR = 90^\circ$.

- (a) (i) Calculate the volume of the prism.

Answer(a)(i) cm^3 [3]

- (ii) The prism is made from wood.
 The mass of 1 cm^3 of the wood is 0.96 g.

Calculate the mass of the prism.
 Give your answer in kilograms.

Answer(a)(ii) kg [2]

- (b) (i)** Show that $PR = 13$ cm.

Answer(b)(i)

[2]

- (ii)** The prism is completely covered with plastic at a cost of \$0.08 per square centimetre.

By finding the total area of the two triangles and the three rectangles, calculate the total cost of the plastic used.

Answer(b)(ii) \$ [4]

10 (a) Tatiana goes for a walk.

(i) She walks for 15 minutes at a speed of 80 metres per minute.

Calculate the distance she walks.

Answer(a)(i) m [1]

(ii) She then walks for a further p minutes at w metres per minute.

Write down an expression, in terms of p and w , for the **total** distance Tatiana walks.

Answer(a)(ii) m [1]

(iii) Write down an expression, in terms of p and w , for Tatiana's average speed, in metres per minute.

Answer(a)(iii) m/min [2]

(b) The volume, V , of a solid is given by the following formula.

$$V = 3b\left(t + \frac{1}{2}m\right)$$

(i) Find V when $b = 4$, $t = 5$ and $m = 6$.

Answer(b)(i) $V =$ [2]

(ii) Find b when $t = 3$, $m = 2$ and $V = 84$.

Answer(b)(ii) $b =$ [3]

11 (a) Write down the next term in each of the following sequences.

(i) 8, 15, 22, 29, [1]

(ii) 3, 6, 12, 24, [1]

(iii) 1, 4, 9, 16, [1]

(iv) 0, 3, 8, 15, [1]

(b) Write down an expression, in terms of n , for the n th term of

(i) the sequence in **part(a)(iii)**,

Answer(b)(i) [1]

(ii) the sequence in **part(a)(iv)**.

Answer(b)(ii) [1]

(c) The n th term of a sequence is $7n - 3$.

(i) Write down the value of the 4th term.

Answer(c)(i) [1]

(ii) Which term has a value of 592?

Answer(c)(ii) [2]

(d) 1, 2, 2, 4, 8, 32, 256,

Work out the next two terms of this sequence.

Answer(d) , [2]

- 1 A concert hall has 1540 seats.

Calculate the number of people in the hall when 55% of the seats are occupied.

Answer [1]

- 2 (a) Write down in figures the number twenty thousand three hundred and seventy six.

Answer(a) [1]

- (b) Write your answer to **part (a)** correct to the nearest hundred.

Answer(b) [1]

- 3 For an equilateral triangle, write down

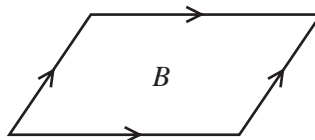
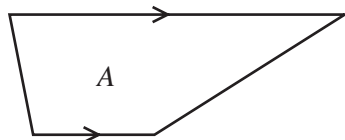
- (a) the number of lines of symmetry,

Answer(a) [1]

- (b) the order of rotational symmetry.

Answer(b) [1]

4



Write down the geometrical name for

- (a) shape *A*,

Answer(a) [1]

- (b) shape *B*.

Answer(b) [1]

- 5 Mark and Naomi share \$600 in the ratio Mark : Naomi = 5 : 1.

Calculate how much money Naomi receives.

Answer \$ [2]

- 6 Calculate the area of a circle with radius 6.28 centimetres.

Answer cm^2 [2]

- 7 The scale on a map is 1 : 20 000.

Calculate the actual distance between two points which are 2.7 cm apart on the map.
Give your answer in kilometres.

Answer km [2]

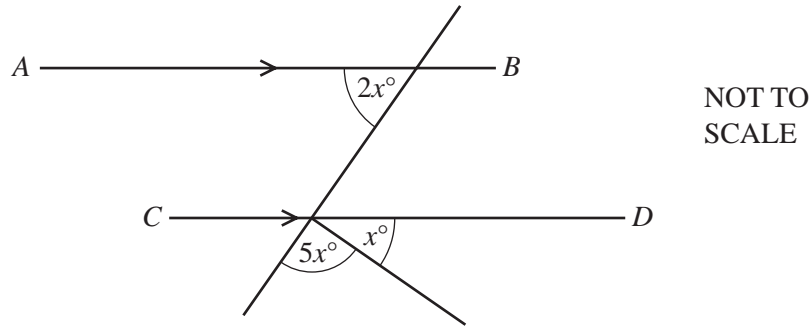
- 8 (a) Find m when $4^m \times 4^2 = 4^{12}$.

Answer(a) $m =$ [1]

- (b) Find p when $6^p \div 6^7 = 6^2$.

Answer(b) $p =$ [1]

9



AB is parallel to CD .
Calculate the value of x .

Answer $x =$ [3]

10 Solve the simultaneous equations.

$$\begin{aligned} 3x + y &= 30 \\ 2x - 3y &= 53 \end{aligned}$$

Answer $x =$

$y =$ [3]

11 Without using your calculator, and leaving your answer as a fraction, work out

$$2\frac{1}{6} - \frac{7}{12}.$$

You must show all your working.

Answer [3]

- 12 (a) Write 1738.279 correct to 1 decimal place.

Answer(a) [1]

- (b) Write 28 700 in standard form.

Answer(b) [1]

- (c) The mass of a ten-pin bowling ball is 7 kg to the nearest kilogram.

Write down the lower bound of the mass of the ball.

Answer(c) kg [1]

- 13 Paulo invests \$3000 at a rate of 4% per year **compound** interest.

Calculate the **total** amount Paulo has after 2 years.

Give your answer correct to the nearest dollar.

Answer \$ [3]

- 14 A train leaves Barcelona at 21 28 and takes 10 hours and 33 minutes to reach Paris.

- (a) Calculate the time the next day when the train arrives in Paris.

Answer(a) [1]

- (b) The distance from Barcelona to Paris is 827 km.

Calculate the average speed of the train in kilometres per hour.

Answer(b) km/h [3]

- 15 (a) The table shows part of a railway timetable.

| | | | | | |
|------------------|----------------|-------|-------|-------|-------|
| Peartree Station | arrival time | 12 58 | 13 56 | 14 54 | 15 52 |
| | departure time | 13 07 | 14 05 | 15 03 | 16 01 |

- (i) Each train waits the same number of minutes at Peartree Station.

Write down how many minutes each train waits.

Answer(a)(i) min [1]

- (ii) Janine is at Peartree Station at 3 pm.

At what time does the next train depart?

Answer(a)(ii) [1]

- (b) The average temperature each month in Moscow and Helsinki is recorded.
The table shows this information from January to June.

| | January | February | March | April | May | June |
|------------------------------|---------|----------|-------|-------|-----|------|
| Temperature in Moscow (°C) | −16 | −14 | −8 | 1 | 8 | 11 |
| Temperature in Helsinki (°C) | −9 | −10 | −7 | −1 | 4 | 10 |

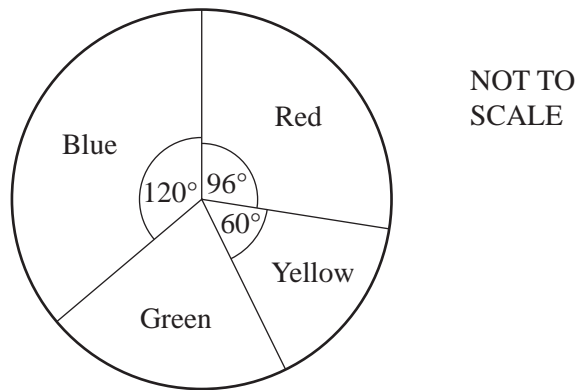
- (i) Find the difference in temperature between Moscow and Helsinki in **January**.

Answer(b)(i) °C [1]

- (ii) Find the increase in temperature in Helsinki from March to June.

Answer(b)(ii) °C [1]

16



In a survey a number of people chose their favourite colour.

The results are shown in the pie chart.

(a) Calculate the size of the sector angle for green.

Answer(a) [1]

(b) The number of people who chose red is 16.

Calculate the number who chose yellow.

Answer(b) [1]

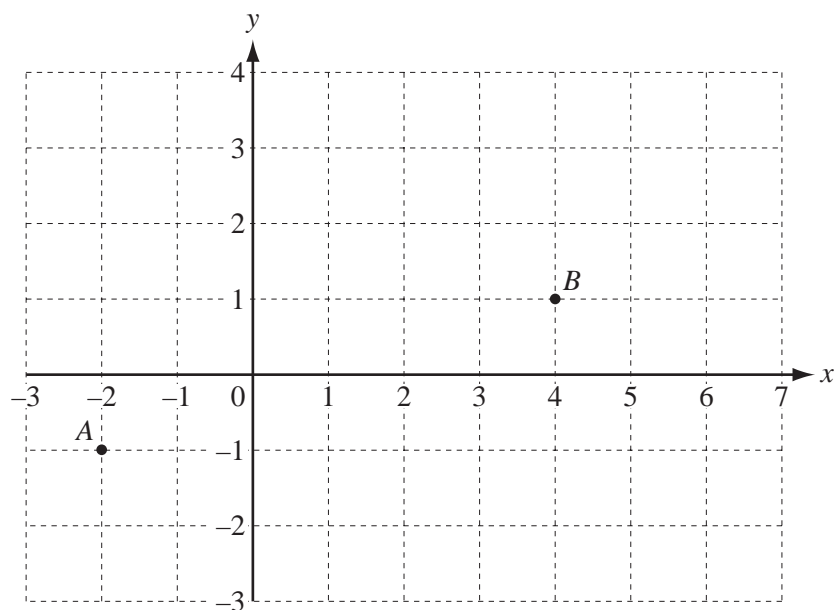
(c) Calculate the total number of people in the survey.

Answer(c) [1]

(d) Write down the fraction who chose red.

Answer(d) [1]

17



- (a) Write down the vector \vec{AB} .

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $\vec{BC} = \begin{pmatrix} -3 \\ 1 \end{pmatrix}$

Mark the point C on the grid.

[1]

- (c) Work out

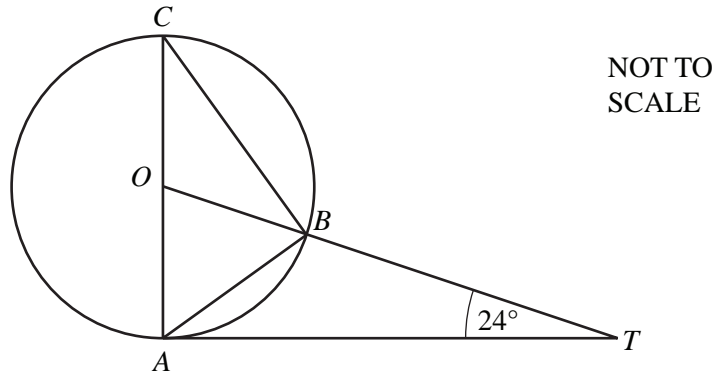
(i) $\begin{pmatrix} -3 \\ 1 \end{pmatrix} + \begin{pmatrix} 7 \\ -4 \end{pmatrix},$

Answer(c)(i) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(ii) $4 \times \begin{pmatrix} -3 \\ 1 \end{pmatrix}.$

Answer(c)(ii) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

18



A , B and C are points on a circle, centre O .
 TA is a tangent to the circle at A and OBT is a straight line.
 AC is a diameter and angle $OTA = 24^\circ$.

Calculate

(a) angle AOT ,

Answer(a) Angle $AOT =$ [2]

(b) angle BOC ,

Answer(b) Angle $BOC =$ [1]

(c) angle OCB .

Answer(c) Angle $OCB =$ [1]

- 19** Piet, Rob and Sam collect model aeroplanes.
 Piet has x aeroplanes.
 Rob has 7 more aeroplanes than Piet.
 Sam has three times as many aeroplanes as Piet.

(a) Write down an expression, in terms of x , for

(i) the number of aeroplanes Rob has,

Answer(a)(i) [1]

(ii) the number of aeroplanes Sam has.

Answer(a)(ii) [1]

(b) The total number of aeroplanes is 32.

(i) Use the information in **part (a)** to write down an equation in x .

Answer(b)(i) [1]

(ii) Solve your equation.

Answer(b)(ii) $x =$ [2]

(c) Write down the number of aeroplanes Rob has.

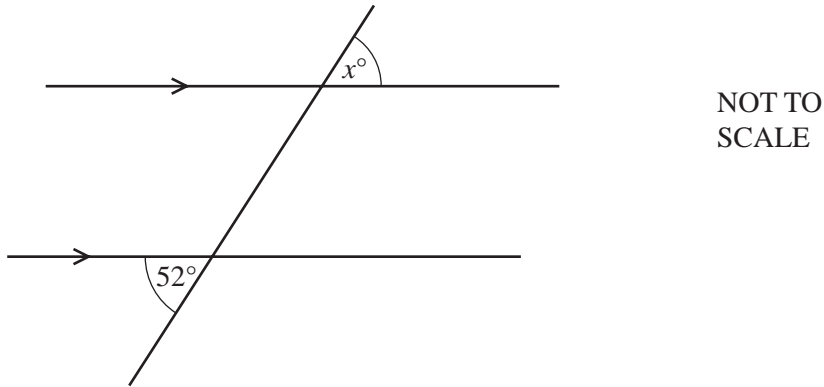
Answer(c) [1]

- 1 One square number between 50 and 100 is also a cube number.

Write down this number.

Answer [1]

2



A straight line intersects two parallel lines as shown in the diagram.

Find the value of x .

Answer $x =$ [1]

- 3 A letter is chosen at random from the following word.

STATISTICS

Write down the probability that the letter is

(a) **A** or **I**,

Answer(a) [1]

(b) **E**.

Answer(b) [1]

- 4 Ingrid throws a javelin a distance of 58.3 metres, correct to 1 decimal place.

Complete the statement about the distance, d metres, the javelin is thrown.

Answer $\leq d <$ [2]

5 Show that $1\frac{5}{9} \div 1\frac{7}{9} = \frac{7}{8}$.

Write down all the steps in your working.

Answer

[2]

6 $\frac{3}{5} < p < \frac{2}{3}$

Which of the following could be a value of p ?

$\frac{16}{27}$ 0.67 60% $(0.8)^2$ $\sqrt{\frac{4}{9}}$

Answer [2]

7 Calculate 324×17 .

Give your answer in standard form, correct to 3 significant figures.

Answer [2]

- 8 A meal on a boat costs 6 euros (€) or 11.5 Brunei dollars (\$).

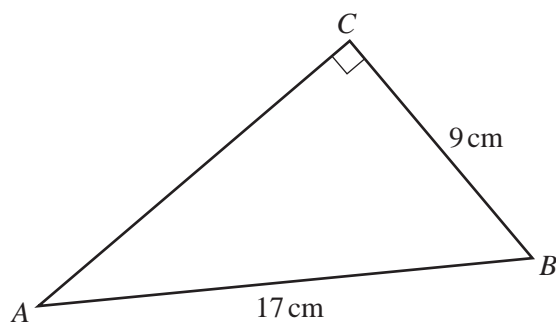
In which currency does the meal cost less, on a day when the exchange rate is €1 = \$1.9037?
Write down all the steps in your working.

Answer [2]

- 9 Simplify $32x^8 \div 8x^{32}$.

Answer [2]

10



NOT TO
SCALE

In the triangle ABC , $AB = 17$ cm, $BC = 9$ cm and angle $ACB = 90^\circ$.

Calculate AC .

Answer $AC =$ cm [3]

- 11 The table shows the opening and closing times of a café.

| | Mon | Tue | Wed | Thu | Fri | Sat | Sun |
|--------------|------|------|------|------|------|------|------|
| Opening time | 0600 | 0600 | 0600 | 0600 | 0600 | (a) | 0800 |
| Closing time | 2200 | 2200 | 2200 | 2200 | 2200 | 2200 | 1300 |

- (a) The café is open for a total of 100 hours each week.
Work out the opening time on Saturday.

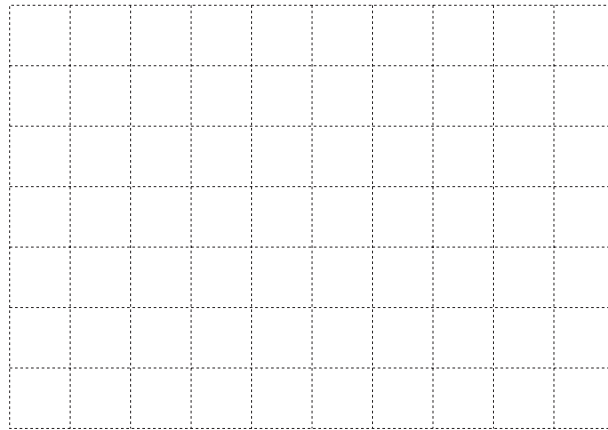
Answer(a) [2]

- (b) The owner decides to close the café at a later time on Sunday. This increases the **total** number of hours the café is open by 4%.
Work out the new closing time on Sunday.

Answer(b) [1]

12 $\vec{AB} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$ and $\vec{BC} = \begin{pmatrix} -5 \\ 4 \end{pmatrix}$

- (a) Find \vec{AC} . You may use the grid below to help if you wish.



Answer(a) $\vec{AC} = \begin{pmatrix} \\ \end{pmatrix}$ [2]

- (b) Work out \vec{CA} .

Answer(b) $\vec{CA} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

- 13 (a) Rewrite this calculation with all the numbers rounded to 1 significant figure.

$$\frac{77.8}{21.9 - 3.8 \times 4.3}$$

Answer(a) [1]

- (b) Use your answer to **part (a)** to work out an estimate for the calculation.

Answer(b) [1]

- (c) Use your calculator to find the **actual** answer to the calculation in **part (a)**.
Give your answer correct to 1 decimal place.

Answer(c) [2]

- 14 (a) Complete the list to show all the factors of 18.

1, 2, , , , 18 [2]

- (b) Write down the prime factors of 18.

Answer(b) [1]

- (c) Write down all the multiples of 18 between 50 and 100.

Answer(c) [1]

- 15 (a) Expand the brackets and simplify.

$$3(2x - 5y) - 4(x - y)$$

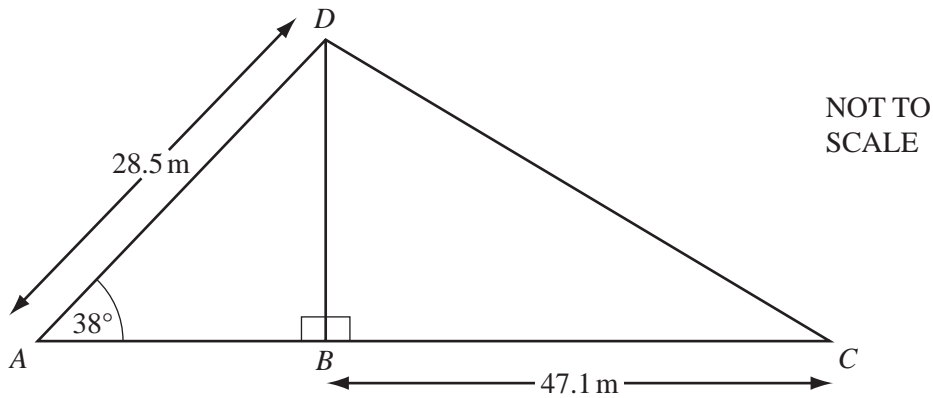
Answer(a) [2]

- (b) Factorise completely.

$$6x^2 - 9xy$$

Answer(b) [2]

16



A flagpole, BD , is attached to level horizontal ground by ropes, AD and CD .

$AD = 28.5$ m, $BC = 47.1$ m and angle $DAB = 38^\circ$.

Calculate

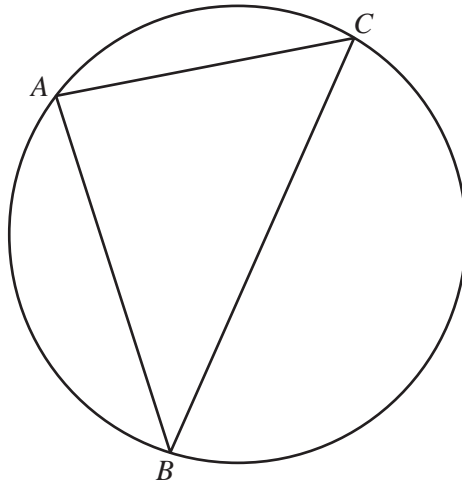
- (a) BD , the height of the flagpole,

Answer(a) $BD =$ m [2]

- (b) angle BCD .

Answer(b) Angle $BCD =$ [2]

17 (a)

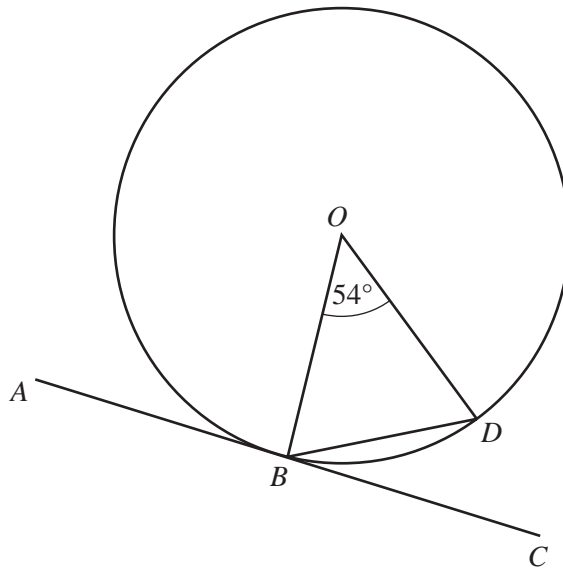
NOT TO
SCALE

Points A , B and C lie on the circumference of the circle shown above.

When angle BAC is 90° write down a statement about the line BC .

Answer(a) [1]

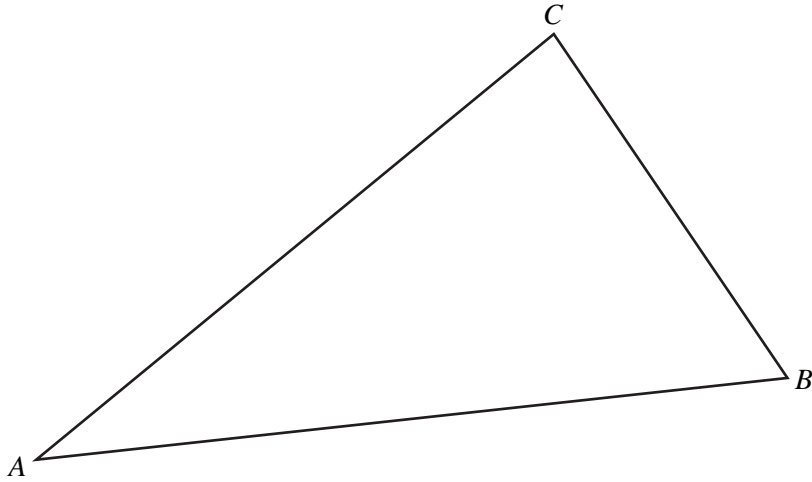
(b)

NOT TO
SCALE

O is the centre of a circle and the line ABC is a tangent to the circle at B .
 D is a point on the circumference and angle $BOD = 54^\circ$.

Calculate angle DBC .

Answer(b) Angle $DBC =$ [3]



- (a) On the diagram above, **using a straight edge and compasses only**, construct
- (i) the bisector of angle ABC , [2]
 - (ii) the locus of points which are equidistant from A and from B . [2]
- (b) Shade the region inside the triangle which is nearer to A than to B **and** nearer to AB than to BC . [1]
-

- 19 (a)** The travel graph on the opposite page shows Joel's journey to his school.
He walks to the bus stop and waits for the bus, which takes him to the school.

(i) How long did Joel wait for the bus?

Answer(a)(i) min [1]

(ii) Find the distance from the bus stop to the school.

Answer(a)(ii) km [1]

- (b)** Joel's sister, Samantha, leaves home 14 minutes later than Joel to cycle to the same school.
She cycles at a constant speed and arrives at the school at 08 16.

(i) On the grid, show her journey. [1]

(ii) At what time did the bus pass Samantha?

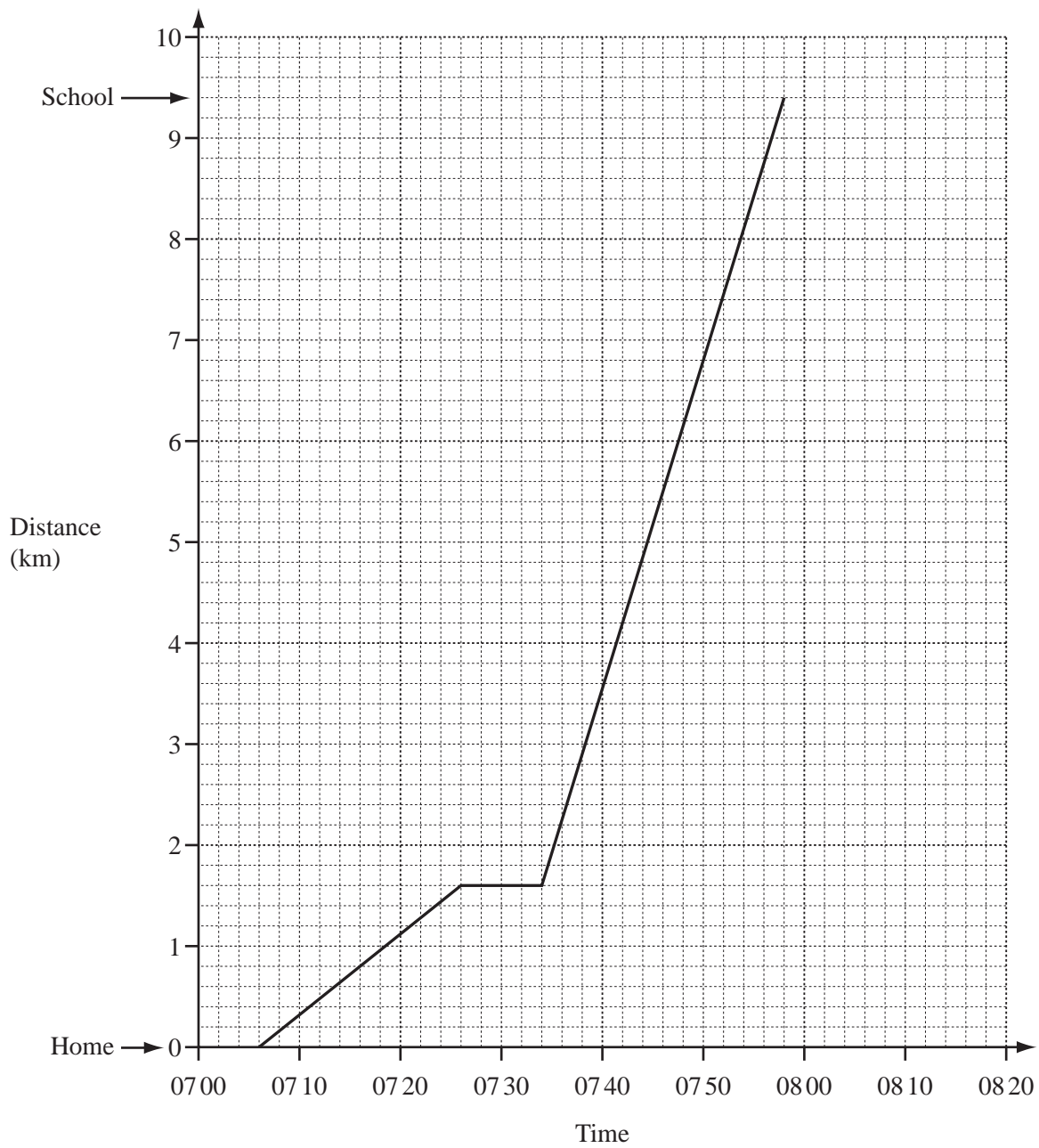
Answer(b)(ii) [1]

(iii) How far from the school was she when the bus passed her?

Answer(b)(iii) km [1]

(iv) How many minutes after Joel did Samantha arrive at the school?

Answer(b)(iv) min [1]



- 1 (a) Write down ten thousand and seventy three in figures.

Answer(a) [1]

- (b) Work out $13 + 5 \times 4 - 2$.
Write down all the steps of your working.

Answer(b) [1]

- 2 Write down the next term in each sequence.

(a) 1, 2, 4, 8, 16, [1]

(b) 23, 19, 15, 11, 7, [1]

- 3 Write down the time and date which is 90 hours after 20 30 on May 31st.

Answer Time

Date [2]

- 4 Factorise completely.

$$2xy - 4yz$$

Answer [2]

- 5 Insert $<$ or $>$ or $=$ in the spaces provided to make correct statements.

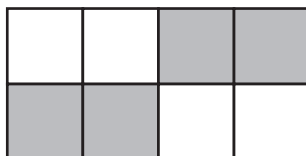
(a) $\frac{3}{11}$ 0.273 [1]

(b) 1.1 111% [1]

- 6 Make x the subject of the formula. $y = \frac{x}{3} + 5$

Answer $x =$ [2]

7



For the diagram, write down

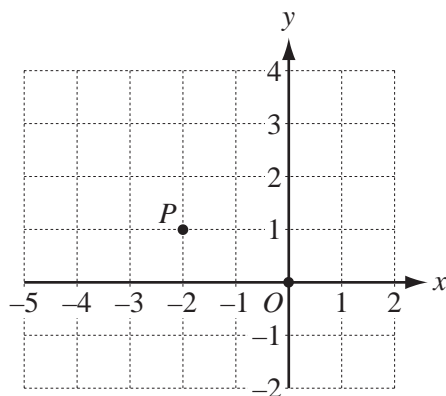
- (a) the number of lines of symmetry,

Answer(a) [1]

- (b) the order of rotational symmetry.

Answer(b) [1]

8



In the diagram O is the origin and P is the point $(-2, 1)$.

- (a) Write \vec{OP} as a column vector.

Answer(a) $\vec{OP} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

- (b) $\vec{PQ} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$

Mark the point Q on the diagram.

[1]

9 Using integers between 10 and 30, write down

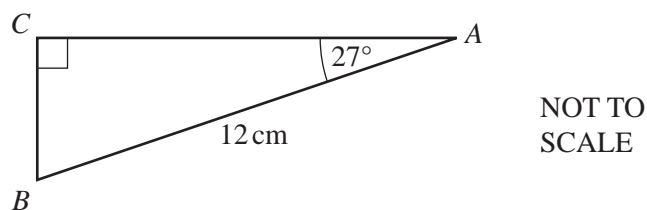
- (a) an odd multiple of 7,

Answer(a) [1]

- (b) a cube number.

Answer(b) [1]

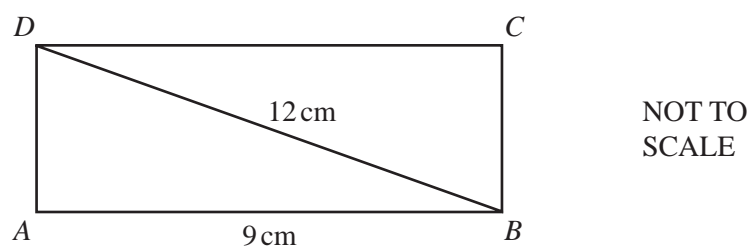
10



In triangle ABC , $AB = 12$ cm, angle $C = 90^\circ$ and angle $A = 27^\circ$.
Calculate the length of AC .

Answer $AC =$ cm [2]

11



In the rectangle $ABCD$, $AB = 9$ cm and $BD = 12$ cm.
Calculate the length of the side BC .

Answer $BC =$ cm [3]

12 (a) Write 16 460 000 in standard form.

Answer(a) [1]

(b) Calculate $7.85 \div (2.366 \times 10^2)$, giving your answer in standard form.

Answer(b) [2]

- 13 (a) Find the value of x when $\frac{18}{24} = \frac{27}{x}$.

Answer(a) $x =$ [1]

- (b) Show that $\frac{2}{3} \div 1\frac{1}{6} = \frac{4}{7}$.

Write down all the steps in your working.

Answer(b)

[2]

- 14 (a) A drinking glass contains 55 cl of water.
Write 55 cl in litres.

Answer(a) litres [1]

- (b) The mass of grain in a sack is 35 kg.
The grain is divided equally into 140 bags.

Calculate the mass of grain in each bag.
Give your answer in grams.

Answer(b) g [2]

- 15 (a) Write 67.499 correct to the nearest integer.

Answer(a) [1]

- (b) Write 0.003040506 correct to 3 significant figures.

Answer(b) [1]

- (c) $d = 56.4$, correct to 1 decimal place.

Write down the lower bound of d .

Answer(c) [1]

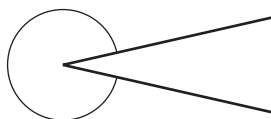
16 Solve the simultaneous equations.

$$\begin{aligned}x + 2y &= 3 \\ 2x - 3y &= 13\end{aligned}$$

Answer $x =$

$y =$ [3]

17 (a)



What type of angle is shown by the arc on the diagram?

Answer(a) [1]

(b) $ABCD$ is a quadrilateral.

- AB is parallel to DC .
- BC is longer than AD .

(i) Draw a possible quadrilateral $ABCD$.

Answer(b)(i)

[1]

(ii) Write down the geometrical name for the quadrilateral $ABCD$.

Answer(b)(ii) [1]

- 18** Eva invests \$120 at a rate of 3% per year **compound interest**.

Calculate the total amount Eva has after 2 years.
Give your answer correct to 2 decimal places.

Answer \$ [3]

- 19** At a ski resort the temperature, in $^{\circ}\text{C}$, was measured every 4 hours during one day.

The results were -12° , -13° , -10° , 4° , 4° , -6° .

- (a)** Find the difference between the highest and the lowest of these temperatures.

Answer(a) $^{\circ}\text{C}$ [1]

- (b)** Find

- (i)** the mean,

Answer(b)(i) $^{\circ}\text{C}$ [2]

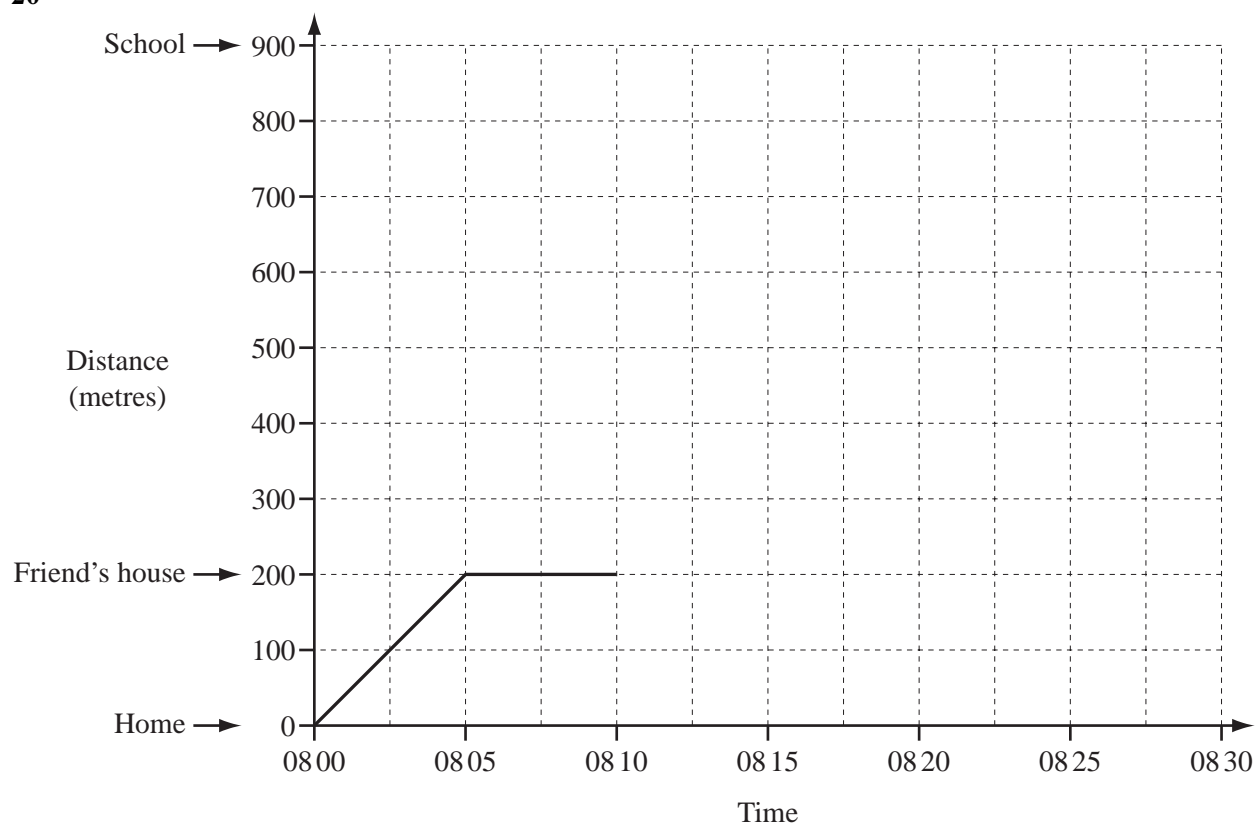
- (ii)** the median,

Answer(b)(ii) $^{\circ}\text{C}$ [2]

- (iii)** the mode.

Answer(b)(iii) $^{\circ}\text{C}$ [1]

20



The graph shows part of Ali's journey from home to his school.

The school is 900 m from his home.

He walks 200 m to his friend's house and waits there.

He then takes 20 minutes to walk with his friend to their school.

(a) Complete the travel graph showing Ali's journey. [1]

(b) How long does he wait at his friend's house?

Answer(b) min [1]

(c) Calculate the average speed for Ali's complete journey from home to his school.
Give your answer in **kilometres per hour**.

Answer(c) km/h [4]

- 1 Mr and Mrs Clark and their three children live in the USA and take a holiday in Europe.

- (a) Mr Clark changes \$500 into euros (€) when the exchange rate is €1 = \$1.4593.

Calculate how much he receives.
Give your answer correct to 2 decimal places.

Answer(a) € [2]

- (b) Tickets for an amusement park cost €62 for an adult and €52 for a child.

Work out the cost for Mr and Mrs Clark and their three children to visit the park.

Answer(b) € [3]

- (c) Mr Clark sees a notice:

| |
|---|
| <p>SPECIAL OFFER!</p> <p>Family ticket €200</p> |
|---|

Work out €200 as a percentage of your answer to **part (b)**.

Answer(c) % [1]

- (d) Mrs Clark buys 6 postcards at €0.98 each.
She pays with a €10 note.

Calculate how much change she will receive.

Answer(d) € [2]

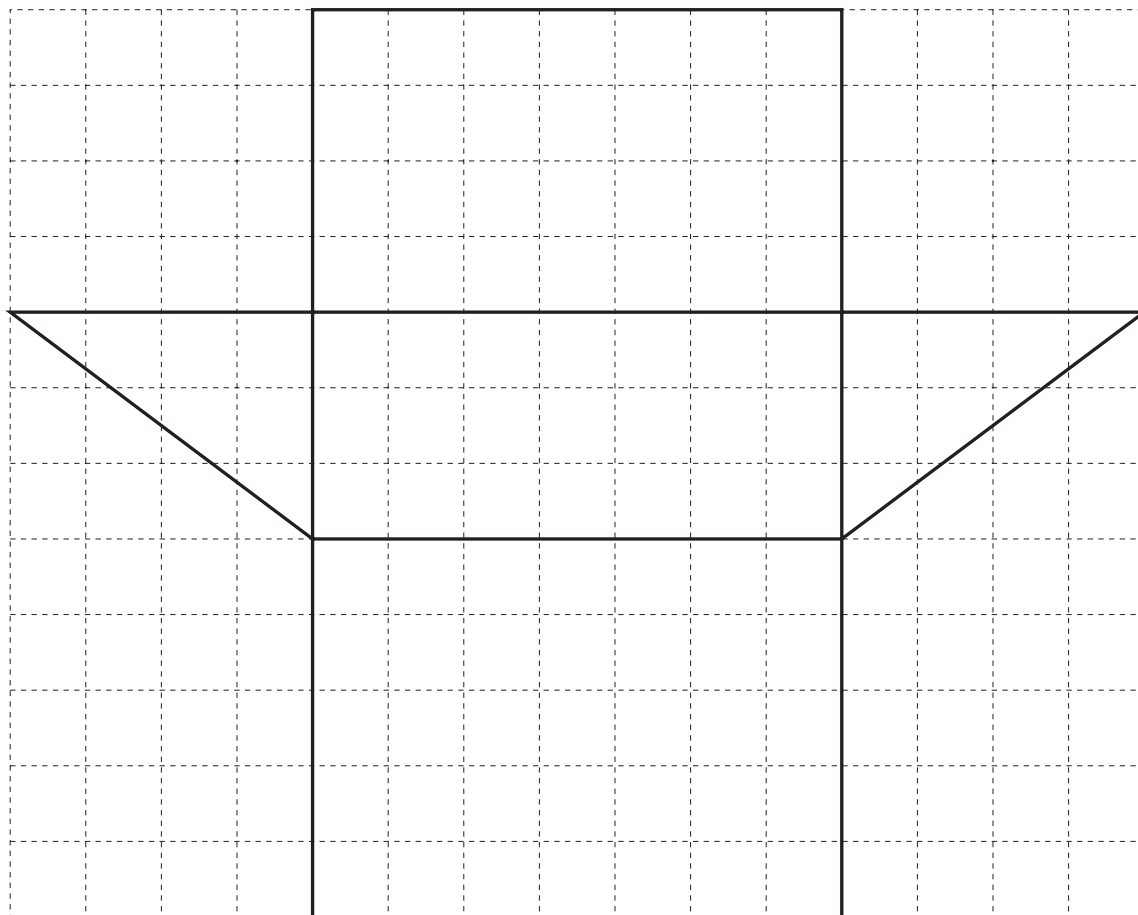
- (e) Children under a height of 130 cm are not allowed on one of the rides in the park.
Helen Clark is 50 inches tall.

Use 1 inch = 2.54 cm to show that she will not be allowed on this ride.

Answer(e)

[1]

2



The shape above is the net of a solid drawn on a 1 cm square grid.

- (a) Write down the geometrical name of the solid.

Answer(a) [1]

- (b) Find the perimeter of the net.

Answer(b) cm [1]

(c) Work out

(i) the area of one of the triangles,

Answer(c)(i) cm^2 [2]

(ii) the volume of the solid.

Answer(c)(ii) cm^3 [2]

(d) A cuboid of length 4 cm and width 3 cm has the same volume as the solid.

Calculate the height of the cuboid.

Answer(d) cm [2]

3 (a)

$$x = 3m - k$$

Find the value of

(i) x when $m = 2$ and $k = -4$,

Answer(a)(i) [2]

(ii) m when $x = 19$ and $k = 5$.

Answer(a)(ii) [3]

(b) Expand the brackets.

$$g(7f - g^2)$$

Answer(b) [2]

(c) Factorise completely.

$$18h^2 - 12hj$$

Answer(c) [2]

(d) Make m the subject of the formula.

$$t = 8m + 15$$

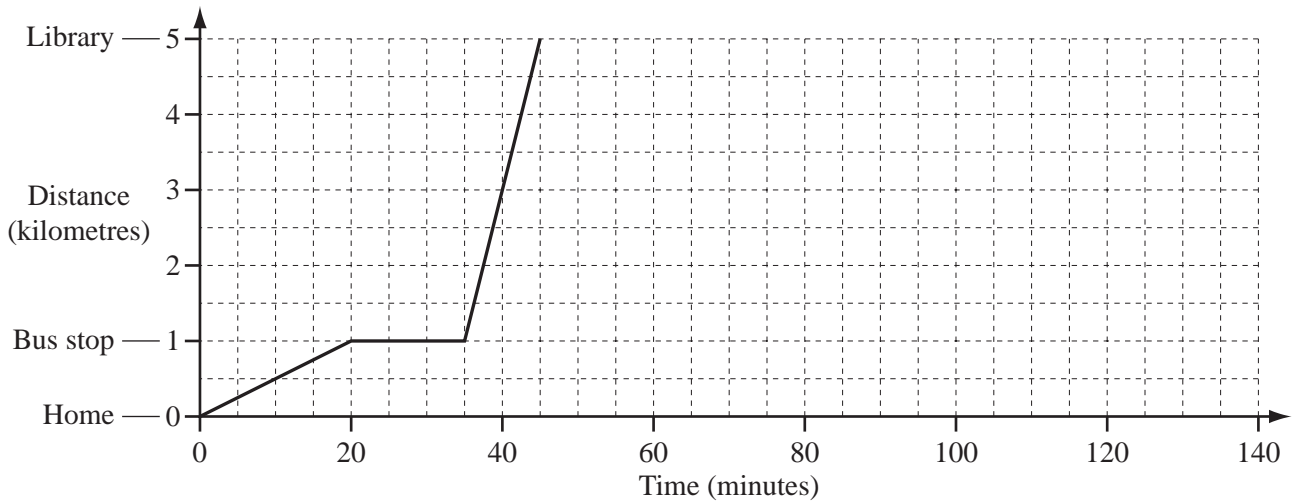
Answer(d) $m =$ [2]

(e) Solve the equation.

$$p + 3 = 3(p - 5)$$

Answer(e) $p =$ [3]

4



Sonia travels from home to the library.
She walks to the bus stop and waits for a bus to take her to the library.

(a) Write down

(i) the distance to the bus stop,

Answer(a)(i) km [1]

(ii) how many minutes Sonia waits for a bus,

Answer(a)(ii) min [1]

(iii) how many minutes the bus journey takes to the library.

Answer(a)(iii) min [1]

(b) Calculate, in **kilometres per hour**,

(i) Sonia's walking speed,

Answer(b)(i) km/h [1]

(ii) the speed of the bus,

Answer(b)(ii) km/h [2]

(iii) the **average** speed for Sonia's journey from home to the library.

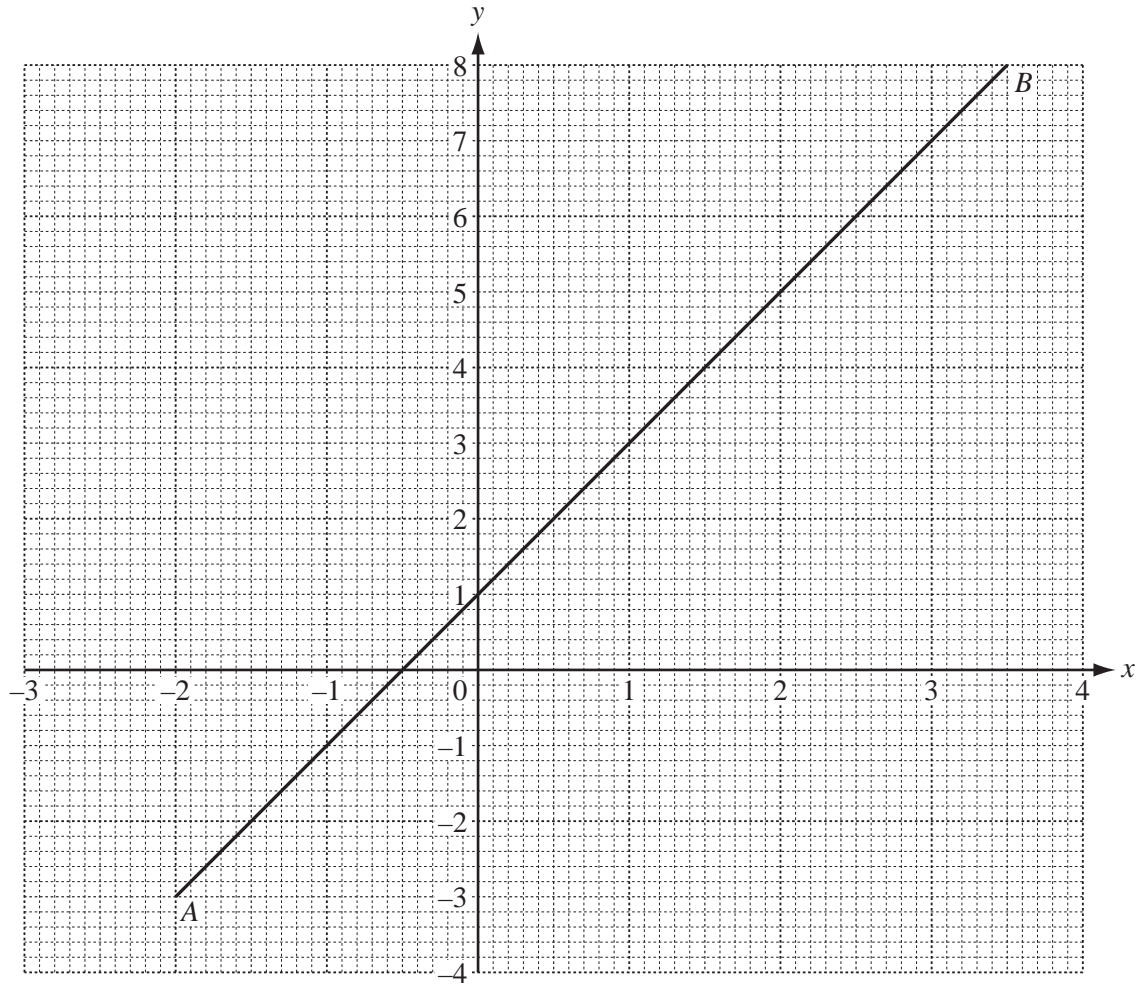
Answer(b)(iii) km/h [3]

(c) Sonia works in the library for one hour.
Then she travels home by car.
The average speed of the car is 30 km/h.

Complete the travel graph.

[2]

5



- (a) (i) Find the gradient of the line AB .

Answer(a)(i) [2]

- (ii) Write down the equation of the line AB in the form $y = mx + c$.

Answer(a)(ii) $y =$ [2]

(b) The table shows some values of the function $y = x^2 - 2$.

| | | | | | | | |
|-----|----|----|----|---|----|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| y | 7 | | -1 | | -1 | | 7 |

(i) Complete the table. [2]

(ii) On the grid, draw the graph of $y = x^2 - 2$ for $-3 \leq x \leq 3$. [4]

(iii) Use your graph to solve the equation $x^2 - 2 = 0$.

Answer(b)(iii) $x =$ or $x =$ [2]

(c) Write down the co-ordinates of the points where your graph meets the line AB .

Answer(c) (..... ,) and (..... ,) [2]

6 (a) 103 112 125 132 144 159 161

From the list above, write down

(i) a square number,

Answer(a)(i) [1]

(ii) a cube number,

Answer(a)(ii) [1]

(iii) a prime number,

Answer(a)(iii) [1]

(iv) an odd number which is a multiple of 3.

Answer(a)(iv) [1]

(b) Write 88 as a product of prime numbers.

Answer(b) [2]

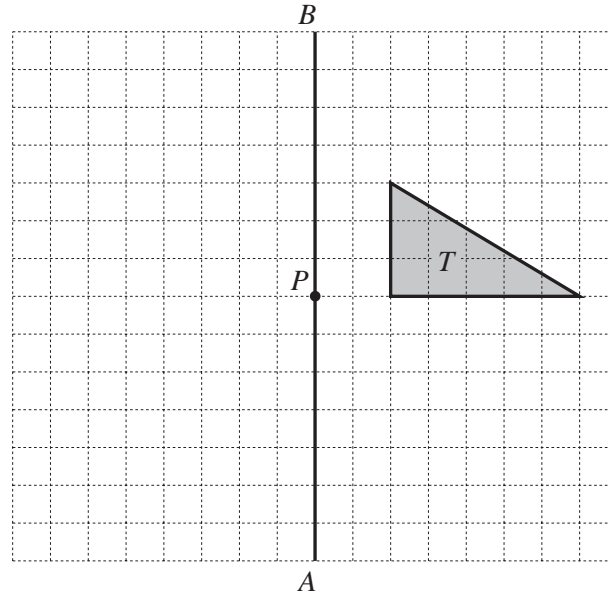
(c) Find the highest common factor of 72 and 96.

Answer(c) [2]

(d) Find the lowest common multiple of 15 and 20.

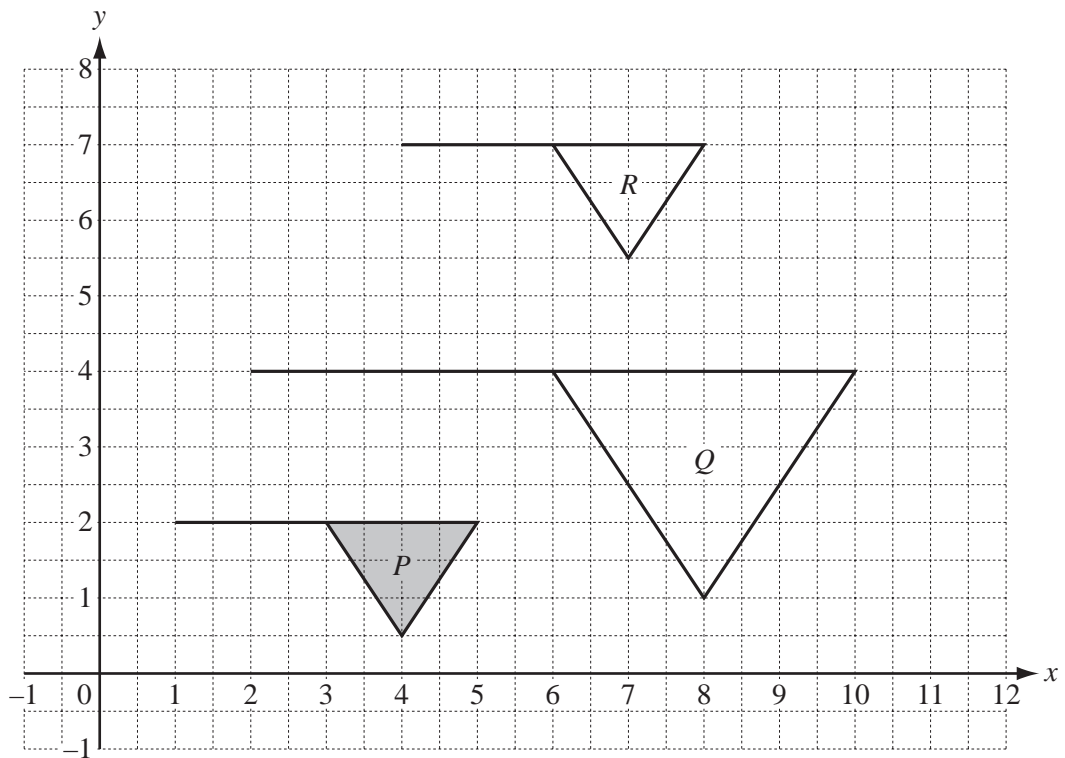
Answer(d) [2]

7 (a)



- (i) Reflect triangle T in the line AB .
Label your image X . [1]
- (ii) Rotate triangle T through 90° clockwise about the point P .
Label your image Y . [2]

(b)

Describe the **single** transformation which maps

- (i) flag
- P
- onto flag
- Q
- ,

Answer(b)(i) [3]

- (ii) flag
- P
- onto flag
- R
- .

Answer(b)(ii) [2]

- 8 30 students took a vocabulary test.
The marks they scored are shown below.

| | | | | | |
|---|---|---|----|----|---|
| 7 | 8 | 5 | 8 | 3 | 2 |
| 6 | 6 | 3 | 3 | 6 | 2 |
| 7 | 1 | 5 | 10 | 2 | 6 |
| 6 | 5 | 8 | 1 | 2 | 7 |
| 3 | 1 | 5 | 3 | 10 | 3 |

- (a) Complete the frequency table below.

The first five frequencies have been completed for you.
You may use the tally column to help you.

| Mark | Tally | Frequency |
|------|-------|-----------|
| 1 | | 3 |
| 2 | | 4 |
| 3 | | 6 |
| 4 | | 0 |
| 5 | | 4 |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

[3]

(b) (i) Find the range.

Answer(b)(i) [1]

(ii) Write down the mode.

Answer(b)(ii) [1]

(iii) Find the median.

Answer(b)(iii) [2]

(iv) Calculate the mean.

Answer(b)(iv) [3]

(c) A student is chosen at random.

Find the probability that the student scored

(i) 1 mark,

Answer(c)(i) [1]

(ii) 4 marks,

Answer(c)(ii) [1]

(iii) fewer than 6 marks.

Answer(c)(iii) [1]

- 9 (a) In the space below, construct the triangle ABC with $AB = 10$ cm and $AC = 12$ cm.
Leave in your construction arcs.
The line BC is already drawn.



[2]

(b) Measure angle ABC .

Answer(b) Angle $ABC =$ [1]

(c) (i) **Using a straight edge and compasses only**, and leaving in your construction arcs, construct the perpendicular bisector of BC . [2]

(ii) This bisector cuts AC at P .

Mark the position of P on the diagram and measure AP .

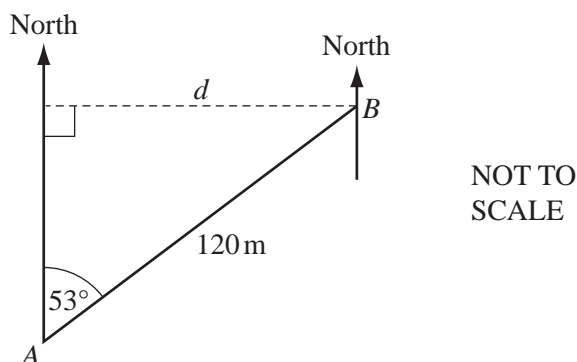
Answer(c)(ii) $AP =$ cm [1]

(d) Construct the locus of all the points inside the triangle which are 5 cm from A . [1]

(e) Shade the region inside the triangle which is

- nearer to B than to C
 - and
 - less than 5 cm from A . [2]
-

10 (a)



B is 120 m from A on a bearing of 053° .
Calculate

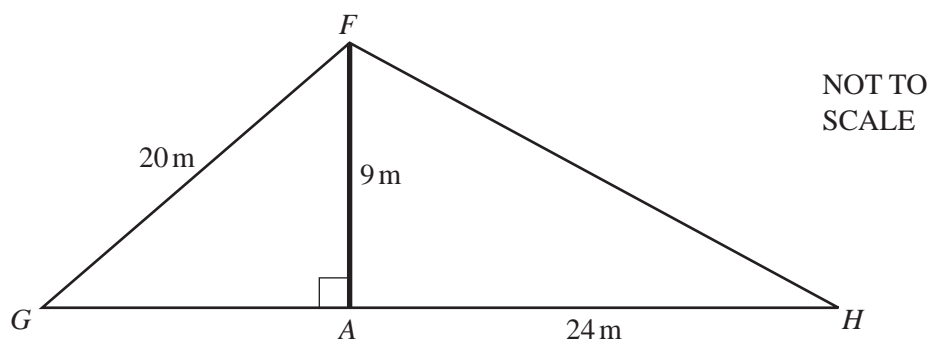
(i) the distance d ,

Answer(a)(i) $d = \dots\dots\dots$ m [2]

(ii) the bearing of A from B .

Answer(a)(ii) $\dots\dots\dots$ [1]

(b)



A vertical flagpole, AF , is 9 m high.
It is held in place by two straight wires FG and FH .
 $FG = 20$ m and $AH = 24$ m.
 G , A and H lie in a straight line on horizontal ground.
Calculate

(i) angle FHA ,

Answer(b)(i) Angle $FHA = \dots\dots\dots$ [2]

(ii) the distance GA .

Answer(b)(ii) $GA = \dots\dots\dots$ m [3]

- 1** Falla buys 3000 square metres of land for a house and garden.
The garden is divided into areas for flowers, vegetables and grass.

He divides the land in the following ratio.

$$\text{house} : \text{flowers} : \text{vegetables} : \text{grass} = 4 : 7 : 8 : 5$$

- (a) (i)** Show that the area of land used for flowers is 875 m^2 .

Answer(a)(i)

[2]

- (ii)** Calculate the area of land used for the house.

Answer(a)(ii) m^2 [2]

- (b)** Write down the fraction of land used for vegetables.
Give your answer in its simplest form.

Answer(b) [2]

- (c) During the first year Falla plants flowers in 64% of the 875 m^2 .

Calculate the area he plants with flowers.

Answer(c) m^2 [2]

- (d) Falla sells some of the vegetables he grows.
These vegetables cost \$85 to grow.
He sells them for \$105.

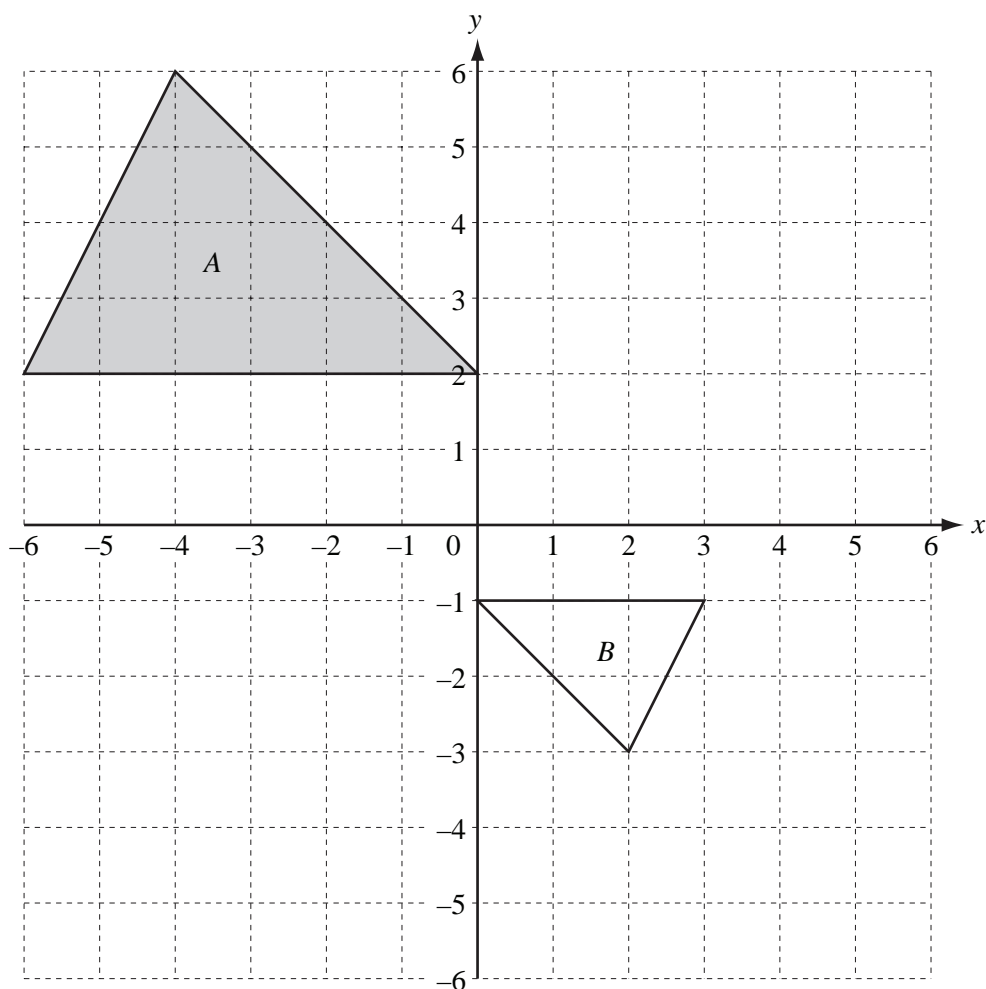
Calculate his percentage profit.

Answer(d) % [3]

- (e) To buy the land Falla borrowed \$5000 at a rate of 6.4% **compound** interest for 2 years.

Calculate the **total** amount he pays back at the end of the 2 years.
Give your answer correct to the nearest dollar.

Answer(e) \$ [3]



The diagram shows two triangles drawn on a 1 cm square grid.

- (a) (i) Describe fully the **single** transformation which maps triangle *A* onto triangle *B*.

Answer(a)(i) [3]

- (ii) Calculate the area of triangle *A*.

Answer(a)(ii) cm² [2]

- (iii) Find the perimeter of triangle *A*.

Answer(a)(iii) cm [1]

- (b) Reflect triangle *A* in the *x*-axis.
Label the image *P*.

[1]

- (c) Rotate triangle *A* through 90° clockwise about (0, 0).
Label the image *Q*.

[2]

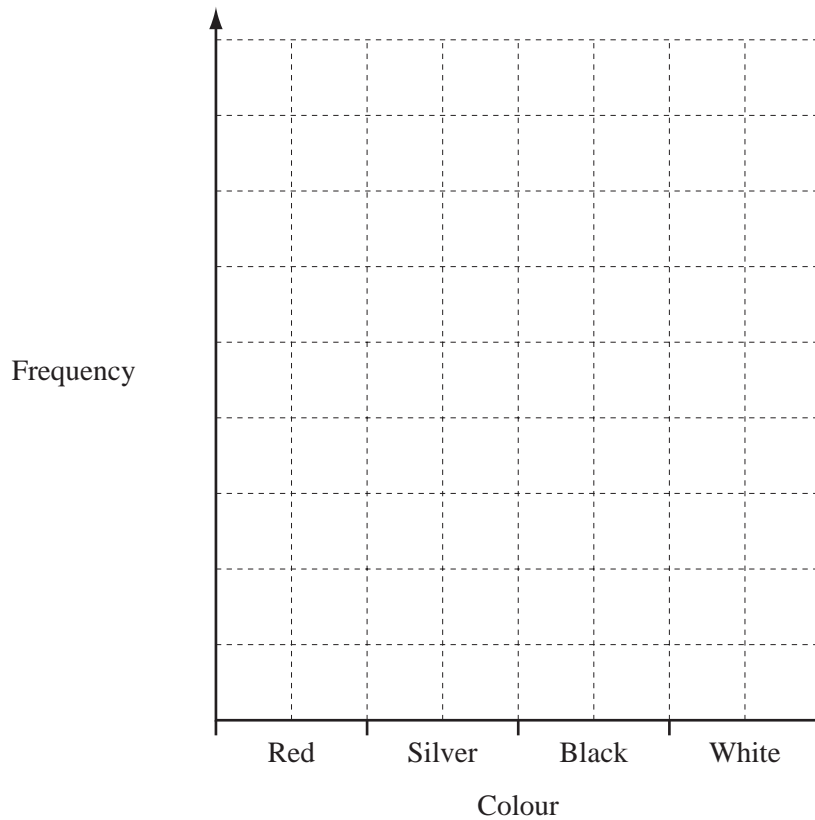
- (d) Describe fully the **single** transformation which maps triangle *P* onto triangle *Q*.

Answer(d) [2]

- 3 The colours of 30 cars in a car park are shown in the frequency table.

| Colour | Frequency |
|--------|-----------|
| Red | 5 |
| Silver | 15 |
| Black | 6 |
| White | 4 |

- (a) Complete the bar chart to represent this information.



[3]

- (b) Write down the mode.

Answer(b) [1]

- 4 (a) An electrician is paid a fixed amount of \$12 and then \$6.50 for each hour she works.

- (i) The electrician works for 7 hours.

Calculate how much she is paid for this work.

Answer(a)(i) \$ [2]

- (ii) The electrician works for n hours.

Write down an expression, in terms of n , for how much she is paid.

Answer(a)(ii) [1]

- (iii) The electrician is paid \$44.50 for her work.

Calculate the number of hours she worked.

Answer(a)(iii) [2]

- (b) Solve the simultaneous equations.

$$\begin{aligned} 3x - y &= 22 \\ 5x + 3y &= 4 \end{aligned}$$

Answer(b) $x =$

$y =$ [3]

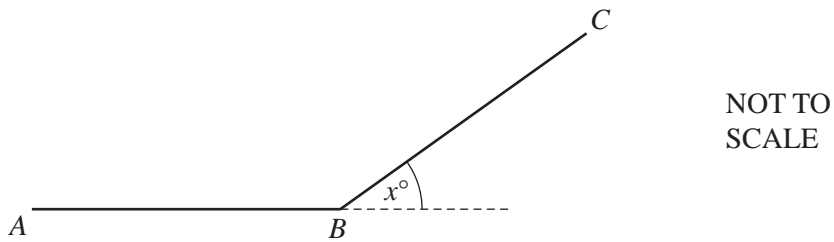
- 5 (a) The table below shows how many sides different polygons have.

Complete the table.

| Name of polygon | Number of sides |
|-----------------|-----------------|
| | 3 |
| Quadrilateral | 4 |
| | 5 |
| Hexagon | 6 |
| Heptagon | 7 |
| | 8 |
| Nonagon | 9 |

[3]

- (b) Two sides, AB and BC , of a regular nonagon are shown in the diagram below.



- (i) Work out the value of x , the exterior angle.

Answer(b)(i) $x =$ [2]

- (ii) Find the value of angle ABC , the interior angle of a regular nonagon.

Answer(b)(ii) Angle $ABC =$ [1]

6 The number of ice-creams sold in a shop each month is shown in the table.

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Number of ice-creams sold | 1300 | 1200 | 1700 | 1800 | 2300 | 2500 | 2800 | 2600 | 1500 | 1600 | 1100 | 1900 |

(a) (i) Find the range.

Answer(a)(i) [1]

(ii) Calculate the mean.

Answer(a)(ii) [2]

(iii) Find the median.

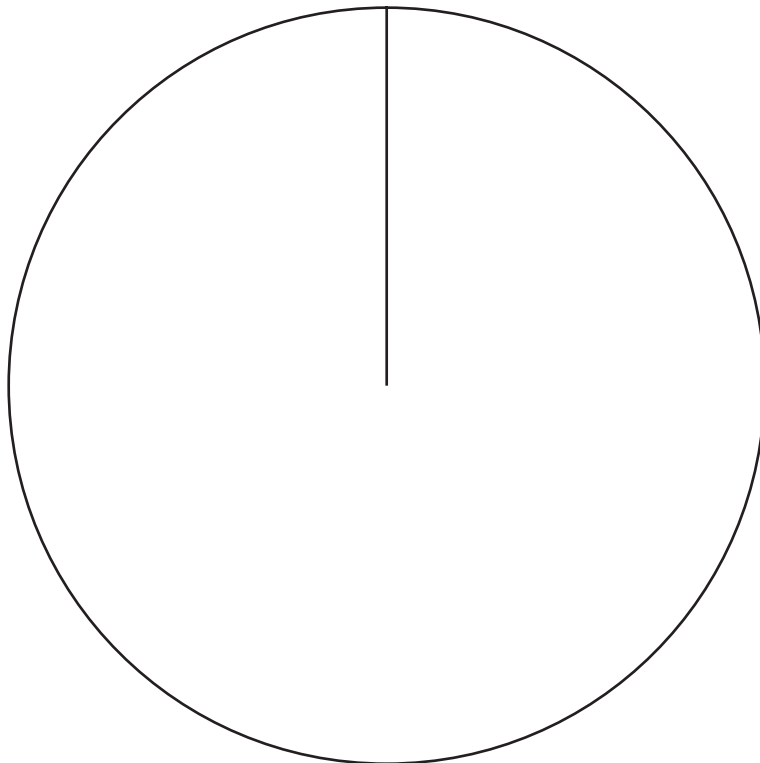
Answer(a)(iii) [2]

(b) The numbers of chocolate, strawberry and vanilla ice-creams sold are shown in the table.

| Flavour | Number of ice-creams | Pie chart sector angle |
|------------|----------------------|------------------------|
| Chocolate | 4200 | 140° |
| Strawberry | 3600 | |
| Vanilla | 3000 | |

(i) Complete the table by working out the sector angles for strawberry and vanilla. [3]

(ii) Complete the pie chart below and label the sectors.

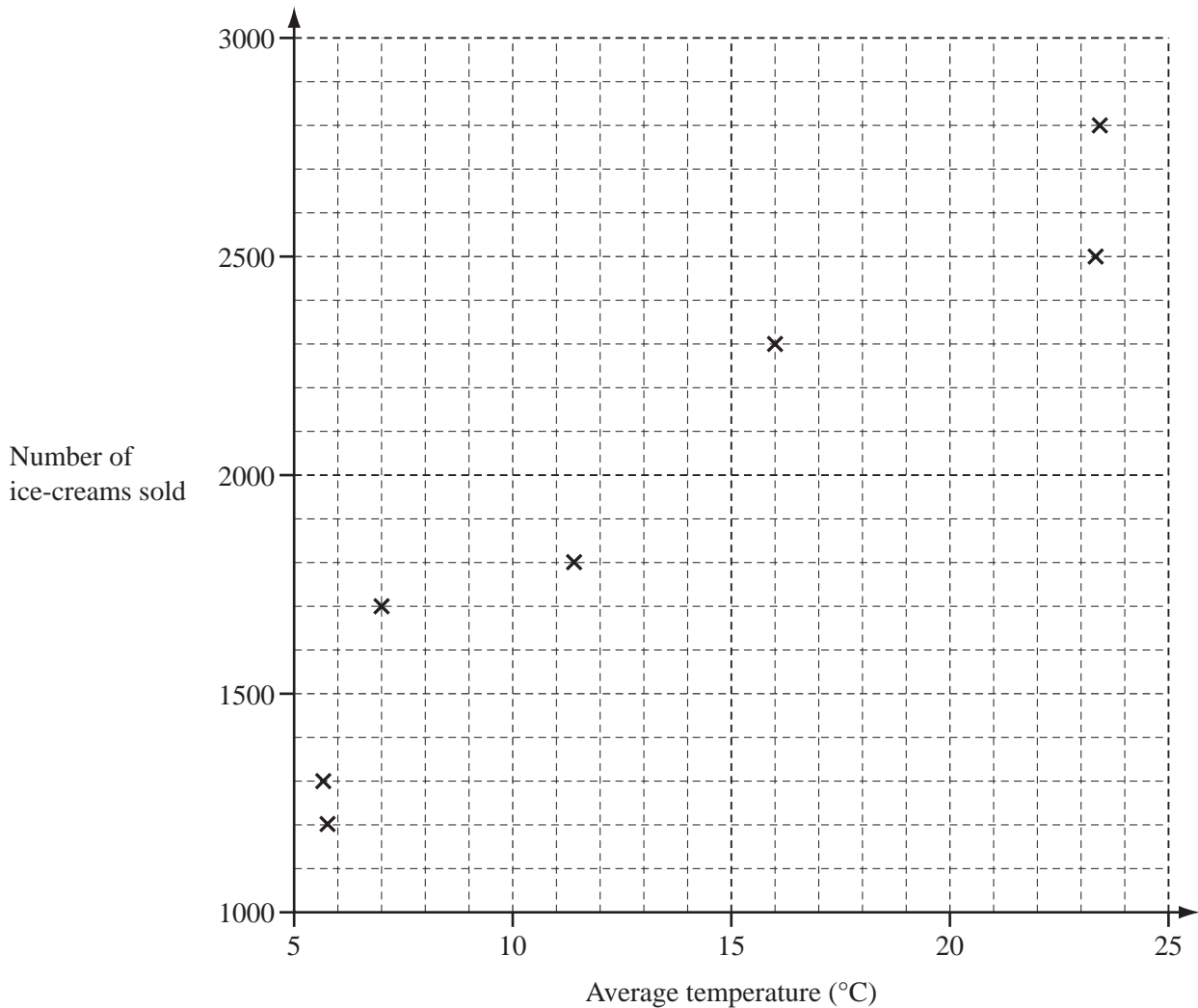


[2]

(c) The table shows the average temperature and the number of ice-creams sold each month.

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Temperature (°C) | 5.6 | 5.7 | 7.0 | 11.4 | 16.0 | 23.3 | 23.4 | 20.0 | 15.5 | 11.5 | 8.0 | 14.0 |
| Number of ice-creams sold | 1300 | 1200 | 1700 | 1800 | 2300 | 2500 | 2800 | 2600 | 1500 | 1600 | 1100 | 1900 |

- (i) Complete the scatter diagram for the months August to December. The points for January to July are plotted for you.



- (ii) What type of correlation does the scatter diagram show? [2]

Answer(c)(ii) [1]

- (iii) Write down a statement connecting the number of ice-creams sold to the average monthly temperature.

Answer(c)(iii) [1]

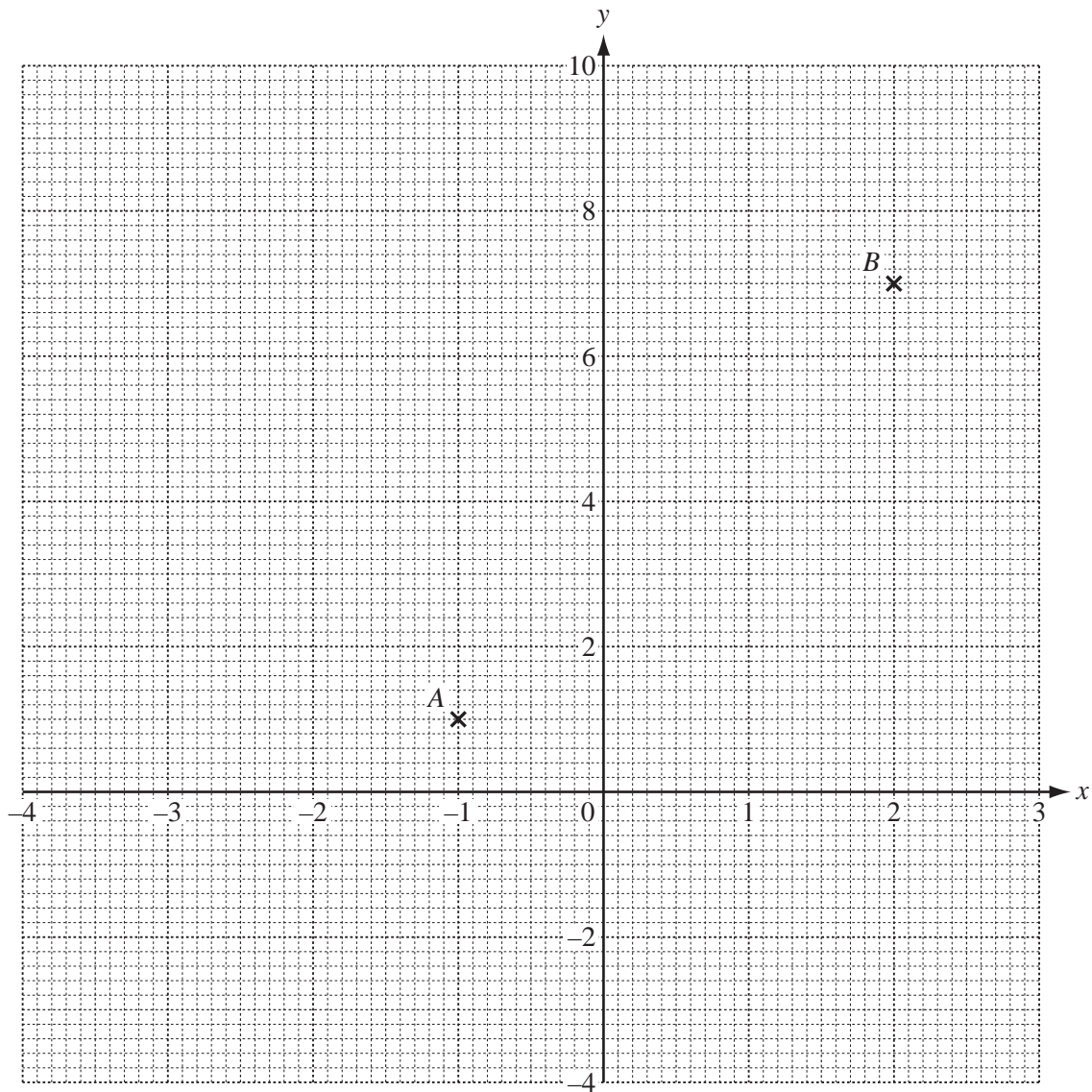
- 7 (a) The table shows some values of the function $y = x^2 + x - 3$.

| | | | | | | | | |
|-----|----|----|----|----|---|----|---|---|
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| y | 9 | 3 | | -3 | | -1 | | 9 |

(i) Complete the table.

[2]

(ii) On the grid, draw the graph of $y = x^2 + x - 3$ for $-4 \leq x \leq 3$.



[4]

(iii) Use your graph to solve the equation $x^2 + x - 3 = 0$.

Answer(a)(iii) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

- (b) (i) Draw the line of symmetry of the graph. [1]
- (ii) Write down the equation of the line of symmetry.

Answer(b)(ii) [1]

- (c) Two points, A and B , are marked on the grid.

- (i) Draw the straight line through the points A and B extending it to the edges of the grid. [1]
- (ii) Write down the co-ordinates of the points of intersection of this line with $y = x^2 + x - 3$.

Answer(c)(ii) (..... ,) and (..... ,) [2]

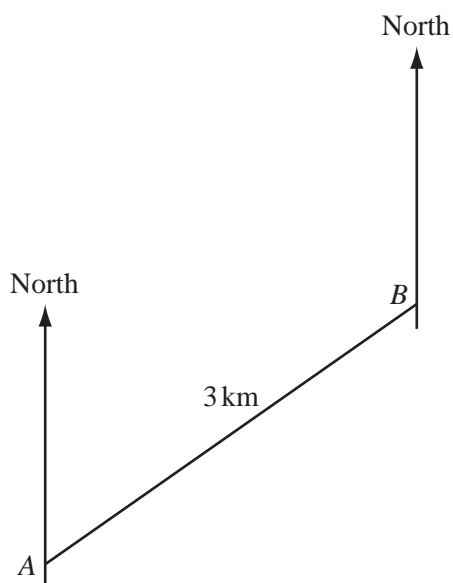
- (iii) Work out the gradient of the straight line through points A and B .

Answer(c)(iii) [2]

- (iv) Write down the equation of the straight line through points A and B , in the form $y = mx + c$.

Answer(c)(iv) $y =$ [2]

- 8 Manuel rows his boat from A to B , a distance of 3 kilometres.
The scale diagram below shows his journey.
1 centimetre represents 0.5 kilometres.



- (a) (i) Measure the bearing of B from A .

Answer(a)(i) [1]

- (ii) The journey from A to B takes him 30 minutes.

Calculate his average speed in kilometres per hour.

Answer(a)(ii) km/h [1]

- (b) From B , Manuel rows 3.5 kilometres in a straight line, on a bearing of 145° , to a point C .

On the diagram, draw accurately this journey and label the point C . [2]

(c) Manuel then rows from C to A .

(i) Measure CA .

Answer(c)(i) cm [1]

(ii) Work out the **actual** distance from C to A .

Answer(c)(ii) km [1]

(iii) By measuring a suitable angle, find the bearing of A from C .

Answer(c)(iii) [1]

(d) Two buoys, P and Q , are on opposite sides of the line AB .

Each buoy is 2 km from A and 1.5 km from B .

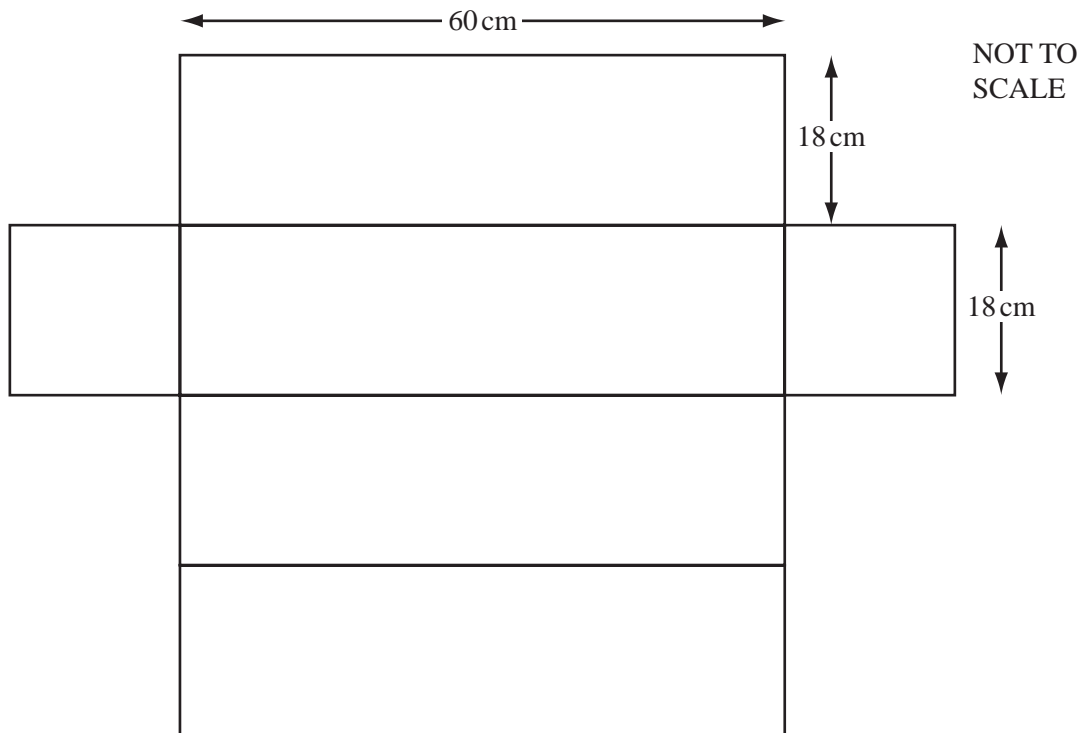
(i) On the diagram, construct and mark the positions of P and Q . [2]

(ii) Measure the distance between P and Q .

Answer(d)(ii) cm [1]

(iii) Find the **actual** distance, PQ , in kilometres.

Answer(d)(iii) km [1]



The diagram shows the net of a box.

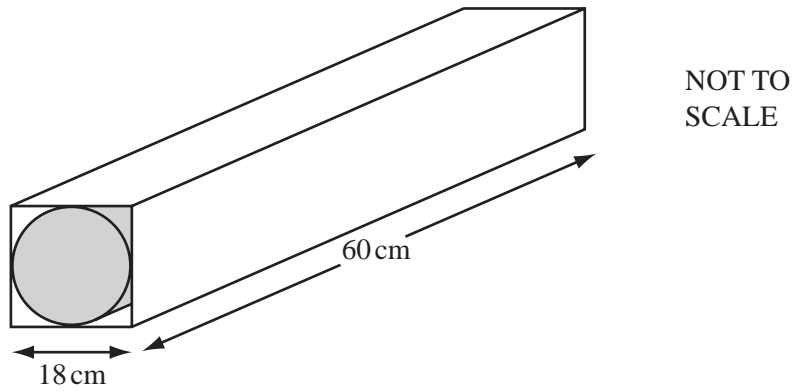
(a) (i) Calculate the **total** surface area of the box.

Answer(a)(i) cm^2 [2]

(ii) Calculate the volume of the box.

Answer(a)(ii) cm^3 [2]

- (b) A cylinder with **diameter** 18 cm and length 60 cm just fits inside the box.



- (i) Calculate the volume of the cylinder.

Answer(b)(i) cm^3 [2]

- (ii) Find the volume of space outside the cylinder but inside the box.

Answer(b)(ii) cm^3 [1]

- (iii) Calculate the curved surface area of the cylinder.

Answer(b)(iii) cm^2 [2]

10 (a) Write down the next two terms in each of the following sequences.

(i) 71, 64, 57, 50, , [1]

(ii) -17, -13, -9, -5, , [2]

(b) The n th term of the sequence in **part (a)(i)** is $78 - 7n$.

Find the value of the 15th term.

Answer(b) [1]

(c) Write down an expression for the n th term of the sequence in **part (a)(ii)**.

Answer(c) [2]

(d) For one value of n , both sequences in **part (a)** have a term with the same value.

Use **parts (b) and (c)** to find

(i) the value of n ,

Answer(d)(i) $n =$ [2]

(ii) the value of this term.

Answer(d)(ii) [2]

1 At a theatre, adult tickets cost \$5 each and child tickets cost \$3 each.

(a) Find the total cost of 110 adult tickets and 85 child tickets.

Answer(a) \$ [2]

(b) The total cost of some tickets is \$750.
There are 120 adult tickets.

Work out the number of child tickets.

Answer(b) [2]

(c) The ratio of the **number** of adults to the **number** of children during one performance is

adults : children = 3 : 2.

(i) The total number of adults and children in the theatre is 150.

Find the number of adults in the theatre.

Answer(c)(i) [2]

(ii) For this performance, find the ratio **total cost** of adult tickets : **total cost** of child tickets.
Give your answer in its simplest form.

Answer(c)(ii) : [3]

(d) The \$5 cost of an adult ticket is increased by 30%.

Calculate the new cost of an adult ticket.

Answer(d) \$ [2]

(e) The cost of a child ticket is reduced from \$3 to \$2.70.

Calculate the percentage decrease in the cost of a child ticket.

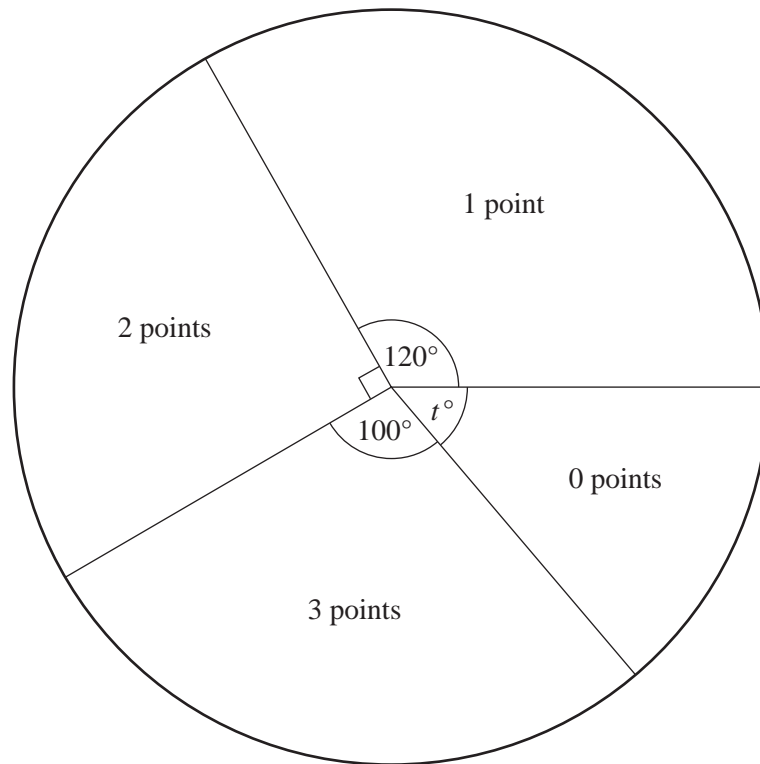
Answer(e) % [3]



- (a) In the space above, construct triangle PQR with $QR = 9$ cm and $PR = 7$ cm.
 Leave in your construction arcs.
 The line PQ is already drawn. [2]
- (b) Using a straight edge and compasses only, construct
- (i) the perpendicular bisector of PR , [2]
 - (ii) the bisector of angle QPR . [2]
- (c) Shade the region inside the triangle PQR which is
 nearer to P than to R **and** nearer to PQ than to PR . [1]
- (d) Triangle PQR is a scale drawing with a scale 1 : 50 000.
 Find the **actual** distance QR .
 Give your answer in kilometres.

Answer(d) km [2]

- 3 288 students took part in a quiz.
There were three questions in the quiz.
Each correct answer scored 1 point.
The pie chart shows the results.



- (a) Find the value of t .

Answer(a) $t =$ [1]

- (b) Find the number of students who scored 2 points.

Answer(b) [2]

- (c) Find the modal number of points.

Answer(c) [1]

- (d) (i) Use the information in the pie chart to complete the frequency table for the 288 students.

| | | | | |
|--------------------|---|---|---|---|
| Number of points | 0 | 1 | 2 | 3 |
| Number of students | | | | |

[2]

- (ii) Calculate the mean number of points.

Answer(d)(ii) [3]

- (e) One student is chosen at random.

Find the probability that this student scored

- (i) 3 points,

Answer(e)(i) [1]

- (ii) at least 1 point,

Answer(e)(ii) [2]

- (iii) more than 3 points.

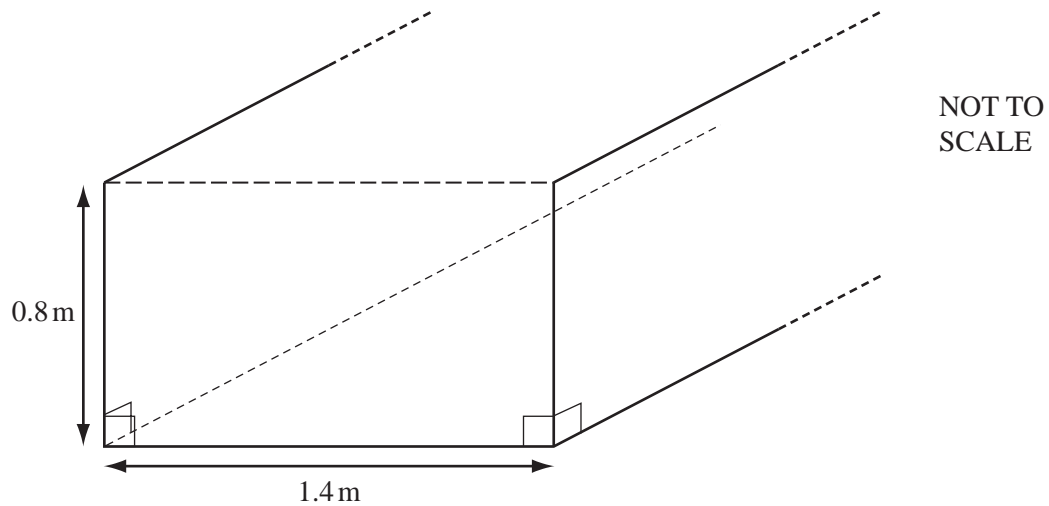
Answer(e)(iii) [1]

- (f) 1440 students took part in the same quiz.

How many students would be expected to score 3 points?

Answer(f) [1]

4



The diagram shows part of a trench.
 The trench is made by removing soil from the ground.
 The cross-section of the trench is a rectangle.
 The depth of the trench is 0.8 m and the width is 1.4 m.

(a) Calculate the area of the cross-section.

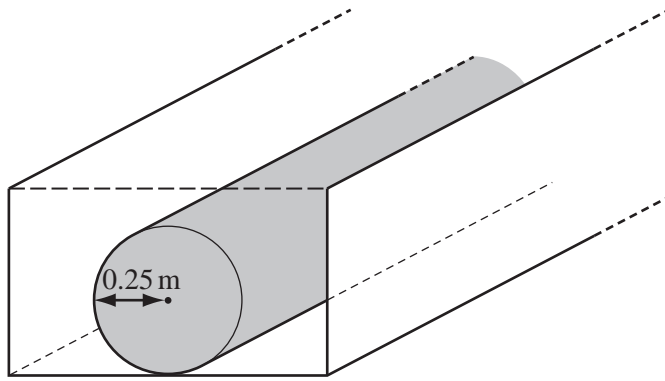
Answer(a) m^2 [2]

(b) The length of the trench is 200 m.

Calculate the volume of soil removed.

Answer(b) m^3 [1]

(c)

NOT TO
SCALE

A pipe is put in the trench.

The pipe is a cylinder of radius 0.25 m and length 200 m.

- (i) Calculate the volume of the pipe.

[The volume, V , of a cylinder of radius r and length l is $V = \pi r^2 l$.]

Answer(c)(i) m^3 [2]

- (ii) The trench is then filled with soil.
Find the volume of soil put back into the trench.

Answer(c)(ii) m^3 [1]

- (iii) The soil which is **not used** for the trench is spread evenly over a horizontal area of 8000 m^2 .

Calculate the depth of this soil.

Give your answer in **millimetres**, correct to 1 decimal place.

Answer(c)(iii) mm [3]

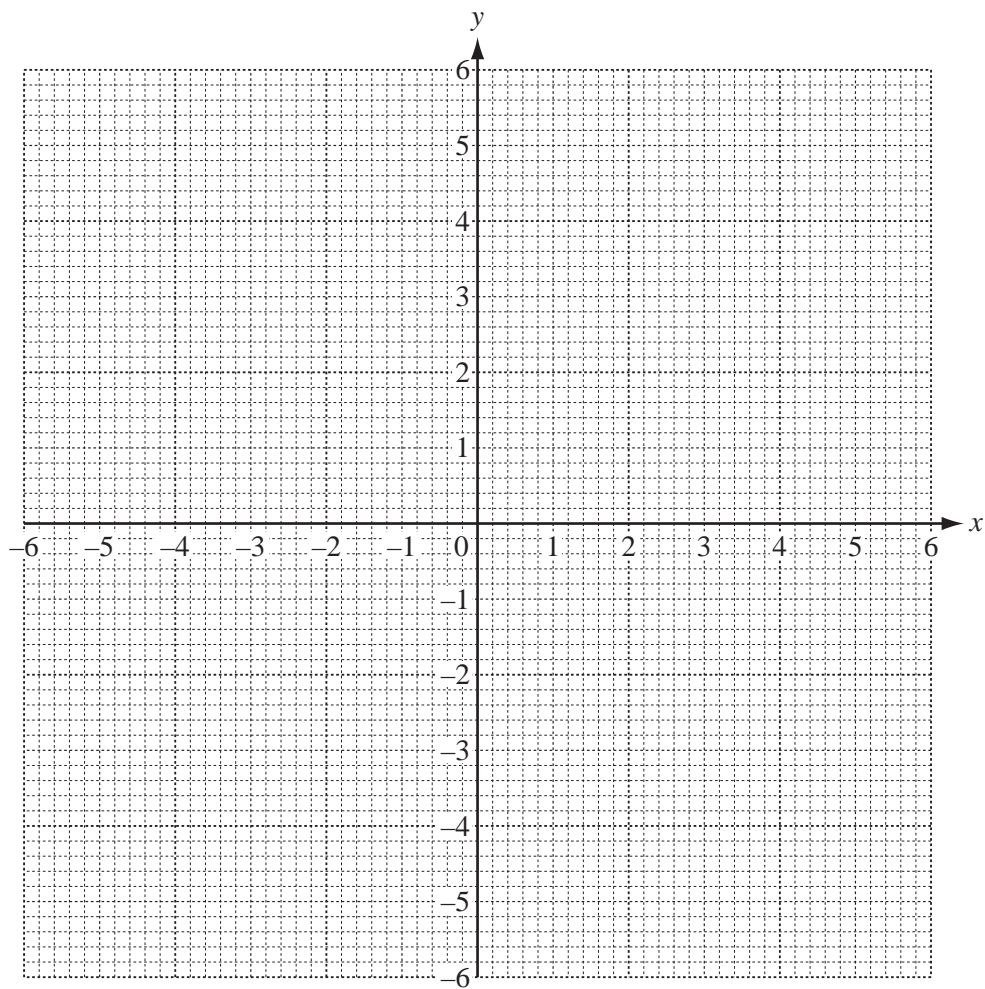
- 5 (a) (i) Complete the table for the function $y = \frac{6}{x}$, $x \neq 0$.

For
Examiner's
Use

| | | | | | | | | | | | | |
|-----|----|------|----|----|----|----|---|---|---|---|-----|---|
| x | -6 | -5 | -4 | -3 | -2 | -1 | 1 | 2 | 3 | 4 | 5 | 6 |
| y | -1 | -1.2 | | -2 | -3 | -6 | 6 | 3 | | | 1.2 | 1 |

[2]

- (ii) On the grid, draw the graph of $y = \frac{6}{x}$ for $-6 \leq x \leq -1$ and $1 \leq x \leq 6$.



[4]

- (b) (i) Complete the table for the function $y = \frac{x^2}{2} - 2$.

| | | | | | | | | | |
|-----|----|-----|----|----|----|---|---|-----|---|
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| y | 6 | 2.5 | | | -2 | | | 2.5 | 6 |

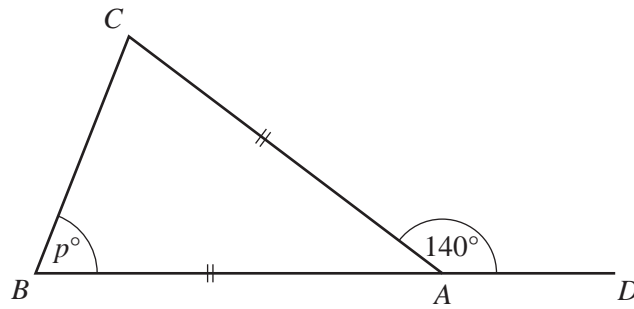
[2]

- (ii) On the grid opposite, draw the graph of $y = \frac{x^2}{2} - 2$ for $-4 \leq x \leq 4$. [4]

- (c) Write down the co-ordinates of the point of intersection of the two graphs.

Answer(c)(..... ,) [2]

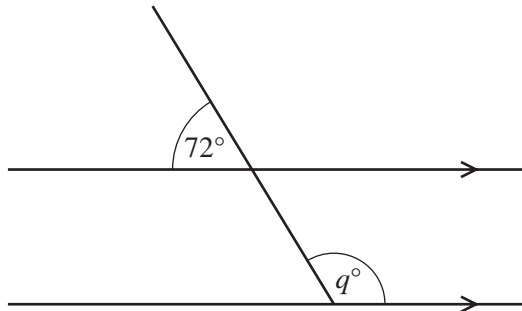
6 (a)

NOT TO
SCALE

The diagram shows a triangle ABC with BA extended to D .
 $AB = AC$ and angle $CAD = 140^\circ$.
 Find the value of p .

Answer(a) $p =$ [2]

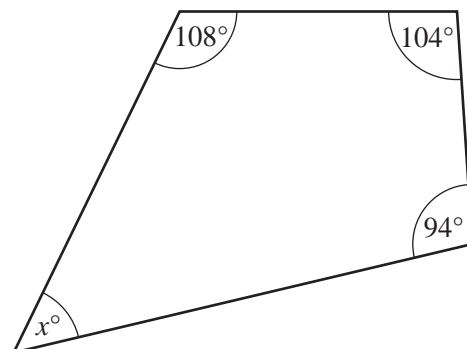
(b)

NOT TO
SCALE

Find the value of q .

Answer(b) $q =$ [2]

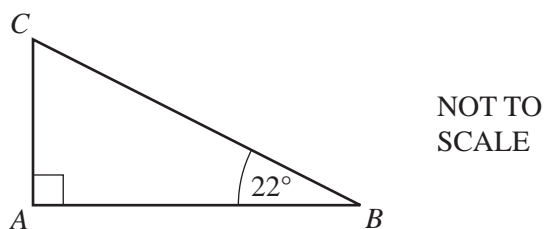
(c)

NOT TO
SCALE

Find the value of x .

Answer(c) $x =$ [1]

(d)

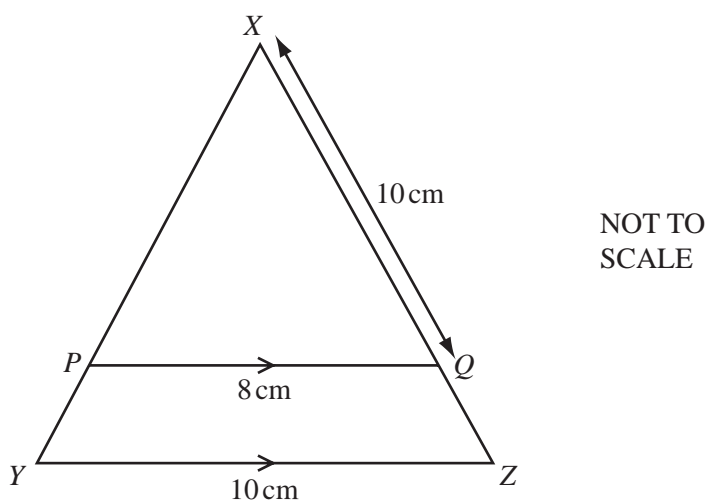


In triangle ABC , angle $A = 90^\circ$ and angle $B = 22^\circ$.

Calculate angle C .

Answer(d) Angle $C =$ [1]

(e)



In triangle XYZ , P is a point on XY and Q is a point on XZ .
 PQ is parallel to YZ .

(i) Complete the statement.

Triangle XPQ is to triangle XYZ . [1]

(ii) $PQ = 8$ cm, $XQ = 10$ cm and $YZ = 10$ cm.

Calculate the length of XZ .

Answer(e)(ii) $XZ =$ cm [2]

7 (a) Solve the equations.

(i) $2x + 3 = 15 - x$

Answer(a)(i) $x =$ [2]

(ii) $\frac{2y-1}{3} = 7$

Answer(a)(ii) $y =$ [2]

(iii) $2 = \frac{1}{u-1}$

Answer(a)(iii) $u =$ [3]

(b) Write down equations to show the following.

(i) p is equal to r plus two times q .

Answer(b)(i) [1]

(ii) k is equal to the square of the sum of l and m .

Answer(b)(ii) [2]

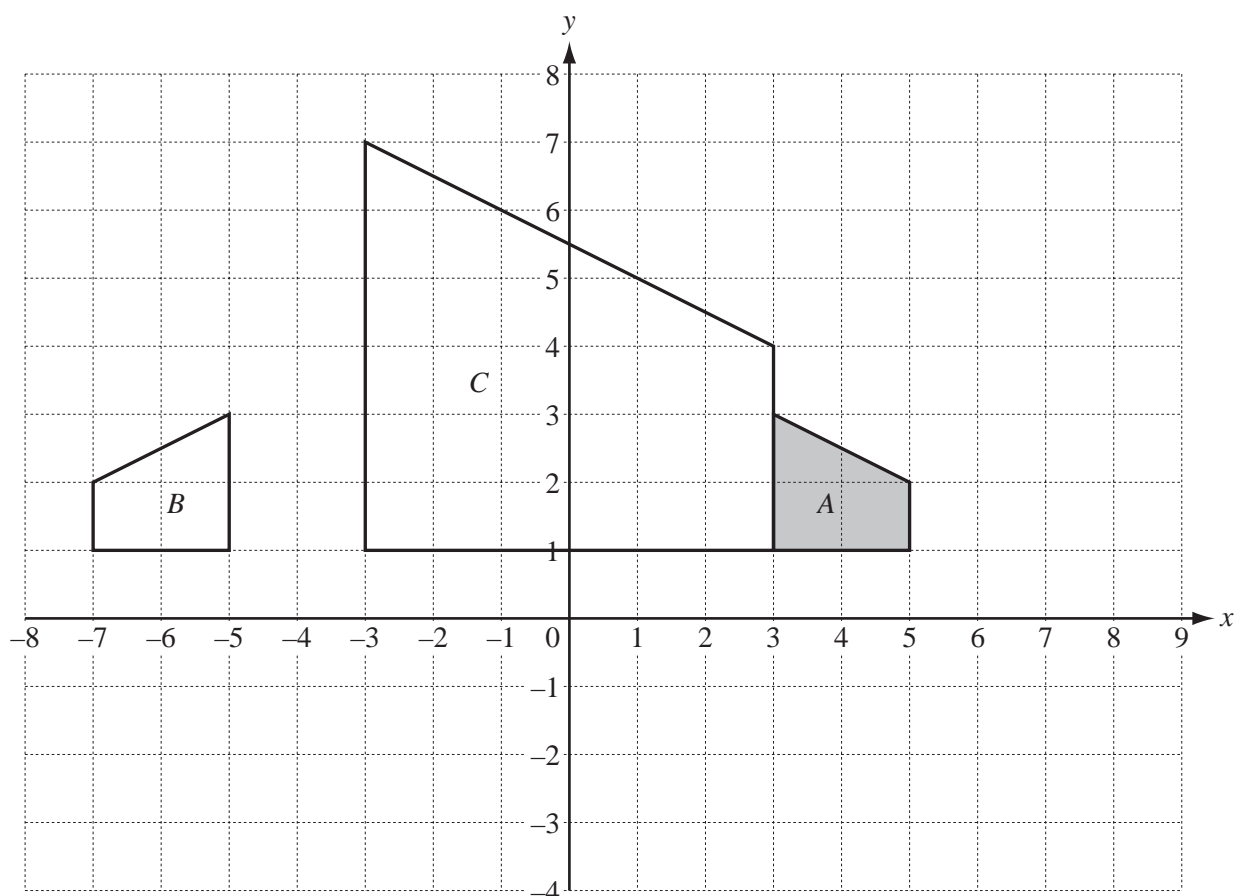
(c) Pierre walks for 2 hours at w km/h and then for another 3 hours at $(w - 1)$ km/h.

The total distance of Pierre's journey is 11.5 km.

Find the value of w .

Answer(c) $w =$ [4]

8



(a) On the grid, draw the images of the following transformations of **shape A**.

(i) Reflection in the x -axis [1]

(ii) Translation by the vector $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$ [2]

(iii) Rotation, centre $(0, 0)$, through 180° [2]

(b) Describe fully the **single** transformation that maps

(i) shape A onto shape B ,

Answer(b)(i) [2]

(ii) shape A onto shape C .

Answer(b)(ii) [3]

9



Diagram 1 Diagram 2 Diagram 3 Diagram 4 Diagram 5

The Diagrams above form a pattern.

(a) Draw Diagram 5 in the space provided. [1]

(b) The table shows the numbers of dots in some of the diagrams.
Complete the table.

| | | | | | | | | | |
|----------------|---|---|---|---|---|--|----|--|-----|
| Diagram | 1 | 2 | 3 | 4 | 5 | | 10 | | n |
| Number of dots | 3 | 5 | | | | | | | |

[5]

(c) What is the value of n when the number of dots is 737?

Answer(c) [2]

(d) Complete the table which shows the **total** number of dots in consecutive pairs of diagrams.

For example, the **total** number of dots in Diagram 2 and Diagram 3 is 12.

| | | | | | | | | |
|----------------------|---------|---------|---------|---------|--|-----------|--|-----------------|
| Diagrams | 1 and 2 | 2 and 3 | 3 and 4 | 4 and 5 | | 10 and 11 | | n and $n + 1$ |
| Total number of dots | 8 | 12 | 16 | | | | | |

[3]

- 1 On Monday the temperature was -3°C .
On Tuesday the temperature fell by 5°C .

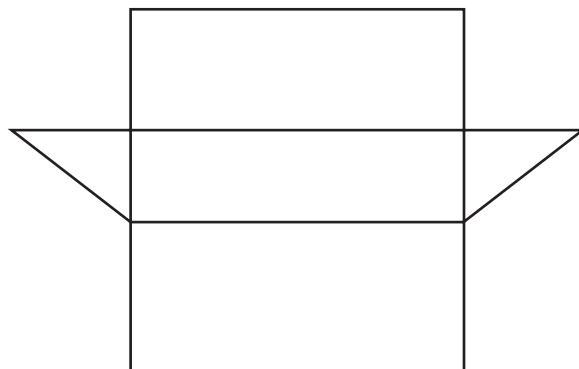
Write down the temperature on Tuesday.

Answer $^{\circ}\text{C}$ [1]

- 2 Write 0.00387 in standard form.

Answer [1]

3



The diagram is an accurate net for a solid shape.

Write down the geometrical name for this solid shape.

Answer [1]

- 4 On a map, a straight section of a canal is 3.5 cm long.
The scale of the map is 1 cm to 5 km.

Calculate the actual length of this straight section.

Answer km [1]

- 5 Sophie invests \$450 at a rate of 1.5% per year **simple** interest.

Calculate the interest she earns after 8 years.

Answer \$ [2]

6

$A \cdot$

$\cdot B$

Using a straight edge and compasses only, construct the locus of points which are equidistant from point A and from point B .

Show clearly all your construction arcs.

[2]

- 7 A box is 12 cm high, correct to the nearest centimetre.

Complete the statement about the height, h cm, of the box.

Answer $\leq h <$ [2]

- 8 The metal used to make a coin is a mixture of steel and copper.

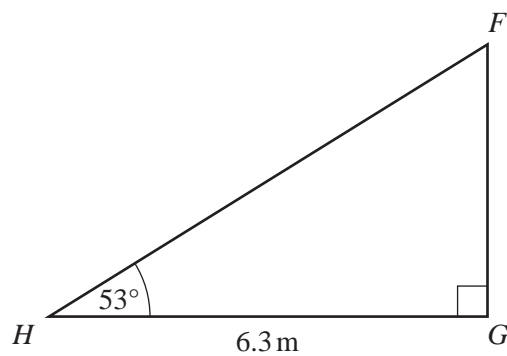
The ratio mass of steel : mass of copper is 108 : 7.

The coin has a total mass of 230 milligrams.

Calculate the mass of copper in this coin.

Answer milligrams [2]

9



NOT TO
SCALE

Calculate the length FG .

Answer m [2]

- 10 Use your calculator to find the value of $\sqrt{25.63}$.

Write down your answer

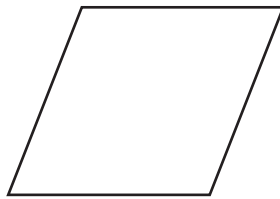
- (a) as it appears on your calculator,

Answer(a) [1]

- (b) correct to 4 significant figures.

Answer(b) [1]

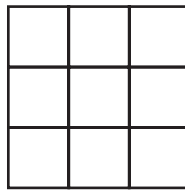
- 11 (a)



The diagram shows a rhombus.

Draw all the lines of symmetry. [2]

- (b)



Shade **two** squares in the diagram above so that the figure has **one** line of symmetry and **no** rotational symmetry. [1]

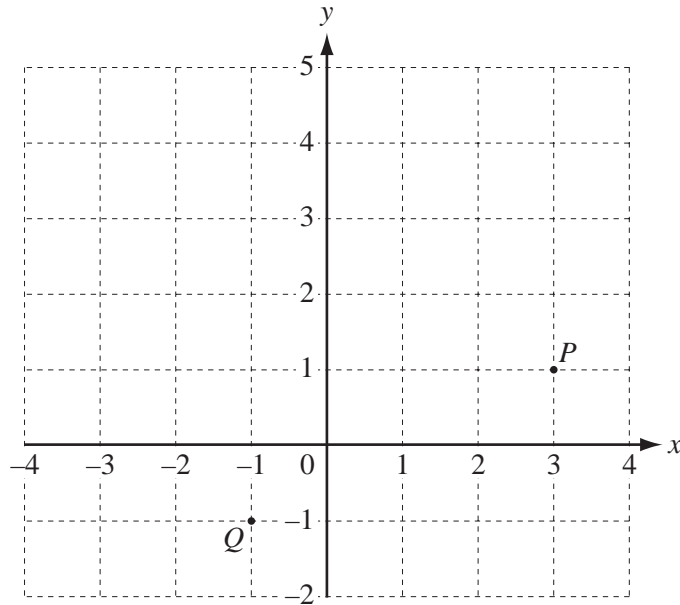
- 12 Solve the simultaneous equations.

$$\begin{aligned} 3x + y &= 18 \\ 4x - 2y &= 34 \end{aligned}$$

Answer $x =$

$y =$ [3]

13



The points $P(3, 1)$ and $Q(-1, -1)$ are marked on the grid.

(a) Write down the vector \vec{QP} .

$$\text{Answer(a)} \quad \vec{QP} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(b) R and S are two more points.

$$\vec{PR} = \begin{pmatrix} -2 \\ 1 \end{pmatrix} \text{ and } \vec{PS} = 3 \vec{PR}.$$

(i) Write down the vector \vec{PS} .

$$\text{Answer(b)(i)} \quad \vec{PS} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(ii) Mark the point S on the grid. [1]

14 Simplify the following.

(a) 8^0

Answer(a) [1]

(b) $(x^5)^2$

Answer(b) [1]

(c) $p^{-3} \div p^4$

Answer(c) [1]

15 A tourist changes \$900 to euros (€) when the exchange rate is €1 = \$1.356.

Calculate the amount he receives.

Give your answer correct to 2 decimal places.

Answer € [3]

- 16 (a) Write down all the common factors of 30 and 42.

Answer(a) [2]

- (b) Write down the smallest number which is a multiple of both 12 and 18.

Answer(b) [2]

- 17 Simon has ten cards, numbered 1 to 10.
He chooses a card at random.

Write down the probability that the number on the card is

- (a) 8,

Answer(a) [1]

- (b) 12,

Answer(b) [1]

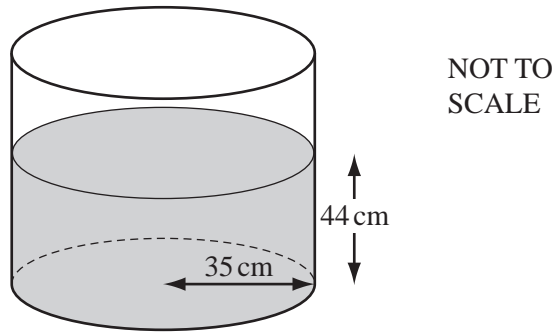
- (c) an odd number,

Answer(c) [1]

- (d) not a multiple of 3.

Answer(d) [1]

18



A cylindrical tank, with radius 35 cm, is filled with water to a depth of 44 cm.

(a) Calculate the area of the base of the tank.

Answer(a) cm^2 [2]

(b) Calculate the volume of water in the tank.

Answer(b) cm^3 [1]

(c) Change your answer to **part (b)** into litres.

Answer(c) litres [1]

19 In this question, **you must show all the steps in your working.**

Without using a calculator, find the value of

(a) $1\frac{1}{3} \div 2\frac{4}{5}$,

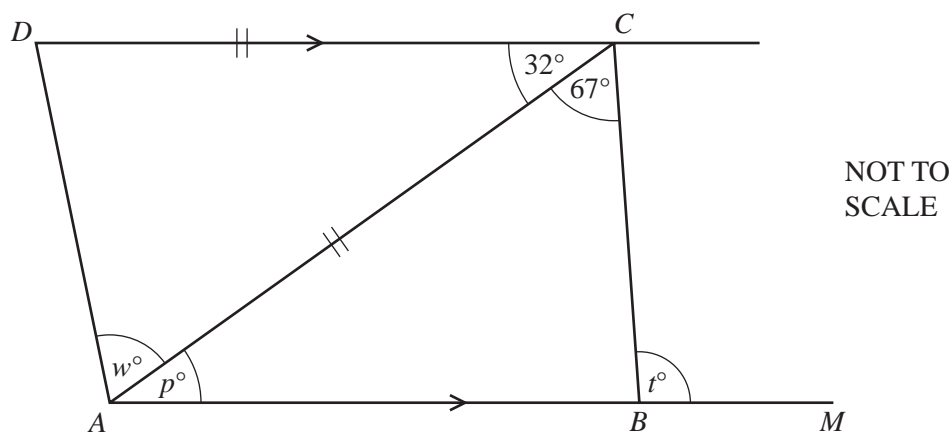
Answer(a) [3]

(b) $\frac{13}{15} + \frac{3}{5}$.

Give your answer as a mixed number.

Answer(b) [3]

20



The diagram shows a quadrilateral $ABCD$ with DC parallel to AB .

- (a) Write down the geometrical name for a quadrilateral with **only one** pair of parallel sides.

Answer(a) [1]

- (b) ABM is a straight line and $DC = AC$.
Angle $DCA = 32^\circ$ and angle $ACB = 67^\circ$.

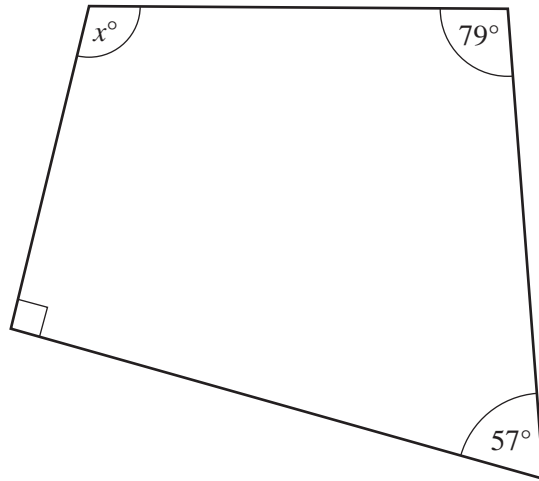
Find the values of p , t and w , giving a reason for each answer.

Answer (b) $p =$ because [2]

$t =$ because [2]

$w =$ because [2]

1



NOT TO
SCALE

The diagram shows a quadrilateral.
Work out the value of x .

Answer $x =$ [1]

- 2 Caroline changed £200 into New Zealand dollars (NZ\$).
The exchange rate was £1 = NZ\$2.56 .

How many New Zealand dollars did she receive?

Answer NZ\$ [1]

- 3 Francis recorded a temperature of -4°C on Sunday.
By Monday it had gone down by 3°C .

(a) Find the temperature on Monday.

Answer(a) $^{\circ}\text{C}$ [1]

(b) On Tuesday the temperature was -1°C .

Find the change in temperature between Monday and Tuesday.

Answer(b) $^{\circ}\text{C}$ [1]

- 4 The distance from the Sun to the planet Saturn is 1 429 400 000 kilometres.

Write this distance in standard form, correct to 3 significant figures.

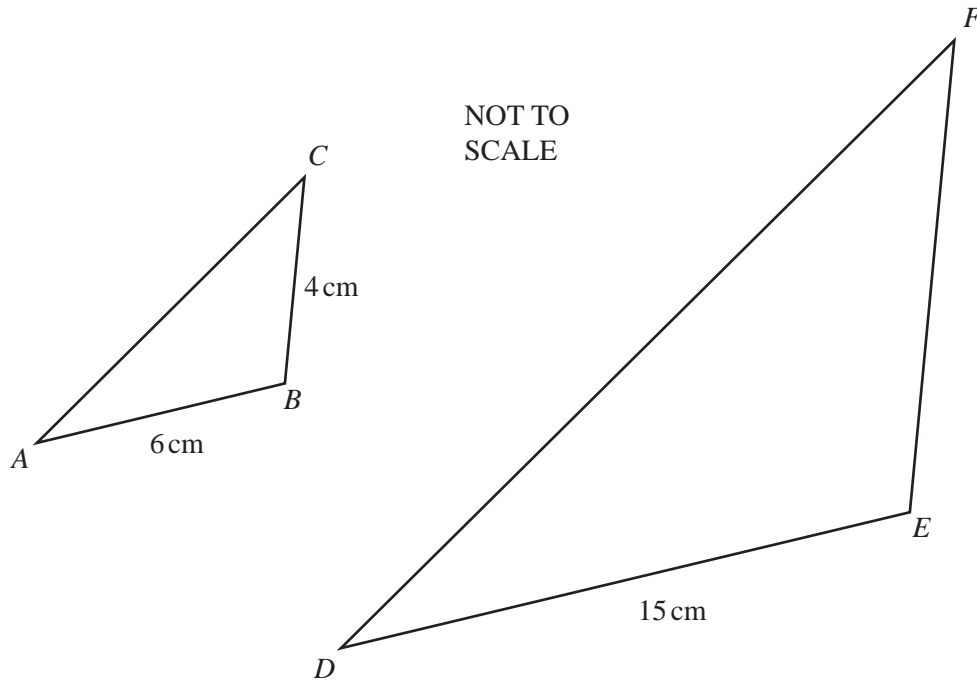
Answer km [2]

- 5 A factory makes doors that are each 900 millimetres wide, correct to the nearest millimetre.

Complete the statement about the width, w millimetres, of each door.

Answer $\leq w <$ [2]

6



The triangles ABC and DEF are similar.
 $AB = 6\text{ cm}$, $BC = 4\text{ cm}$ and $DE = 15\text{ cm}$.

Calculate EF .

Answer $EF = \dots\dots\dots\text{ cm}$ [2]

- 7 Maria puts \$600 into a bank account for 3 years at a rate of 3.4% per year **compound** interest.

Calculate how much will be in the account at the end of the 3 years.

Answer \$ \dots\dots\dots\$ [3]

- 8 (a) Factorise completely.

$$8pq + 12pr$$

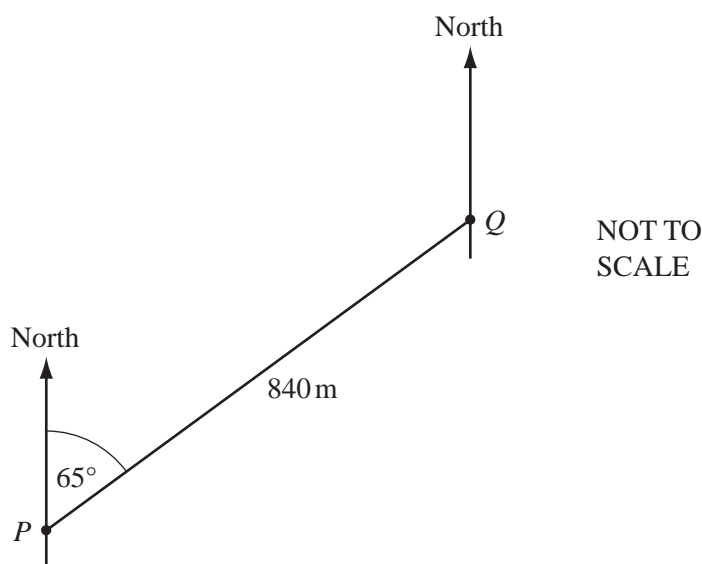
Answer(a) [2]

- (b) Use your answer to **part (a)** to make p the subject of the formula below.

$$s = 8pq + 12pr$$

Answer(b) $p =$ [1]

9



The diagram shows a straight road PQ .
 $PQ = 840\text{m}$ and the bearing of Q from P is 065° .

- (a) Work out the bearing of P from Q .

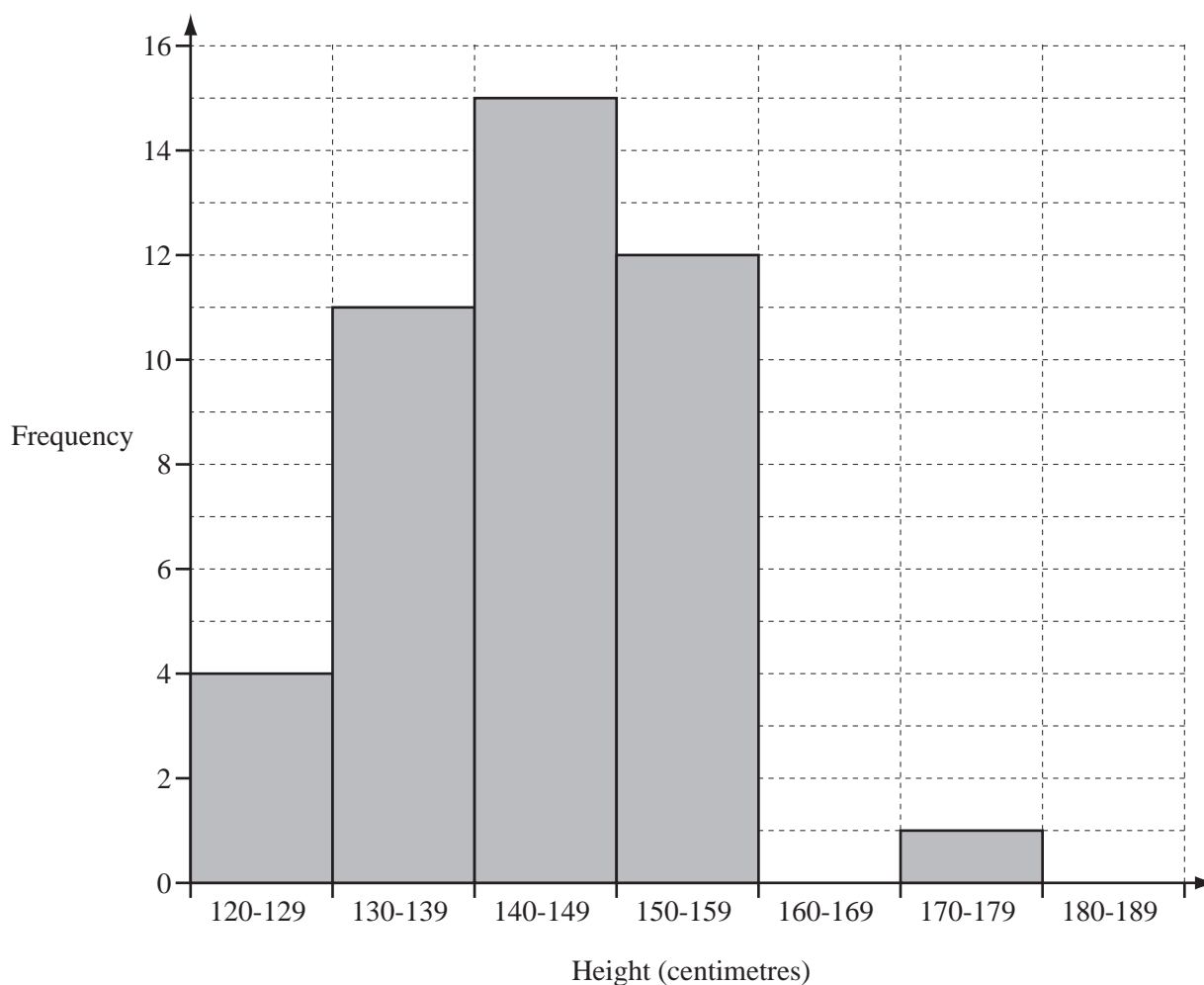
Answer(a) [1]

- (b) Calvin walks $\frac{4}{7}$ of the distance from P to Q .

How far is he **from** Q ?

Answer(b) m [2]

- 10 The heights of 43 children are measured to the nearest centimetre.
Braima draws a bar chart from this information.



A child is chosen at random.

Write down, as a fraction, the probability that the child will be

- (a) in the group 140 – 149 cm,

Answer(a) [1]

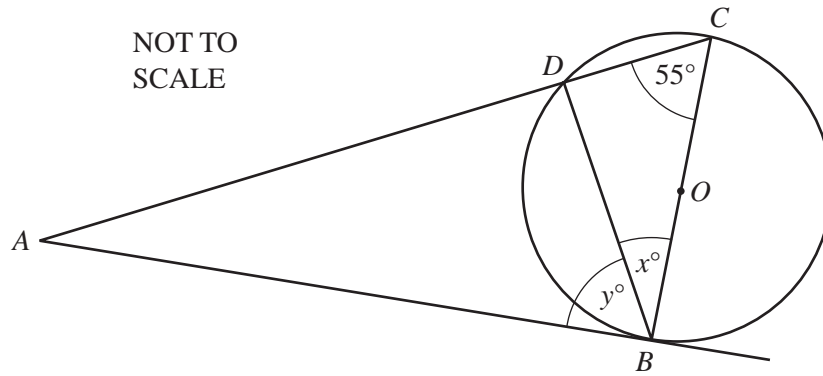
- (b) less than 160 cm,

Answer(b) [1]

- (c) in the group 160 – 169 cm.

Answer(c) [1]

11



The diagram shows a circle, centre O , with diameter BC .
 AB is a tangent to the circle at B and angle $BCD = 55^\circ$.
 A straight line from A meets the circle at D and C .

Calculate the value of

(a) x ,

Answer(a) $x =$ [2]

(b) y .

Answer(b) $y =$ [1]

12 (a) Write down the value of x when

(i) $5^x \div 5^2 = 5^4$,

Answer(a)(i) $x =$ [1]

(ii) $\frac{1}{49} = 7^x$.

Answer(a)(ii) $x =$ [1]

(b) Write down the value of $3p^0$.

Answer(b) [1]

13 Dominic, Esther, Flora and Galena shared a pizza.

- (a) Dominic ate $\frac{1}{5}$ of the pizza and Esther ate $\frac{2}{7}$ of the pizza.

Show that $\frac{18}{35}$ of the pizza remained.

Do not use your calculator and show all your working.

Answer (a)

[2]

- (b) Flora ate $\frac{2}{3}$ of the **pizza that remained**.

Find the fraction of the pizza that was left for Galena.

Answer(b) [2]

14

$$\frac{9.6 \times 7.8 - 0.53 \times 86}{4.95}$$

- (a) (i) Rewrite this calculation with each number written correct to 1 significant figure.

Answer(a)(i)

[1]

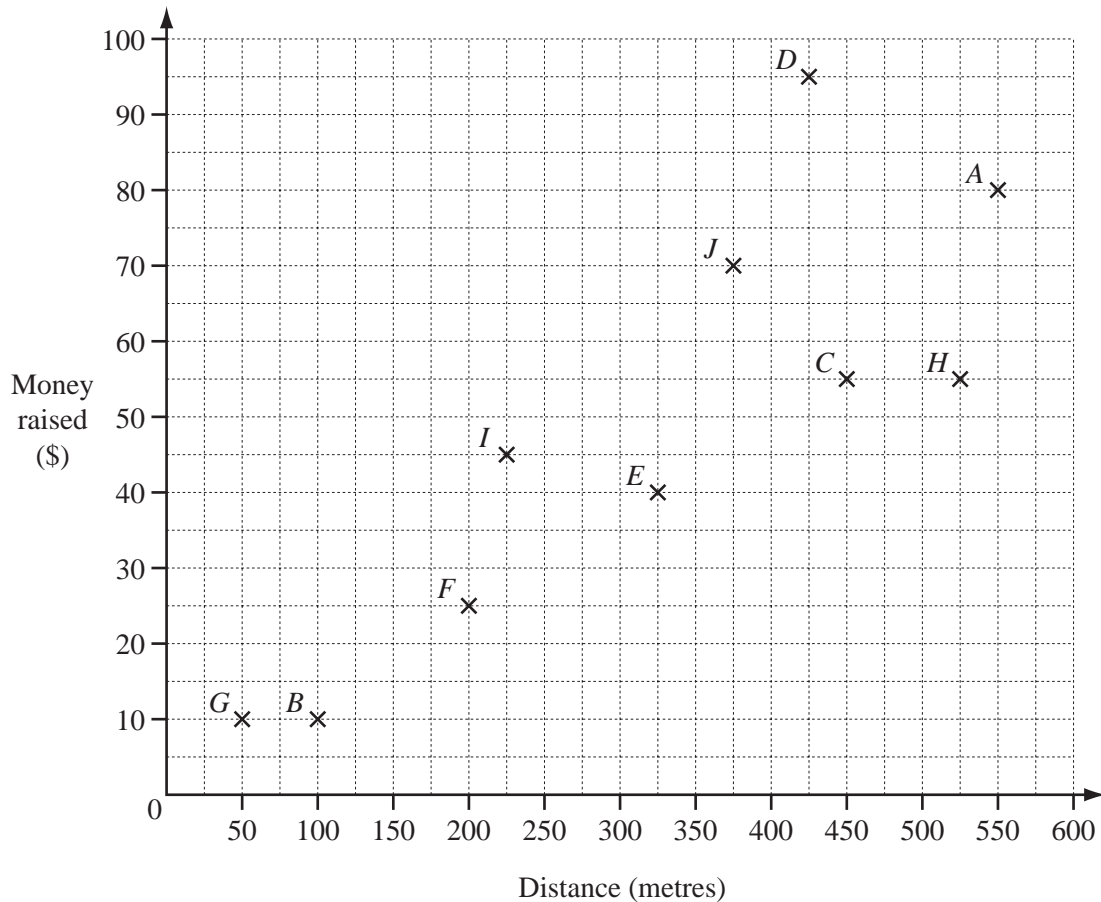
- (ii) Work out the answer to your calculation in **part(a)(i)**.
Do not use a calculator and show all your working.

Answer(a)(ii) [2]

- (b) Use your calculator to work out the correct answer to the original calculation.

Answer(b) [1]

- 15 Some children took part in a sponsored swim to raise money for charity. The scatter diagram shows the results for 10 of the children.



- (a) (i) How much further did *A* swim than *J*?

Answer(a)(i) m [1]

- (ii) How much more money did *D* raise than *F*?

Answer(a)(ii) \$ [1]

- (b) The results for 2 more children are given in the table below.

| Child | Distance (m) | Money raised (\$) |
|----------|--------------|-------------------|
| <i>K</i> | 125 | 35 |
| <i>L</i> | 475 | 80 |

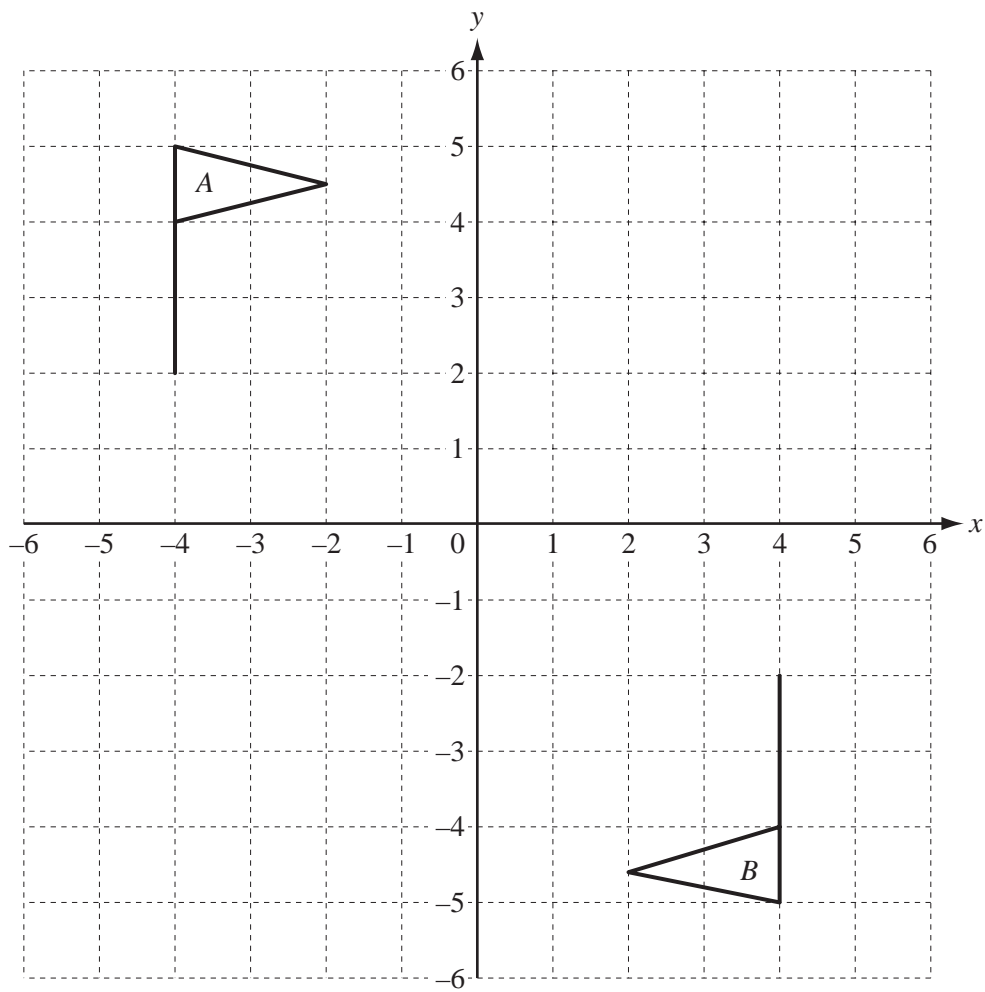
Plot the results for *K* and *L* on the scatter diagram.

[1]

- (c) What type of correlation does the scatter diagram show?

Answer(c) [1]

16 Flags A and B are shown on the grid.



- (a) Describe fully the **single** transformation which maps flag A onto flag B .

Answer(a)
 [3]

- (b) On the grid, draw the translation of flag A by the vector $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$. [2]

17

$$\vec{AB} = \begin{pmatrix} 3 \\ -3 \end{pmatrix}$$

$$\vec{AC} = \begin{pmatrix} -5 \\ 0 \end{pmatrix}$$

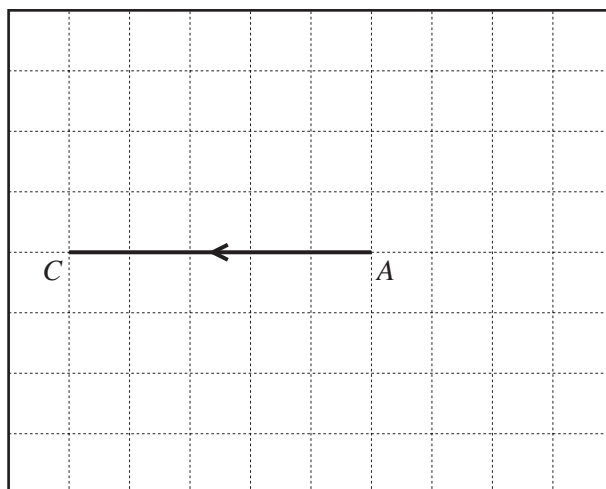
(a) Calculate $\vec{AB} + 3\vec{AC}$.

$$\text{Answer(a)} \quad \begin{pmatrix} \\ \end{pmatrix} \quad [2]$$

(b) Write down \vec{BA} .

$$\text{Answer(b)} \quad \vec{BA} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(c) \vec{AC} is drawn on the grid below.



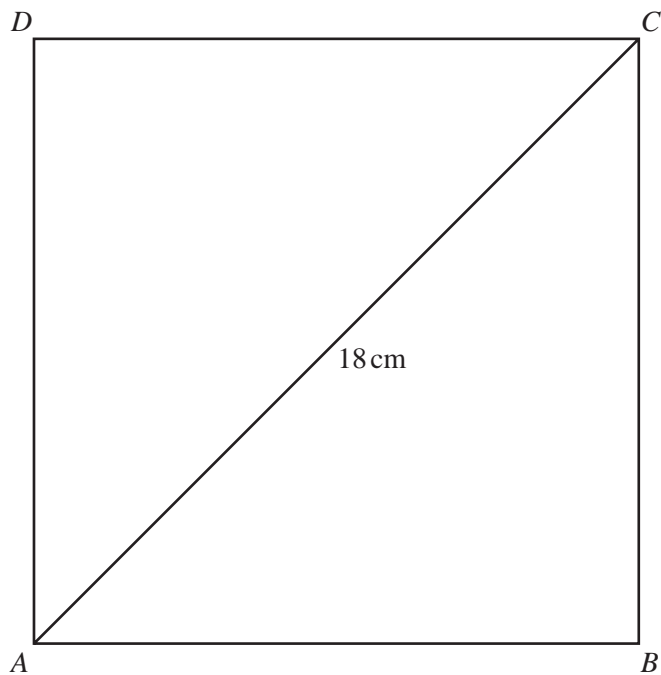
(i) On the grid, draw \vec{AB} . [1]

(ii) Write down the obtuse angle between \vec{AB} and \vec{AC} .

Answer(c)(ii) [1]

Question 18 is printed on the next page.

18

NOT TO
SCALE

The diagram shows a square $ABCD$.
The length of the diagonal AC is 18 cm.

(a) Calculate

(i) the length of the side of the square,

Answer(a)(i) cm [2]

(ii) the area of the square.

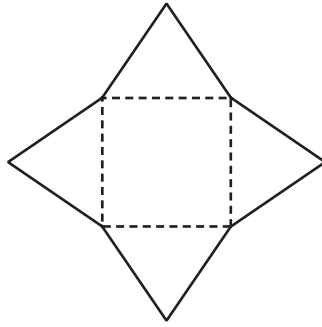
Answer(a)(ii) cm^2 [2]

(b) A , B , C and D lie on a circle with diameter AC .

Calculate the area of this circle.

Answer(b) cm^2 [2]

1



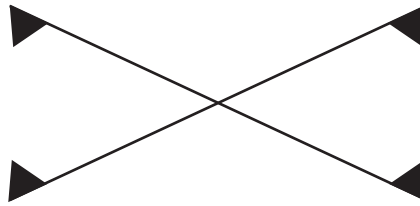
Write down the name of the solid that can be made from the net shown in the diagram.

Answer [1]

2 Write down all the square numbers which are factors of 100.

Answer [2]

3



For the diagram, write down

(a) the number of lines of symmetry,

Answer(a) [1]

(b) the order of rotational symmetry.

Answer(b) [1]

4 In a desert the temperature at noon was 38°C .
At midnight the temperature was -3°C .

(a) Find the change in temperature between noon and midnight.

Answer(a) $^{\circ}\text{C}$ [1]

(b) At 02 00 the temperature was 4°C below the midnight temperature.

Write down the temperature at 02 00.

Answer(b) $^{\circ}\text{C}$ [1]

- 5 Multiply out the brackets.

$$x(2x + y)$$

Answer [2]

- 6 Solve the equation.

$$\frac{2x + 1}{3} = 4$$

Answer $x =$ [2]

- 7 Work out $\sqrt[3]{7.2^3 - 100}$.
Give your answer correct to 3 decimal places.

Answer [2]

- 8 Chris and Max share \$45 in the ratio Chris:Max = 7 : 2 .

Calculate how much Chris receives.

Answer \$ [2]

- 9 When Valentina was 10 years old, her mass was 32 kg.
Two years later her mass had increased by 45%.

Calculate Valentina's mass when she was 12 years old.

Answer kg [2]

- 10 Change 18.75% into a fraction.

Write your answer in its lowest terms.

Answer [2]

- 11 Factorise completely.

$$3ac - 6ad$$

Answer [2]

- 12 Simplify $\left(1\frac{1}{2}\right)^{-3}$.

Give your answer as a fraction.

Answer [2]

- 13 Solve the simultaneous equations.

$$3x + y = 5$$

$$5x + y = 9$$

Answer $x =$
 $y =$ [2]

14

17

27

$\sqrt{17}$

0.294

$\frac{5}{17}$

From the list of numbers, write down

(a) a prime number,

Answer(a) [1]

(b) an irrational number,

Answer(b) [1]

(c) the smallest number.

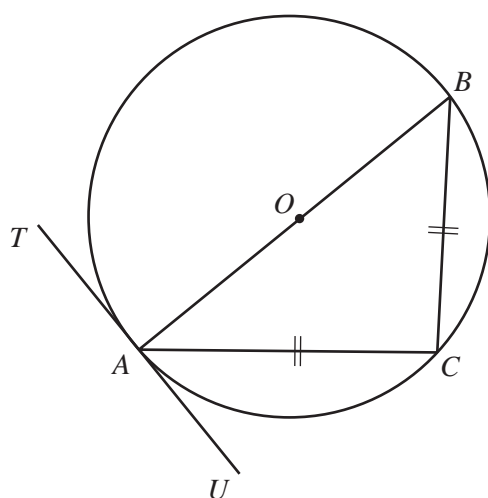
Answer(c) [1]

- 15 Amiria invests \$200 for 2 years at 3% per year **compound** interest.

Calculate the total amount Amiria has at the end of the two years.

Answer \$ [3]

16



NOT TO
SCALE

In the diagram, TAU is a tangent to the circle at A .
 AB is a diameter of the circle and $AC = BC$.

Find

- (a) angle BCA ,

Answer(a) Angle $BCA =$ [1]

- (b) angle ABC ,

Answer(b) Angle $ABC =$ [1]

- (c) angle CAU .

Answer(c) Angle $CAU =$ [1]

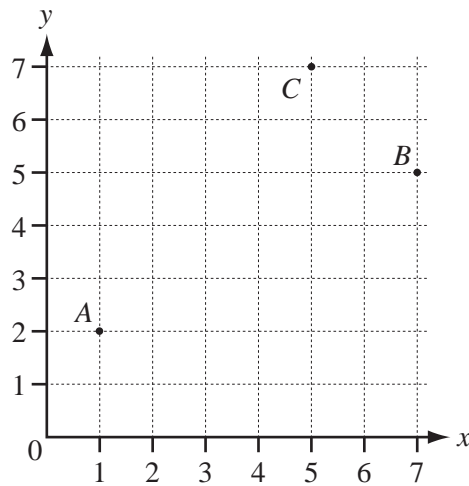
17 Insert brackets to make each statement correct.

(a) $7 + 2 \times 9 = 81$ [1]

(b) $36 \div 6 \div 2 = 12$ [1]

(c) $5 \times 3 + 6 \times 2 = 90$ [1]

18



The diagram shows three points, $A(1, 2)$, $B(7, 5)$ and $C(5, 7)$.

(a) Write as column vectors

(i) \vec{AC} ,

Answer(a)(i) $\vec{AC} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

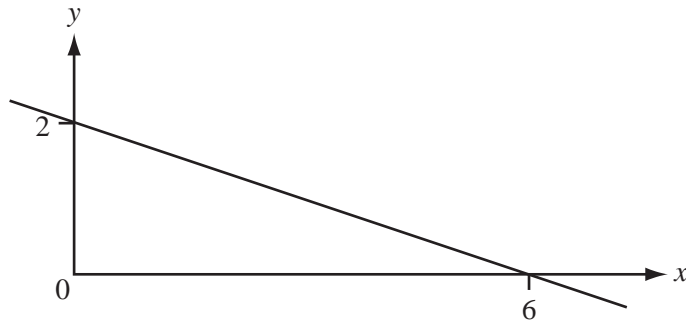
(ii) \vec{CB} .

Answer(a)(ii) $\vec{CB} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) Use two of the symbols $+$, $-$, $=$ in the spaces to make a correct statement.

\vec{AC} \vec{CB} \vec{AB} [1]

19



The diagram shows a straight line passing through the points (0, 2) and (6, 0).

Find the equation of this line in the form $y = mx + c$.

Answer $y =$ [3]

20



- (a) The diagram shows 5 discs.
One disc is chosen at random.

- (i) Which number is most likely to be chosen?

Answer(a)(i) [1]

- (ii) What is the probability that the number on the disc is even?

Answer(a)(ii) [1]

- (iii) What is the probability that the number on the disc is even and a factor of 20?

Answer(a)(iii) [1]

- (b) A disc is chosen at random from the discs with even numbers.

What is the probability that the number on the disc is a factor of 20?

Answer(b) [1]

21

0 0 0 1 2 2 4 4 5 9

The list shows the number of days absent in a school term for each of 10 students.

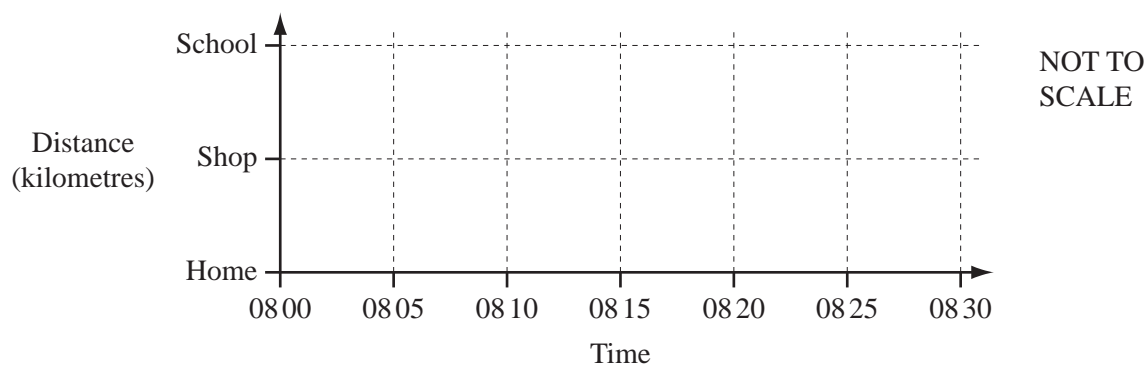
Find the mode, the median and the mean for the number of days absent.

Answer Mode =

Median =

Mean = [4]

22



Rob walks to school each morning.

One day, he leaves home at 08 00.

He stops at a shop at 08 10 and stays there for 5 minutes.

He then continues to school and arrives at 08 30.

(a) Draw the travel graph for Rob's journey from home to school. [3]

(b) Rob's average speed for the whole journey from home to school is 3.3 km/h.

Calculate the distance from Rob's home to school.

Answer(b) km [2]

1 (a) Write down

(i) a multiple of 7 between 80 and 90,

Answer(a)(i) [1]

(ii) a prime number between 30 and 40,

Answer(a)(ii) [1]

(iii) a square number between 120 and 130,

Answer(a)(iii) [1]

(iv) a cube number between 100 and 200.

Answer(a)(iv) [1]

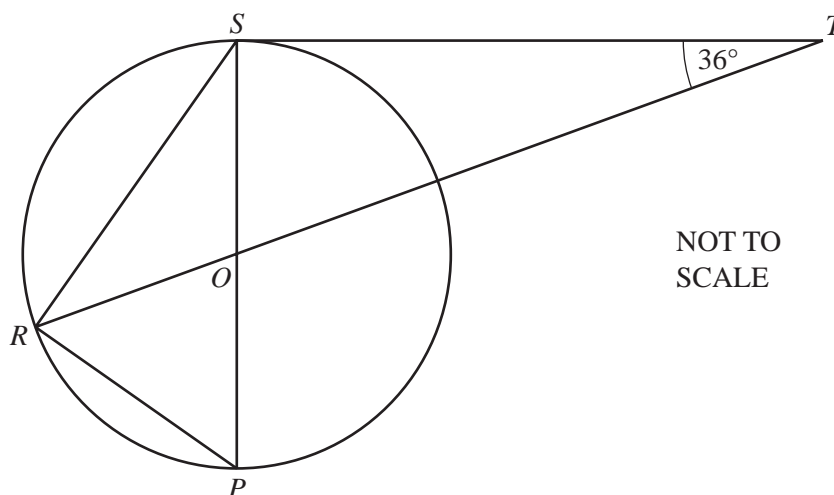
(b) Write the following numbers in order, starting with the smallest.

$$\sqrt{0.31}$$

$$\frac{5}{9}$$

55%

Answer(b) < < [2]



The points P , R and S lie on a circle, centre O .
 ROT is a straight line and TS is a tangent to the circle at S .
 Angle $STO = 36^\circ$.

- (a) Write down the size of angle TSO , giving a reason for your answer.

Answer(a) Angle $TSO =$ because
 [2]

- (b) (i) Calculate the size of angle TOS .

Answer(b)(i) Angle $TOS =$ [1]

- (ii) Show that angle $OPR = 63^\circ$.

Answer(b)(ii)

[2]

- (c) (i) Write down the size of angle PRS .

Answer(c)(i) Angle $PRS =$ [1]

- (ii) Calculate the size of angle PSR .

Answer(c)(ii) Angle $PSR =$ [1]

3

| Month | Total rainfall (mm) | Average daily sunshine (hours) |
|----------|---------------------|--------------------------------|
| January | 79 | 6 |
| February | 84 | 7 |
| March | 62 | 4.5 |
| April | 46 | 1.5 |
| May | 53 | 3.5 |
| June | 54 | 1.5 |

The table shows some data about rainfall and sunshine.

(a) For the **rainfall**, calculate

(i) the mean,

Answer(a)(i) mm [2]

(ii) the range.

Answer(a)(ii) mm [1]

(b) For the **sunshine**, find

(i) the mode,

Answer(b)(i) h [1]

(ii) the median.














Answer(b)(ii) h [2]

(c) Dinesh draws a pie chart to display the **rainfall data**.

Calculate the sector angle for **February**.

Answer(c) [2]

- (d) Amalia draws a pictogram to display the **sunshine data** for January and February.

| | |
|----------|---|
| January |       |
| February |        |
| March | |

- (i) Complete the key for the pictogram.

| |
|--|
|  represents |
|--|

[1]

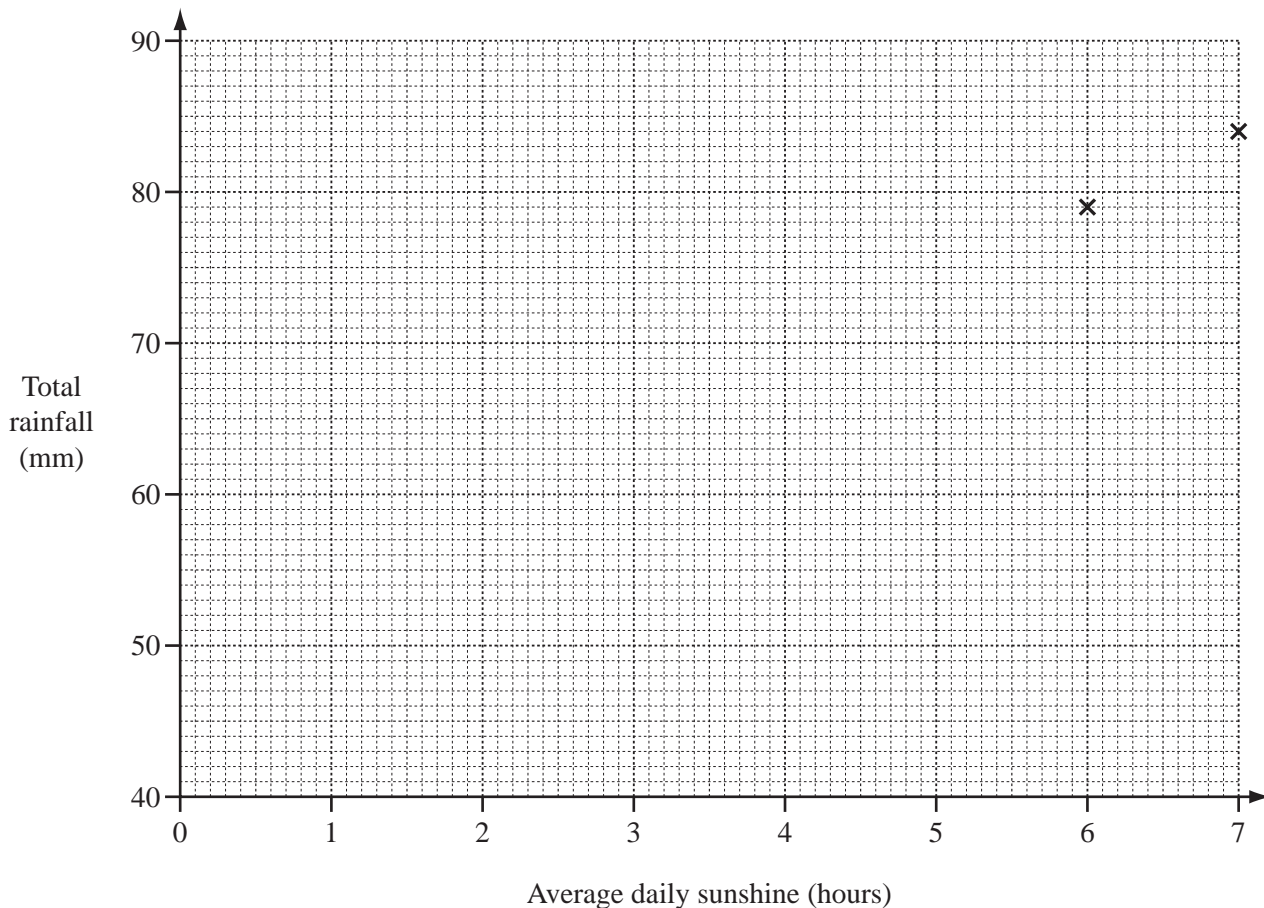
- (ii) Complete the pictogram for March.

[1]

- (e) Priya draws a scatter diagram to find the correlation between rainfall and sunshine for January to June.

- (i) Complete the scatter diagram below.

January and February are plotted for you.

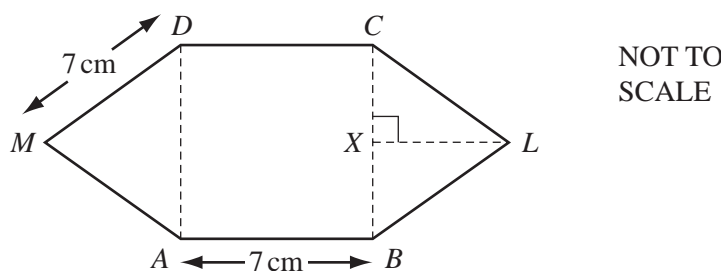


[2]

- (ii) What type of correlation does the scatter diagram show?

Answer(e)(ii) [1]

4



In the diagram, $ABCD$ is a square of side 7 cm.
 BLC and DMA are **equilateral** triangles.

(a) Find the perimeter of the shape $ABLCDM$.

Answer(a) cm [1]

(b) (i) Write down the size of angle CBL .

Answer(b)(i) Angle CBL = [1]

(ii) Calculate the length of LX .

Answer(b)(ii) LX = cm [2]

(c) (i) Calculate the area of triangle BLC .

Answer(c)(i) cm^2 [2]

(ii) Calculate the area of the shape $ABLCDM$.

Answer(c)(ii) cm^2 [2]

5 A shopkeeper buys cheese for \$3.75 per kilogram and sells it for \$5.10 per kilogram.

(a) Calculate his percentage profit.

Answer(a) % [3]

(b) Mrs Garcia buys cheese from the shopkeeper.

Calculate the number of **grams** of cheese she can buy for \$2.04 .

Answer(b) g [2]

(c) The shopkeeper sells 7 kg of cheese and has 3 kg left.

(i) He reduces his selling price of \$5.10 per kilogram by 70%.

Calculate the reduced price.

Answer(c)(i) \$ [2]

(ii) He sells the 3kg of cheese at the reduced price.

Calculate the **total** amount of money he receives by selling all the cheese.

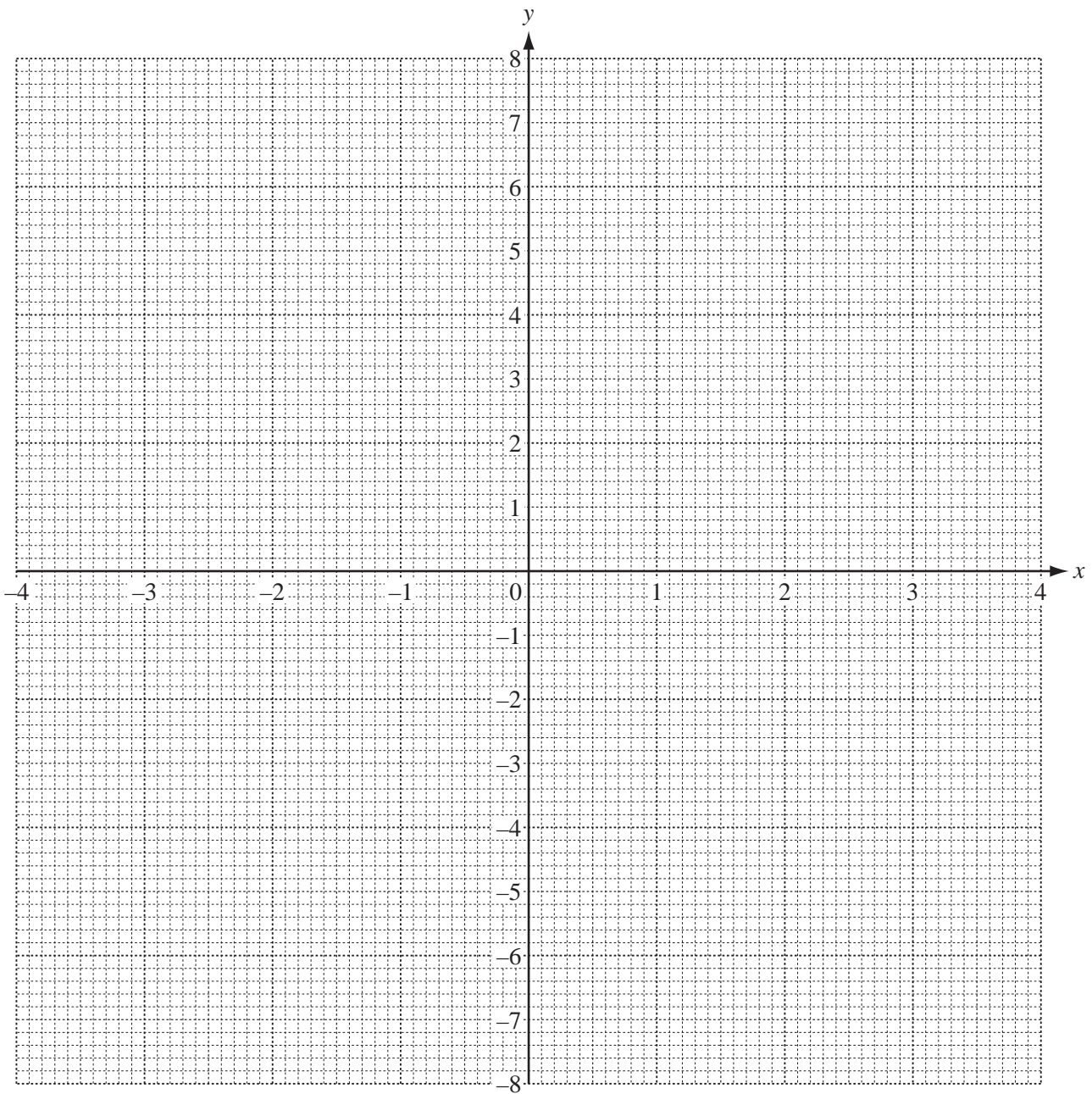
Answer(c)(ii) \$ [2]

- 6 (a) Complete the table of values for $y = \frac{4}{x}$, $x \neq 0$.

| | | | | | | | | | | | |
|-----|----|------|----|----|------|--|-----|---|---|---|---|
| x | -4 | -3 | -2 | -1 | -0.5 | | 0.5 | 1 | 2 | 3 | 4 |
| y | | -1.3 | -2 | | -8 | | 8 | 4 | 2 | | |

[2]

- (b) On the grid below, draw the graph of $y = \frac{4}{x}$, for $-4 \leq x \leq -0.5$ and $0.5 \leq x \leq 4$.



[4]

(c) Complete the following statement.

The point $(-2.5, \dots\dots\dots)$ lies on the graph of $y = \frac{4}{x}$. [1]

(d) (i) On the grid, draw the line $y = 5$. [1]

(ii) Use your graphs to solve the equation $\frac{4}{x} = 5$.

Answer(d)(ii) $x = \dots\dots\dots$ [1]

(e) (i) On the grid, draw the straight line joining the points $(-0.5, -8)$ and $(2, 2)$. [2]

(ii) Find the gradient of this line.

Answer(e)(ii) $\dots\dots\dots$ [1]

(iii) Write down the equation of this line in the form $y = mx + c$.

Answer(e)(iii) $y = \dots\dots\dots$ [2]

- 7 (a) Solve the equation.

$$4x + 3 = 2 + 6x$$

Answer(a) $x =$ [2]

- (b) Simplify.

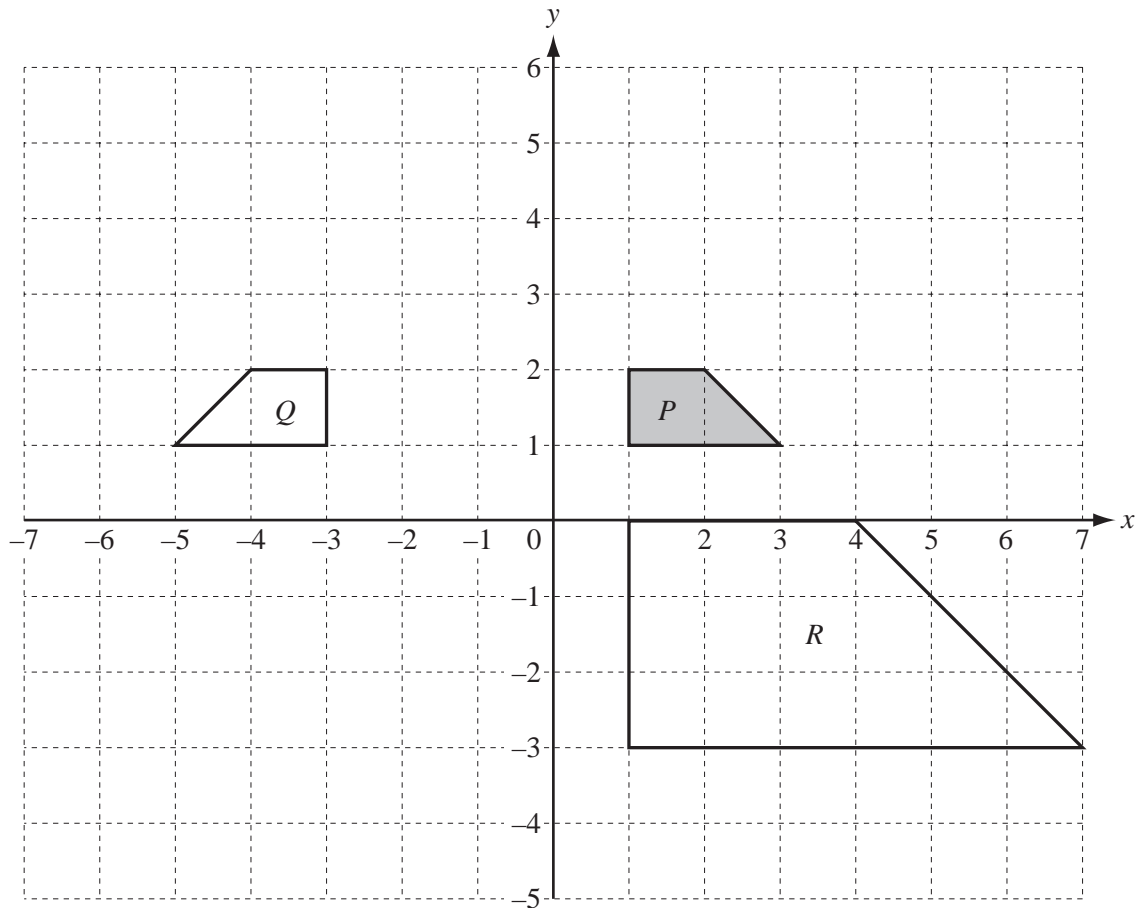
$$7(3x - 4y) - 3(5x + 2y)$$

Answer(b) [2]

- (c) Factorise completely.

$$6g^2 - 3g^3$$

Answer(c) [2]



Shapes P , Q , and R are shown on the grid.

(a) On the grid, draw the image of **shape P** after

(i) a rotation through 180° about the origin, [2]

(ii) a reflection in the line $y = 3$, [2]

(iii) a translation by the vector $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$. [2]

(b) Describe fully the **single** transformation which maps

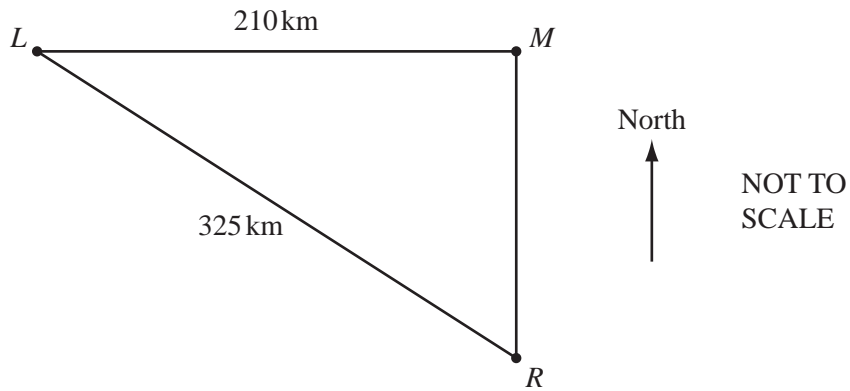
(i) shape P onto shape Q ,

Answer(b)(i) [2]

(ii) shape P onto shape R .

Answer(b)(ii) [3]

9



The diagram shows three islands, L , M and R .

L is due west of M and R is due south of M .

$LM = 210$ km and $LR = 325$ km.

(a) Calculate the distance RM .

Answer(a) $RM =$ km [3]

(b) (i) Use trigonometry to calculate angle LRM .

Answer(b)(i) Angle $LRM =$ [2]

(ii) Find the bearing of L from R .

Answer(b)(ii) [2]

- (c) (i) A ferry travels directly from M to L .
It leaves M at 06 15 and arrives at L at 13 45.

Calculate the average speed of the ferry in kilometres per hour.

Answer(c)(i) km/h [2]

- (ii) The ferry then travels the 325 km from L to R at an average speed of 37 km/h.

Calculate the time taken.

Give your answer in hours and minutes, to the nearest minute.

Answer(c)(ii) h min [3]

- (iii) The ferry leaves L at 14 00.

Use your answer to **part (c)(ii)** to find the time it arrives at R .

Answer(c)(iii) [1]

10

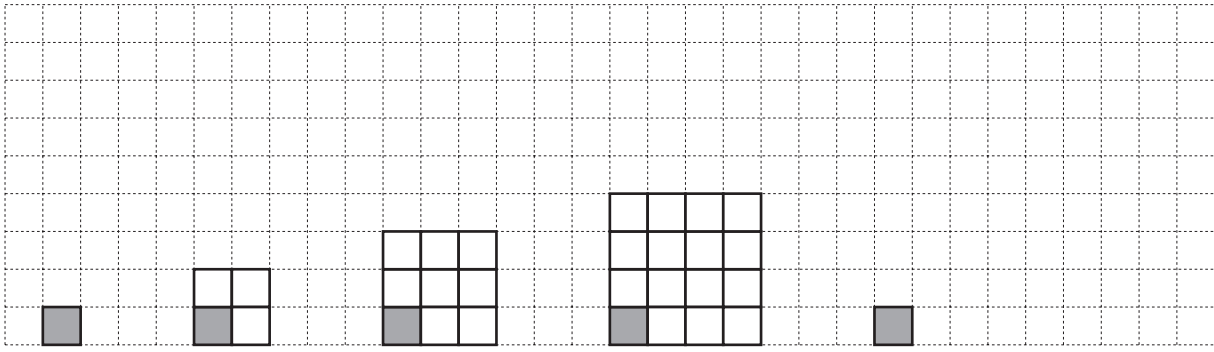


Diagram 1 Diagram 2 Diagram 3 Diagram 4 Diagram 5

Each of the diagrams above shows one small shaded square and a number of small unshaded squares. The diagrams form a sequence.

(a) Complete Diagram 5. [1]

(b) Complete the table.

| Diagram | 1 | 2 | 3 | 4 | 5 | | 50 | | n |
|----------------------------------|---|---|---|----|---|--|----|--|-----|
| Total number of small squares | 1 | 4 | 9 | 16 | | | | | |
| Number of small shaded squares | 1 | 1 | 1 | 1 | | | | | |
| Number of small unshaded squares | 0 | 3 | 8 | 15 | | | | | |

[7]

(c) Diagram p has 9999 small unshaded squares. Find p .

Answer(c) $p =$ [1]

- 11** Roberto earns a total of $\$p$ per week.
 He works for t hours each week and is paid a fixed amount per hour.
 He also receives a bonus of $\$k$ every week.

The formula for p is

$$p = 8t + k.$$

- (a)** Write down how much Roberto is paid per hour.

Answer(a) \$ [1]

- (b) (i)** Find how much Roberto earns in a week when he works for 40 hours and his bonus is \$35.

Answer(b)(i) \$ [2]

- (ii)** Find how many hours Roberto works in a week when he earns \$288 and his bonus is \$24.

Answer(b)(ii) h [3]

- (c)** Make t the subject of the formula.

Answer(c) $t =$ [2]

1 A drink consists of water and fruit juice.

(a) 24% of the drink is water.

Show that there is a total of 760 cm^3 of fruit juice in one litre of the drink.

Answer(a)

[2]

(b) What fraction of one litre of the drink is fruit juice?

Give your answer in its simplest form.

Answer(b) [2]

(c) The 760 cm^3 of fruit juice in one litre of the drink is made from apple, mango and peach in the following ratio.

Apple : Mango : Peach = 6 : 15 : 17

Calculate the amount of apple juice.

Answer(c) cm^3 [2]

(d) A shopkeeper buys bottles of the drink for 65 cents each.
He sells them for 80 cents each.

Calculate the percentage profit he makes on each bottle he sells.

Answer(d) % [3]

2 (a) (i) $f \times g = 90$

f and g are both integers **greater than 1**.

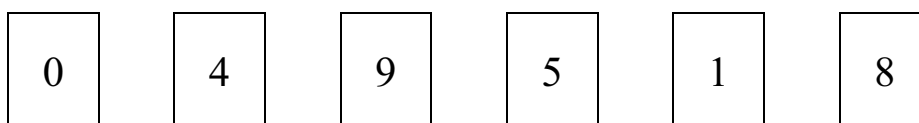
Write down one possible pair of values of f and g .

Answer(a)(i) $f = \dots\dots\dots$ and $g = \dots\dots\dots$ [1]

(ii) Find all the prime factors of 90.

Answer(a)(ii) $\dots\dots\dots$ [3]

(b) Six number cards are shown below.



One or more of the cards are chosen to make different numbers.

For example

| |
|---|
| 5 |
|---|

| |
|---|
| 9 |
|---|

 makes the number 59.

Choosing a card or cards, write down

(i) a 2-digit odd number less than 40,

Answer(b)(i) $\dots\dots\dots$ [1]

(ii) the largest 3-digit even number,

Answer(b)(ii) $\dots\dots\dots$ [1]

(iii) a 2-digit square number greater than 50,

Answer(b)(iii) $\dots\dots\dots$ [1]

(iv) a cube number,

Answer(b)(iv) $\dots\dots\dots$ [1]

(v) a 2-digit multiple of 13,

Answer(b)(v) $\dots\dots\dots$ [1]

(vi) the cube root of 64,

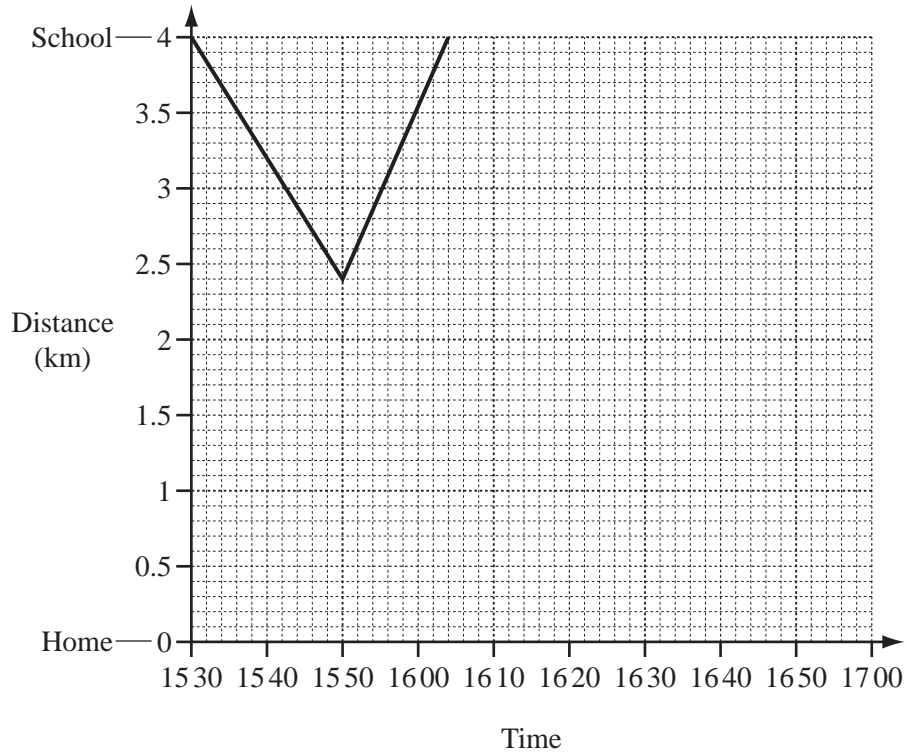
Answer(b)(vi) $\dots\dots\dots$ [1]

(vii) a prime number between 100 and 120.

Answer(b)(vii) $\dots\dots\dots$ [1]

- 3 Kim left school at 15 30 to walk home.
On the way home he remembered he had left a book at school.
He ran back to school and arrived at 16 04.

The travel graph shows his journey.



- (a) Use the graph to answer the following questions.

- (i) At what time did Kim start to run back to school?

Answer(a)(i) [1]

- (ii) How far was he from school at this time?

Answer(a)(ii) km [1]

- (iii) How many minutes did he take to run back to school?

Answer(a)(iii) min [1]

- (iv) What was his speed, in kilometres per hour, on his journey back to school?

Answer(a)(iv) km/h [3]

- (b) Kim spent 6 minutes at school collecting his book.
He then walked home at a speed of 6 km/h.

(i) Complete the travel graph. [3]

(ii) At what time did Kim arrive home?

Answer(b)(ii) [1]

- (c) Kim's sister, Julie, left the school at 15 48.
She walked at a steady speed, without stopping, and arrived home 46 minutes later.

(i) On the grid, draw the travel graph of Julie's journey home from school. [2]

(ii) Complete the sentence.

..... arrived home first by minutes. [1]

- 4 An accurate scale drawing of three sides of a garden, AB , BC , and CD is shown on the opposite page. A is due north of B and C is due east of B .

(a) A vegetable area is to be constructed in the garden.

Parts (i) and (iii) must be completed using a straight edge and compasses only.

On the scale drawing

(i) construct the perpendicular bisector of BC , [2]

(ii) mark the point S at the midpoint of BC , [1]

(iii) construct the bisector of angle ABC , [2]

(iv) mark the point R where this line crosses the perpendicular bisector of BC , [1]

(v) mark the point Q on BA where $BQ = SR$, [1]

(vi) draw the vegetable area, quadrilateral $BQRS$. [1]

(b) On the scale drawing, 1 centimetre represents 6 metres.

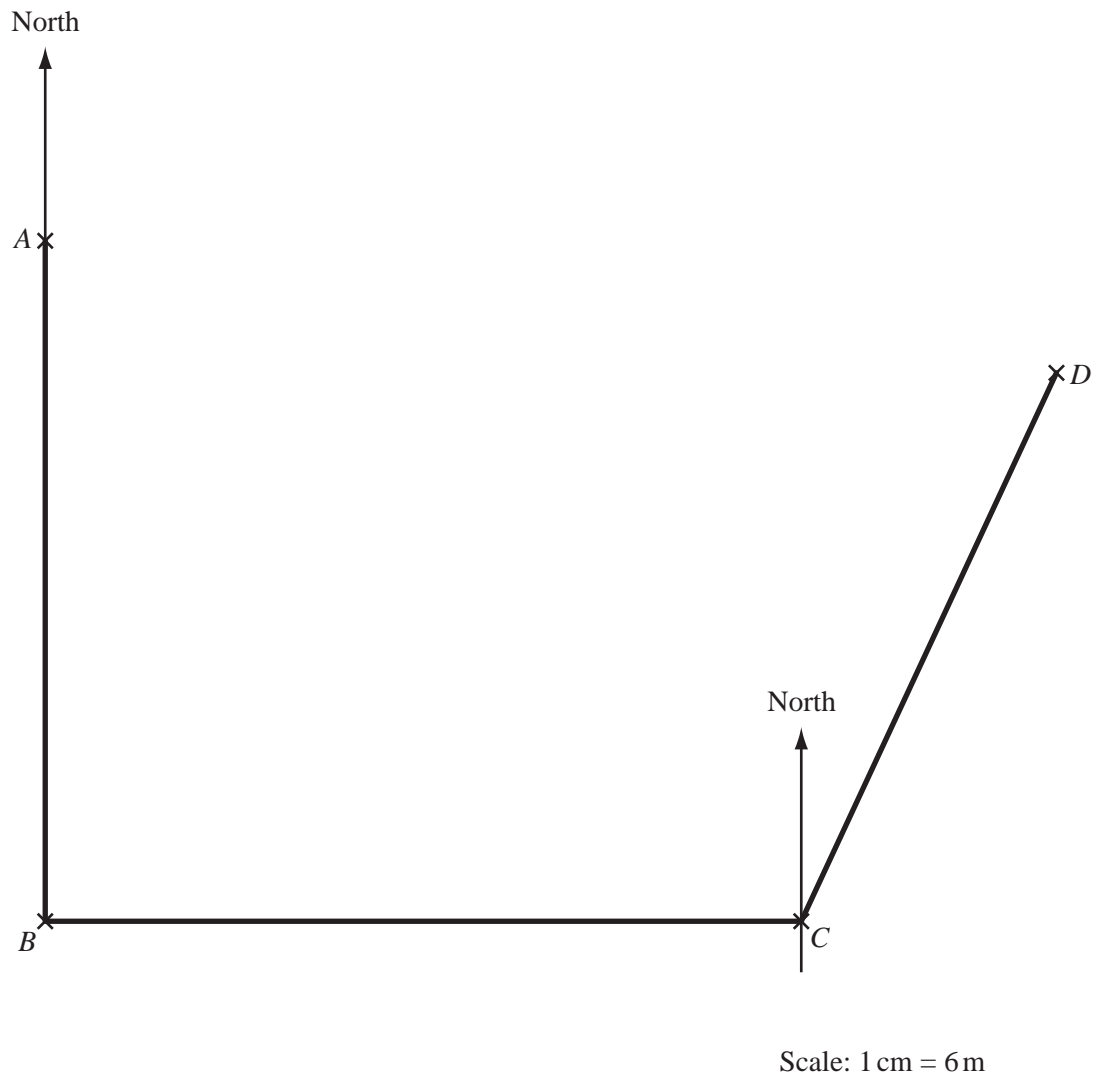
Calculate the vegetable area in square metres.

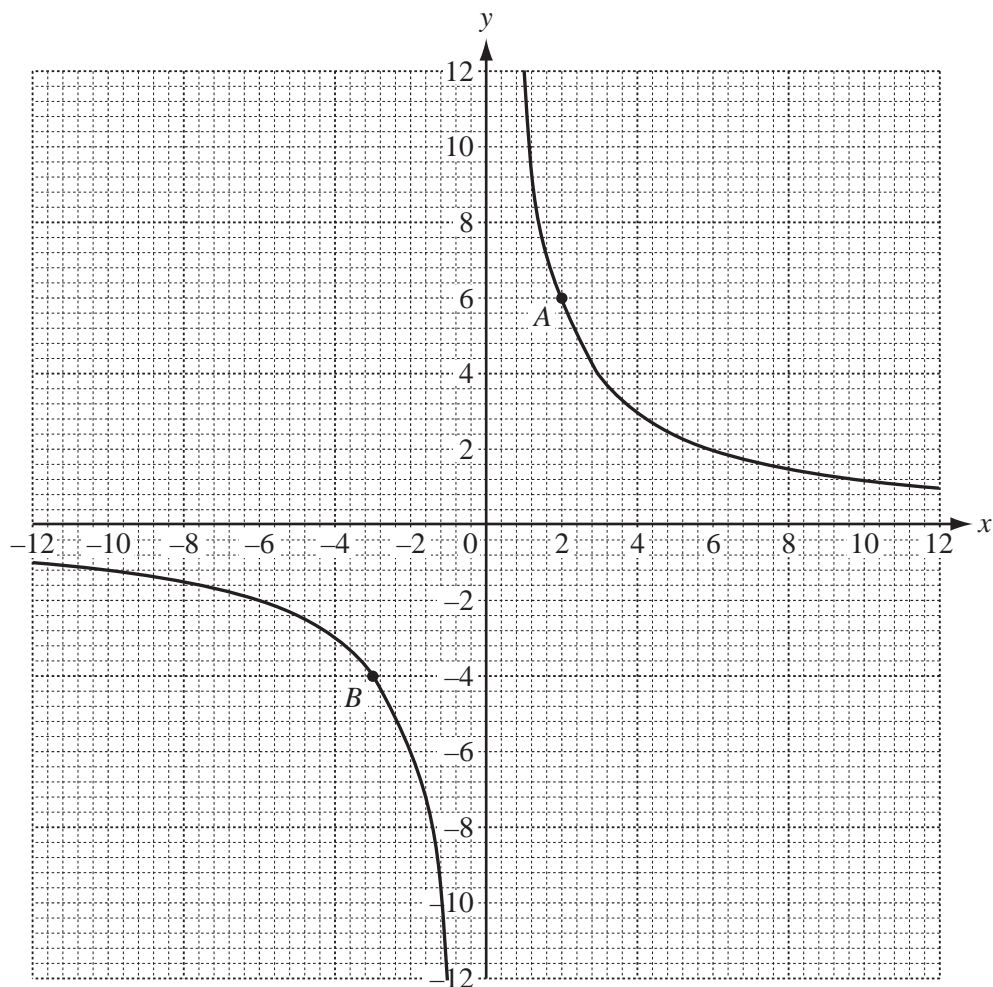
Answer(b) m^2 [3]

(c) A tree, T , is on a bearing of 070° from A and 345° from C .

On the scale drawing, mark the position of T . [2]

(d) Draw accurately the locus of points which are 24 metres from the tree, T . [2]





A graph is drawn on the grid.
Points A and B are marked on the curves.

- (a) (i) Write down the co-ordinates of the points A and B .

Answer(a)(i) $A(\dots\dots\dots , \dots\dots\dots)$ and $B(\dots\dots\dots , \dots\dots\dots)$ [2]

- (ii) The equation of the graph is $xy = n$.

Write down the value of n .

Answer(a)(ii) $n = \dots\dots\dots$ [1]

- (b) (i)** Write down the order of rotational symmetry of the graph.

Answer(b)(i) [1]

- (ii)** On the grid, draw the lines of symmetry of the graph. [2]

- (iii)** Write down the equation of each line of symmetry.

Answer(b)(iii) and [2]

- (c) (i)** One line of symmetry crosses both curves.

Write down the x co-ordinates of the points where this line meets each curve.
Give your answers to 1 decimal place.

Answer(c)(i) $x =$ and $x =$ [2]

- (ii)** On the grid, draw the line which passes through the point (0, 4) and is parallel to the line of symmetry in **part (c)(i)**. [1]

- (iii)** Write down the equation of this line in the form $y = mx + c$.

Answer(c)(iii) $y =$ [2]

- 6 (a) The formula for finding the interior angle of a regular polygon with n sides is given below.

$$\text{Interior angle} = \frac{180(n-2)}{n}$$

- (i) Find the size of the interior angle of a regular polygon with 9 sides.

Answer(a)(i) [2]

- (ii) Multiply out the brackets.

$$180(n-2)$$

Answer(a)(ii) [1]

- (iii) A regular polygon has an interior angle of 156° .

How many sides does this polygon have?

Answer(a)(iii) [3]

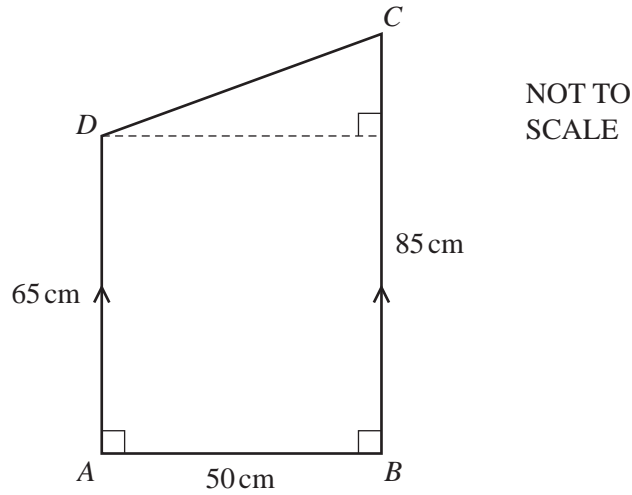
- (b) Solve the simultaneous equations.

$$3x + 5y = 9$$

$$x + 2y = 4$$

Answer(b) $x =$

$y =$ [3]



The diagram represents the cross-section of a storage box.
 $AB = 50$ cm, $AD = 65$ cm and $BC = 85$ cm.
 AD is parallel to BC .

- (a) Write down the geometrical name of the quadrilateral $ABCD$.

Answer(a) [1]

- (b) Calculate angle DCB .

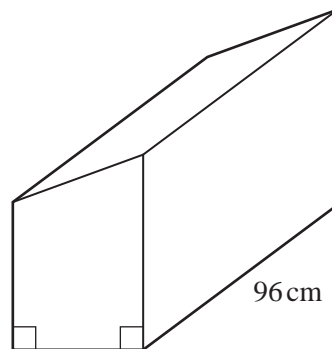
Answer(b) Angle $DCB =$ [3]

- (c) Calculate the area of the cross-section $ABCD$.

Answer(c) cm^2 [2]

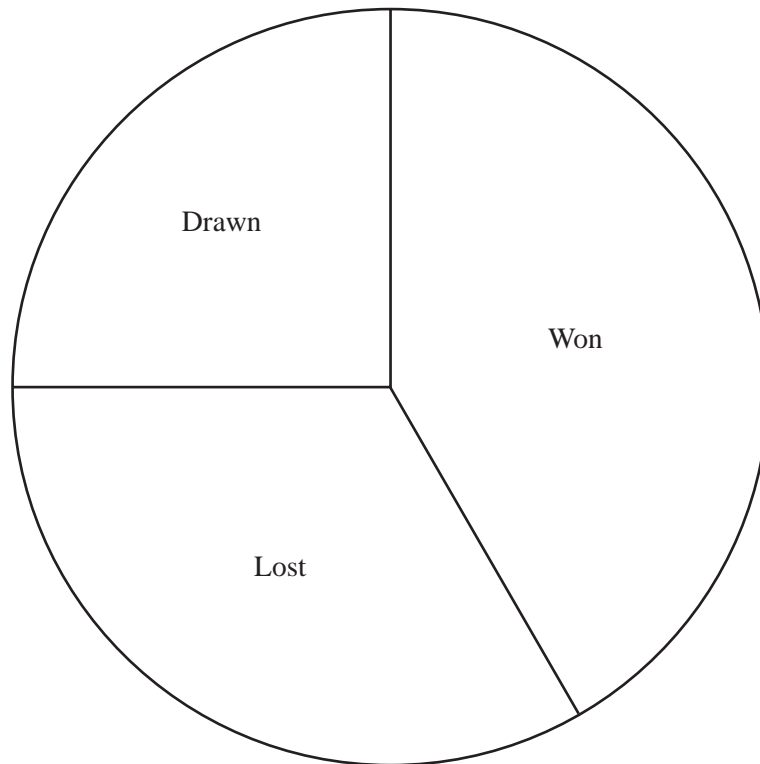
- (d) The storage box is 96 cm long.

Calculate the volume of the box.
 Write down the units of your answer.



Answer(d) [2]

- 8 (a) The results of 24 games of hockey played by a school team in one year are shown in the pie chart below.



- (i) Show that the school team won 10 games during the year.

Answer(a)(i)

[2]

- (ii) Find how many games were lost and how many games were drawn.

Answer(a)(ii) Lost

Drawn [3]

(b) The number of goals scored by the hockey team in each of the 24 games are shown below.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 2 | 1 | 1 | 0 | 3 | 2 | 5 |
| 3 | 0 | 2 | 3 | 2 | 1 | 4 | 0 |
| 2 | 1 | 2 | 1 | 0 | 1 | 4 | 1 |

(i) Complete the frequency table below. You may use the tally column to help you.

| Number of goals per game | Tally | Number of games |
|--------------------------|-------|-----------------|
| 0 | | |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

[2]

(ii) Write down the mode.

Answer(b)(ii) [1]

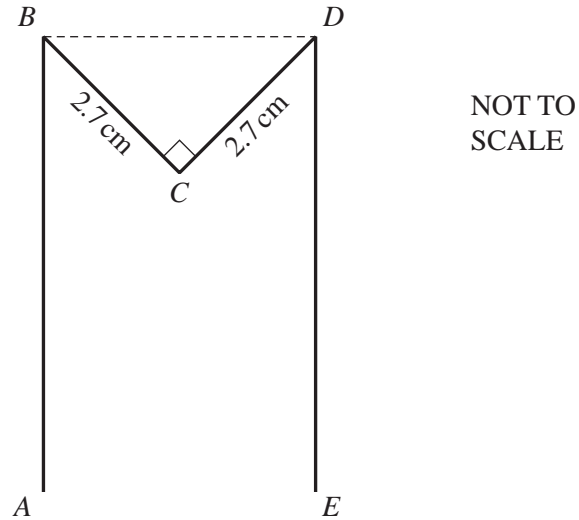
(iii) Find the median.

Answer(b)(iii) [2]

(iv) Calculate the mean number of goals per game.

Answer(b)(iv) [3]

9



- (a) In the diagram above, AB and ED are vertical.
 The diagram is symmetrical about a line through C parallel to AB .
 Angle $BCD = 90^\circ$ and $BC = CD = 2.7$ cm.

- (i) Calculate BD .

Answer(a)(i) $BD =$ cm [2]

- (ii) Complete the statement.

Triangle BCD is right-angled and [1]

- (iii) Find the size of angle ABC .

Answer(a)(iii) Angle $ABC =$ [1]

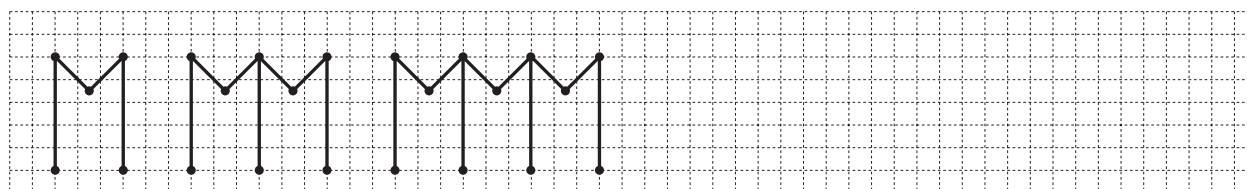


Diagram 1

Diagram 2

Diagram 3

Diagram 4

(b) The pattern of diagrams above is continued by adding more lines and dots.

(i) On the grid, draw diagram 4.

[1]

(ii) Complete the table below.

| Diagram | 1 | 2 | 3 | 4 | 5 |
|-----------------|---|---|---|---|---|
| Number of lines | 4 | 7 | | | |

[2]

(c) How many lines will there be in

(i) Diagram 9,

Answer(c)(i)

[1]

(ii) Diagram n ?

Answer(c)(ii)

[2]

(d) The number of lines in Diagram r is 76.

Find the value of r .

Answer(d) $r =$

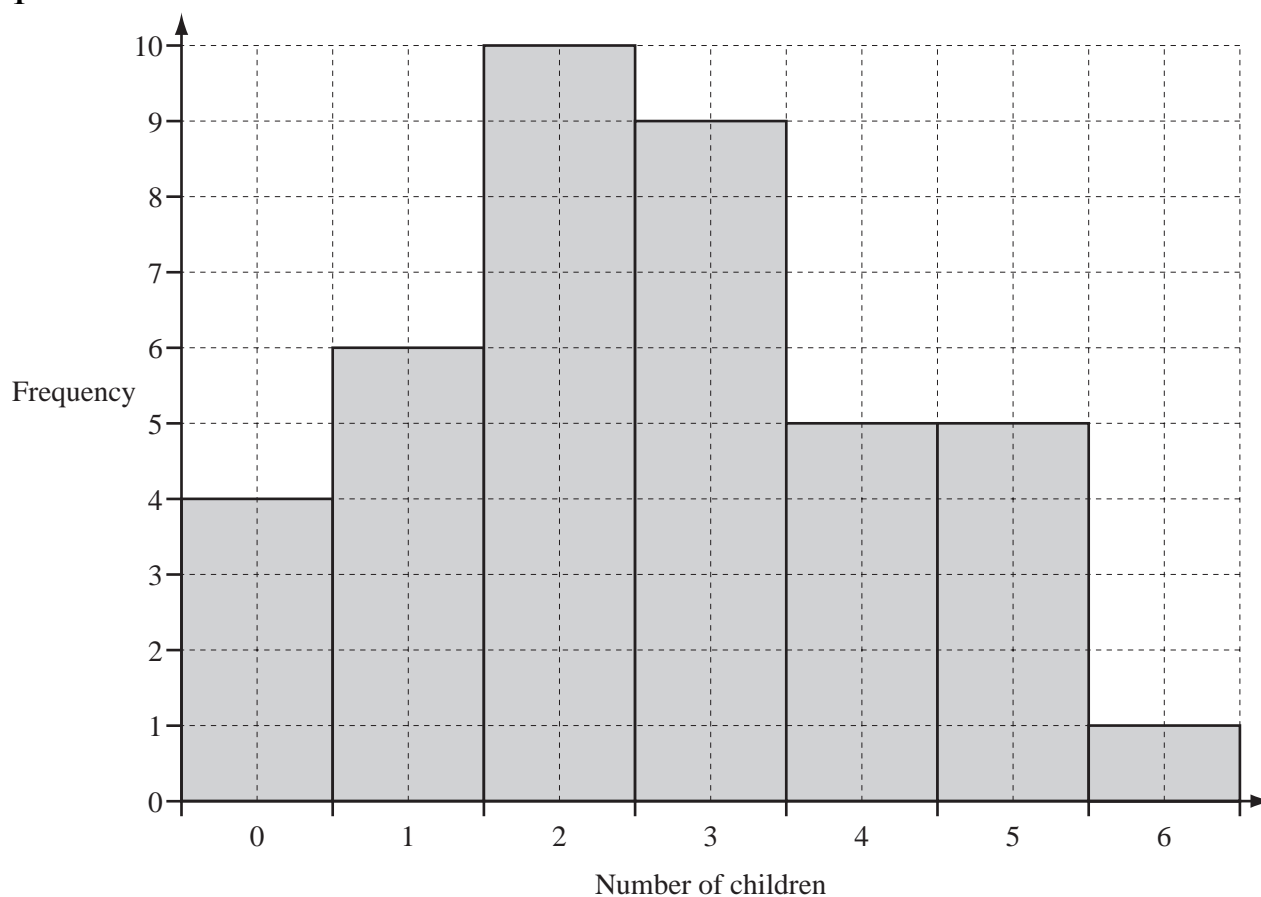
[2]

(e) Write down an expression, in terms of n , for the number of **dots** in Diagram n .

Answer(e)

[1]

1



The number of children in each of 40 families was recorded.
The bar chart shows the results.

(a) Complete the frequency table.

| | | | | | | | |
|--------------------|---|---|---|---|---|---|---|
| Number of children | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Frequency | 4 | 6 | | | | | |

[3]

(b) Find

(i) the mode,

Answer(b)(i) [1]

(ii) the median,

Answer(b)(ii) [2]

(iii) the mean.

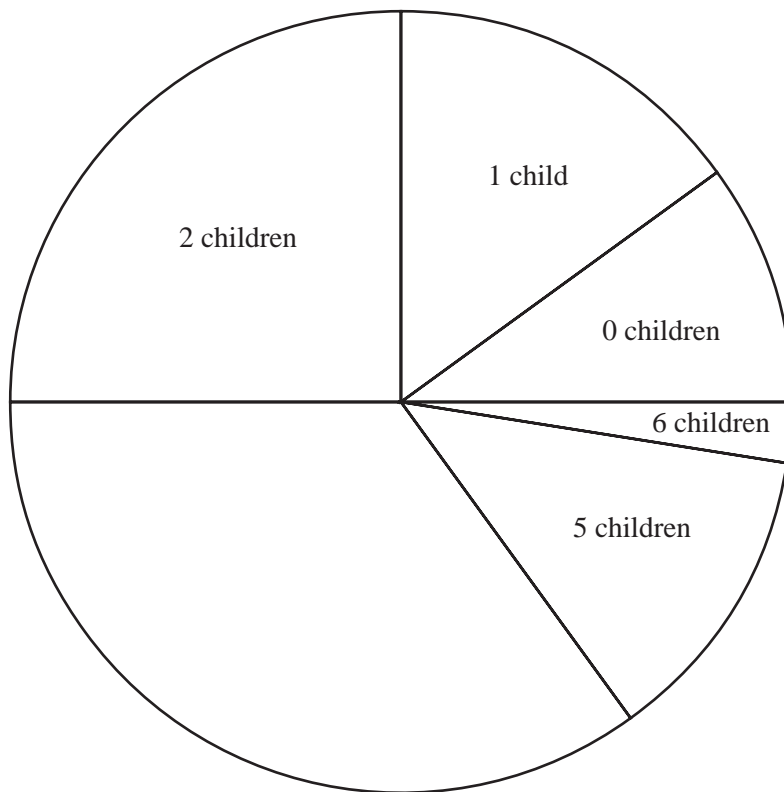
Answer(b)(iii) [3]

(c) A pie chart showing the information has been started.

(i) Calculate the angles of the sectors for 3 and 4 children.

Answer(c)(i) , [3]

(ii) Complete the pie chart accurately.



[1]

2 Eduardo lives in Argentina and travels to Uruguay for a holiday.

- (a) His flight from Buenos Aires to Montevideo takes 55 minutes.
The plane departs at 17 35.

(i) Write down the arrival time.

Answer(a)(i) [1]

- (ii) The distance between Buenos Aires and Montevideo is 230 km.

Calculate the average speed of the plane.

Answer(a)(ii) km/h [3]

- (b) At the airport, Eduardo changed some Argentine pesos (ARS).
He received 9121 Uruguay pesos (UYU).

(i) The exchange rate was ARS 1 = UYU 6.515.

Calculate how many Argentine pesos Eduardo changed.

Answer(b)(i) ARS [2]

- (ii) Eduardo spent 1890 Uruguay pesos on meals.

Calculate this as a percentage of the UYU 9121.

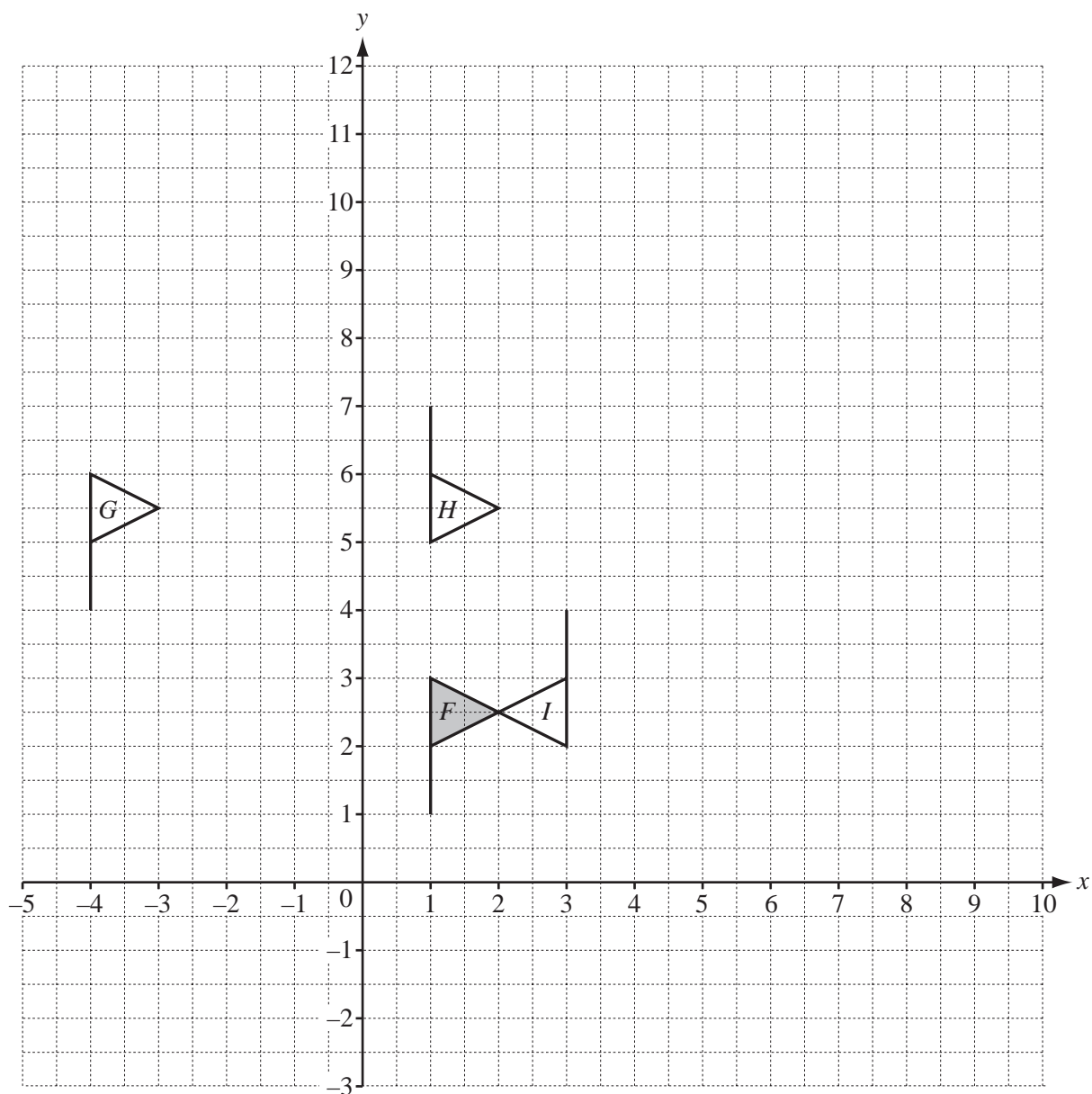
Answer(b)(ii) % [1]

- (iii) At the end of his holiday, Eduardo has UYU 610 remaining.
He changes this into Argentine pesos when the exchange rate is UYU 1 = ARS 0.149.

Calculate how much Eduardo receives in Argentine pesos.
Give your answer to the nearest whole number.

Answer(b)(iii) ARS [2]

3



(a) Describe fully the **single** transformation that maps

(i) flag F onto flag G ,

Answer(a)(i) [2]

(ii) flag F onto flag H ,

Answer(a)(ii) [2]

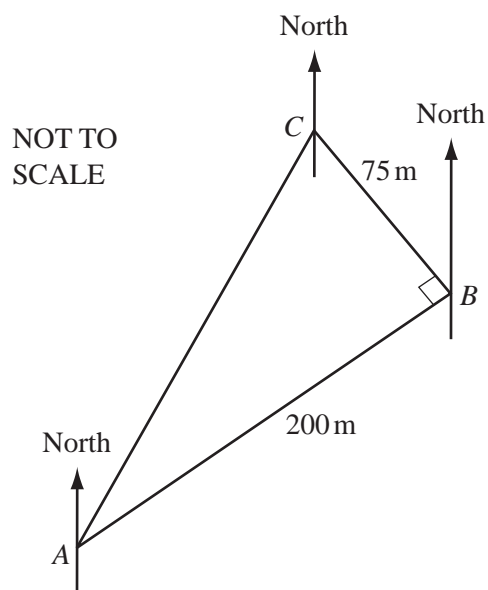
(iii) flag F onto flag I .

Answer(a)(iii) [3]

(b) On the grid, draw

(i) the reflection of flag F in the y -axis, [2]

(ii) the enlargement of flag F , centre $(0, 0)$ and scale factor 4. [2]



Dariella walks 200 m from A to B .
She then turns through 90° and walks 75 m from B to C .

(a) Calculate

(i) the distance AC ,

Answer(a)(i) m [2]

(ii) angle CAB .

Answer(a)(ii) Angle CAB = [2]

(b) The bearing of B from A is 065° .

Find the bearing of

(i) C from A ,

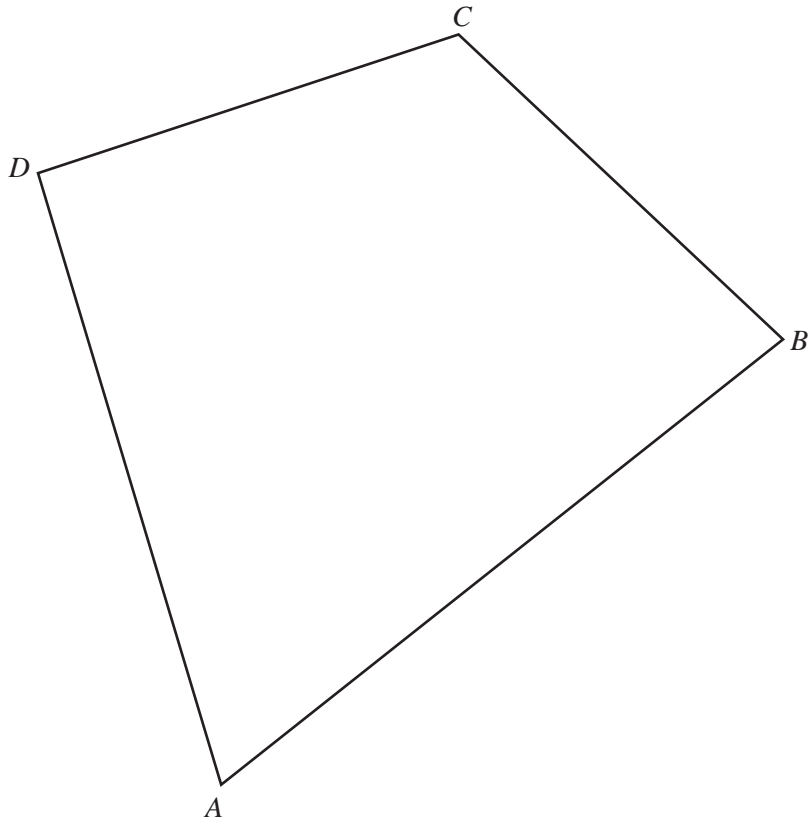
Answer(b)(i) [1]

(ii) A from C ,

Answer(b)(ii) [1]

(iii) C from B .

Answer(b)(iii) [2]



The diagram shows a quadrilateral $ABCD$.

(a) Using a straight edge and compasses only, construct

(i) the perpendicular bisector of AB , [2]

(ii) the bisector of angle ADC . [2]

(b) Draw accurately the locus of points, inside the quadrilateral, that are 2 cm from BC . [2]

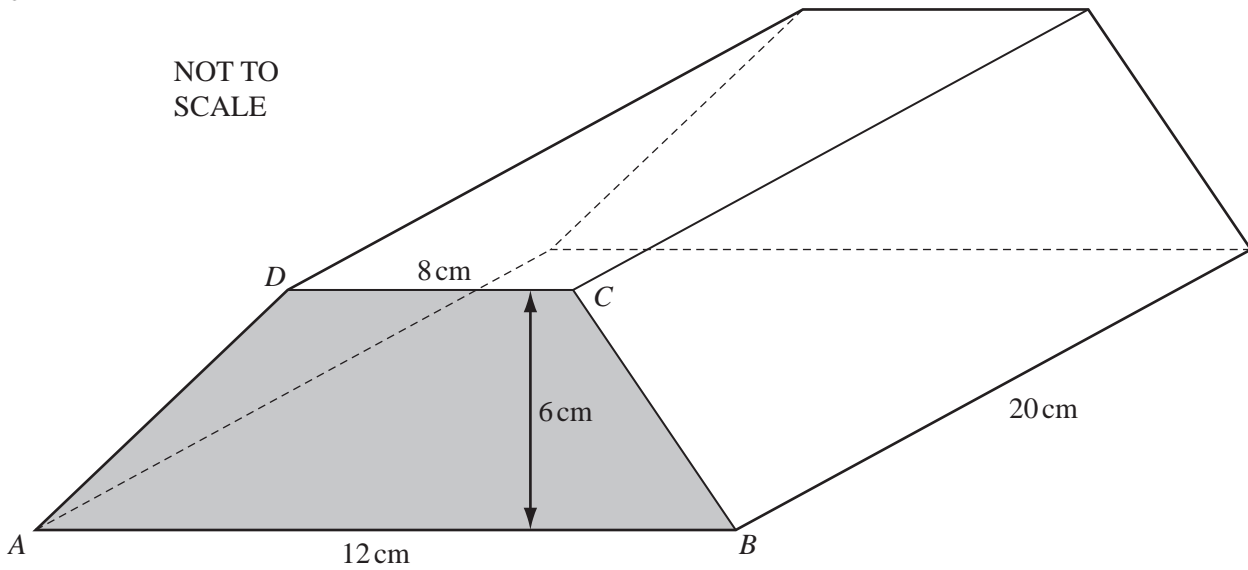
(c) Shade the region, inside the quadrilateral, which is

nearer to B than to A

and nearer to DC than to DA

and more than 2 cm from BC . [1]

6

NOT TO
SCALE

The diagram shows a prism of length 20 cm.

The cross-section of the prism is a trapezium, $ABCD$, with AB parallel to DC .

$AB = 12$ cm, $DC = 8$ cm and the perpendicular distance between AB and DC is 6 cm.

(a) Calculate

(i) the area of the trapezium $ABCD$,

Answer(a)(i) cm^2 [2]

(ii) the volume of the prism.

Answer(a)(ii) cm^3 [1]

(b) The prism is solid and made of brass.

(i) One cubic centimetre of brass has a mass of 8.5 grams.

Calculate the mass of the prism.
Give your answer in kilograms.

Answer(b)(i) kg [2]

(ii) Brass costs \$2.26 for one kilogram.

How much will the brass cost to make this prism?
Give your answer correct to 2 decimal places.

Answer(b)(ii) \$ [2]

- 7 Alex has d dollars to spend.
He buys a book which costs \$9 less than 2 times d .

(a) Write down an algebraic expression, in terms of d , for the cost of the book.

Answer(a) \$ [2]

(b) The actual cost of the book is \$7.80.

Find the value of d .

Answer(b) $d =$ [2]

(c) How much does Alex have left after buying the book?

Answer(c) \$ [1]

- 8 The area, A , of a sector of a circle of radius r is given by the formula below.

$$A = \frac{\pi r^2}{5}$$

- (a) Calculate the area when the radius is 7.5 cm.

Answer(a) cm^2 [2]

- (b) Make r the subject of the formula.

Answer(b) $r =$ [3]

- (c) Calculate r when $A = 4.8 \text{ cm}^2$.

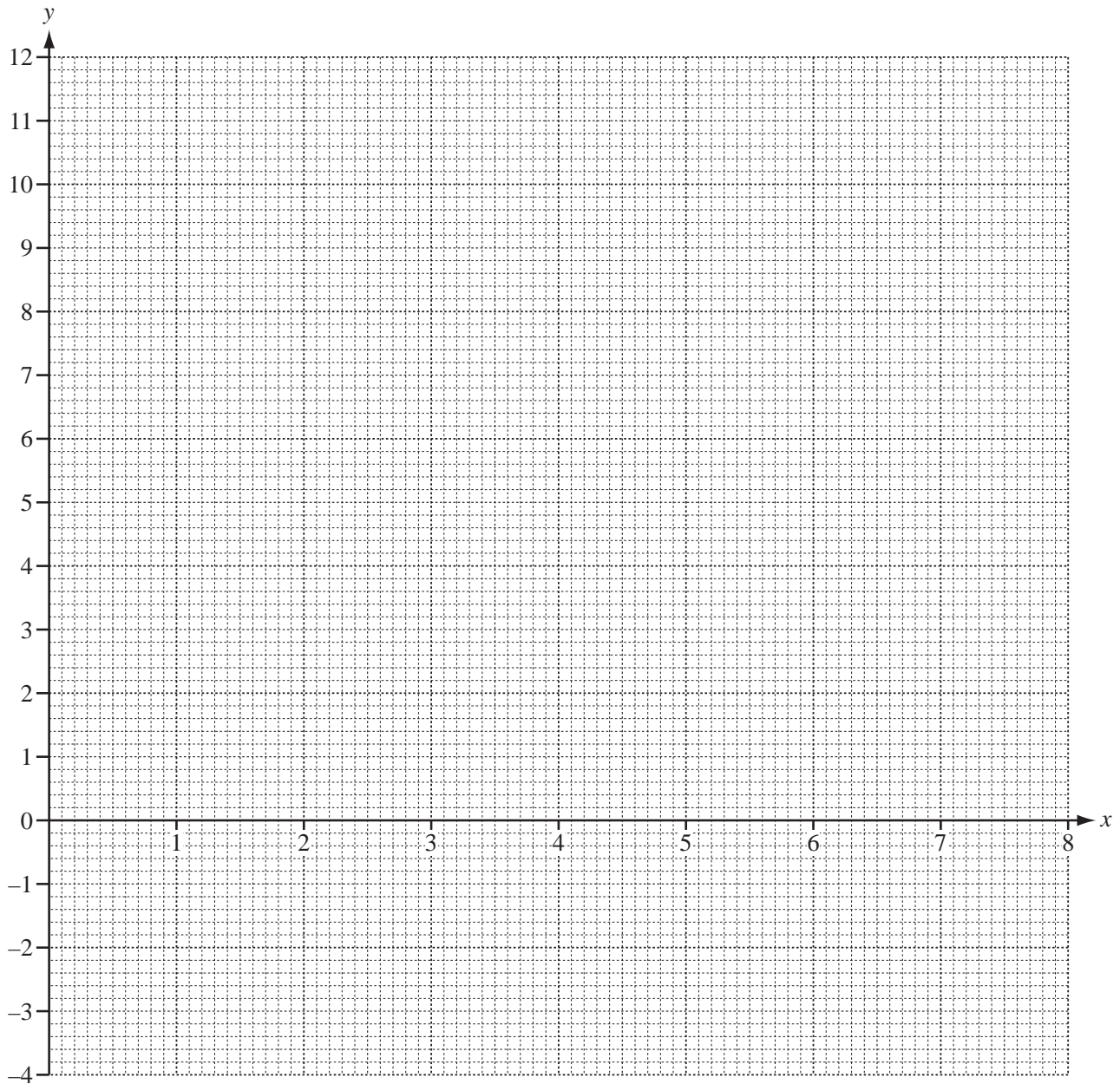
Answer(c) $r =$ cm [2]

- 9 (a) (i) Complete the table for $y = 12 - x^2$.

| | | | | | |
|-----|----|----|---|---|----|
| x | 0 | 1 | 2 | 3 | 4 |
| y | 12 | 11 | | | -4 |

[2]

- (ii) On the grid, draw the graph of $y = 12 - x^2$ for $0 \leq x \leq 4$.



[3]

- (iii) Use your graph to solve the equation $12 - x^2 = 0$.

Answer (a)(iii) $x =$ [1]

- (b) (i) Complete the table for $y = \frac{12}{x}$, $x \neq 0$.

| | | | | | | | | |
|-----|----|---|---|---|-----|---|-----|---|
| x | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| y | 12 | 6 | 4 | | 2.4 | | 1.7 | |

[3]

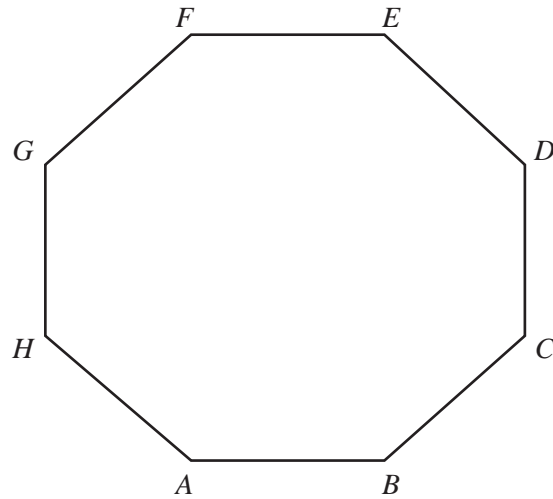
- (ii) On the grid opposite, draw the graph of $y = \frac{12}{x}$ for $1 \leq x \leq 8$.

[3]

- (c) Write down the co-ordinates of the points of intersection of the two graphs.

Answer(c) (..... ,), (..... ,) [2]

10

NOT TO
SCALE

$ABCDEFGH$ is a regular octagon.

(a) Show that angle $BCD = 135^\circ$.

Answer (a)

[2]

(b) Find

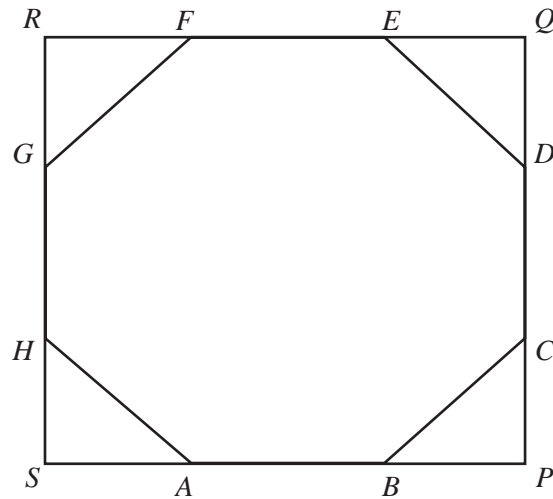
(i) angle DEB ,

Answer(b)(i) Angle $DEB = \dots\dots\dots$ [1]

(ii) angle FEB .

Answer(b)(ii) Angle $FEB = \dots\dots\dots$ [1]

(c)

NOT TO
SCALE

The sides of the octagon are extended to form the square $PQRS$.
The length of each side of the octagon is 12 cm and the length of BP is 8.485 cm.

Calculate the area of

(i) triangle BPC ,

Answer(c)(i) cm^2 [2]

(ii) the octagon $ABCDEFGH$.

Answer(c)(ii) cm^2 [3]

11 (a) (i)

0, 1, 1, 2, 3, 5, 8,

This sequence has the rule:

After the first two terms, any term is the sum of the two previous terms.

The first two terms are 0 and 1,
 the 3rd term is $0 + 1 = 1$,
 the 4th term is $1 + 1 = 2$,
 the 5th term is $1 + 2 = 3$ and so on.

Show that the 8th term is 13.

Answer(a)(i) [1]

(ii) Each of the following sequences have the same rule as **part (a)(i)**.

For each sequence write down the missing terms.

2, 5, 7, , [1]

4, 3, 7, , [1]

5, 2, , [1]

0, , 3, [1]

1, , , 9, [1]

..... , , 5, 7 [1]

(b) For the following sequences find the next term and the n th term.(i) 1, 3, 5, 7, 9, n th term = [3](ii) 1, 4, 9, 16, 25, n th term = [2](iii) 1, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, n th term = [2]

- 1 A ferry to Crete leaves at 07 30.
The journey takes 2 hours and 48 minutes.
Work out the time when the ferry arrives in Crete.

Answer [1]

- 2 (a) Write the following in order, starting with the smallest.

$$0.43 \quad \frac{4}{9} \quad 41\%$$

Answer(a) < < [1]

- (b) Only **one** of the following statements is correct.

$$\sin 30^\circ \neq 0.5$$

$$4^2 > 16$$

$$0.3 < \frac{1}{3}$$

Put a ring around the **correct** statement.

[1]

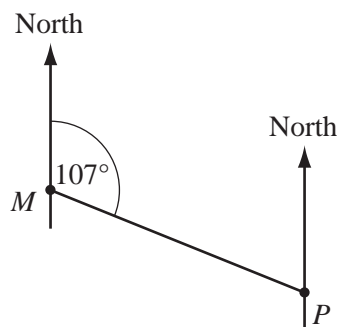
- 3 In a group of 35 students, 14 go to school by bus.
Write down the probability that a student, chosen at random, does **not** go to school by bus.
Give your answer as a fraction in its lowest terms.

Answer [2]

- 4 Write down the equation of the line, parallel to $y = 4x + 1$, which passes through the point $(0, -3)$.

Answer [2]

5

NOT TO
SCALE

The bearing of P from M is 107° .
Work out the bearing of M from P .

Answer [2]

- 6 Martin recorded the outside temperature every three hours.
At 07 00 the temperature was -2°C .

- (a) This was 5°C higher than the temperature at 04 00.
Write down the temperature at 04 00.

Answer(a) $^\circ\text{C}$ [1]

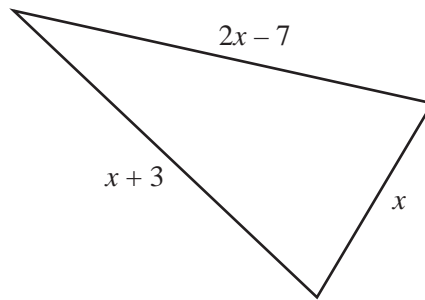
- (b) At 10 00 the temperature was 11°C .
Write down the increase in temperature between 07 00 and 10 00.

Answer(b) $^\circ\text{C}$ [1]

- 7 In a sale, the price of a car was reduced from \$ 17 000 to \$ 15 300.
Calculate the reduction as a percentage of the original price.

Answer % [2]

8

NOT TO
SCALE

The lengths, in centimetres, of the sides of a triangle are x , $x + 3$ and $2x - 7$.
The perimeter of the triangle is 52 cm.

- (a) Use this information to write down an equation in x .

Answer(a) [1]

- (b) Find the value of x .

Answer(b) $x =$ [2]

- 9 The area of a circle is 19.7 cm^2 .
Calculate the radius of the circle.

Answer cm [3]

- 10 Simplify

(a) $p^3 \times p^4$,

Answer(a) [1]

(b) $12q^8 \div 3q^2$.

Answer(b) [2]

11

NOT TO
SCALE

The diagram shows part of a regular polygon.
Each interior angle of the polygon is 160° .
Calculate the number of sides of the polygon.

Answer [3]

12 Write down the value of

(a) 10^{-2} ,

Answer(a) [1]

(b) 4^0 ,

Answer(b) [1]

(c) $\sqrt[3]{343}$.

Answer(c) [1]

13 Solve the simultaneous equations.

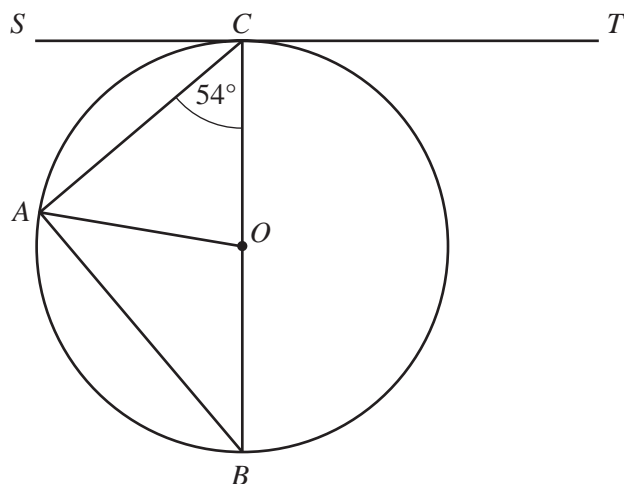
$$2x - y = 9$$

$$7x + 2y = 26$$

Answer $x =$

$y =$ [3]

14

NOT TO
SCALE

A, B and C lie on a circle, centre O . BC is a diameter and SCT is a tangent at C . Angle $ACB = 54^\circ$.

Find

(a) angle BCT ,

Answer(a) Angle $BCT = \dots\dots\dots$ [1]

(b) angle COA ,

Answer(b) Angle $COA = \dots\dots\dots$ [1]

(c) angle CAB ,

Answer(c) Angle $CAB = \dots\dots\dots$ [1]

(d) angle ABC .

Answer(d) Angle $ABC = \dots\dots\dots$ [1]

15

$$\mathbf{d} = \begin{pmatrix} 3 \\ -5 \end{pmatrix}$$

$$\mathbf{e} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$$

$$\mathbf{f} = \begin{pmatrix} 0 \\ 7 \end{pmatrix}$$

Calculate


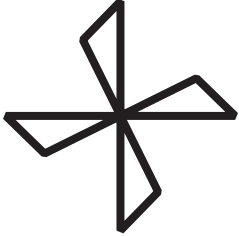
(a) $\mathbf{d} - \mathbf{e}$,

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

(b) $4\mathbf{f}$.

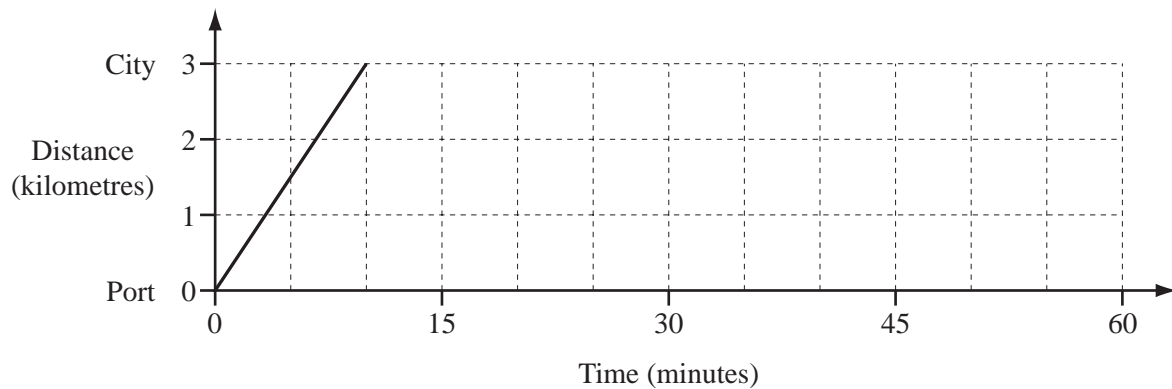
Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

16 Complete the information about each shape.

| | | |
|------------------------------|---|---|
| Shape |  |  |
| Number of lines of symmetry | | |
| Order of rotational symmetry | | |

[4]

17



- (a) The travel graph shows the journey of a bus from a port to a city.
Calculate the average speed of the bus

(i) in kilometres per minute,

Answer(a)(i) km/min [1]

(ii) in kilometres per hour.

Answer(a)(ii) km/h [1]

- (b) The bus waits in the city for 20 minutes and then returns to the port at an average speed of 12 km/h.

Complete the travel graph.

[2]

- 18 (a) Factorise $3y^2 - 7xy$.

Answer(a) [1]

- (b) Expand the brackets and simplify completely.

$$p(4p + 5r) + 2r(6p + r)$$

Answer(b) [3]

- 19 Erica is tiling the floor of a rectangular room of length 3 metres and width 2.5 metres. She uses square tiles of side 25 centimetres.

- (a) Calculate

- (i) how many tiles will fit along the length of the room,

Answer(a)(i) [1]

- (ii) how many tiles she will need altogether.

Answer(a)(ii) [2]

- (b) Work out the area of **one tile**

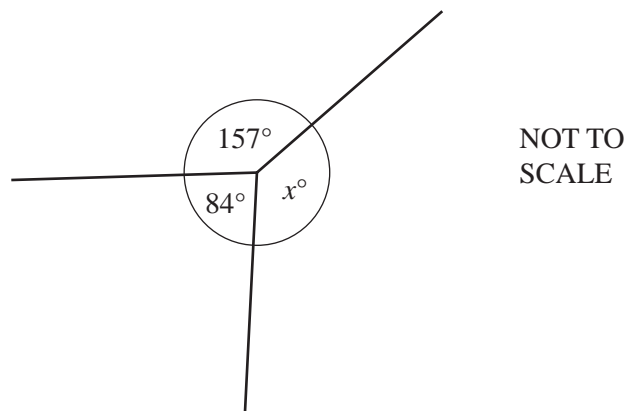
- (i) in square centimetres,

Answer(b)(i) cm^2 [1]

- (ii) in square metres.

Answer(b)(ii) m^2 [1]

1



Find the value of x .

Answer $x =$ [1]

2 (a) Write down the smallest number which is a multiple of both 8 and 12.

Answer(a) [1]

(b) Write down **all** the other multiples of both 8 and 12 which are less than 100.

Answer(b) [1]

3 Factorise **completely** $6mp - 9pq$.

Answer [2]

- 4** 1 litre of apple juice is poured into 3 glasses.

The first glass contains $\frac{2}{5}$ litre.

The second glass contains $\frac{1}{4}$ litre.

What fraction of a litre does the third glass contain?

Show all your working clearly.

Answer [2]

- 5** A plane from Hong Kong to New Zealand leaves at 18 10 on Monday.

The time in New Zealand is 4 hours ahead of the time in Hong Kong.

- (a)** Write down the time in New Zealand when the plane leaves Hong Kong.

Answer(a) [1]

- (b)** The plane arrives in New Zealand at 09 45 on Tuesday.

How long, in hours and minutes, does the journey take?

Answer(b) h min [1]

- 6 Alphonse changed 400 Brazilian reals into South African Rand.
The exchange rate was 1 Brazilian real = 4.76 South African Rand (R).

How much did he receive?

Answer R [2]

- 7 Joe measured the diameter of a tennis ball correct to the nearest millimetre.
The upper bound of his measurement was 6.75 centimetres.

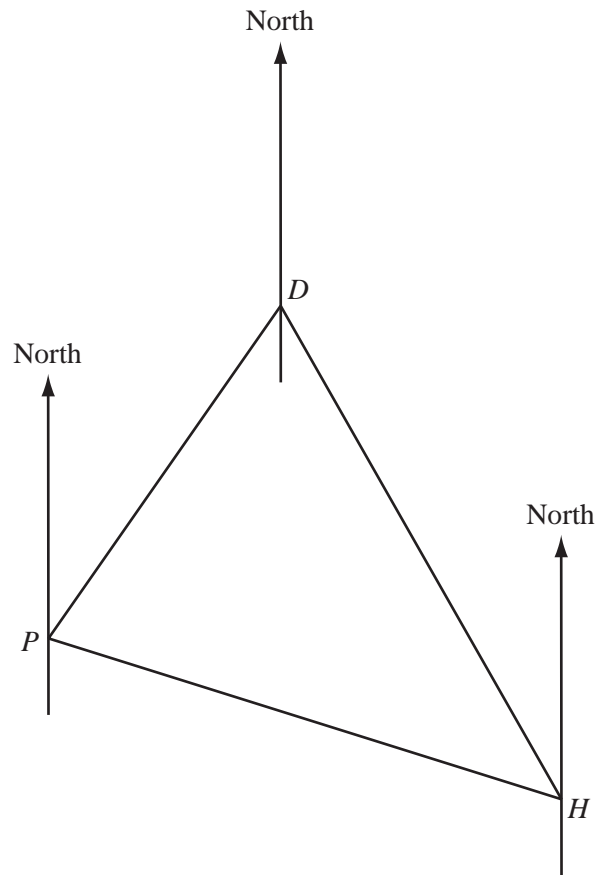
Write down, **in millimetres**, the lower bound of his measurement.

Answer mm [2]

- 8 Make p the subject of the formula $m = p^2 - 2$.

Answer $p =$ [2]

9



The positions of Perth (P), Darwin (D) and Hobart (H) are shown on the diagram.

Measure accurately any angles you need and write down the bearing of

(a) D from P ,

Answer(a) [1]

(b) P from H .

Answer(b) [1]

10 When $c = 10$ and $d = -2$, find the value of the following expressions.

(a) $c + 2d$

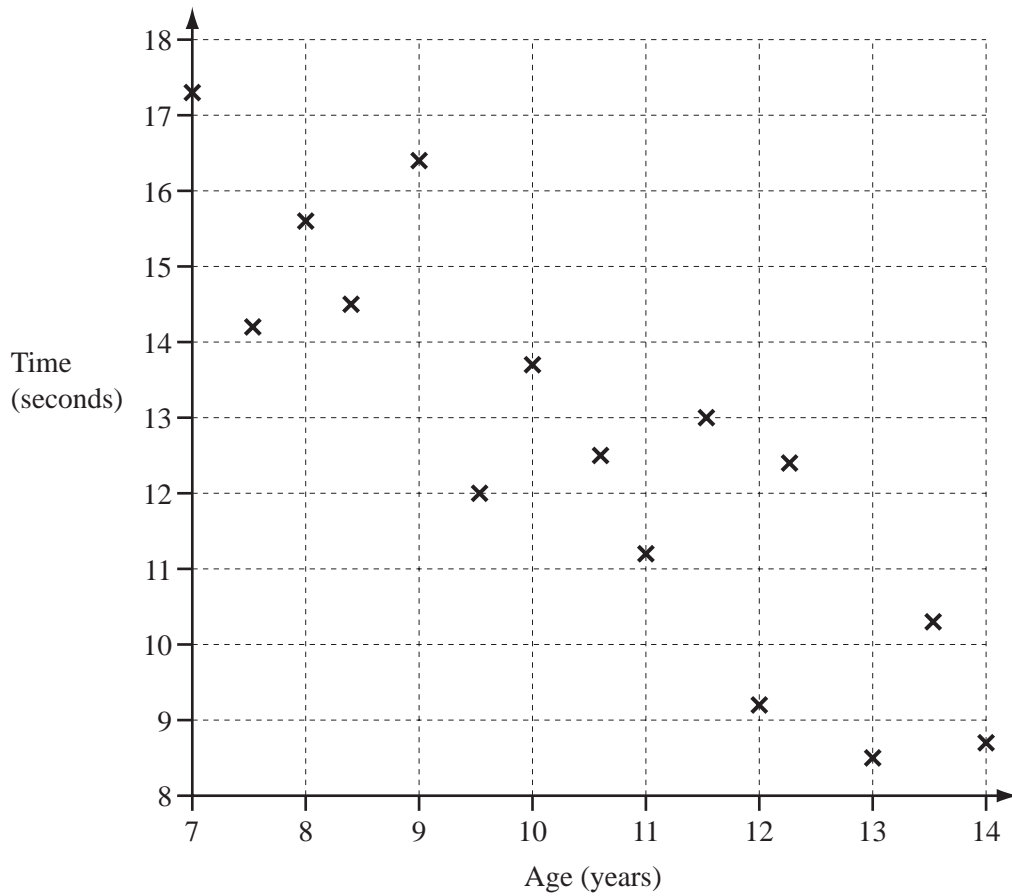
Answer(a) [1]

(b) $5c^2 - cd$

Answer(b) [2]

- 11 Fifteen children ran a 60 metre race.

In the scatter diagram below, the time taken is plotted against the age for each child.



- (a) Draw a line of best fit on the scatter diagram. [1]

- (b) What type of correlation does the scatter diagram show?

Answer(b) [1]

- (c) Describe how the times taken change with the ages of the children.

Answer (c) [1]

12 (a) $\frac{1}{27} = 3^x$.

Write down the value of x .

Answer(a) $x =$ [1]

(b) Simplify

(i) $p^7 \times p^{-2}$,

Answer(b)(i) [1]

(ii) $m^3 \div m^7$.

Answer(b)(ii) [1]

13 (a) Work out $\frac{0.68 + 2.57 \times 1.76}{63}$.

Write down all the figures from your calculator display.

Answer(a) [1]

(b) Write your answer to **part (a)** in standard form correct to 3 significant figures.

Answer(b) [2]

14 Solve the simultaneous equations.

$$3x - 2y = 15$$

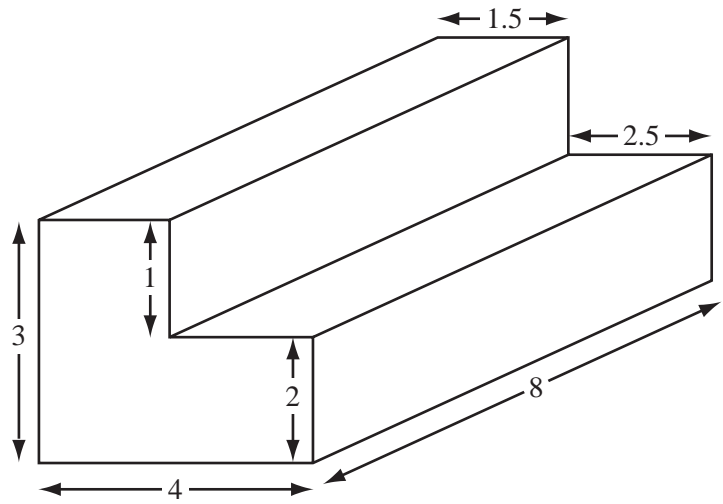
$$2x + y = 17$$

Answer $x =$

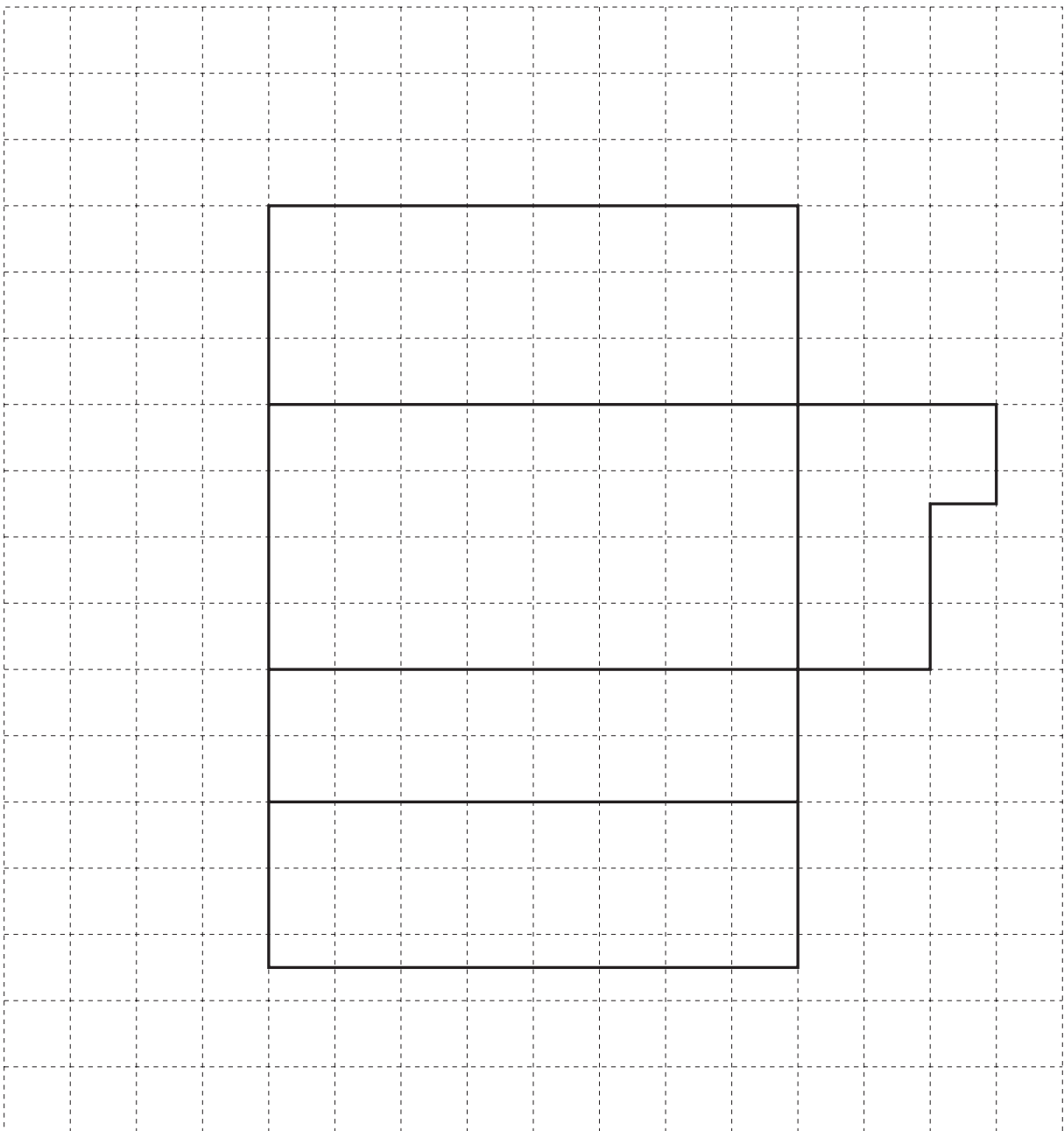
$y =$ [3]

- 15 The diagram shows a prism.
The lengths are in centimetres.

NOT TO
SCALE



Part of an accurate net of the prism is drawn below.
Complete the net.



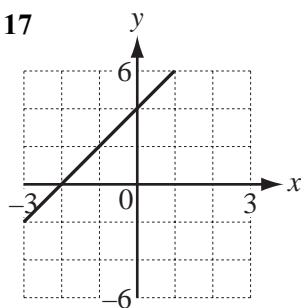
[3]

- 16 Daniel invested \$2500 for 2 years at 5.5% per year **compound** interest.

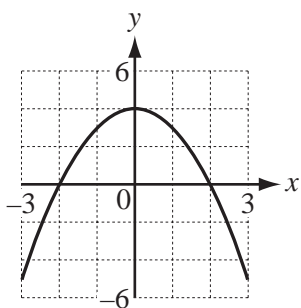
Calculate how much interest he received.

Answer \$ [3]

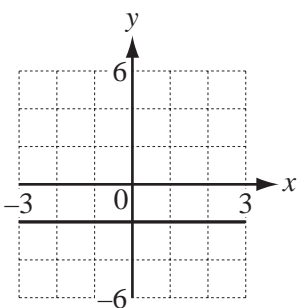
17



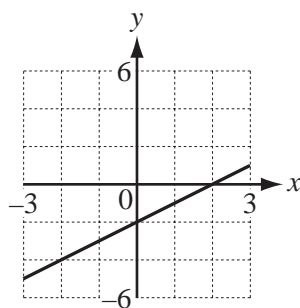
A



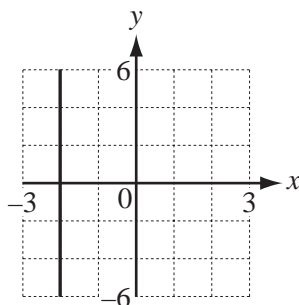
B



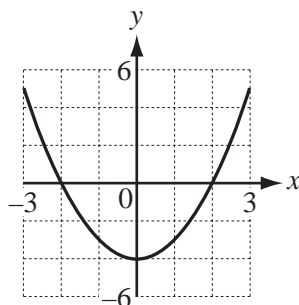
C



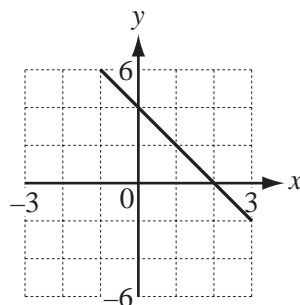
D



E



F



G

Write down the letter of the graph which is

(a) $y = x - 2$,

Answer(a) [1]

(b) $x = -2$,

Answer(b) [1]

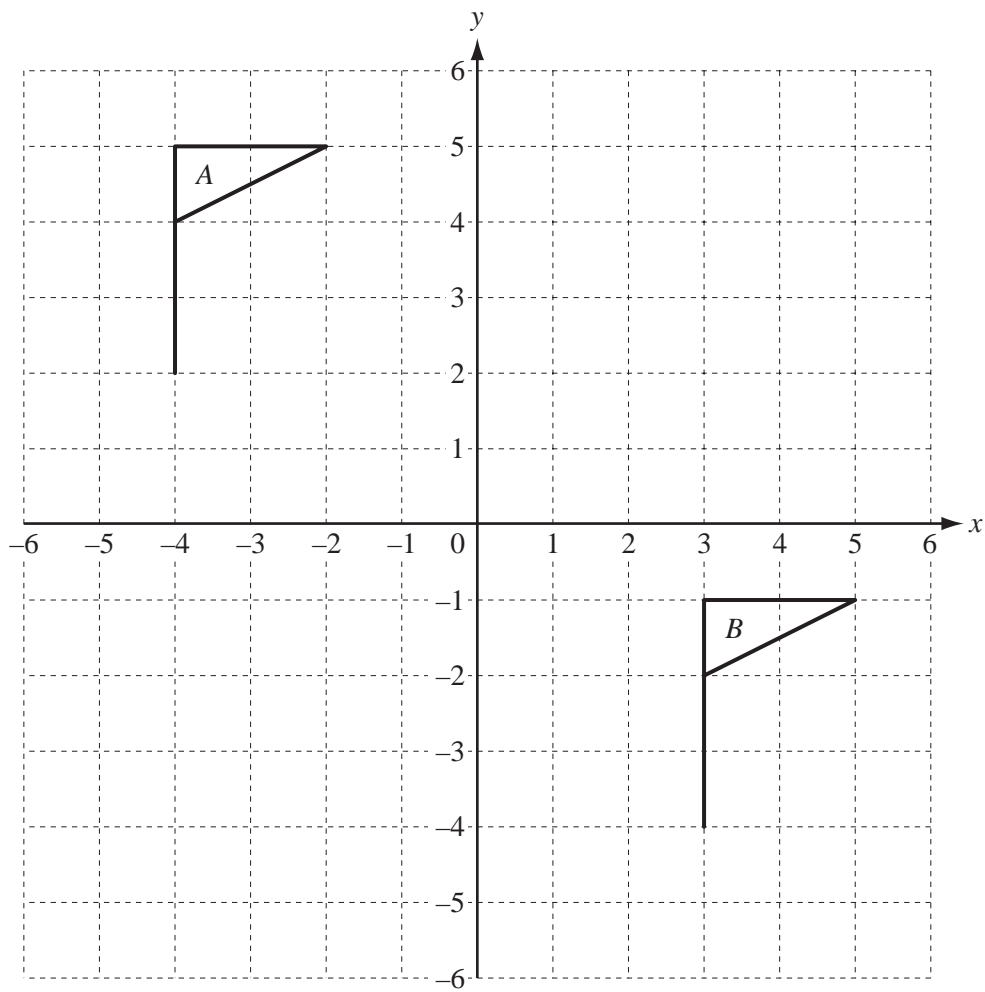
(c) $y = -2x + 4$,

Answer(c) [1]

(d) $y = x^2 - 4$.

Answer(d) [1]

18



- (a) Describe fully the **single** transformation which maps flag A onto flag B .

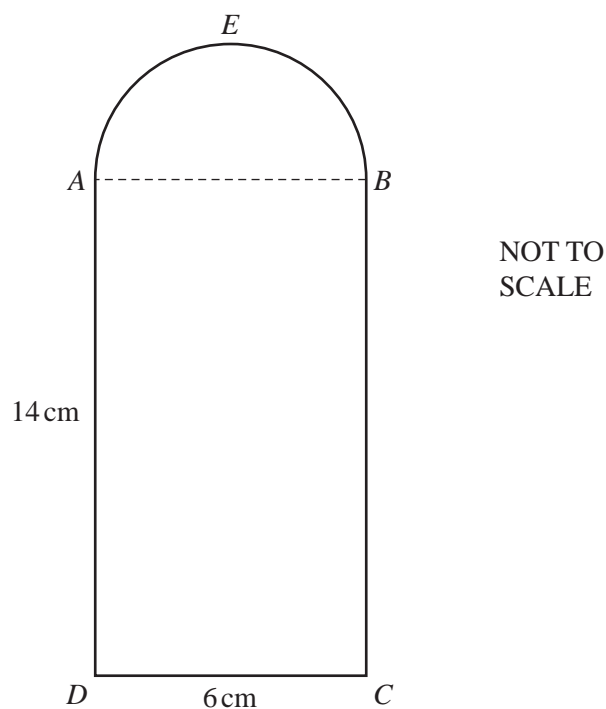
Answer(a) [2]

- (b) Draw, on the grid above, the image of flag A after rotation through 90° clockwise about the origin. [2]

- 19 The diagram shows a door, $AEBCD$, from a model of a house.

$ABCD$ is a rectangle and AEB is a semi-circle.

$AD = 14$ cm and $DC = 6$ cm.



- (a) Calculate the area of the door.

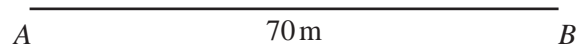
Answer(a) cm^2 [3]

- (b) The door is 2 **millimetres** thick.

Calculate, in cubic centimetres, the volume of the door.

Answer(b) cm^3 [2]

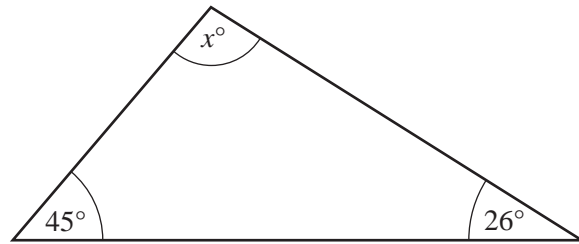
- 20** A running track has a boundary that is always 40 metres from a straight line, AB .
 $AB = 70$ m.
 The scale drawing below shows the line AB .
 1 centimetre represents 10 metres.



- (a) Complete the scale drawing accurately to show the boundary of the running track. [2]
- (b) **Calculate**, in metres, the total length of the actual boundary.

Answer(b) m [3]

1



NOT TO
SCALE

Find the value of x .

Answer $x =$ [1]

- 2 A train to Paris leaves at 06 30.
The journey takes 3 hours and 56 minutes.

Work out the time when the train arrives in Paris.

Answer [1]

- 3 Write down the factors of 48 which are between 10 and 40.

Answer [2]

4 < = >

For each part, choose a symbol from those above to make a correct statement.

$$(a) \quad \frac{5}{9} \dots\dots\dots 0.55 \quad [1]$$

(b) 66% $\frac{2}{3}$ [1]

5 In a sale, the price of a boat was reduced from \$21 000 to \$16 800.

Calculate the reduction as a percentage of the original price.

Answer _____ % [2]

6 Write down the equation of the line, parallel to $y = 3x + 5$, which passes through the point $(0, -2)$.

Answer [2]

- 7 Mrs Duval makes one litre of ice cream.
She eats $\frac{1}{8}$ litre and her children eat $\frac{3}{5}$ litre.

Without using your calculator, find what fraction of a litre of ice cream is left.
Show all your working clearly.

Answer [2]

- 8 (a) Use your calculator to work out $27.4 \times (3.28 + 1.6 \times 9.8)$.

Write down all the figures from your calculator display.

Answer(a) [1]

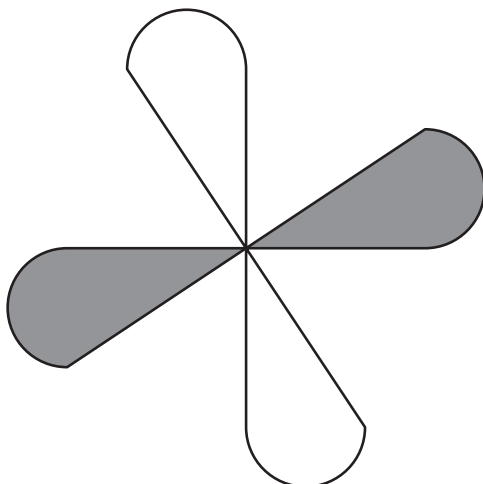
- (b) Write your answer to **part (a)** correct to 3 significant figures.

Answer(b) [1]

- 9 Calculate the area of a circle of radius 3.75 cm.

Answer cm² [2]

10 (a)



Write down the order of rotational symmetry of the shape above.

Answer(a) [1]

(b)

A M N O T X

From the list, write down the letters which have only **one** line of symmetry.

Answer(b) [2]

11 Simplify

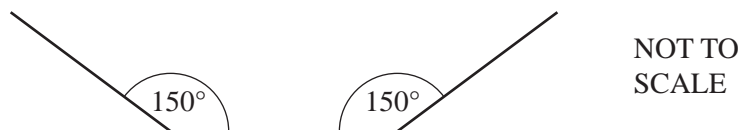
(a) $m^3 \times m^{-5}$,

Answer(a) [1]

(b) $15k^8 \div 3k^2$.

Answer(b) [2]

12



The diagram shows part of a regular polygon with each interior angle 150° .

Calculate the number of sides of the polygon.

Answer [3]

13 Expand the following expressions.

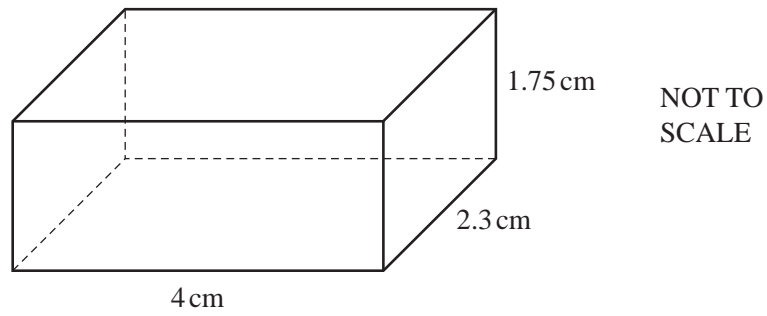
(a) $5(3 - 4h)$

Answer(a) [1]

(b) $4d(6d^2 + e^2)$

Answer(b) [2]

14



The cuboid above has length 4 cm, width 2.3 cm and height 1.75 cm.

Calculate the volume of the cuboid

(a) in cubic centimetres,

Answer(a) cm^3 [2]

(b) in cubic millimetres.

Answer(b) mm^3 [1]

15 Simplify the following expressions.

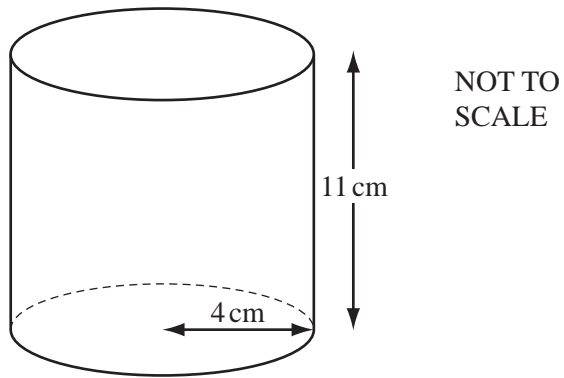
(a) $6r + 2s + s - 4r$

Answer(a) [1]

(b) $4f^2 - 3g + 4g - 9f^2$

Answer(b) [2]

16



A cylindrical can of beans has height 11 cm and radius 4 cm.
A label covers the curved surface of the can completely.

Calculate the area of the label.

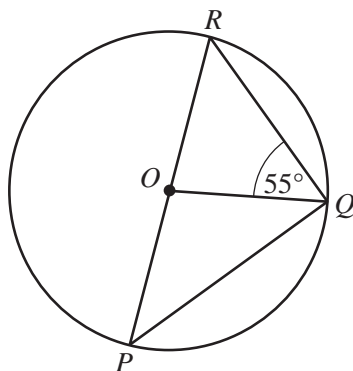
Answer cm^2 [3]

17 Solve the simultaneous equations.

$$\begin{aligned} 3x + y &= 19 \\ 5x - y &= 13 \end{aligned}$$

Answer $x =$
 $y =$ [3]

18

NOT TO
SCALE

P , Q and R lie on a circle, centre O .
 PR is a diameter and angle $OQR = 55^\circ$.

Find

(a) angle PQR ,Answer(a) Angle $PQR = \dots\dots\dots$ [1](b) angle ROQ ,Answer(b) Angle $ROQ = \dots\dots\dots$ [1](c) angle OPQ .Answer(c) Angle $OPQ = \dots\dots\dots$ [1]

19

$$\mathbf{f} = \begin{pmatrix} 6 \\ 0 \end{pmatrix}$$

$$\mathbf{g} = \begin{pmatrix} -3 \\ 6 \end{pmatrix}$$

$$\mathbf{h} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}$$

Calculate

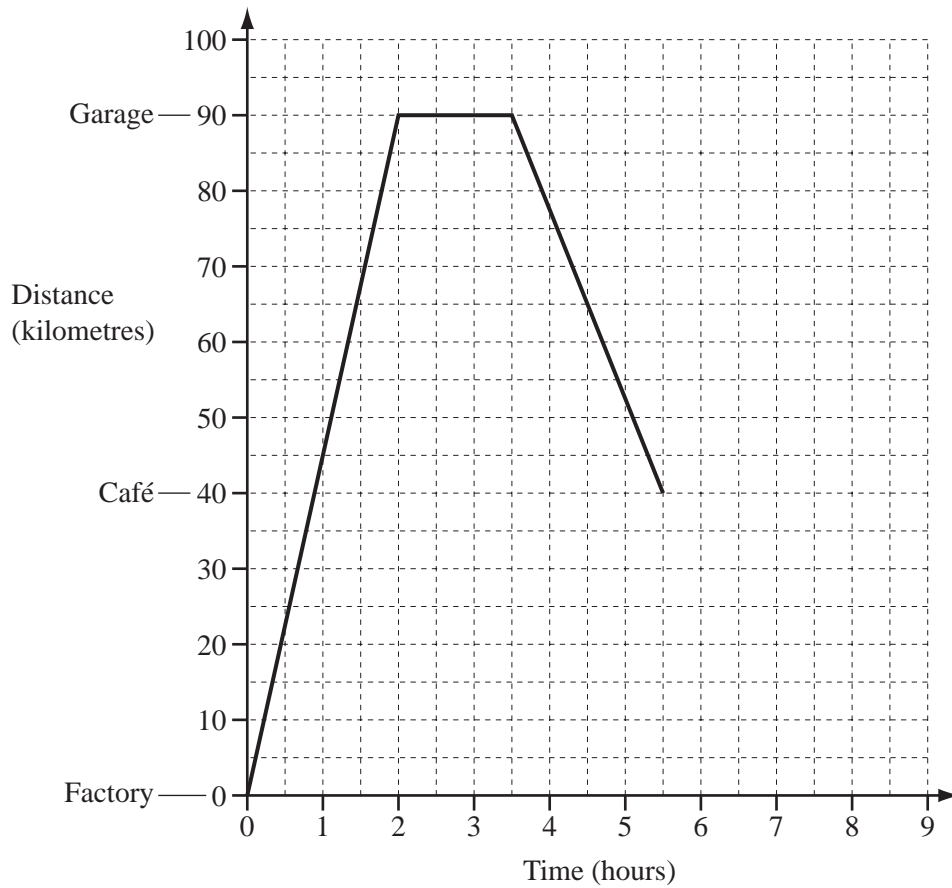
(a) $3\mathbf{f}$,

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

(b) $\mathbf{g} - \mathbf{h}$.

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

20



The travel graph shows part of the journey of a truck driver.

The driver leaves a factory to deliver tyres to a garage.

After unloading the tyres, the driver returns to the factory, but stops at a café for 1 hour.

He then completes the journey at an average speed of 80 km/h.

- (a) Calculate the average speed of the truck on its journey from the factory to the garage.

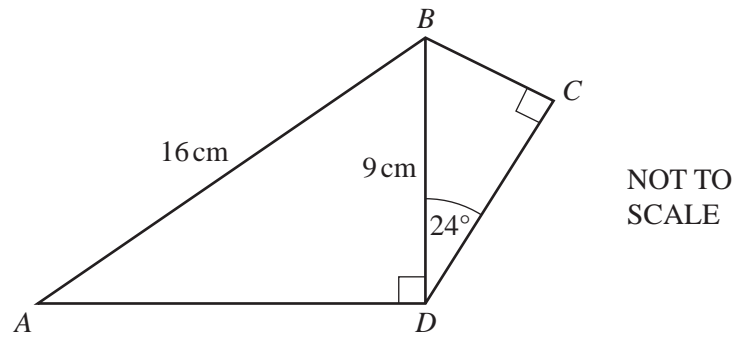
Answer(a) km/h [1]

- (b) Write down the length of time the truck stays at the garage.

Answer(b) hours [1]

- (c) Complete the travel graph. [2]

21



The diagram shows a quadrilateral $ABCD$.
 $AB = 16$ cm, $BD = 9$ cm and angle $BDC = 24^\circ$.
 Angle $ADB = 90^\circ = \text{angle } BCD$.

Calculate the length of

(a) AD ,

Answer(a) $AD = \dots\dots\dots$ cm [3]

(b) CD .

Answer(b) $CD = \dots\dots\dots$ cm [2]

1 The population of a village is 2250.

- (a) 32% of the population are children.
Calculate the number of children in the village.

Answer(a) [2]

(b) 360 people in the village are over the age of 60.

- (i) For these 360 people, the ratio of men to women is 2 : 7.
Calculate how many men are over the age of 60.

Answer(b)(i) [2]

(ii) Write 360 as a fraction of 2250 in its lowest terms.

Answer(b)(ii) [2]

- (c) The population of 2250 is expected to increase by 18% next year.
Calculate the expected population next year.

Answer(c) [3]

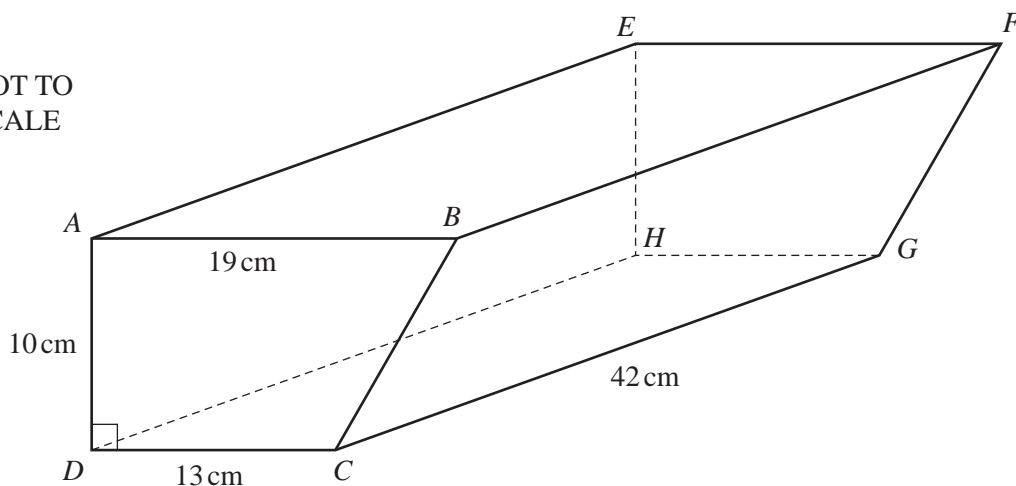
(d) Write the number 2250 in standard form.

Answer(d) [1]

- (e) Another village has a population of 1770, correct to the nearest ten.
Write down the lower bound for the population of this village.

Answer(e) [1]

2

NOT TO
SCALE

The diagram shows a block of stone in the shape of a prism of length 42 cm.

The cross-section is a trapezium $ABCD$.

$AB = 19$ cm, $AD = 10$ cm, $DC = 13$ cm and angle $ADC = 90^\circ$.

(a) Calculate

(i) the perimeter of the rectangular face $ABFE$,

Answer(a)(i) cm [2]

(ii) the area of the cross-section $ABCD$,

Answer(a)(ii) cm^2 [3]

(iii) the volume of the block of stone.

Answer(a)(iii) cm^3 [2]

(b) The mass of 1 cubic centimetre of the stone is 4 grams.

Calculate the mass of the block.

Give your answer in kilograms.

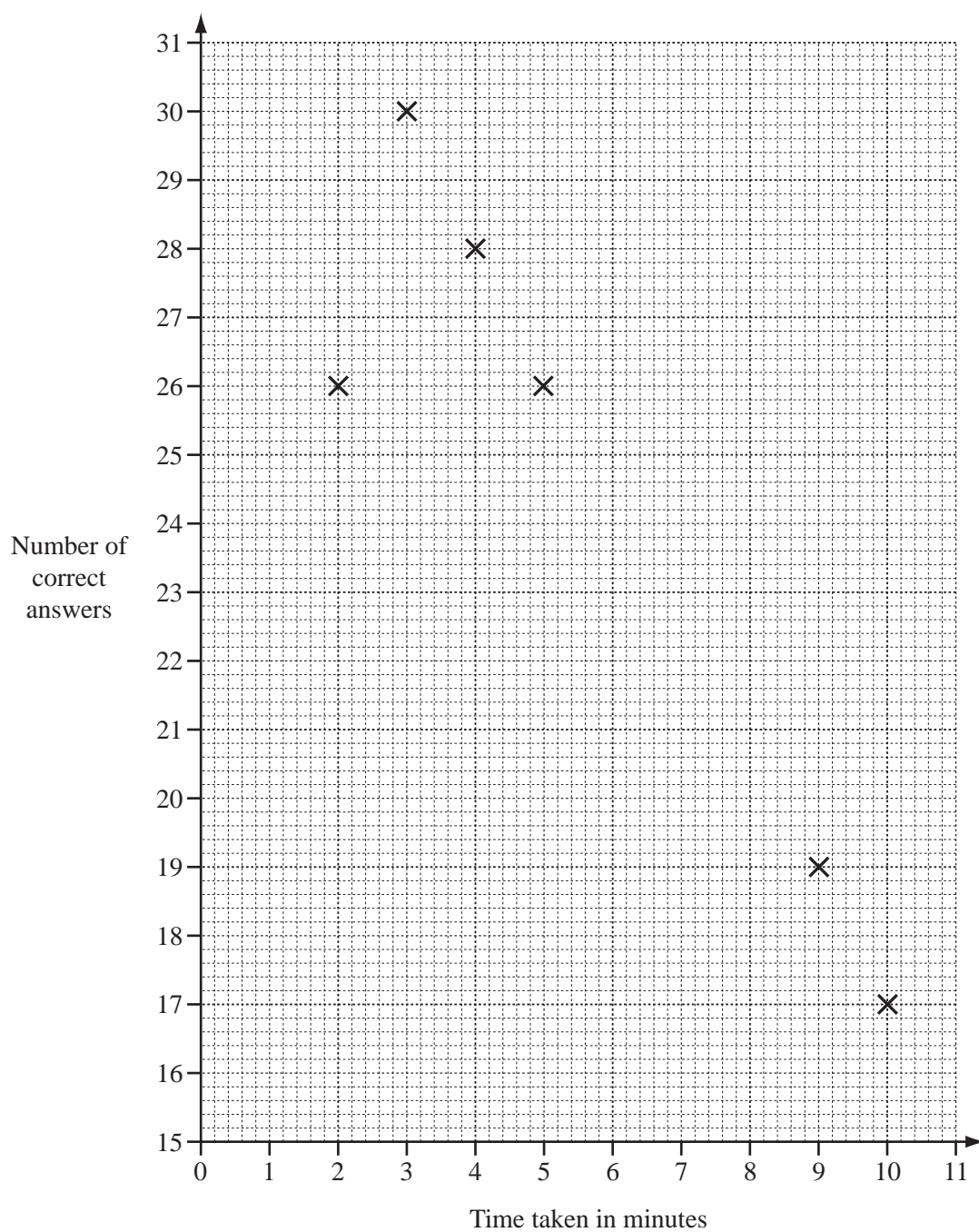
Answer(b) kg [3]

- 3 Twelve students each answer 30 questions in a quiz.

The time taken and the number of correct answers for each student is given in the table.

| | | | | | | | | | | | | |
|---------------------------|----|----|----|----|----|----|----|----|----|----|----|----|
| Time taken in minutes | 9 | 4 | 5 | 10 | 3 | 2 | 8 | 8 | 4 | 5 | 6 | 7 |
| Number of correct answers | 19 | 28 | 26 | 17 | 30 | 26 | 25 | 20 | 23 | 21 | 24 | 22 |

- (a) Complete the scatter diagram below to show this information.
The first six points have been plotted for you.



[3]

(b) What type of correlation does the scatter diagram show?

Answer(b) [1]

(c) (i) Find the range of the **time taken**.

Answer(c)(i) min [1]

(ii) Calculate the mean time taken.

Answer(c)(ii) min [3]

(d) (i) Find the mode for the **number of correct answers**.

Answer(d)(i) [1]

(ii) Find the median for the number of correct answers.

Answer(d)(ii) [1]

(e) One of the 12 students is selected at random.

Write down the probability that the student

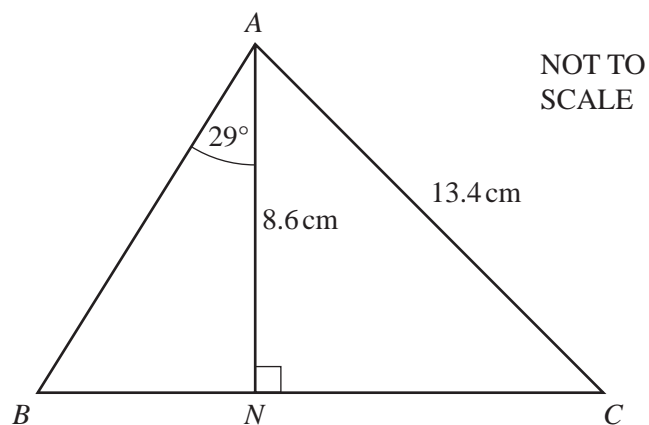
(i) took more than 8 minutes to answer the quiz,

Answer(e)(i) [1]

(ii) took less than 5 minutes **and** had more than 24 correct answers.

Answer(e)(ii) [2]

4



In triangle ABC , $AN = 8.6 \text{ cm}$ and is perpendicular to BC .

Angle $BAN = 29^\circ$ and $AC = 13.4 \text{ cm}$.

(a) Use trigonometry to calculate

(i) the length of BN ,

Answer(a)(i) $BN = \dots\dots\dots \text{ cm}$ [3]

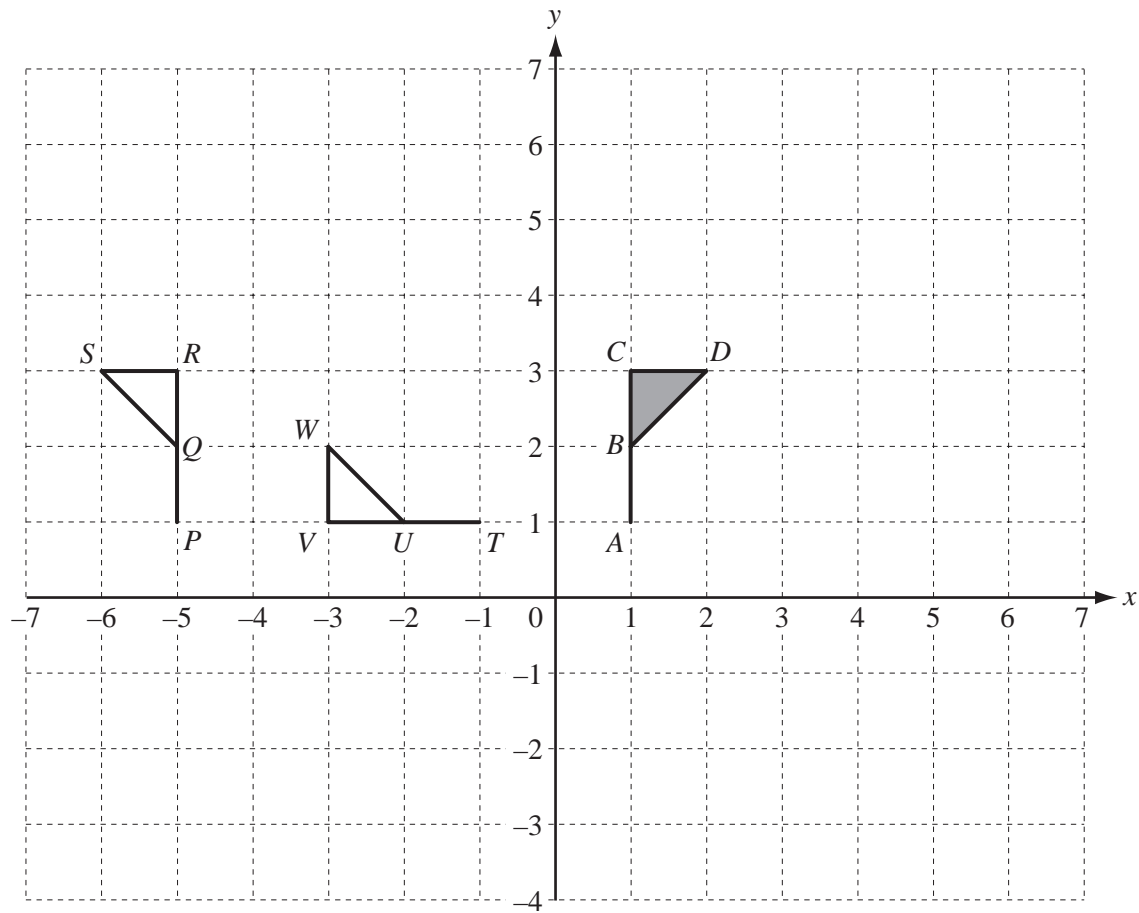
(ii) angle CAN .

Answer(a)(ii) Angle $CAN = \dots\dots\dots$ [2]

(b) Calculate the length of NC .

Answer(b) $NC = \dots\dots\dots \text{ cm}$ [3]

5



(a) On the grid, draw the image of

(i) the flag $ABCD$ after translation by $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$, [2]

(ii) the flag $ABCD$ after enlargement, scale factor 2, centre the origin, [2]

(iii) the flag $ABCD$ after reflection in the x -axis. [2]

(b) Describe fully the **single** transformation which maps $ABCD$ onto $PQRS$.

..... [2]

(c) Describe fully the **single** transformation which maps $ABCD$ onto $TUVW$.

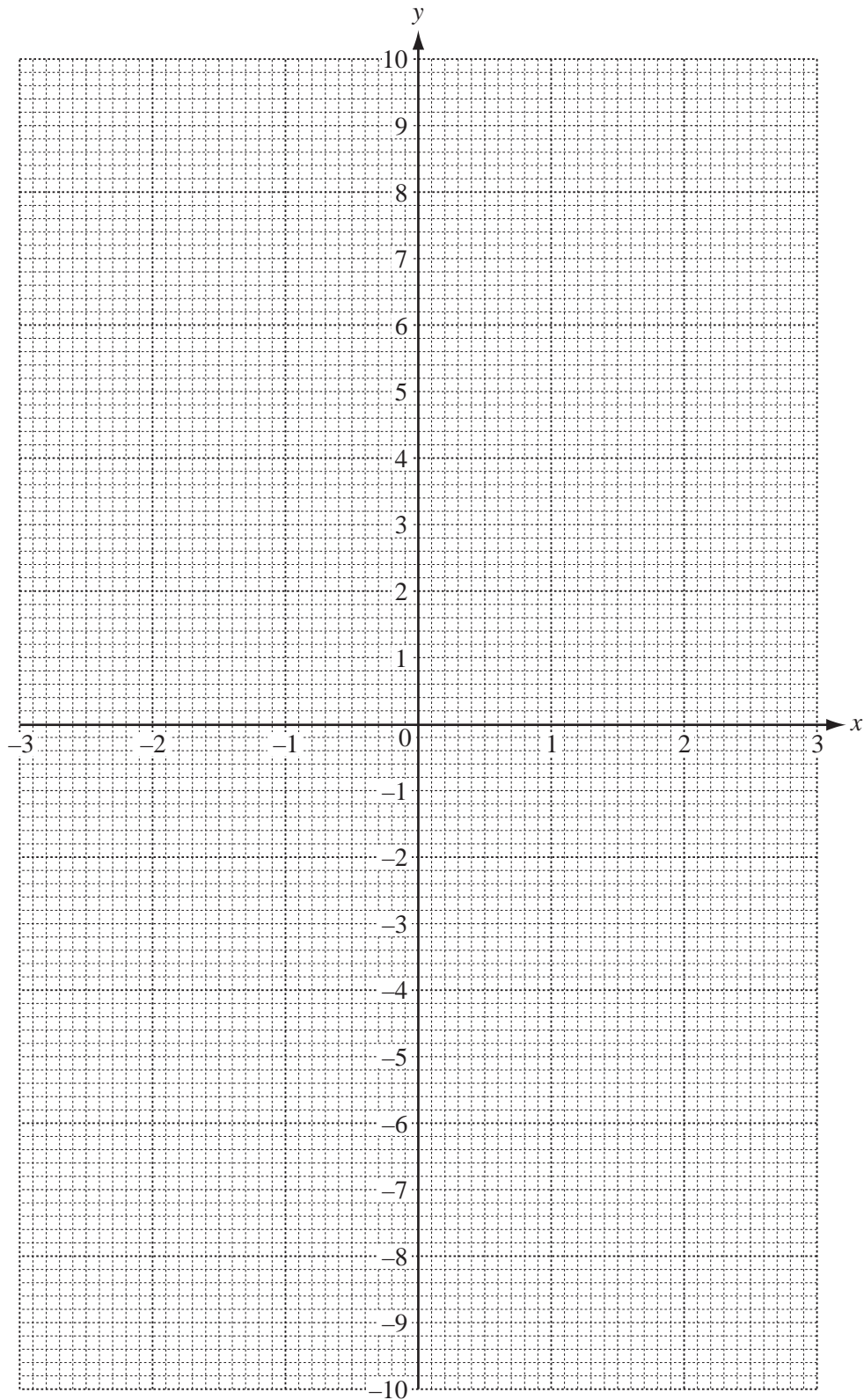
..... [3]

- 6 (a) Complete the table of values for the function $y = \frac{3}{x}$, $x \neq 0$.

| | | | | | | | | | | | | | | | |
|-----|----|------|----|------|----|------|------|--|-----|-----|---|-----|-----|-----|---|
| x | -3 | -2.5 | -2 | -1.5 | -1 | -0.5 | -0.3 | | 0.3 | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 |
| y | -1 | -1.2 | | -2 | -3 | -6 | | | | | 3 | 2 | 1.5 | | 1 |

[3]

- (b) On the grid below, draw the graph of $y = \frac{3}{x}$ for $-3 \leq x \leq -0.3$ and $0.3 \leq x \leq 3$.



[5]

- (c) Use your graph to solve the equation $\frac{3}{x} = 7$.

Answer(c) $x =$ [1]

- (d) Complete the table of values for $y = \frac{2x}{3} - 1$.

| | | | |
|-----|----|---|---|
| x | -3 | 0 | 3 |
| y | | | |

[2]

- (e) On the grid, draw the straight line $y = \frac{2x}{3} - 1$ for $-3 \leq x \leq 3$. [2]

- (f) Write down the co-ordinates of the points where the line $y = \frac{2x}{3} - 1$ intersects the graph of $y = \frac{3}{x}$.

Answer(f) (..... ,) and (..... ,) [2]

7

$$S = a + 4d$$

- (a) Find S when $a = 17$ and $d = -5$.

Answer(a) $S =$ [2]

- (b) Find d when $S = 37$ and $a = 5$.

Answer(b) $d =$ [2]

- (c) Make d the subject of the formula $S = a + 4d$.

Answer(c) $d =$ [2]

8 In this question give all your answers to 2 decimal places.

- (a) Ankuri lends her brother \$275 for 4 years at a rate of 3.6% per year **simple** interest.
Calculate the total amount her brother owes after 4 years.

Answer(a) \$ [3]

- (b) Monesh invests \$650 in a bank which pays 4% per year **compound** interest.
Calculate the amount Monesh will have after 2 years.

Answer(b) \$ [3]

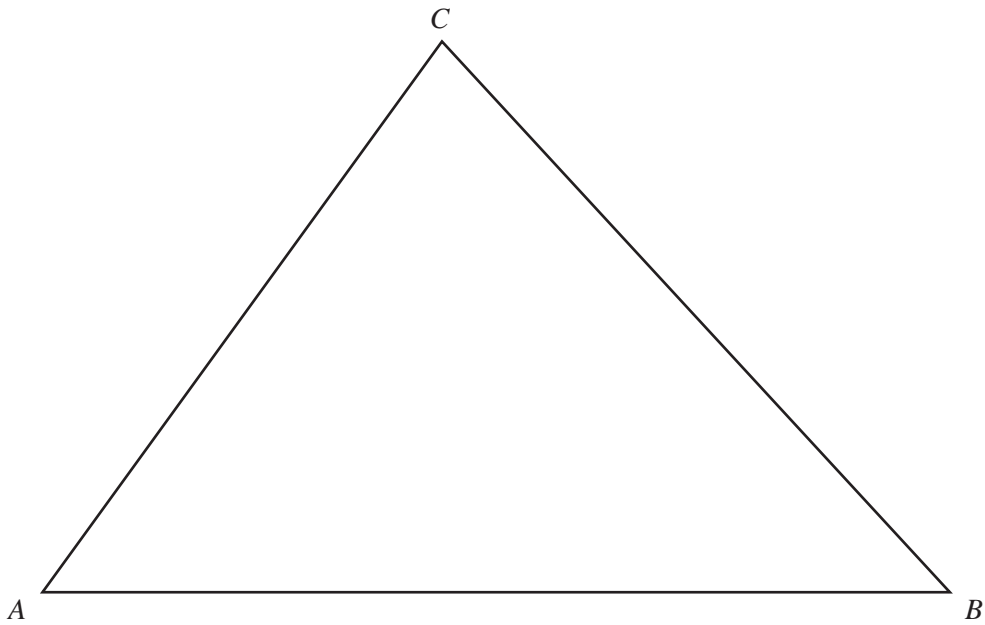
- (c) Theresa and Ian have 400 euros (€) each.

- (i) Theresa changes her €400 for pounds (£) when the exchange rate is €1 = £ 0.7857.
Calculate the amount she receives.

Answer(c)(i) £ [2]

- (ii) Ian changes his €400 for dollars (\$) when the exchange rate is \$1 = € 0.6374.
Calculate the amount he receives.

Answer(c)(ii) \$ [3]



Triangle ABC is drawn accurately.

(a) Measure and write down

(i) the length of AC ,

Answer(a)(i) $AC =$ cm [1]

(ii) the size of angle CAB .

Answer(a)(ii) Angle $CAB =$ [1]

(b) Construct accurately the locus of all the points 7 cm from C . [2]

(c) The point X lies **outside** the triangle ABC , with $CX = 7$ cm and angle $BCX = 67^\circ$.
Draw accurately the line CX . [2]

(d) Draw the line BX . Measure and write down the length of this line.

Answer(d) $BX =$ cm [1]

(e) Using a straight edge and compasses only, construct the locus of points equidistant from BC and from BX . [2]

10



Diagram 1



Diagram 2

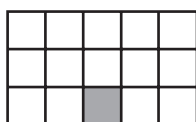


Diagram 3

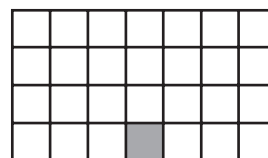


Diagram 4

Look at the sequence of diagrams.

- (a) Diagram 2 has a height of 2.

Write down the height of

- (i) Diagram 5,

Answer(a)(i) [1]

- (ii) Diagram 10,

Answer(a)(ii) [1]

- (iii) Diagram n .

Answer(a)(iii) [1]

- (b) Diagram 2 has a width of 3.

Find the width of

- (i) Diagram 5,

Answer(b)(i) [1]

- (ii) Diagram 10,

Answer(b)(ii) [1]

- (iii) Diagram n .

Answer(b)(iii) [2]

- (c) There are 6 squares in Diagram 2 and 15 squares in Diagram 3.

- (i) Write down how many squares there are in Diagram 5.

Answer(c)(i) [1]

- (ii) Explain how this is found from the height and width of the diagram.

Answer(c)(ii) [1]

- (iii) Write down, in terms of n , how many squares there are in Diagram n .

Answer(c)(iii) [1]

- 1 (a) (i) 1, 2 and 36 are factors of 36.

Write down all the other factors of 36.

Answer(a)(i) [2]

- (ii) 1 and 2 are common factors of 36 and 90.

Write down two more common factors of 36 and 90.

Answer(a)(ii) [2]

- (b) Write down all the square numbers between 20 and 50.

Answer(b) [3]

- (c) p and q are prime numbers.

$$p^3 \times q = 56$$

Find p and q .

Answer(c) $p =$

$q =$ [2]

- 2** Francis earns \$150 per week.
He has \$132 left after he pays his tax.

(a) Calculate what percentage of his \$150 he pays in tax.

Answer(a) % [3]

(b) He divides the \$132 between expenses, savings and family in the ratio

Expenses : Savings : Family = 15 : 7 : 11.

Calculate his expenses.

Answer(b) \$ [3]

(c) His rent is \$24 per week.

What fraction of the \$132 is this?

Give your answer as a fraction in its simplest form.

Answer(c) [2]

(d) His earnings of \$150 per week increase by 8%.

Calculate his new earnings.

Answer(d) \$ [2]

- 3** Mrs Sesay leaves home by car at 13 30.
After 15 minutes she stops at a shopping centre, 8 kilometres from home.

- (a)** Calculate the average speed for her journey.
Give your answer in kilometres per hour.

Answer(a) km/h [2]

- (b)** She leaves the shopping centre half an hour later.
She travels a further 12 kilometres at the speed of 36 km/h to Villeneuve.

- (i)** Write down the time when she leaves the shopping centre.

Answer(b)(i) [1]

- (ii)** Calculate the time, in minutes, that she takes to travel from the shopping centre to Villeneuve.

Answer(b)(ii) min [2]

- (iii)** On the grid opposite, complete the travel graph showing her journey. [2]

- (c)** Her son, Braima, also leaves home at 13 30 and cycles the 20 kilometres to Villeneuve.
He cycles at a speed of 15 km/h.

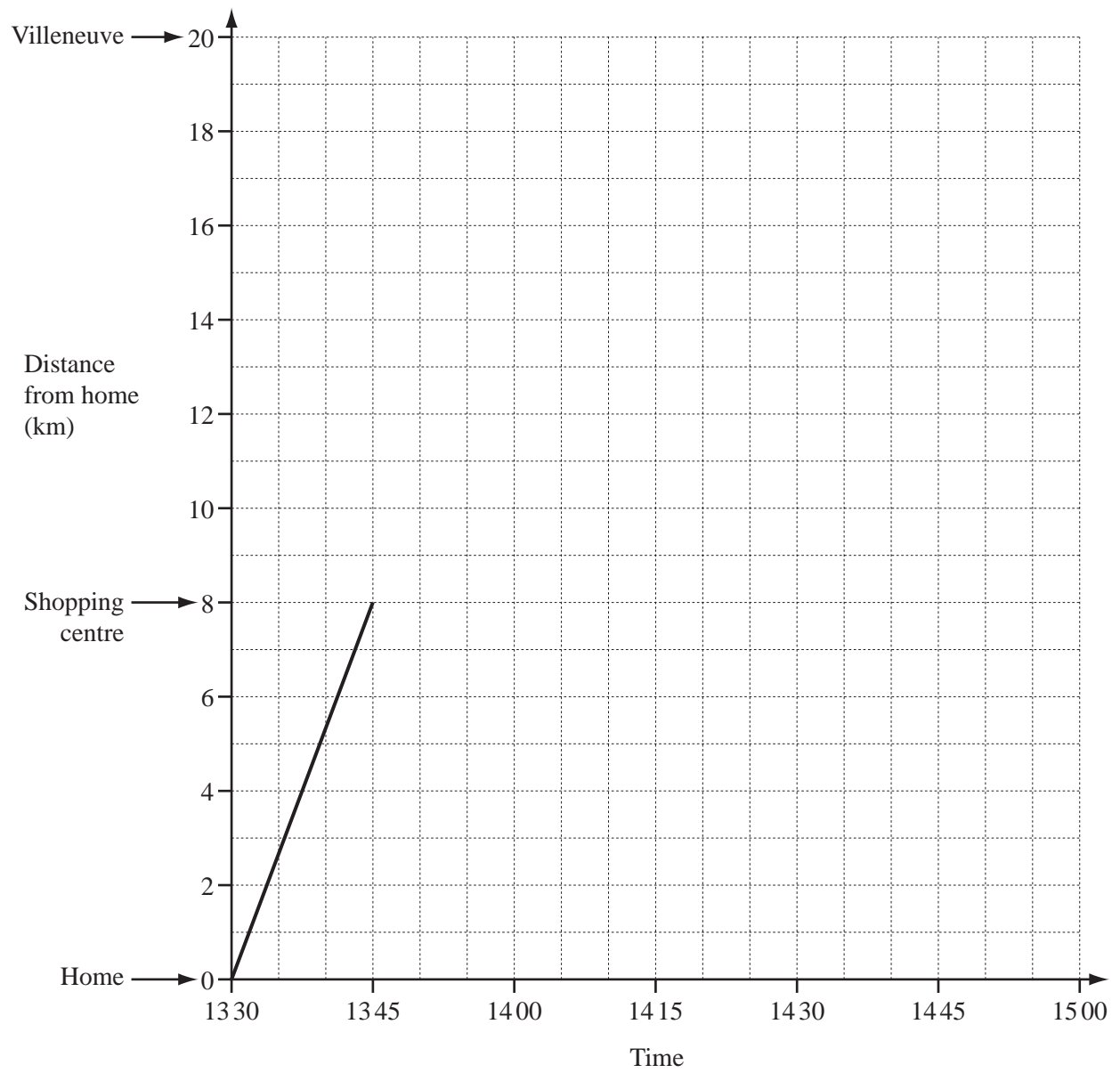
- (i)** Calculate how long his journey takes.
Give your answer in hours and minutes.

Answer(c)(i) h min [2]

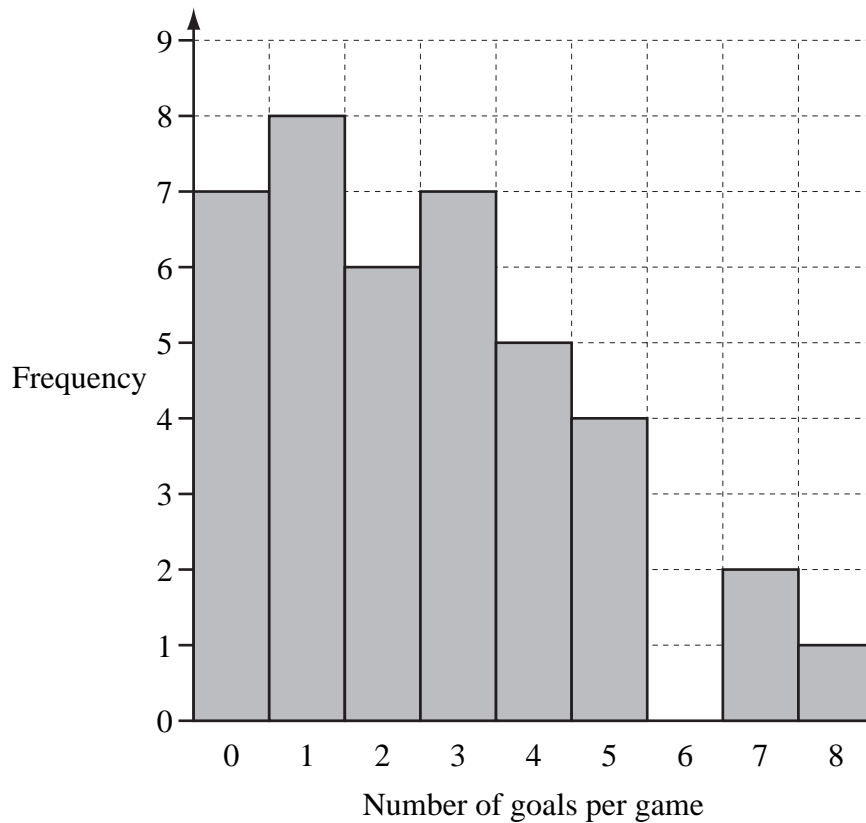
- (ii)** Show his journey on the grid. [1]

- (iii)** How many minutes after his mother does Braima arrive at Villeneuve?

Answer(c)(iii) min [1]



4



Karen keeps a record of how many goals United score in each of 40 games. She draws a bar chart to show this information.

(a) Use the information in the bar chart to complete the frequency table below.

| Number of goals per game | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|------------------------------------|---|---|---|---|---|---|---|----|---|
| Frequency | | | | | | | 0 | 2 | 1 |
| Frequency \times Number of goals | | | | | | | 0 | 14 | 8 |

[2]

(b) (i) How many goals did United score in the 40 games?

Answer(b)(i) [1]

(ii) Calculate the mean number of goals scored per game.

Answer(b)(ii) [2]

(iii) Find the median.

Answer(b)(iii) [2]

(iv) Write down the mode.

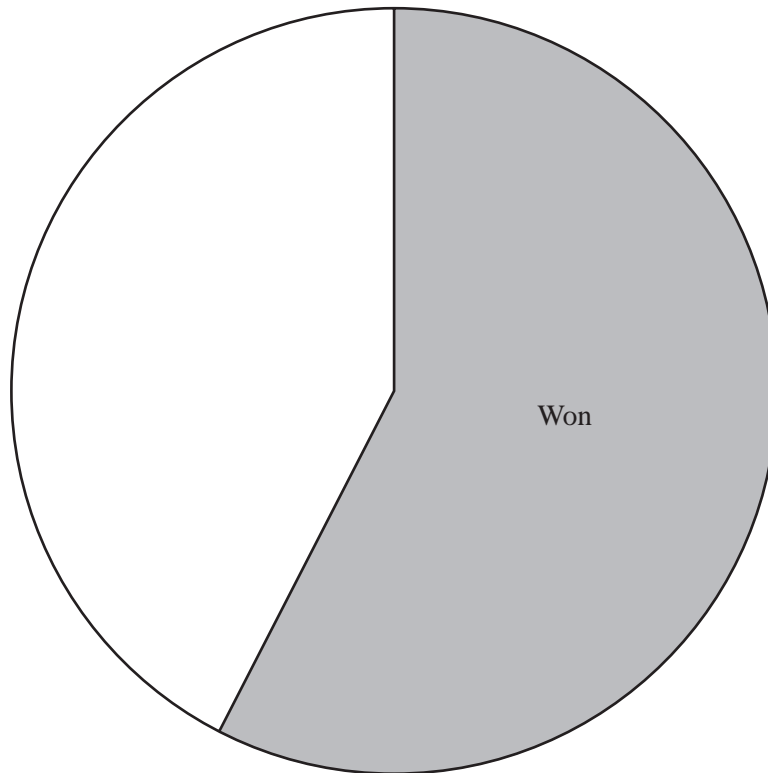
Answer(b)(iv) [1]

(c) United won 23 games and lost 12 games.
The other games ended in a draw.

(i) How many games ended in a draw?

Answer(c)(i) [1]

(ii) Complete the pie chart accurately to represent these results. Label the sectors.



[2]

(d) If one game from the 40 is chosen at random, use the information in **part (c)** to find the probability that United

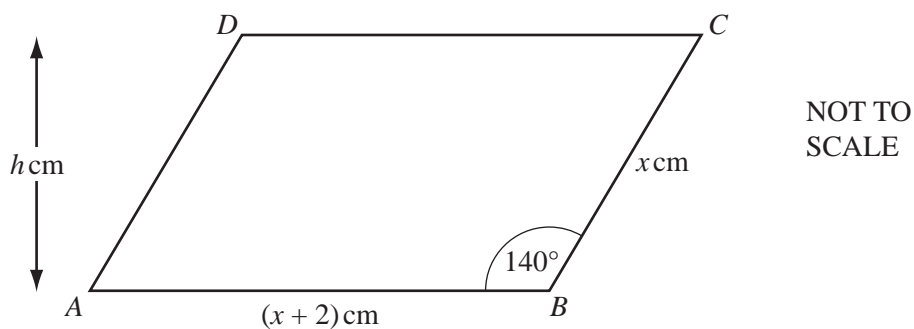
(i) won,

Answer(d)(i) [1]

(ii) did not draw.

Answer(d)(ii) [1]

5



In the parallelogram $ABCD$, $AB = (x + 2)$ cm, $BC = x$ cm and angle $ABC = 140^\circ$.

(a) When $x = 10$,

(i) use trigonometry to calculate the height, h cm, of the parallelogram,

Answer(a)(i) $h =$ [2]

(ii) calculate the area of the parallelogram.

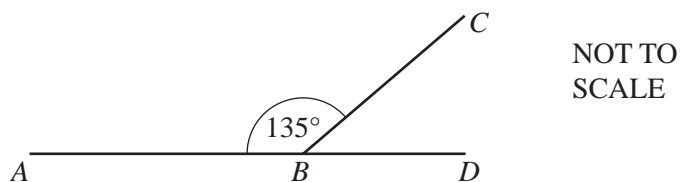
Answer(a)(ii) cm^2 [1]

(b) For a **different** value of x , the perimeter of the parallelogram is 38 cm.

Write down an equation in x and solve it.

Answer(b) $x =$ [3]

6 (a)



In the diagram, ABD is a straight line and angle $ABC = 135^\circ$.

(i) Find the size of angle CBD .

Answer(a)(i) Angle $CBD = \dots\dots\dots$ [1]

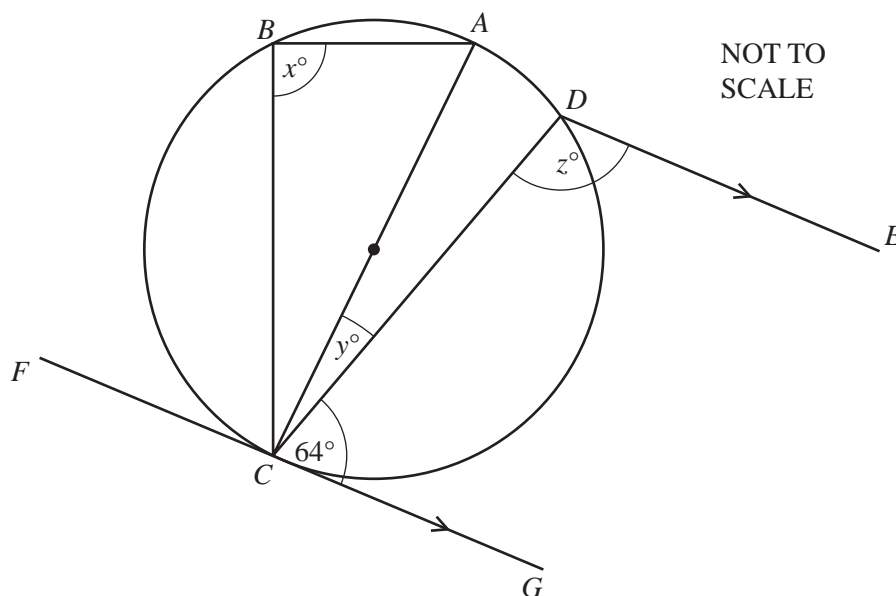
(ii) A regular polygon has interior angles of 135° .
Find the number of sides of the polygon.

Answer(a)(ii) $\dots\dots\dots$ [2]

(iii) Write down the name of the polygon in **part (a)(ii)**.

Answer(a)(iii) $\dots\dots\dots$ [1]

(b)



$A, B, C,$ and D lie on a circle. AC is a diameter.
 FCG is a tangent to the circle at C . DE is parallel to CG .
Find the values of x, y and z .

Answer(b) $x = \dots\dots\dots$

$y = \dots\dots\dots$

$z = \dots\dots\dots$ [5]

- 7 An area of land $ABCDEF$ is in the shape of a hexagon.
 Part of a scale drawing of the land is shown on the opposite page.
 A pond, P , is inside the hexagon.
 On the plan, 1 centimetre represents 20 metres.

Parts (a), (b), (c) and (f) must be completed using a ruler and compasses only.
All construction arcs must be clearly shown.

- (a) On the land, $AF = 80$ m and $EF = 100$ m.

On the scale drawing, find the point F , by construction.
 Draw the lines AF and EF .

[2]

- (b) On the scale drawing, construct the perpendicular bisector of CD .
 Label the point M where the bisector crosses CD .

[2]

- (c) On the scale drawing, construct the bisector of angle BCD .

[2]

- (d) The bisectors from **part (b)** and **part (c)** meet at L .

- (i) Measure and write down the length of LM in centimetres.

Answer(d)(i) cm [1]

- (ii) Find the distance between L and M on the land.
 Give your answer in metres.

Answer(d)(ii) m [1]

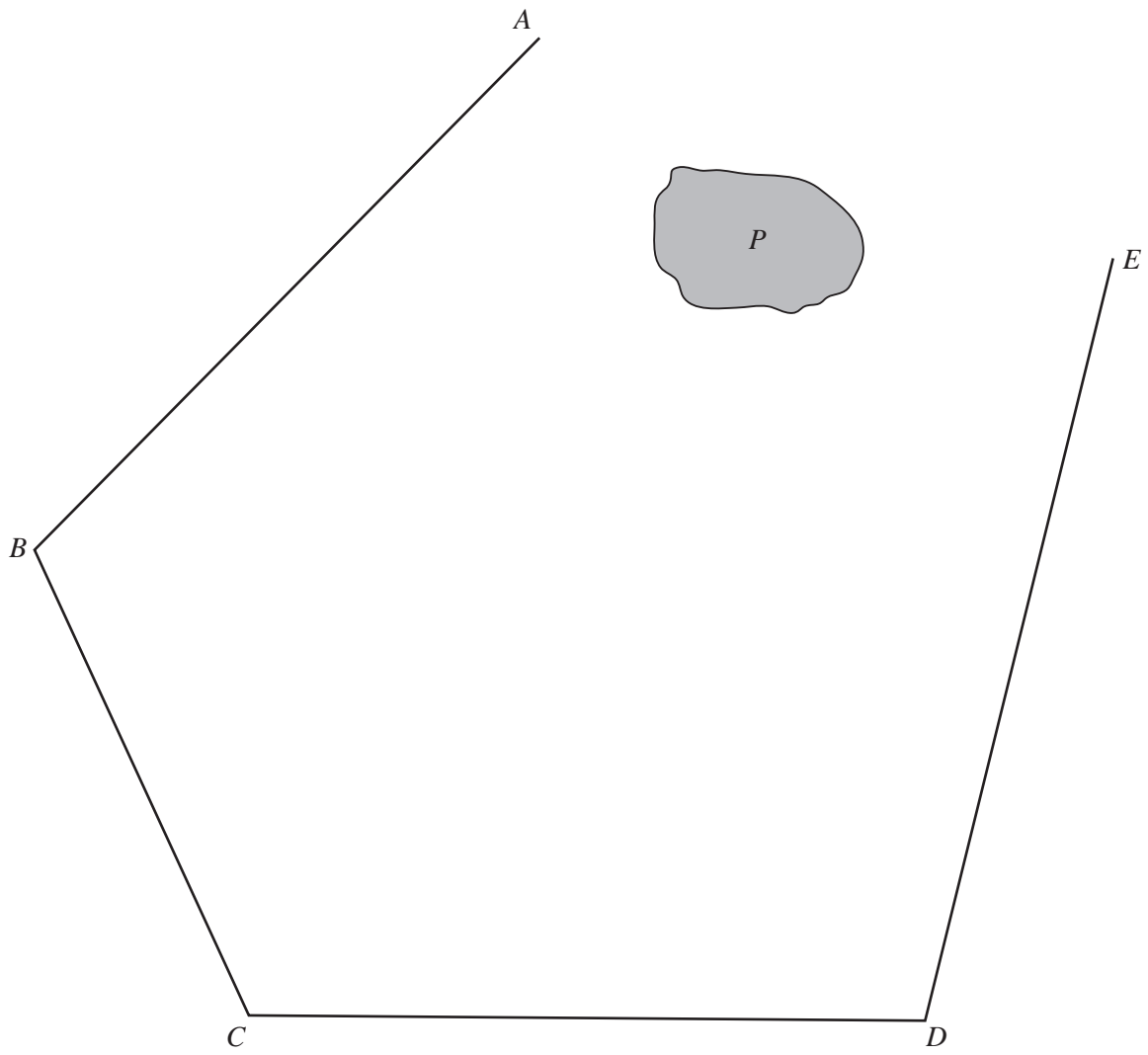
- (e) Triangle CML is a field for sheep.

Calculate the area of this field.

Answer(e) m^2 [2]

- (f) There is also a field for cows inside the hexagon.
 This field is the region nearer to D than to C **and** less than 120 m from D .

By constructing a suitable locus on the scale drawing, find and label this region R . [2]

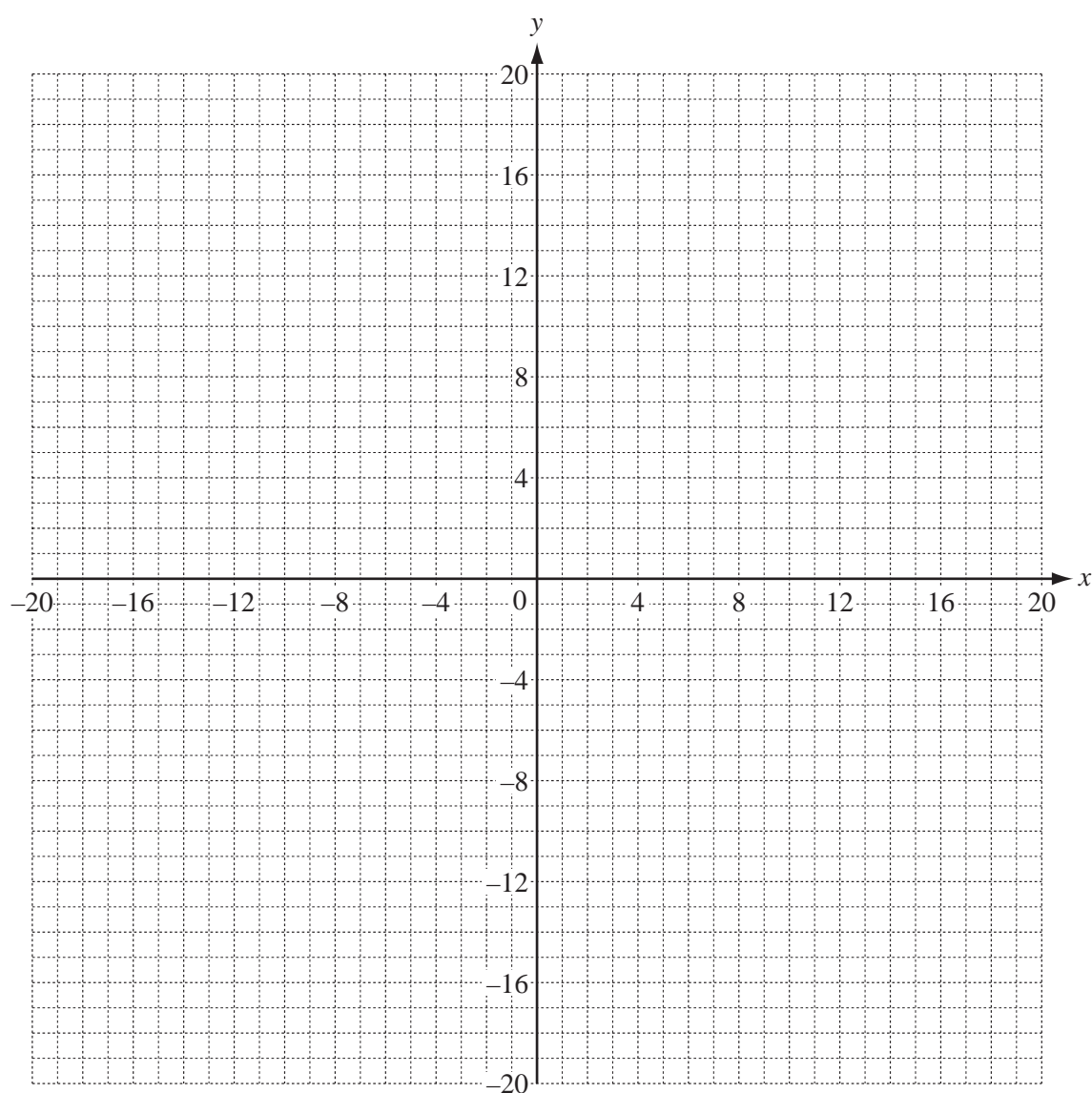


- 8 (a) Complete the table for the function $y = \frac{18}{x}$, ($x \neq 0$).

| | | | | | | | | | | | | | |
|-----|-----|----|----|----|----|-----|--|----|---|---|---|---|----|
| x | -18 | -9 | -6 | -3 | -2 | -1 | | 1 | 2 | 3 | 6 | 9 | 18 |
| y | | | | -6 | -9 | -18 | | 18 | 9 | 6 | | | |

[3]

- (b) On the grid below, draw the graph of $y = \frac{18}{x}$ for $-18 \leq x \leq -1$ and $1 \leq x \leq 18$.



[4]

- (c) Write down the order of rotational symmetry of the graph.

Answer(c) [1]

(d) (i) On the grid, draw the graph of $y = x$. [1]

(ii) Write down the co-ordinates of the points of intersection of $y = x$ and $y = \frac{18}{x}$.

Answer(d)(ii) (..... ,) and (..... ,) [2]

(e) On the grid, draw the reflection of $y = x$ in the y -axis. [1]

9 (a) Simplify the following expressions.

(i) $5k + 3p - 2 + p - 2k - 5$

Answer(a)(i) [2]

(ii) $5y^2 - 4x + 5x - 7y^2$

Answer(a)(ii) [2]

(b) Expand the following expressions.

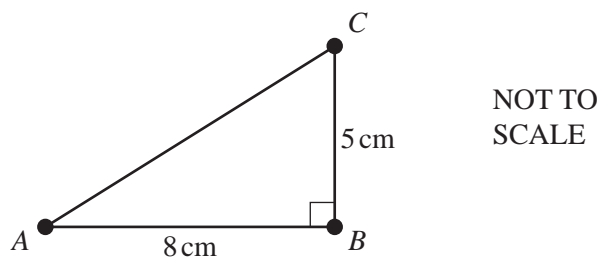
(i) $3(4 + 7g)$

Answer(b)(i) [1]

(ii) $5m(5m^2 - t^2)$

Answer(b)(ii) [2]

- 10 Three bolts at A , B and C join the rods AB , BC and CA to form the right-angled triangle, ABC . Angle $ABC = 90^\circ$, $AB = 8$ cm and $BC = 5$ cm.



(a) Calculate

- (i) the length of the rod AC ,

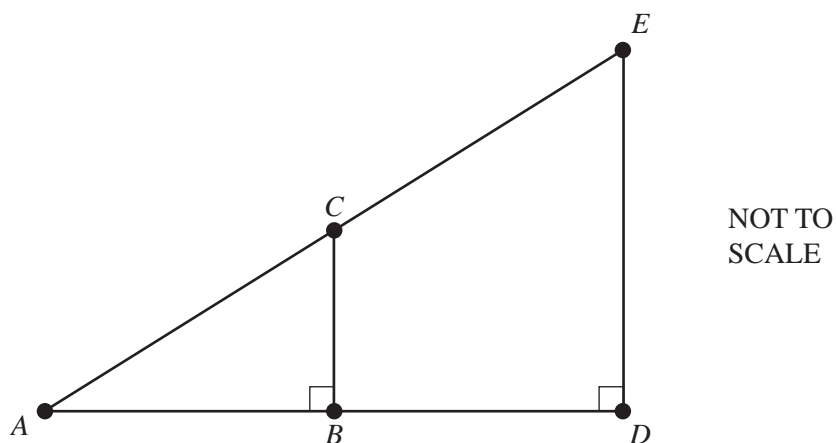
Answer(a)(i) $AC =$ cm [2]

- (ii) angle CAB .

Answer(a)(ii) Angle $CAB =$ [2]

(b) Another right-angled triangle, ADE , is formed by adding rods to triangle ABC .

AC is extended to E and AB is extended to D , with more bolts at D and E .
Rods AB and BD are the same length.

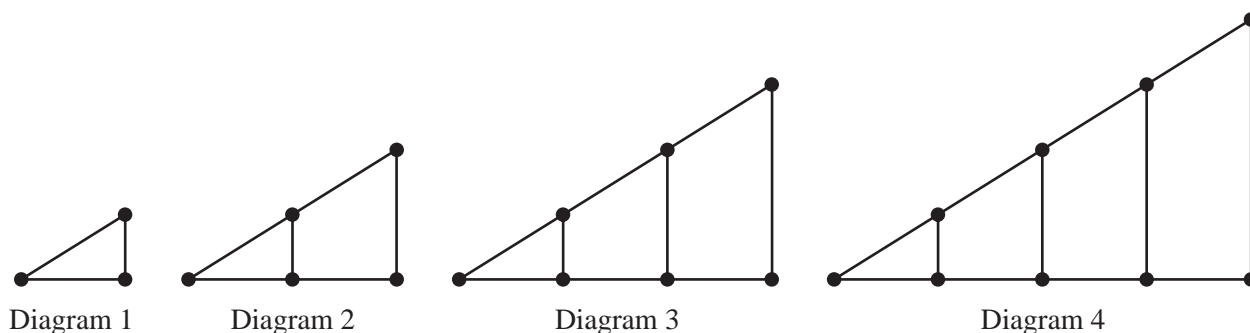


(i) Complete the following statement.

Triangle ADE is to triangle ABC . [1]

(ii) Describe clearly the **single** transformation which maps triangle ABC onto triangle ADE .

Answer(b)(ii) [3]



(c) The pattern of diagrams shown above is continued by adding more rods and bolts.

Complete the table below.

| | | | | | |
|-----------------|---|---|---|---|---|
| Diagram | 1 | 2 | 3 | 4 | 5 |
| Number of bolts | 3 | 5 | 7 | | |

[2]

(d) How many bolts are required for

(i) Diagram 10,

Answer(d)(i) [1]

(ii) Diagram n ?

Answer(d)(ii) [2]

(e) The number of bolts in Diagram n is 47.

Find the value of n .

Answer(e) $n =$ [2]

1 A bookshop sold a total of 2750 books in January.

- (a) The ratio hardback books sold : paperback books sold was 4 : 7.
Calculate how many paperback books were sold.

Answer(a) [2]

- (b) 24% of the 2750 books sold were non-fiction.
Calculate how many non-fiction books were sold.

Answer(b) [2]

- (c) 330 cookery books were sold.
Write 330 as a fraction of 2750 in its lowest terms.

Answer(c) [2]

- (d) In February, the bookshop sold 14% more than the 2750 books sold in January.
Calculate the number of books sold in February.

Answer(d) [3]

- (e) The total value of the books sold in January was \$9480 correct to the nearest 10 dollars.
Write down the lower bound for this amount.

Answer(e) \$ [1]

- (f) 35000 books were sold in a year.
Write this number in standard form.

Answer(f) [1]

2 (a) Write down

(i) five numbers which are multiples of 7,

Answer(a)(i) , , , , [2]

(ii) two common multiples of 4 and 7.

Answer(a)(ii) and [2]

(b) 10 12 13 16 17 23 25 39

From the list above, write down

(i) a square number that is also an odd number,

Answer(b)(i) [1]

(ii) a prime number that is one more than a square number.

Answer(b)(ii) [1]

(c) n is an integer and n^3 is between 60 and 70.
Find the value of n .

Answer(c) $n =$ [1]

(d) k and m are prime numbers.

$$k^2 + m = 23$$

Find k and m .

Answer(d) $k =$

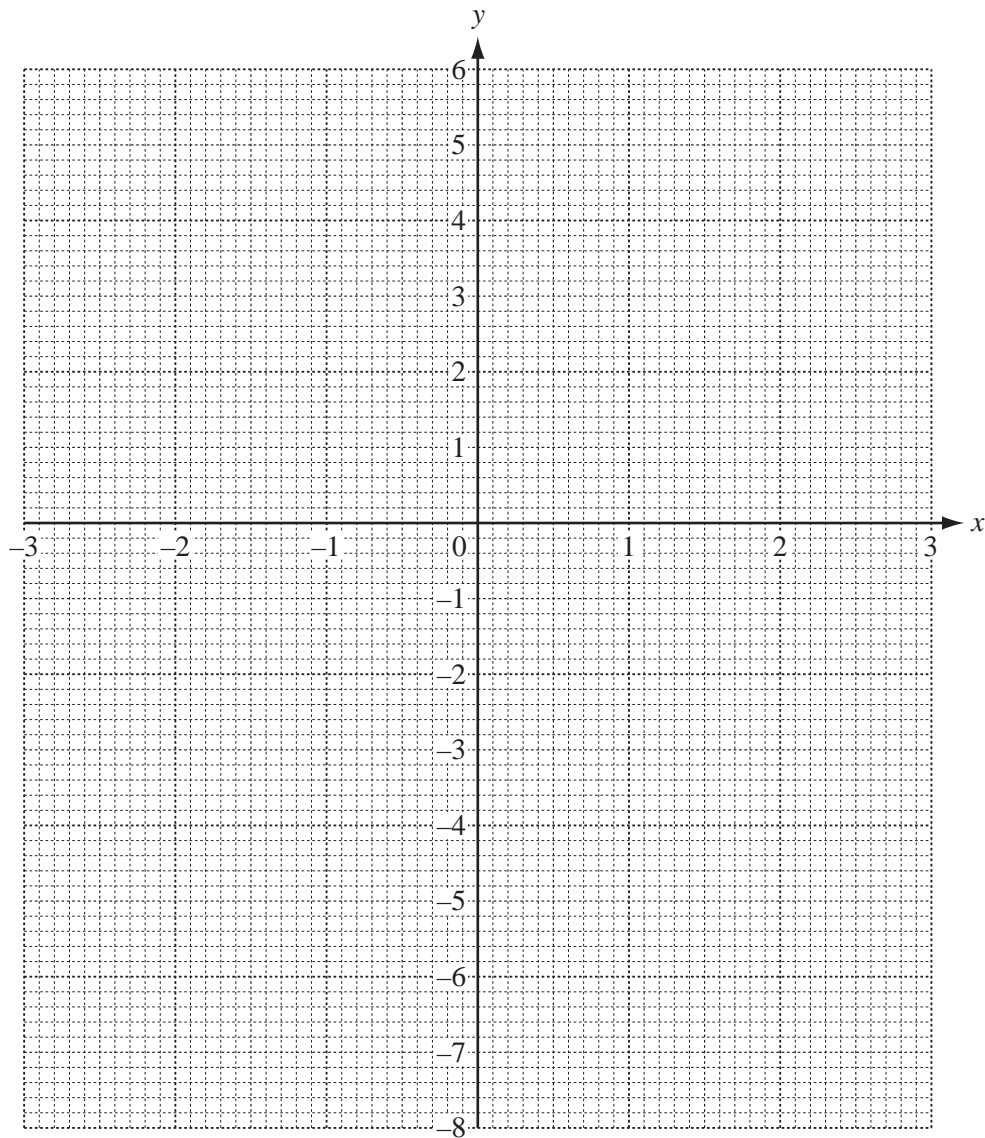
$m =$ [2]

- 3 (a) Complete the table of values for $y = 5 + x - x^2$.

| | | | | | | | |
|-----|----|----|----|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| y | -7 | -1 | | 5 | | 3 | |

[3]

- (b) On the grid below draw the graph of $y = 5 + x - x^2$ for $-3 \leq x \leq 3$.



[4]

- (c) Use your graph to solve the equation $5 + x - x^2 = 2$.

Answer(c) $x =$ or $x =$ [2]

- (d) (i) Complete the table of values for $y = 2x - 1$.

| | | | |
|-----|----|---|---|
| x | -3 | 0 | 3 |
| y | | | |

[2]

- (ii) On the grid, draw the straight line $y = 2x - 1$ for $-3 \leq x \leq 3$.

[2]

- (iii) Write down the gradient of $y = 2x - 1$.

Answer(d)(iii) [1]

- (e) Write down the co-ordinates of the points where the line $y = 2x - 1$ intersects the graph of $y = 5 + x - x^2$.

Answer(e) (..... ,) and (..... ,) [2]

- 4 (a) Solve the equation.

$$3(x + 1) + 5(x - 3) = 48$$

Answer(a) $x =$ [3]

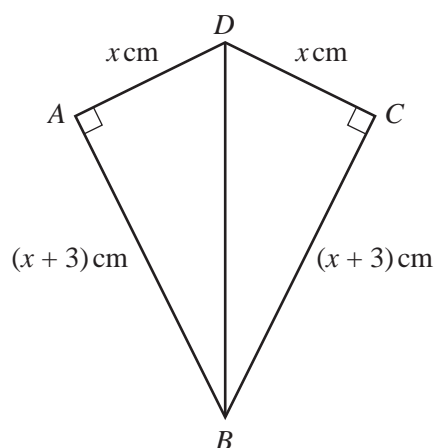
- (b) Make f the subject of the formula $g = 7f - 5$.

Answer(b) $f =$ [2]

- (c) Factorise **completely** $6xy - 10yz$.

Answer(c) [2]

5

NOT TO
SCALE

Triangles DAB and DCB form a kite $ABCD$.

Angle $DAB = \text{angle } DCB = 90^\circ$.

$AD = DC = x \text{ cm}$ and $AB = BC = (x + 3) \text{ cm}$.

(a) Complete the following statement.

Triangle ADB is to triangle CDB . [1]

(b) When $x = 8$, calculate angle DBC .

Answer(b) Angle $DBC = \dots\dots\dots$ [2]

(c) When $x = 5$, calculate

(i) the area of triangle BCD ,

Answer(c)(i) cm^2 [2]

(ii) the area of the kite $ABCD$.

Answer(c)(ii) cm^2 [1]

(d) For a **different** value of x , the perimeter of the kite is 62 cm.

Write down and solve an equation to find this value of x .

Answer(d) $x = \dots\dots\dots$ [3]

- 6 In triangle ABC , $BC = 9$ cm and $AC = 11$ cm.
The side AB has been drawn for you.

A ————— B

- (a) Using ruler and compasses only, complete the triangle ABC . [2]

- (b) Measure and write down the size of angle CAB .

Answer(b) Angle $CAB =$ [1]

- (c) **For the constructions below, use a straight edge and compasses only.**
Leave in all your construction arcs.

- (i) Construct the bisector of angle ABC .
Label the point P where the bisector crosses AC . [2]

- (ii) Construct the locus of points which are equidistant from A and from C .
Label the point Q where the locus crosses AC . [2]

- (d) (i) Write down the length of PQ in centimetres.

Answer(d)(i) cm [1]

- (ii) Shade the region inside the triangle which is nearer to AB than to BC
and nearer to C than to A . [1]

- (e) Triangle ABC is a scale drawing.
The 9 cm line, BC , represents a wall 45 metres long.
The scale of the drawing is 1 : n .
Find the value of n .

Answer(e) $n =$ [2]

- 7 (a) The first four terms of a sequence are given below.

5 9 13 17

Write down

- (i) the next term,

Answer(a)(i) [1]

- (ii) the 8th term,

Answer(a)(ii) [1]

- (iii) an expression, in terms of n , for the n th term of the sequence.

Answer(a)(iii) [2]

- (b) The first four terms of a different sequence are given below.

4 10 18 28

- (i) Find the next term.

Answer(b)(i) [1]

- (ii) The n th term of this sequence is $n(n + p)$ where p is an integer.

Find the value of p .

Answer(b)(ii) $p =$ [2]

- (iii) Find the 100th term of this sequence.

Answer(b)(iii) [1]

- 8 Tom has 50 model cars.
He has 10 blue cars and 19 red cars.
He has no yellow cars.

(a) Tom chooses a car at random.

Write down the probability that it is

(i) red,

Answer(a)(i) [1]

(ii) red or blue,

Answer(a)(ii) [1]

(iii) not blue,

Answer(a)(iii) [1]

(iv) yellow.

Answer(a)(iv) [1]

(b) The probability that a car is damaged is $\frac{1}{5}$.

How many cars are damaged?

Answer(b) [1]

- 9 The table below shows the number of visitors to a museum each day during one week.

| Day | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|--------------------|--------|---------|-----------|----------|--------|----------|--------|
| Number of visitors | 64 | 34 | 75 | 77 | 85 | 96 | 38 |

- (a) Work out the mean number of visitors per day during this week.

Answer(a) [2]

- (b) Find the range.

Answer(b) [1]

- (c) On the grid below, draw a bar chart to show the information given in the table.
Use a vertical scale of 1 cm to represent 10 visitors.



[5]

10 In this question give all your answers correct to 2 decimal places.

(a) A bank has an exchange rate of \$1 = € 0.6513.

- (i)** Jonathan changes \$500 into euros (€).
Calculate the amount Jonathan receives.

Answer(a)(i) € [2]

- (ii)** Arika changes €300 into dollars.
Calculate the amount Arika receives.

Answer(a)(ii) \$ [3]

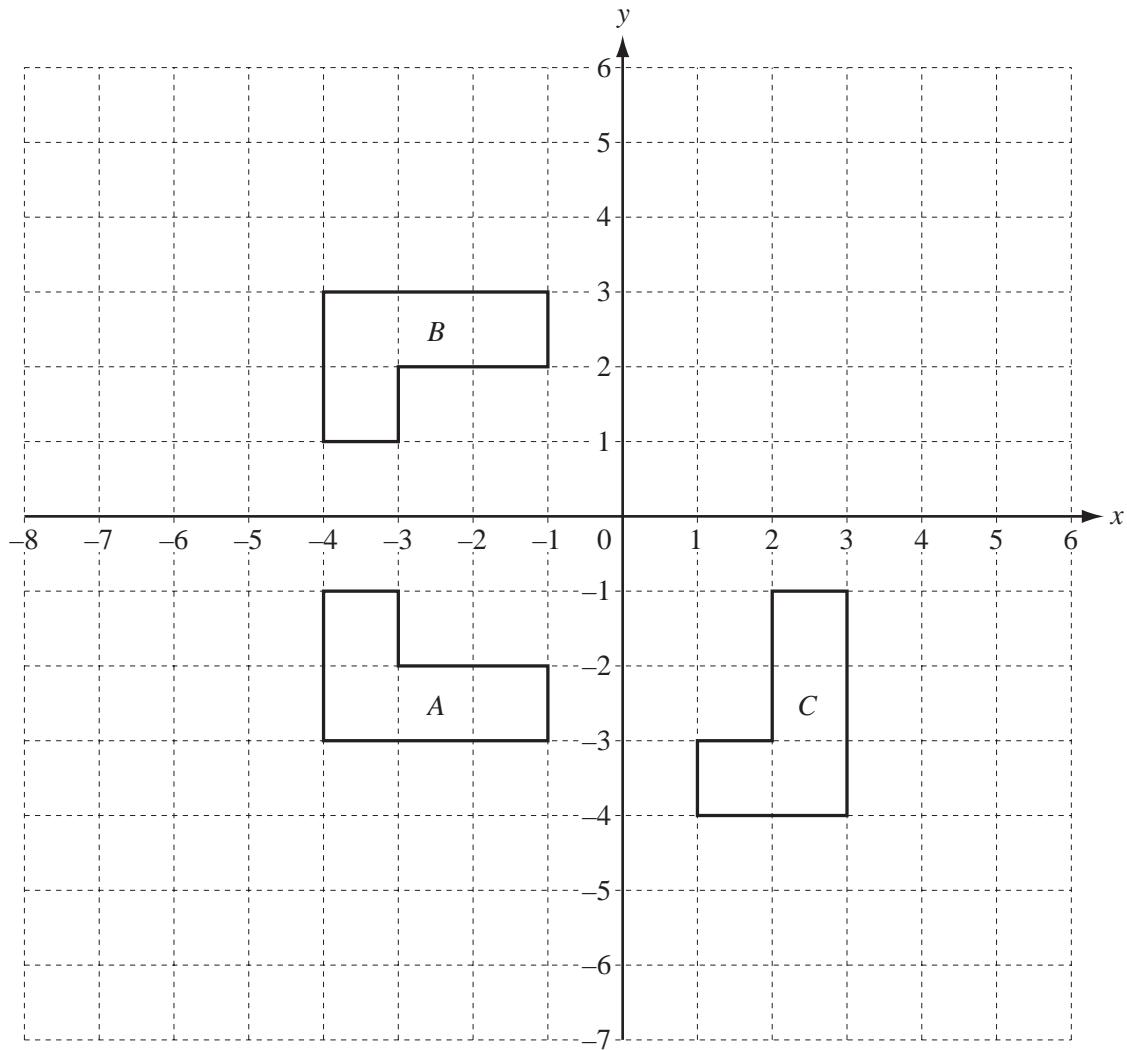
- (b)** Dania borrows \$325 for 2 years at a rate of 3.8% per year **simple** interest.
Calculate the total amount Dania owes after 2 years.

Answer(b) \$ [3]

- (c)** Lee borrows \$550 for 2 years at a rate of 6% per year **compound** interest.
Calculate the total amount Lee owes after 2 years.

Answer(c) \$ [3]

11



Shapes A , B and C are shown on the grid.

(a) Describe fully the **single** transformation which maps

(i) shape A onto shape B ,

Answer(a)(i) [2]

(ii) shape A onto shape C .

Answer(a)(ii) [3]

(b) On the grid draw the image of **shape A** after

(i) a translation by the vector $\begin{pmatrix} 6 \\ 4 \end{pmatrix}$, [2]

(ii) an enlargement, scale factor 2, centre the origin. [2]

- 1 Insert one pair of brackets to make the following equation correct.

$$2 \times 8 - 5 - 4 = 15$$

[1]

- 2 Write the following numbers in order starting with the smallest.

$$\frac{2}{7}$$

0.283

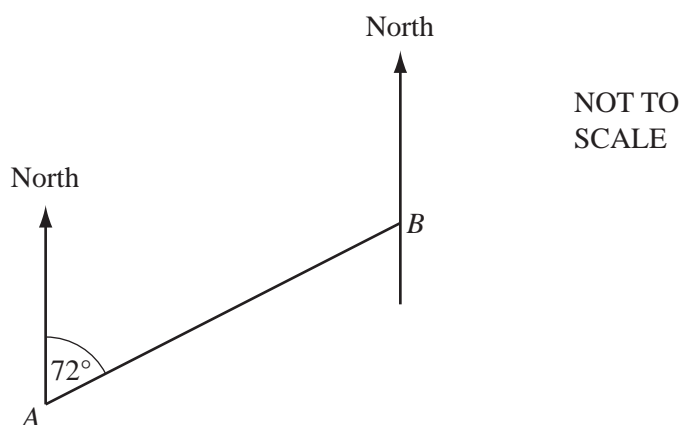
28%

Answer < < [1]

- 3 Find the volume of a cube with sides of 2.3 cm.

Answer cm³ [1]

4



The diagram shows the position of two airports, *A* and *B*.
The bearing of *B* from *A* is 072° .
Work out the bearing of *A* from *B*.

Answer [2]

- 5 The number of spectators, N , at a football match is 16 000, correct to the nearest thousand. Complete the statement for N in the answer space.

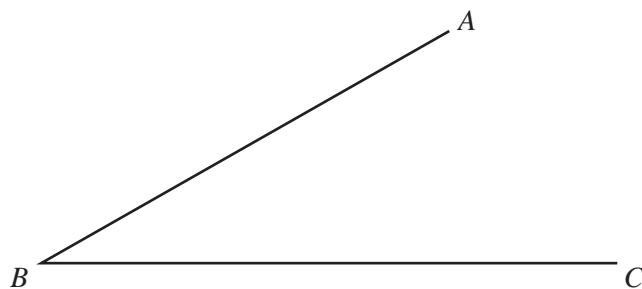
Answer $\leq N <$ [2]

- 6 Work out the value of $3\frac{3}{4} \times 1\frac{1}{7}$.

Show all your working and leave your answer as a fraction.

Answer [2]

7



Using a straight edge and compasses only, construct the locus of points which are equidistant from AB and from BC .

Show clearly all your construction arcs. [2]

4

8

4

$\sqrt{8}$

$\sqrt{25}$

$\frac{5}{2}$

0.3333

From the list above, write down

(a) a prime number,

Answer(a) [1]

(b) an irrational number.

Answer(b) [1]

9 A train sets off at 11 53 on a journey to Mumbai.
The journey takes 2 hours 30 minutes.

(a) Write down the time when the train arrives in Mumbai.

Answer(a) [1]

(b) The distance to Mumbai is 235 kilometres.
Calculate the average speed of the train.

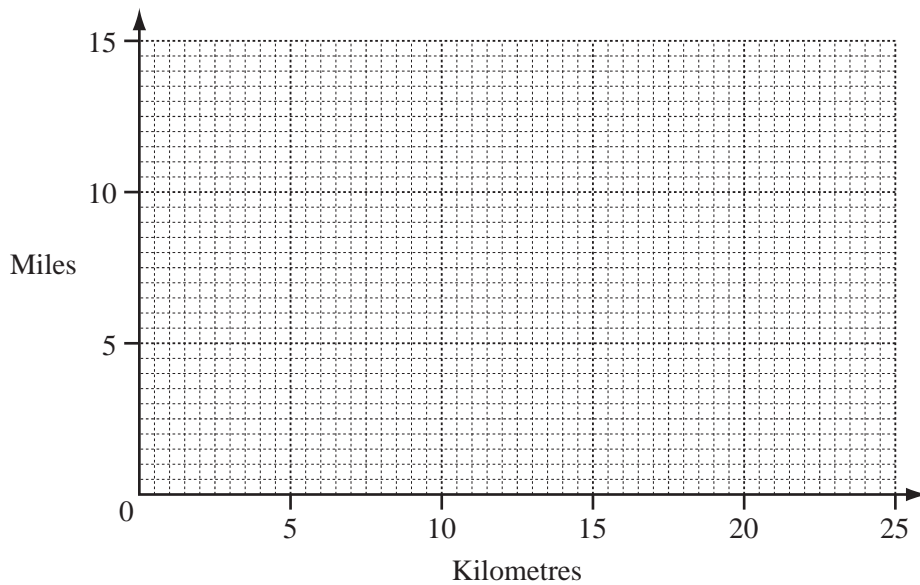
Answer(b) km/h [2]

10 Solve the simultaneous equations

$$\begin{aligned} 5x - y &= 15, \\ 7x - 5y &= 3. \end{aligned}$$

Answer $x =$
 $y =$ [3]

11



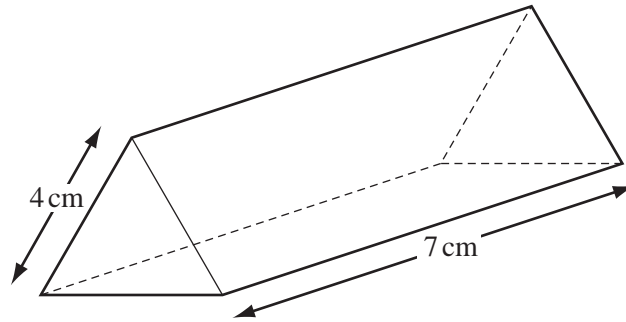
Distance can be measured in miles or kilometres. 24 kilometres is approximately equal to 15 miles.

(a) Draw a straight line on the grid to show the conversion between kilometres and miles. [2]

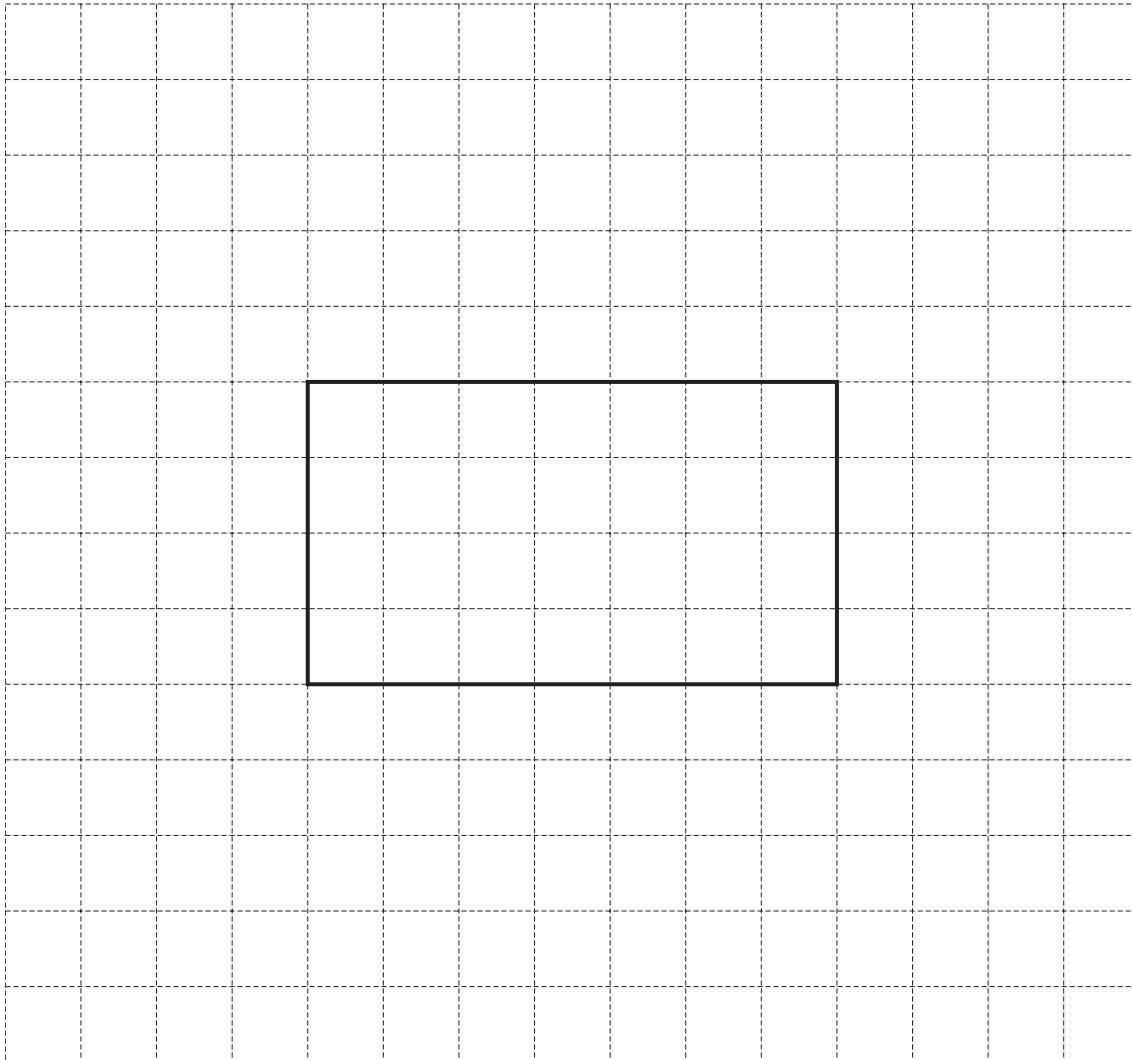
(b) Use your graph to estimate the number of kilometres equal to 12 miles.

Answer (b) km [1]

12

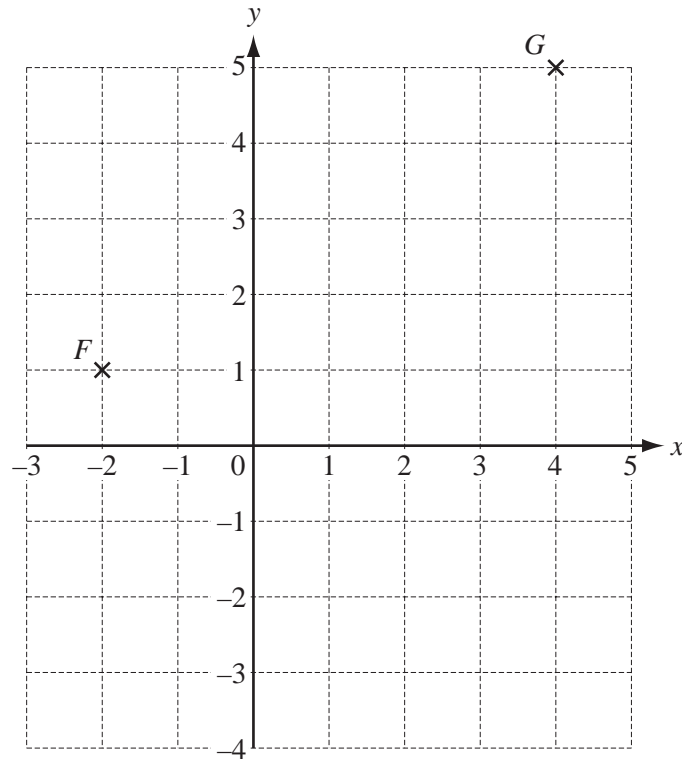
NOT TO
SCALE

The diagram shows a triangular prism of length 7 cm.
 The cross-section is an equilateral triangle of side 4 cm.
 Complete an **accurate** net of the prism.
 One rectangular face has been drawn for you.



[3]

13



The points F and G are shown on the grid.

(a) Write down the co-ordinates of the point F .

Answer(a)(..... ,) [1]

(b) Write \vec{FG} as a column vector.

Answer(b) $\vec{FG} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(c) $\vec{GH} = \begin{pmatrix} -2 \\ -7 \end{pmatrix}$. Mark and label the point H on the grid. [1]

- 14 (a)** Find the value of p when $p^3 = -27$.

Answer(a) $p =$ [1]

- (b)** Find the value of q when $q^{-1} = \frac{1}{6}$.

Answer(b) $q =$ [1]

- (c)** Simplify $8s^2 \div 2s^{-1}$.

Answer(c) [2]

15

$$J = \frac{md}{3}$$

- (a)** Find the value of d when $J = 35$ and $m = 7$.

Answer(a) $d =$ [2]

- (b)** Make d the subject of the formula.

Answer(b) $d =$ [2]

16 As the earth rotates, a point on the equator moves round at a speed of 1669.8 kilometres/hour.

(a) Write down this number in standard form, correct to 3 significant figures.

Answer(a) [2]

(b) Change 1669.8 kilometres/hour into metres/second.

Answer(b) m/s [2]

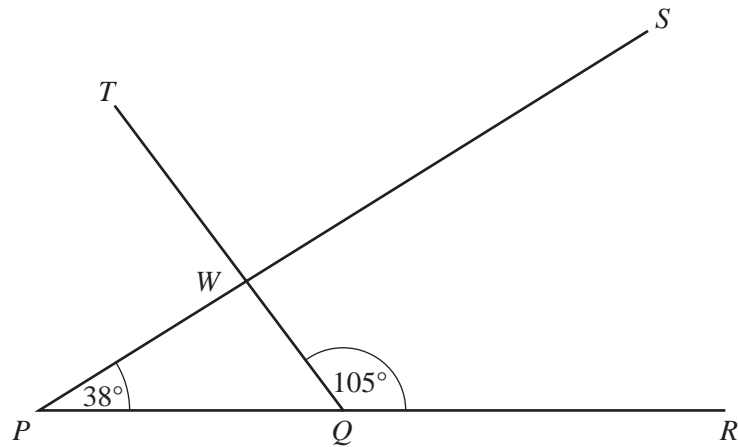
17 (a) Factorise $5x^2 + 4xy$.

Answer (a) [1]

(b) Simplify completely $7(2x + y) - 3(3x - 2y)$.

Answer (b) [3]

18

NOT TO
SCALE

The lines PS and QT intersect at W .

PQR is a straight line.

Angle $SPR = 38^\circ$ and angle $TQR = 105^\circ$.

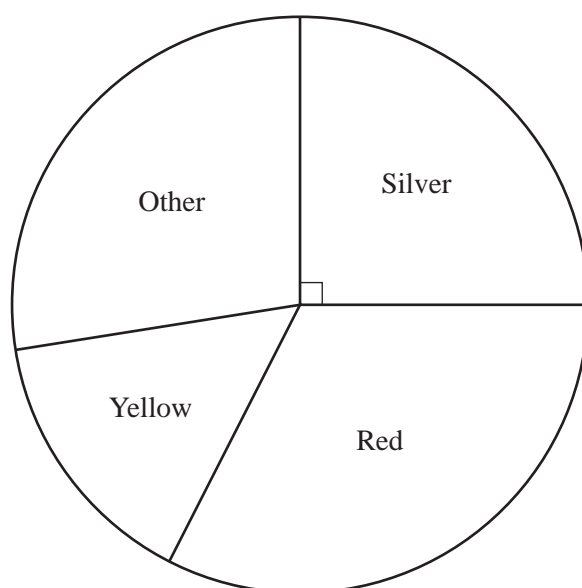
Write down the size of the following angles.
In each case give a reason for your answer.

(a) Angle $PQW =$ because
..... [2]

(b) Angle $PWQ =$ because
..... [2]

(c) Angle $TWS =$ because
..... [2]

19



The accurate pie chart shows information about the colours of 240 cars in a car park.

- (a) The sector angle for silver cars is 90° .
Calculate the number of silver cars in the car park.

Answer(a) [1]

- (b) There are 36 yellow cars in the car park.
Showing all your working, calculate the sector angle for yellow cars.

Answer(b) [2]

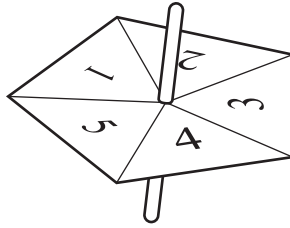
- (c) (i) Measure and write down the sector angle for red cars.

Answer(c)(i) [1]

- (ii) Calculate the percentage of red cars in the car park.

Answer(c)(ii) % [2]

1



Jonah uses a fair five-sided spinner in a game.

(a) What is the probability that the spinner lands on

(i) 3,

Answer(a)(i) [1]

(ii) an even number,

Answer(a)(ii) [1]

(iii) a number greater than 5?

Answer(a)(iii) [1]

(b) Jonah spins the spinner 25 times and records the results in a frequency table.

| Number that the spinner lands on | Frequency |
|----------------------------------|-----------|
| 1 | 8 |
| 2 | 4 |
| 3 | 5 |
| 4 | |
| 5 | 2 |

(i) Fill in the missing number.

[1]

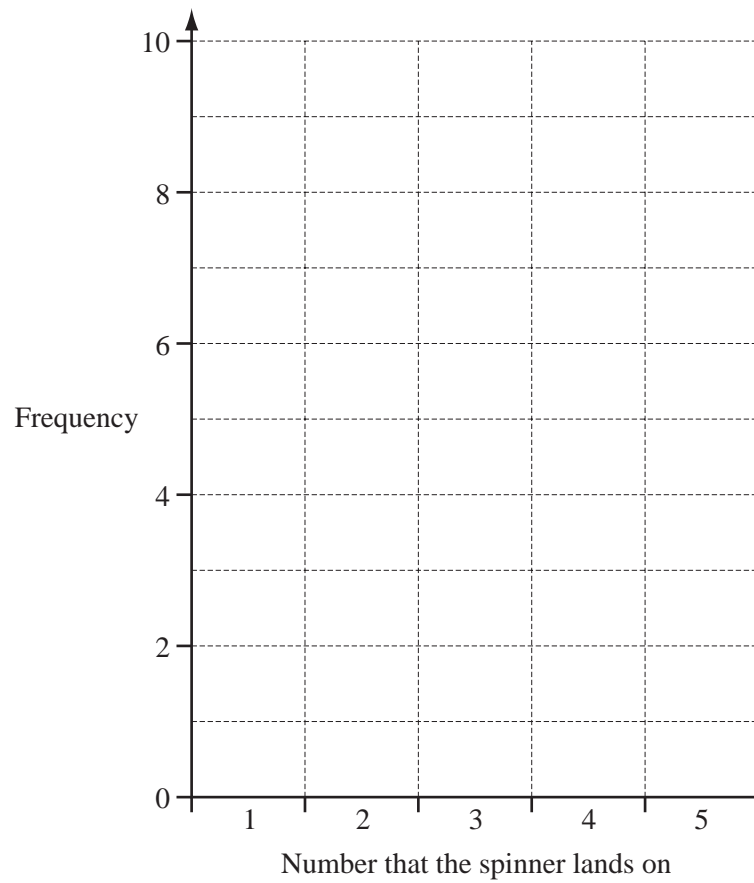
(ii) Write down the mode.

Answer(b)(ii) [1]

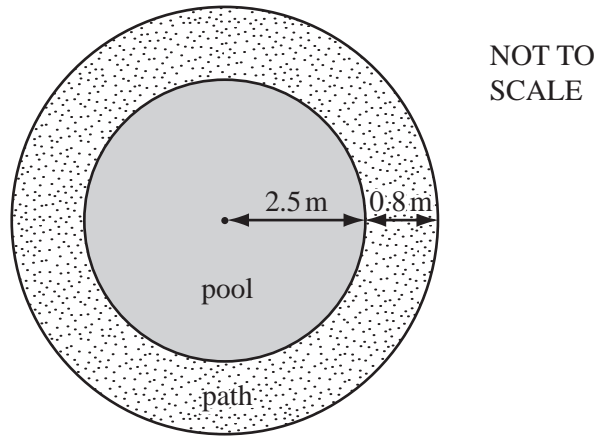
(iii) Calculate the mean.

Answer(b)(iii) [3]

(iv) On the grid, draw a bar chart to show these results.



[3]



The diagram shows a circular pool, of radius 2.5 metres, surrounded by a path 0.8 metres wide.

(a) Calculate

(i) the perimeter of the pool,

Answer(a)(i) m [2]

(ii) the area of the pool,

Answer(a)(ii) m² [2]

(iii) the area of the path.

Answer(a)(iii) m² [2]

(b) The water in the pool has a depth of 0.4 metres.

Calculate the volume of water in the pool.

Give your answer in litres. [1 cubic metre = 1000 litres.]

Answer(b) litres [2]

(c) When the pool is emptied for cleaning, the water flows out at a rate of 250 litres each minute.

Calculate how long it takes to empty the pool.

Give your answer to the nearest minute.

Answer(c) min [3]

- 3 (a) Bruce mixes blue and yellow paint to make green paint.
He uses blue and yellow paint in the ratio blue : yellow = 7 : 3.

- (i) He makes 15 litres of green paint.
How many litres of yellow paint does he use?

Answer(a)(i) litres [2]

- (ii) He buys the yellow paint in tins. Each tin contains 2 litres of paint.
Write down the number of tins of yellow paint he buys.

Answer(a)(ii) [1]

- (b) Tins of red paint cost \$9.25 each.
In a sale, the shop reduces the price by 12%.

- (i) Calculate the sale price.

Answer(b)(i) \$ [3]

- (ii) Bruce buys 4 tins of red paint in the sale.
How much does he pay?

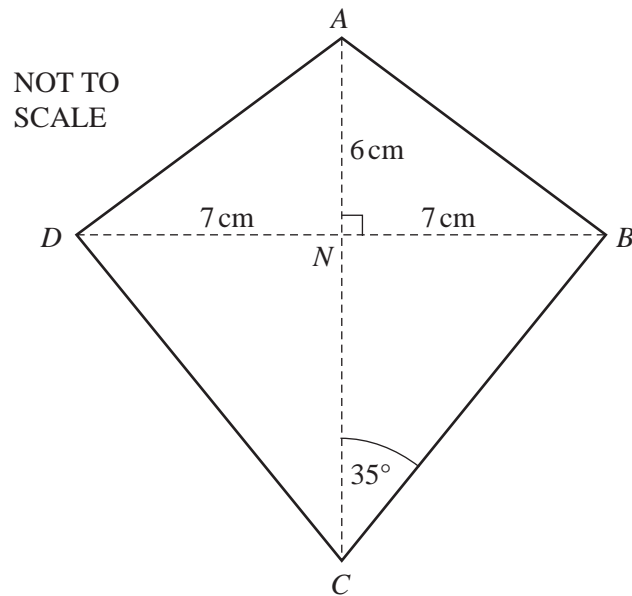
Answer(b)(ii) \$ [1]

- (iii) Before the sale, he bought 5 tins at \$9.25 each.
Calculate how much he paid for these 5 tins.

Answer(b)(iii) \$ [1]

- (iv) Use **parts (b)(ii)** and **(b)(iii)** to find the average (mean) price he paid for a tin of red paint.

Answer(b)(iv) \$ [3]



The diagram shows a kite $ABCD$, with $AB = AD$ and $DC = BC$.
 The diagonals AC and BD intersect at right angles at N .
 $AN = 6\text{ cm}$ and $NB = ND = 7\text{ cm}$.
 Angle $BCN = 35^\circ$.

(a) (i) What is the mathematical name for triangle BCD ?

Answer(a)(i) [1]

(ii) Complete the following statement.

Triangle BNC is congruent to triangle [1]

(iii) Write down the size of angle DCB .

Answer(a)(iii) Angle $DCB =$ [1]

- (b) (i)** Use trigonometry to calculate the size of angle NAB .

Answer(b)(i) Angle $NAB =$ [2]

- (ii)** Calculate the length of AB .

Answer(b)(ii) $AB =$ cm [2]

- (c)** Use trigonometry to calculate the length of BC .

Answer(c) $BC =$ cm [3]

- (d)** Calculate the perimeter of the kite.

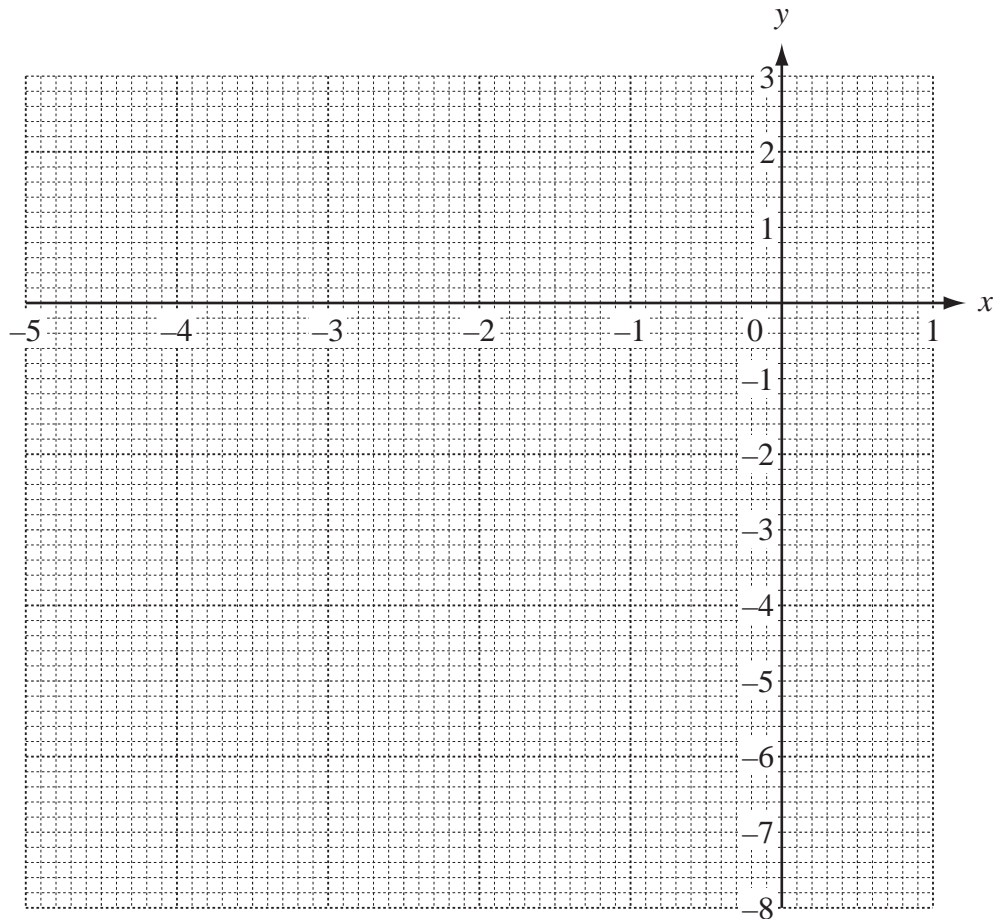
Answer(d) cm [2]

- 5 (a) Complete the table of values for $y = x^2 + 4x - 3$.

| | | | | | | | |
|-----|----|----|----|----|----|----|---|
| x | -5 | -4 | -3 | -2 | -1 | 0 | 1 |
| y | | -3 | | -7 | -6 | -3 | |

[3]

- (b) On the grid below draw the graph of $y = x^2 + 4x - 3$ for $-5 \leq x \leq 1$.



[4]

- (c) (i) Write down the co-ordinates of the lowest point of the graph.

Answer(c)(i) (..... ,) [1]

- (ii) Write down the solutions of the equation $x^2 + 4x - 3 = 0$.

Answer(c)(ii) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

(d) (i) Mark the point $(-2, 1)$ on the grid and label it A . [1]

(ii) Draw the straight line joining A to the point where the graph of $y = x^2 + 4x - 3$ cuts the y -axis. [1]

(iii) Find the gradient of your line.

Answer(d)(iii) [2]

(iv) Write down the equation of your line in the form $y = mx + c$.

Answer(d)(iv) $y =$ [2]

6 Ravinder scores x marks in a test.

(a) Manpreet scores 4 more marks than Ravinder.
Write down Manpreet's mark in terms of x .

Answer(a) [1]

(b) Tamsin scores 3 times as many marks as Ravinder.
Write down Tamsin's mark in terms of x .

Answer(b) [1]

(c) (i) Write down and simplify the total of the three marks in terms of x .

Answer(c)(i) [2]

(ii) The mean of these marks is 28. Show that $5x + 4 = 84$.

Answer (c)(ii)

[1]

(iii) Solve the equation $5x + 4 = 84$.

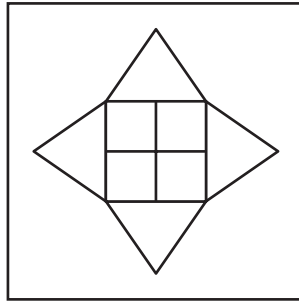
Answer(c)(iii) $x =$ [2]

(d) What mark did Tamsin score?

Answer(d) [1]

(e) Dinesh scored 63 marks out of 75.
Work out the mark Dinesh scored as a percentage.

Answer(e) % [2]



Peter makes square tiles, like the one shown above.

- (a) Write down the order of rotational symmetry of the tile.

Answer(a) [1]

- (b) On the diagram, draw all the lines of symmetry of the tile. [2]

- (c) Charles orders 2800 tiles from Peter at 1.75 euros (€) each.
He pays Peter €2300 now.
Calculate the amount he still has to pay.

Answer(c) € [3]

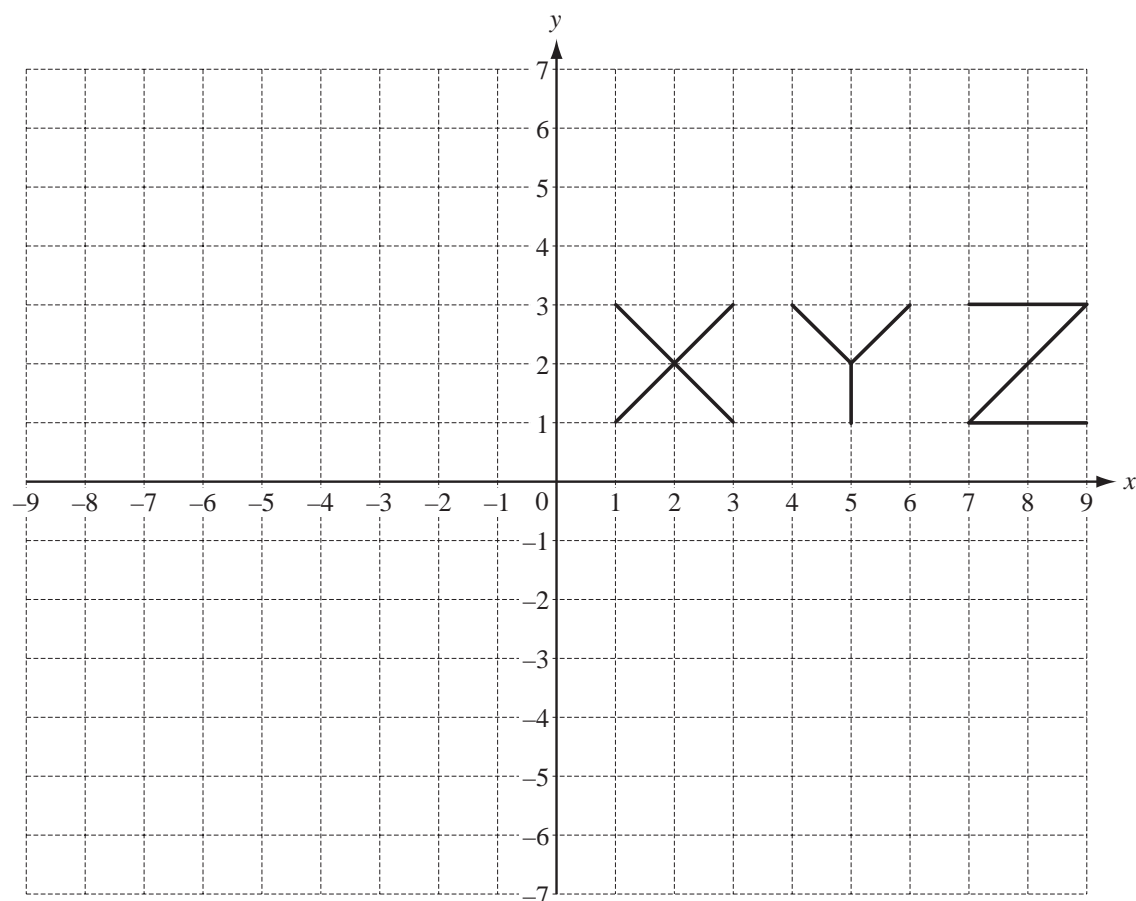
- (d) Peter changes the €2300 into dollars (\$) when the exchange rate is €1 = \$1.348.
Calculate how many dollars Peter receives.
Give your answer correct to 2 decimal places.

Answer(d) \$ [2]

- (e) Peter borrows \$5000 from a bank at a rate of 9.2% per year **compound** interest.
Calculate the amount he owes after 2 years.
Give your answer correct to 2 decimal places.

Answer(e) \$ [3]

8



(a) On the grid,

(i) translate X by the vector $\begin{pmatrix} -7 \\ 2 \end{pmatrix}$, [2]

(ii) rotate Y through 90° anticlockwise about the origin. [2]

(b) (i) On the grid, reflect Z in the x -axis. This is the image Z_1 . [2]

(ii) On the grid, reflect the image Z_1 in the line $x = 4$. This is the image Z_2 . [2]

(iii) Describe a **single** transformation which maps the image Z_2 onto the original Z.

Answer(b)(iii) [2]

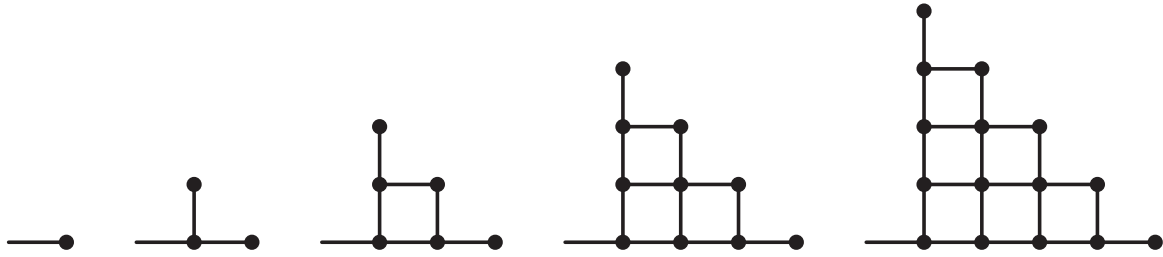


Diagram 1

Diagram 2

Diagram 3

Diagram 4

Diagram 5

The diagrams show a pattern of lines and dots.

(a) Complete the table below.

| Diagram number | 1 | 2 | 3 | 4 | 5 |
|-----------------|---|---|---|---|---|
| Number of lines | 1 | 3 | 7 | | |
| Number of dots | 1 | 3 | 6 | | |

[4]

(b) Work out the number of lines and the number of dots in Diagram 7.

Answer(b) Number of lines = , Number of dots = [2]

(c) The number of dots in Diagram n is $\frac{1}{2}n(n+1)$.

(i) Use this formula to check your result for Diagram 5.

You must show your working.

Answer (c)(i)

[2]

(ii) How many dots are there in Diagram 20?

Answer(c)(ii) [2]

(d) The number of lines in Diagram n is $n^2 + kn + 1$.

Use the information about Diagram 3 from the table to calculate the value of k .

Answer(d) $k =$ [2]

1 \geq $<$ $>$ $=$ \leq

Choose one of the above symbols to make a correct statement in the answer space.

Answer 0.4 $\frac{4}{9}$ [1]

2 (a) Calculate $\frac{0.0763}{1.85 + 4.7 \times 8}$.

Answer(a) [1]

(b) Write 0.0763 in standard form.

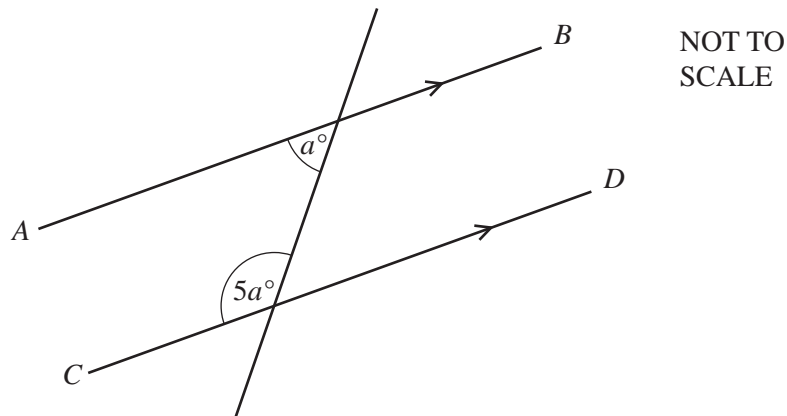
Answer(b) [1]

3 How many glasses, each holding 200 cm^3 , can be filled completely from a full 4.5 litre bottle of water?

Answer [2]

- 4 In the diagram AB is parallel to CD .

Calculate the value of a .



Answer $a =$ [2]

- 5 Hakim and Bashira measure their heights.
Hakim's height is 157 cm and Bashira's height is 163 cm, both correct to the nearest centimetre.

Find the greatest possible difference between their heights.

Answer cm [2]

- 6 (a) Write down the gradient of the line $y = 3x - 4$.

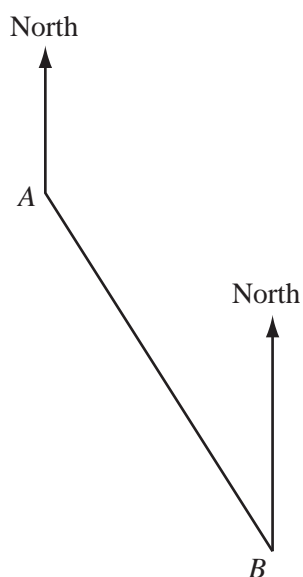
Answer(a) [1]

- (b) Write down the equation of a line through $(0, 0)$ parallel to $y = 3x - 4$.

Answer(b) [1]

- 7 A and B are two points marked on a map.

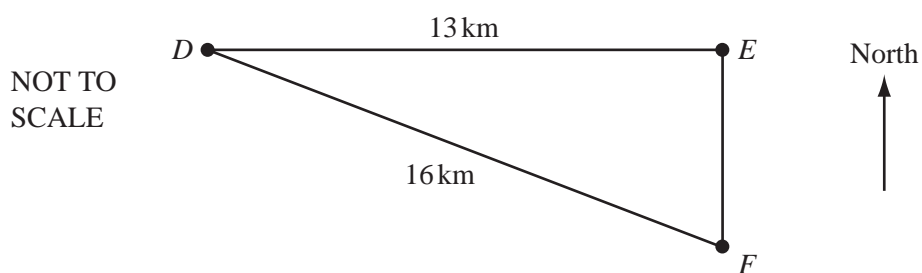
By measuring a suitable angle, find the bearing of A from B .



Answer [2]

- 8 Town E is 13 kilometres due east of D .
Town F is due south of E , and $DF = 16$ kilometres.

Calculate the distance from E to F .



Answer km [2]

- 9 In 2007 Klaus paid 350 euros (€) for a flight from Berlin to Nairobi.

The return flight from Nairobi to Berlin cost him 30 700 Kenyan Shillings (KES).

The exchange rate at the time of the return flight was €1 = 79.6 KES.

Calculate the difference, in euros, between the costs of the two flights.
Give your answer correct to 2 decimal places.

Answer € [2]

- 10 (a) Expand and simplify $5(3c - 4d) - 8c$.

Answer(a) [2]

- (b) Factorise $pq - q^2$.

Answer(b) [1]

- 11 (a) Find the lowest common multiple of 7 and 9.

Answer(a) [1]

- (b) Without using a calculator, work out $\frac{8}{9} - \frac{5}{7}$, leaving your answer as a fraction.
You must show all your working.

Answer(b) [2]

12

$$z = 2x - y$$

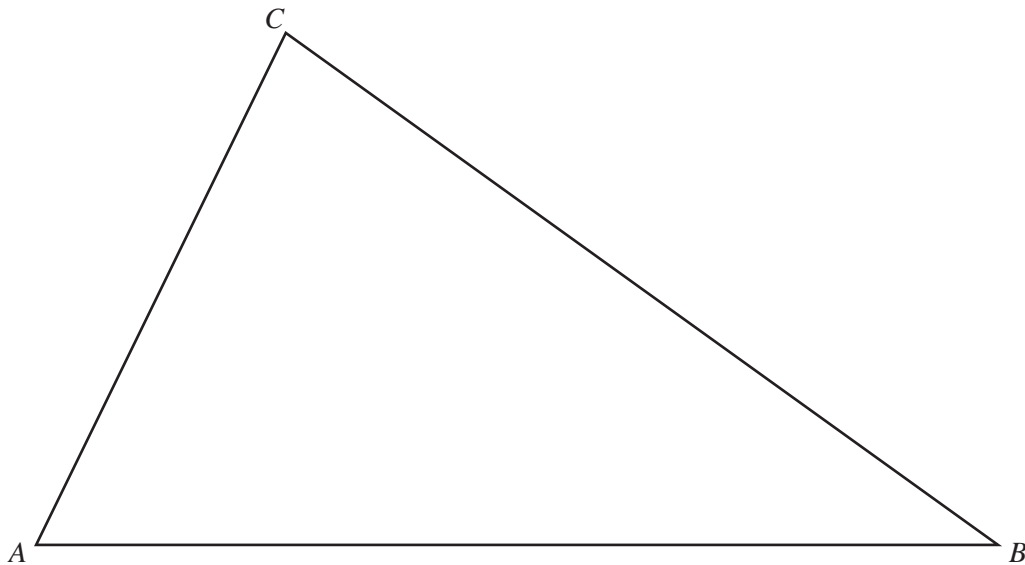
- (a) Find z when $x = -3$ and $y = 7$.

Answer(a) $z =$ [1]

- (b) Make x the subject of the formula.

Answer(b) $x =$ [2]

- 13 The diagram shows an accurate drawing of a triangular field.
 1 centimetre represents 15 metres.
 Florentina walks along a straight path from A to the side BC .
 The path is always the same distance from AB and AC .



- (a) **Using a straight edge and compasses only**, construct the line of the path.
 You must show your construction arcs clearly. [2]
- (b) The path meets BC at D .
 How far, in metres, is Florentina from B when she reaches D ?

Answer(b) m [1]

14 x is an integer between 60 and 90.

Write down the value of x when it is

(a) an odd square number,

Answer(a) $x =$ [1]

(b) 4^3 ,

Answer(b) $x =$ [1]

(c) a multiple of 29,

Answer(c) $x =$ [1]

(d) a prime factor of 146.

Answer(d) $x =$ [1]

15 Simplify

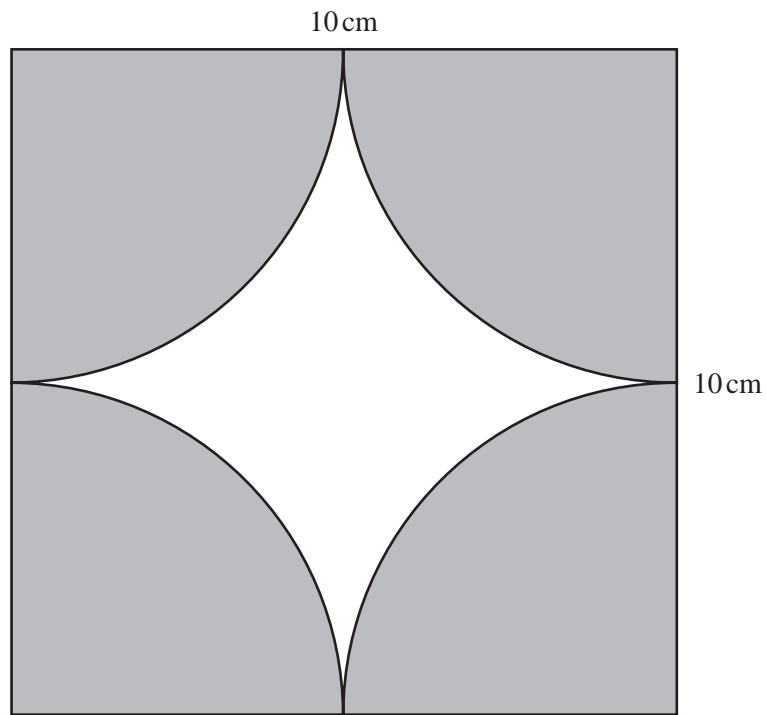
(a) $3p \times 5p^3$,

Answer(a) [2]

(b) $24q^2 \div 8q^{-3}$.

Answer(b) [2]

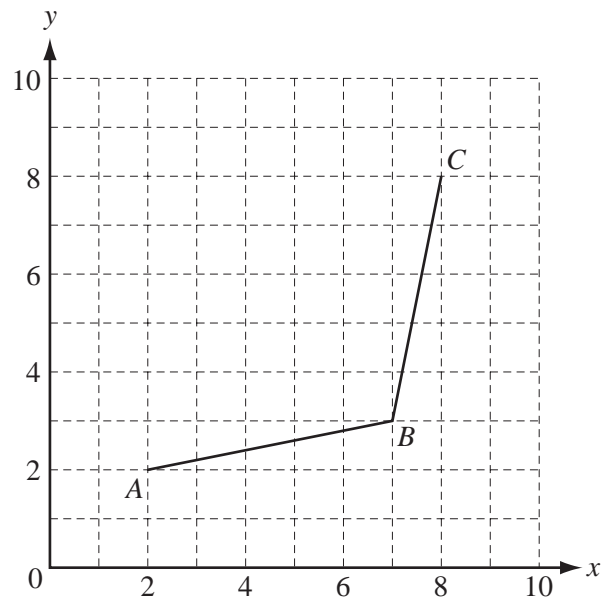
- 16 The diagram shows a square tile of side 10 centimetres with 4 identical quarter circles shaded.



Calculate the area of the **unshaded** region.

Answer cm^2 [4]

17



Points A , B and C are shown on the grid.

(a) Plot the point D on the grid above so that $ABCD$ is a rhombus. [1]

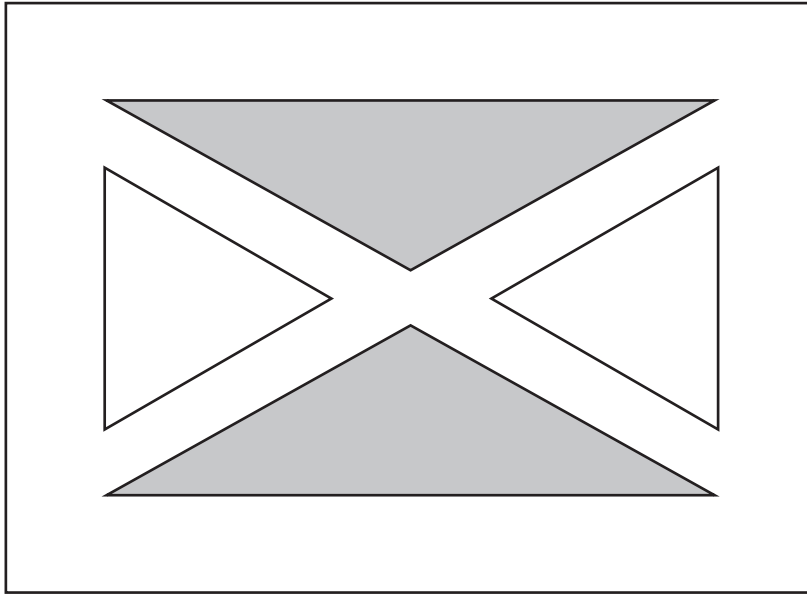
(b) Write \vec{BD} as a column vector.

Answer(b) $\vec{BD} = \begin{pmatrix} \\ \end{pmatrix}$ [2]

(c) M is the mid-point of AC .
Write \vec{AM} as a column vector.

Answer(c) $\vec{AM} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

- 18 The plan of a rectangular garden with 4 triangular flowerbeds is shown in the diagram.



- (a) Write down the name of the special triangles that are

- (i) shaded,

Answer(a)(i) [1]

- (ii) unshaded.

Answer(a)(ii) [1]

- (b) State the order of rotational symmetry of the plan.

Answer(b) [1]

- (c) Draw the lines of symmetry on the plan. [2]

19 A school has 350 students.

(a) On the school sports day 96% of the students were present.

Calculate how many students were **absent**.

Answer(a) [2]

(b) The table shows the number of students attending school in one week.

| Monday | Tuesday | Wednesday | Thursday | Friday |
|--------|---------|-----------|----------|--------|
| 334 | 329 | 348 | 341 | 323 |

For these values,

(i) calculate the mean,

Answer(b)(i) [2]

(ii) find the median,

Answer(b)(ii) [1]

(iii) find the range.

Answer(b)(iii) [1]

- 1 (a) Roberto owns 6000 square metres of land.
He divides it between himself and his two children, Stefano and Tania, in the ratio

$$\text{Roberto} : \text{Stefano} : \text{Tania} = 7 : 5 : 3.$$

- (i) Show that Roberto now has 2800 square metres of land.

Answer(a)(i)

[2]

- (ii) Calculate the area of land that Stefano and Tania each have.

Answer(a)(ii) Stefano m²

Tania m² [2]

- (b) Roberto receives a rent of \$1.40 per month for each square metre of his land.

- (i) Calculate the rent he receives in **one year** from his 2800 square metres of land.

Answer(b)(i) \$ [2]

- (ii) Roberto uses $\frac{3}{5}$ of this amount to buy more land.

Calculate the amount that he uses to buy more land.

Answer(b)(ii) \$ [2]

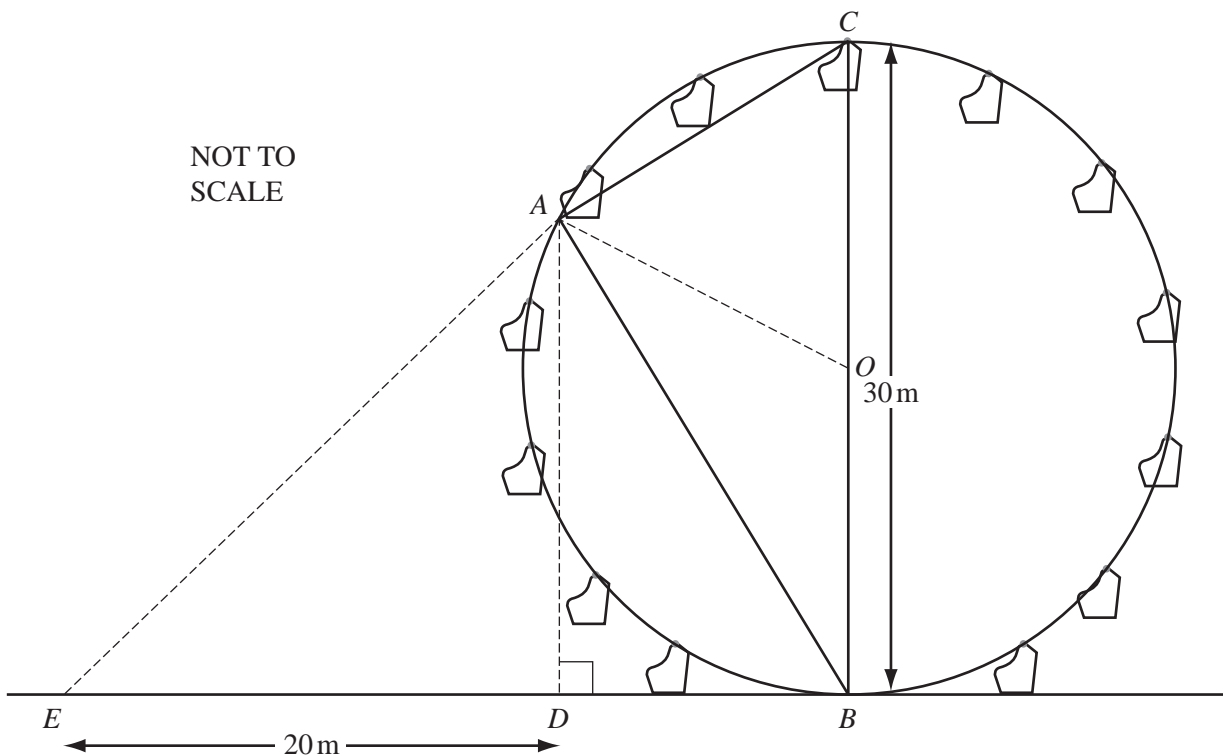
- (c) Stefano builds a house on his land.
He borrows \$5000 from a bank at 8% per year **simple** interest.
Find the total amount of interest he will have paid at the end of 3 years.

Answer(c) \$ [2]

- (d) Tania sells her land for \$12 000.
She invests the money for 3 years at 6% per year **compound** interest.
Calculate the total amount of money she will have at the end of the 3 years.
Give your answer to the nearest dollar.

Answer(d) \$ [4]

- 2** The diagram represents a fairground wheel with centre O , and diameter 30 metres. Point D is vertically below point A , and the line EDB is horizontal. $ED = 20$ metres.



- (a)** A seat starts at B and travels one-third of the circumference to A .

Explain why angle AOB equals 120° .

Answer(a)

[1]

- (b) Find the value, in degrees, of

- (i) angle ABO ,

Answer(b)(i) Angle $ABO =$ [1]

- (ii) angle BAC ,

Answer(b)(ii) Angle $BAC =$ [1]

- (iii) angle ABD .

Answer(b)(iii) Angle $ABD =$ [1]

- (c) (i) Use trigonometry in triangle ABC to calculate the distance AB .

Answer(c)(i) $AB =$ m [2]

- (ii) Show that $AD = 22.5$ metres.

Answer(c)(ii)

[2]

- (d) Eshe holds her camera at E and takes a photograph of her friend in the seat at A .

Calculate angle AED .

Answer(d) [2]

3 All the times given in this question are the local time in Paris.

Pierre left Paris at 08 00 to go to his office in London.

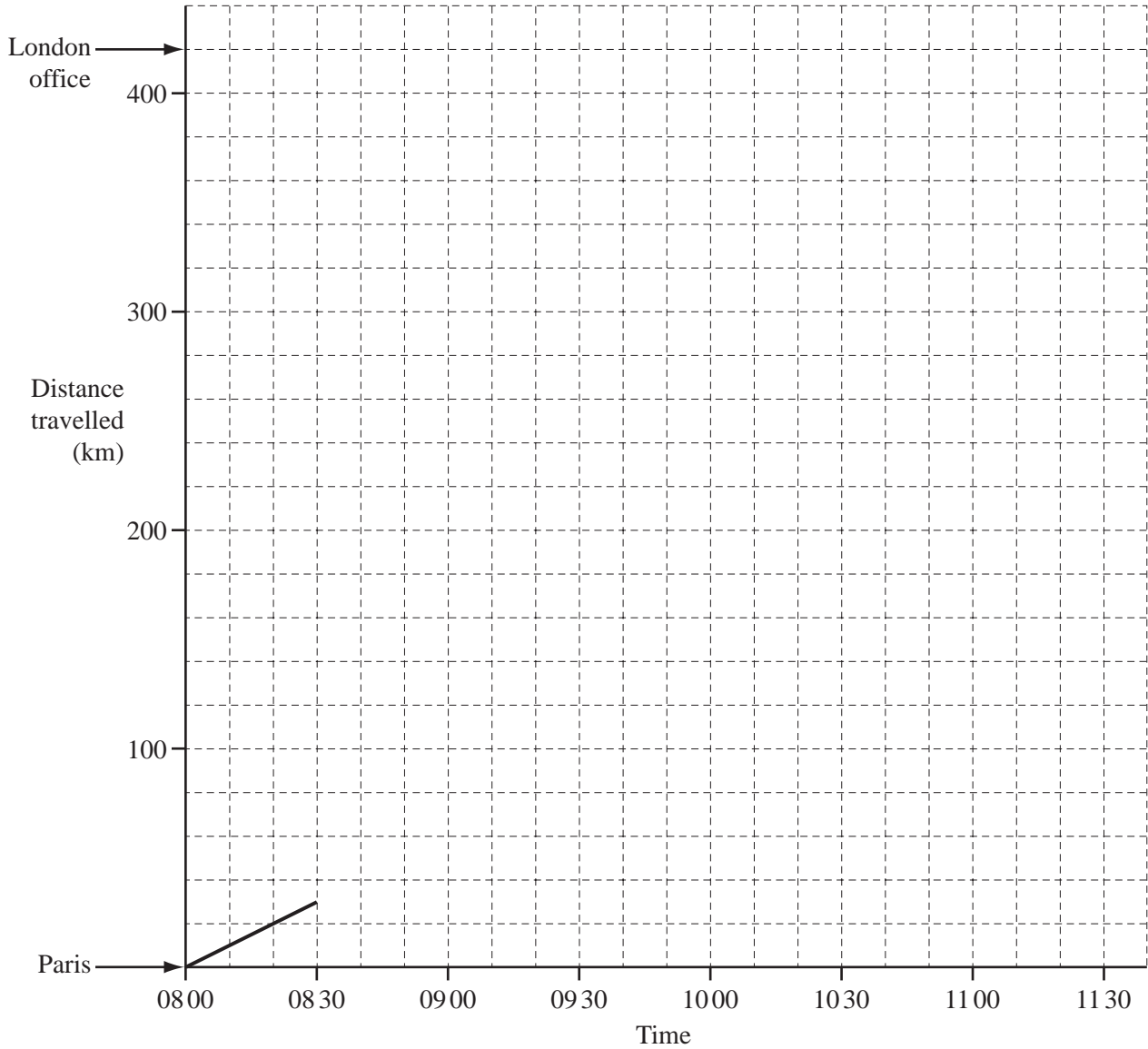
He travelled 30 kilometres to the airport.

He arrived at 08 30 and his plane left one hour later.

It flew 350 kilometres to London airport and landed at 10 15.

Pierre left London airport at 10 50 and he arrived at his office in London 40 minutes later.

(a) On the grid below, complete the travel graph.



[4]

- (b) (i)** How long is the flight from Paris to London?
Give your answer in hours.

Answer(b)(i) h [1]

- (ii)** Calculate the average speed of the flight, in kilometres/hour.

Answer(b)(ii) km/h [2]

- (c)** Pierre's colleague, Annette, travelled from Paris to London by train.
She left at 09 50 and arrived at the London office at 12 45.
Calculate the difference in the times taken by Pierre and Annette for the whole journey.
Give your answer in minutes.

Answer(c) min [3]

4 (a) Garcia and Elena are each given x dollars.

(i) Elena spends 4 dollars.

Write down an expression in terms of x for the number of dollars she has now.

Answer(a)(i) \$ [1]

(ii) Garcia doubles his money by working and then is given another 5 dollars.

Write down an expression in terms of x for the number of dollars he has now.

Answer(a)(ii) \$ [1]

(iii) Garcia now has three times as much money as Elena.

Write down an equation in x to show this.

Answer(a)(iii) [1]

(iv) Solve the equation to find the value of x .

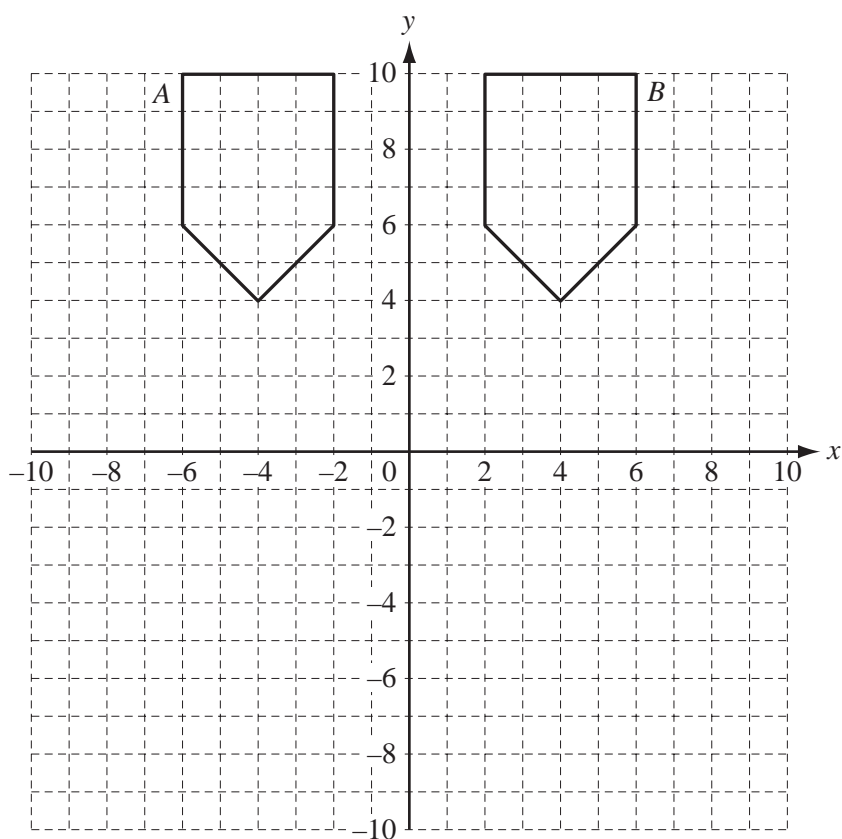
Answer(a)(iv) $x =$ [3]

(b) Solve the simultaneous equations

$$\begin{aligned} 3x - 2y &= 3, \\ x + 4y &= 8. \end{aligned}$$

Answer(b) $x =$

$y =$ [3]



- (a) Two different **single** transformations can map shape *A* onto shape *B*.

Describe each transformation fully.

Answer(a)

or [4]

- (b) Reflect shape *A* in the *x* axis. Draw the image and label it *C*. [2]

- (c) Rotate shape *B* through 90° clockwise about the origin. Draw the image and label it *D*. [2]

- (d) Describe fully the **single** transformation which maps shape *C* onto shape *B*.

Answer(d) [3]

- (e) Draw the enlargement of shape *A*, centre $(-4, 8)$, with scale factor $\frac{1}{2}$.

Label the image *E*. [2]

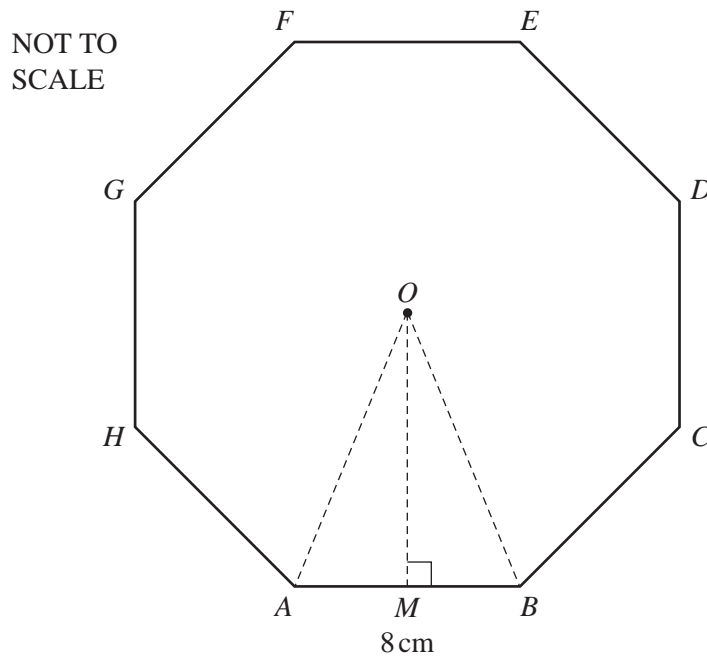
- 6 (a) Write down the name of a polygon with 8 sides.

Answer(a) [1]

- (b) Find the size of the interior angle of a regular polygon with 8 sides.

Answer(b) [2]

- (c) A regular 8-sided polygon, centre O , and side 8 cm, is shown below.
 M is the mid-point of the side AB .



- (i) Show that $OM = 9.66$ cm correct to 3 significant figures.

Answer (c)(i)

[3]

- (ii) Calculate the area of the triangle AOB .

Answer(c)(ii) cm^2 [2]

- (iii) Calculate the area of the polygon.

Answer(c)(iii) cm^2 [1]

- (d) The polygon forms the cross-section of a box.
The box is a prism of height 12 cm.

Calculate the volume of the box.

Answer(d) cm^3 [1]

- (e) The box contains 200 toffees in the shape of cuboids, 3 cm by 2 cm by 2 cm.

Calculate

- (i) the total volume of the 200 toffees,

Answer(e)(i) cm^3 [2]

- (ii) the percentage of the volume of the box **not** filled by the toffees.

Answer(e)(ii) % [3]

7

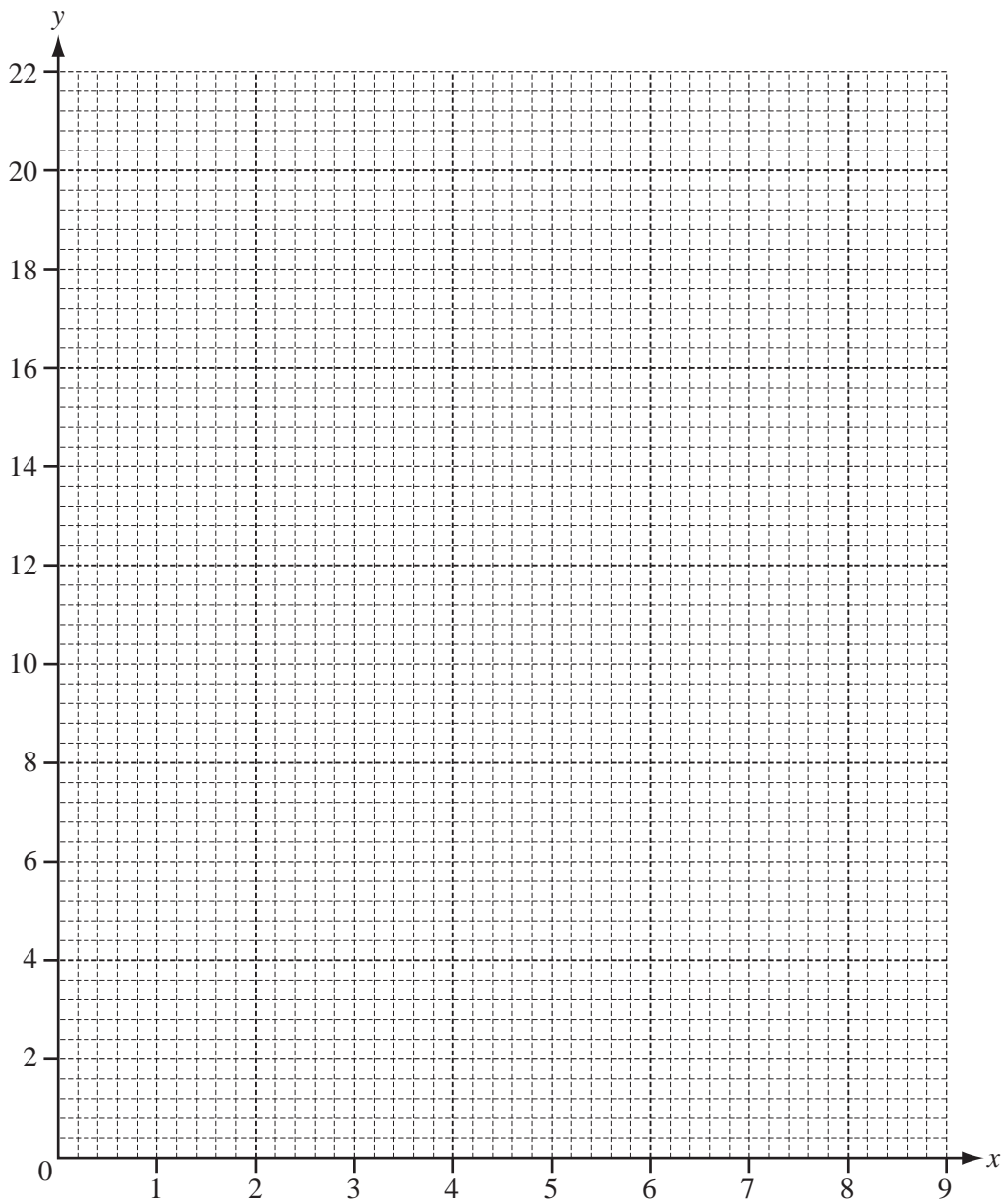
$$y = 9x - x^2.$$

(a) Complete the table of values for this equation.

| | | | | | | | | | | |
|-----|---|---|---|---|----|----|---|---|---|---|
| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| y | | 8 | | | 20 | 20 | | | 8 | 0 |

[3]

(b) On the grid below, draw the graph of $y = 9x - x^2$ for $0 \leq x \leq 9$.



[4]

- (c) Write down the values of x and y at the highest point of the curve.

Answer(c) $x =$
 $y =$ [2]

- (d) (i) On the grid, draw the line $y = 6$ for $0 \leq x \leq 9$. [1]

- (ii) Use this line to find the solutions of the equation

$$9x - x^2 = 6.$$

Give your answers correct to one decimal place.

Answer(d)(ii) $x =$ or $x =$ [2]

- 8 The table below shows the age and price of 20 used cars in a showroom.

| | | | | | | | | | | |
|-------------|------|------|------|------|------|------|------|------|------|------|
| Age (years) | 6 | 5 | 4 | 5 | 4 | 5 | 1 | 6 | 3 | 8 |
| Price (\$) | 1800 | 7600 | 9500 | 2500 | 4100 | 3100 | 5600 | 4700 | 4800 | 7900 |
| | | | | | | | | | | |
| Age (years) | 1 | 2 | 9 | 10 | 3 | 7 | 1 | 8 | 2 | 3 |
| Price (\$) | 6500 | 7000 | 1000 | 3800 | 1900 | 5200 | 3400 | 2100 | 4300 | 8200 |

- (a) Use this information to complete the following table.

| Age of cars (years) | Number of cars | Angle in a pie chart |
|---------------------|----------------|----------------------|
| 1 to 3 | 8 | 144° |
| 4 to 6 | 7 | |
| 7 or more | | |

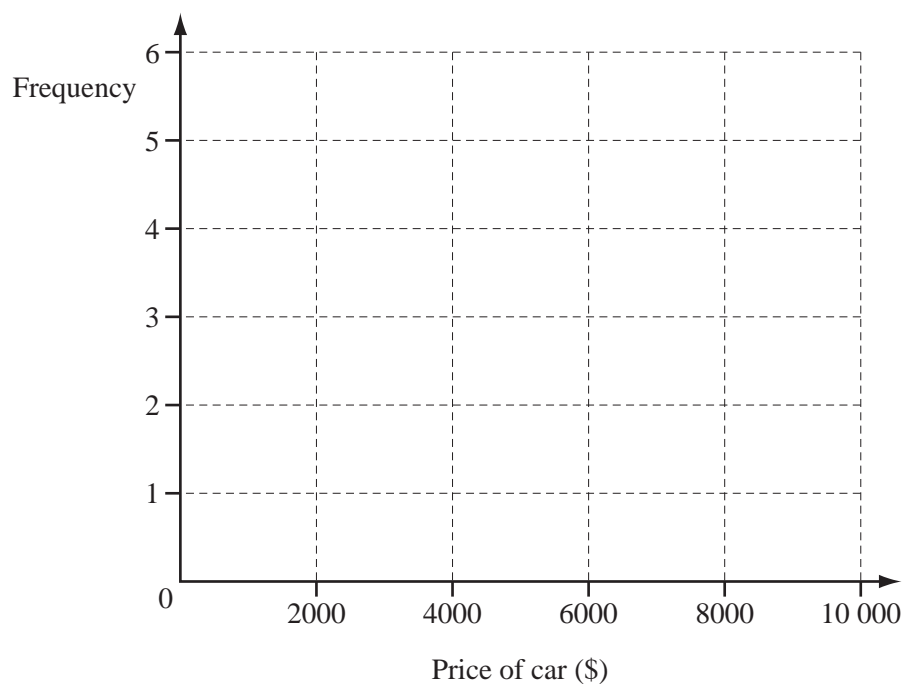
[3]

- (b) (i) Complete the frequency table for the price, \$ x , of the cars.

| | | | | | |
|------------|-------------------|----------------------|----------------------|----------------------|-------------------------|
| Price (\$) | $0 \leq x < 2000$ | $2000 \leq x < 4000$ | $4000 \leq x < 6000$ | $6000 \leq x < 8000$ | $8000 \leq x < 10\,000$ |
| Frequency | | | | | |

[2]

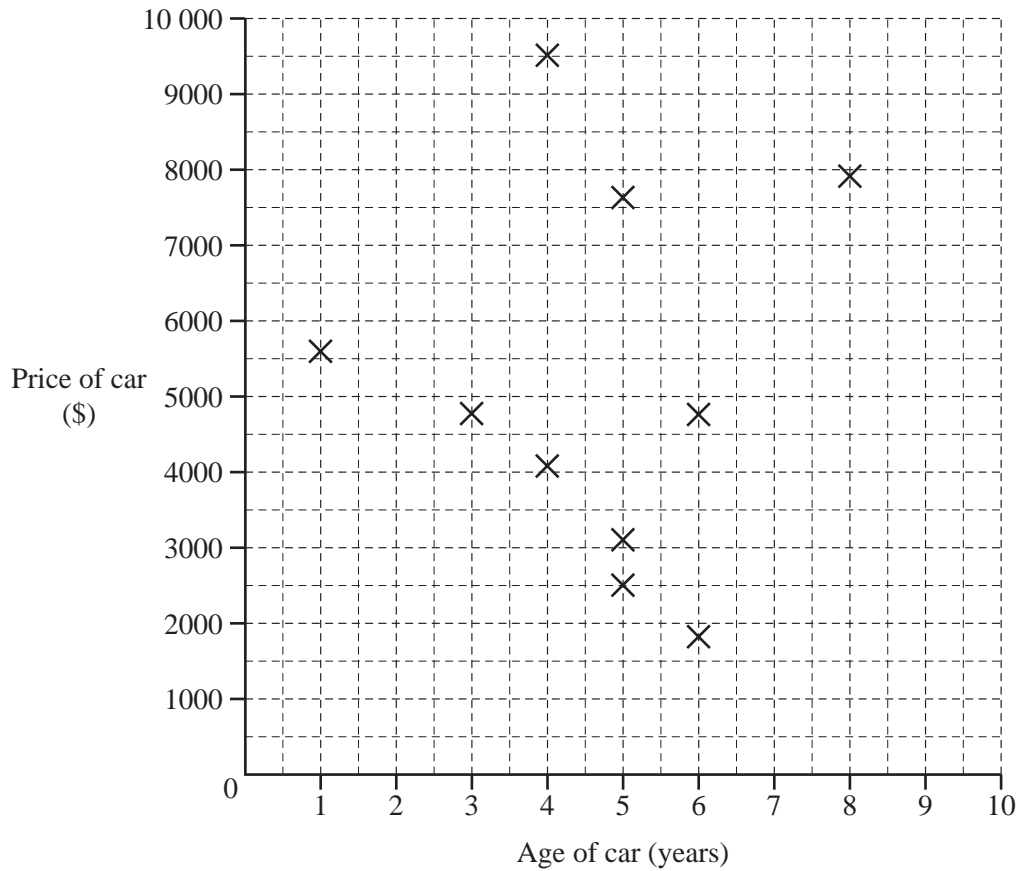
- (ii) Draw a histogram to show this information.



[2]

- (c) (i) On the grid below complete the scatter diagram showing the age and price of each car.

The first 10 points from the original table have been plotted.



[3]

- (ii) What correlation is there between the price of a car and its age?

Answer(c)(ii) [1]

- (iii) A car is chosen at random.

Using your scatter diagram, find the probability that the car is more than 4 years old and the price is more than \$5000.

Answer(c)(iii) [2]

- 9 (a) The first four terms of a sequence are 12, 7, 2, -3.

(i) Write down the next two terms of the sequence.

Answer(a)(i) and [2]

(ii) State the rule for finding the next term of the sequence.

Answer(a)(ii) [1]

(iii) Write down an expression for the n th term of this sequence.

Answer(a)(iii) [2]

- (b) The first four terms of another sequence are -3, 2, 7, 12.

Write down an expression for the n th term of this sequence.

Answer(b) [2]

- (c) Add together the expressions for the n th terms of both sequences.

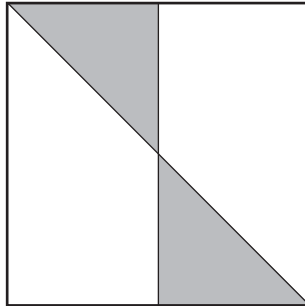
Write your answer as simply as possible.

Answer(c) [1]

- 1 Write down a multiple of 4 and 14 which is less than 30.

Answer [1]

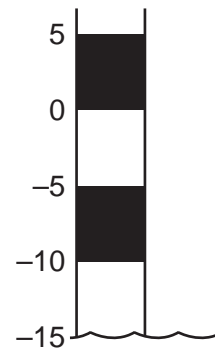
2



Write down the order of rotational symmetry of the diagram above.

Answer [1]

- 3 On 1st August the level of water in a lake was -15 metres.
A month later the level was 2 metres higher.
Write down the new level of water.



Answer m [1]

- 4 The area of a square is 42.25 cm^2 .
Work out the length of one side of the square.

Answer cm [1]

- 5 Expand the brackets and simplify $5x - 6(3x - 2)$.

Answer [2]

- 6 The scale on a map is 1:250 000.
A road is 4.6 centimetres long on the map.
Calculate the actual length of the road in kilometres.

Answer km [2]

- 7 > = <

Choose one of the symbols above to complete each of the following statements.

(a) $74\% \dots\dots\dots \frac{5}{7}$ [1]

(b) $\left(\frac{1}{2}\right)^{-3} \dots\dots\dots 8$ [1]

- 8 Juanita changed \$20 into euros . The exchange rate was €1=\$1.2685.
How many euros did she receive?
Give your answer correct to 2 decimal places.

Answer € [2]

- 9 Solve the equation $5x + 2 = 53$.

Answer $x =$ [2]

- 10 The River Nile is 6700 kilometres long, correct to the nearest hundred kilometres.
Complete the statement about the length, L kilometres, of the River Nile.

Answer $< L$, [2]

11

The table below is part of a bus timetable

| | | | | |
|-------------|-------|-------|-------|-------|
| City centre | 11 15 | 12 30 | 13 10 | 13 40 |
| Heatherton | 11 25 | 12 40 | 13 20 | 13 50 |
| Rykneld | 11 29 | 12 44 | 13 24 | 13 54 |

- (a) The 11 15 bus left the City centre on time and arrived at Rykneld 2 minutes early.
How many minutes did it take to reach Rykneld?

Answer(a) min [1]

- (b) Paulo walked to the bus stop at Heatherton and arrived at 12 56.
The next bus arrived on time.
How many minutes did Paulo wait for the bus?

Answer(b) min [1]

- 12 The line with equation $y = 2x - k$ passes through the point $(4, 0)$.
Work out the value of k .

Answer $k =$ [2]

- 13 Write 0.00578

- (a) in standard form,

Answer(a) [1]

- (b) correct to 2 significant figures,

Answer(b) [1]

- (c) correct to 2 decimal places.

Answer(c) [1]

- 14** Without using your calculator, work out $\frac{5}{8} \div 3\frac{3}{4}$.

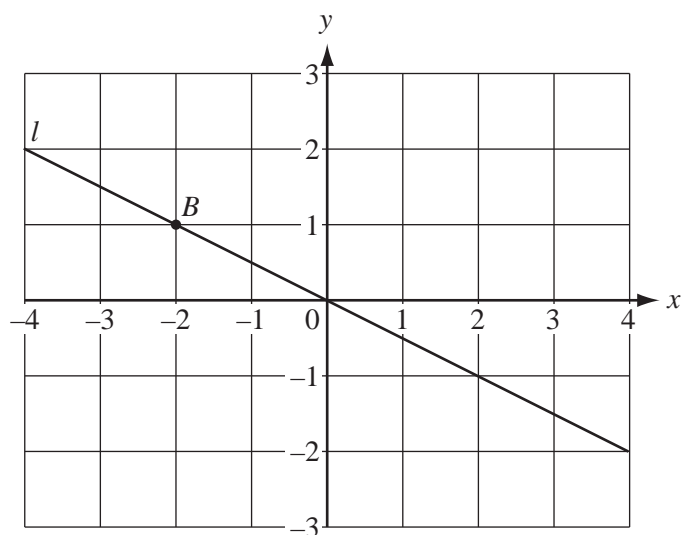
Give your answer as a fraction in its lowest terms.

You must show **all** your working.

Answer

[3]

15



- (a) Mark clearly on the diagram the point with co-ordinates (3, 2) and label it A. [1]

- (b) Write down the co-ordinates of the point B.

Answer(b) (..... ,) [1]

- (c) Find the gradient of the line l .

Answer(c) [1]

16 Simplify

(a) $\left(\frac{1}{p}\right)^0$,

Answer(a) [1]

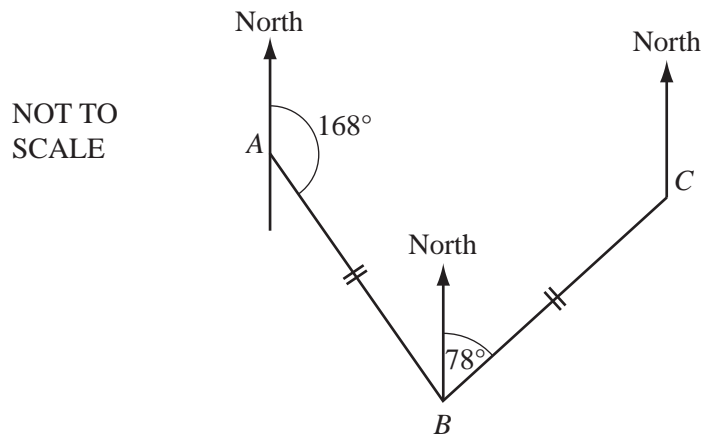
(b) $q^4 \times q^7$,

Answer(b) [1]

(c) $(r^2)^{-3}$.

Answer(c) [1]

17



The diagram shows the route of a fishing boat.

The boat sails from A to B on a bearing 168° and then from B to C on a bearing 078° .

$AB = BC$.

(a) Show that angle $ABC = 90^\circ$.

Answer(a)

[1]

(b) Work out the bearing of C from A.

Answer(b) [2]

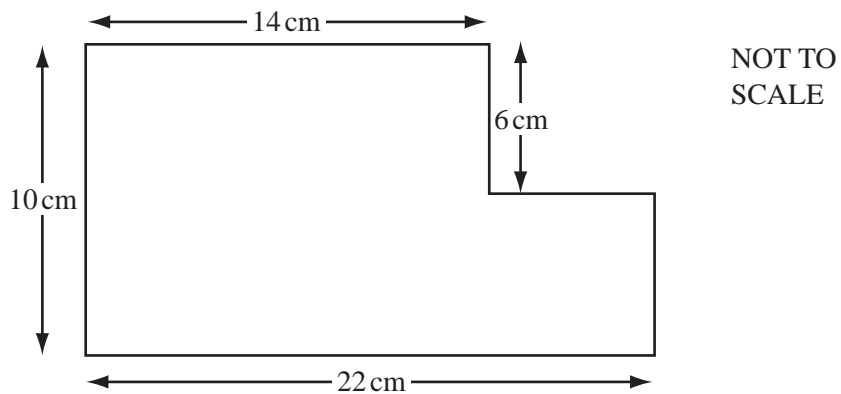
- 18 (a) Calculate the volume of a cylinder of radius 50 cm and height 138 cm.

Answer(a) cm^3 [2]

- (b) Write your answer to **part (a)** in cubic metres.

Answer(b) m^3 [1]

19



For the shape above, work out

- (a) the perimeter,

Answer(a) cm [2]

- (b) the area.

Answer(b) cm^2 [2]

- 20 (a) 85% of the seeds in a packet will produce red flowers.
One seed is chosen at random.
What is the probability that it will **not** produce a red flower?

Answer(a) [1]

- (b) A box of 15 pencils contains 5 red, 4 yellow and 6 blue pencils.
One pencil is chosen at random from the box.
Find the probability that it is

(i) yellow,

Answer(b)(i) [1]

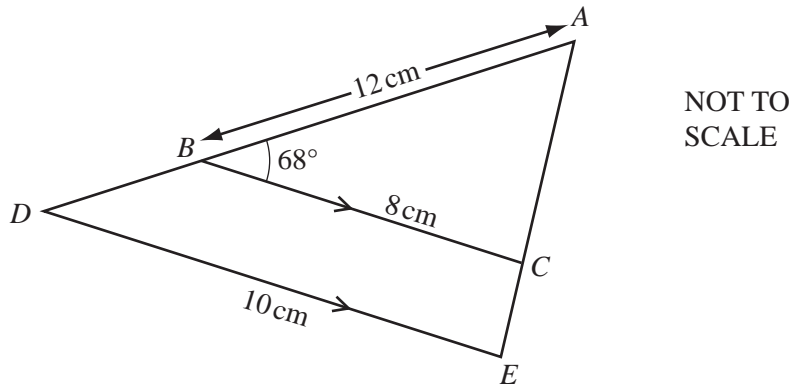
(ii) yellow or blue,

Answer(b)(ii) [1]

(iii) green.

Answer(b)(iii) [1]

21



In the diagram BC is parallel to DE .

- (a) Complete the following statement.

Triangle ABC is to triangle ADE . [1]

- (b) $AB = 12$ cm, $BC = 8$ cm and $DE = 10$ cm.
Calculate the length of AD .

Answer(b) cm [2]

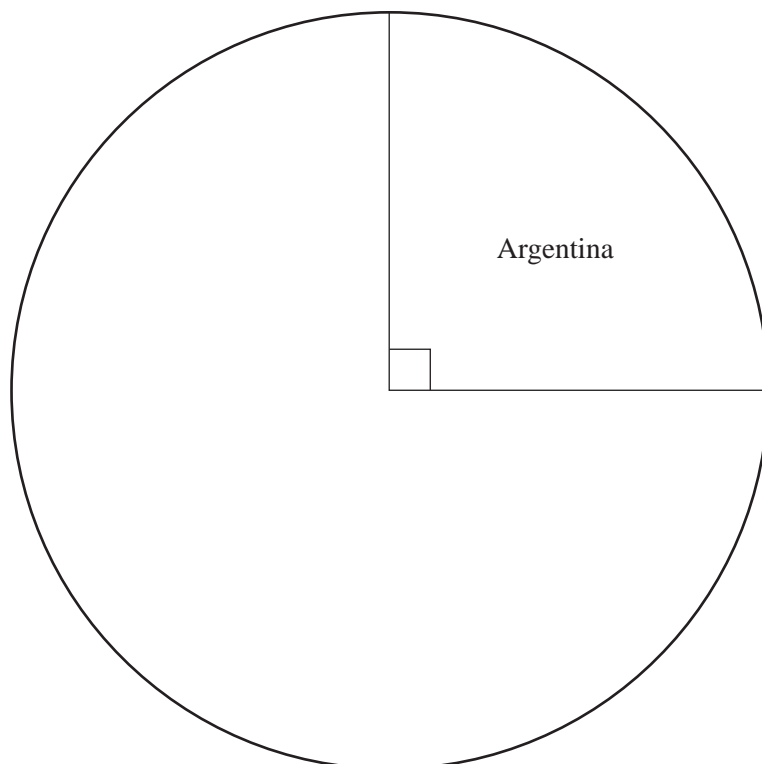
- (c) Angle $ABC = 68^\circ$.
Calculate the size of the reflex angle at D .

Answer(c) [2]

- 22 A travel brochure contains 24 pictures from different countries.
The table shows how many pictures there are from each country.

| Country | Number of pictures | Angle in a pie chart |
|--------------|--------------------|----------------------|
| Argentina | 6 | 90° |
| South Africa | 10 | 150° |
| Australia | 3 | |
| New Zealand | | |

- (a) Complete the table. [3]
- (b) Complete the pie chart accurately and label the sectors for South Africa, Australia and New Zealand.



[2]

1 Aida, Bernado and Cristiano need \$30 000 to start a business.

- (a) (i) They borrow $\frac{2}{5}$ of this amount.

Show that they still need \$18 000.

Answer (a)(i)

[1]

- (ii) They provide the \$18 000 themselves in the ratio

$$\text{Aida : Bernado : Cristiano} = 5 : 4 : 3.$$

Calculate the amount each of them provides.

*Answer(a)(ii)*Aida \$

Bernado \$

Cristiano \$ [3]

- (b) (i) Office equipment costs 35 % of the \$30 000.
Calculate the cost of the equipment.

Answer(b)(i)\$ [2]

- (ii) Office expenses cost another \$6500.
Write this as a fraction of \$30 000.
Give your answer in its lowest terms.

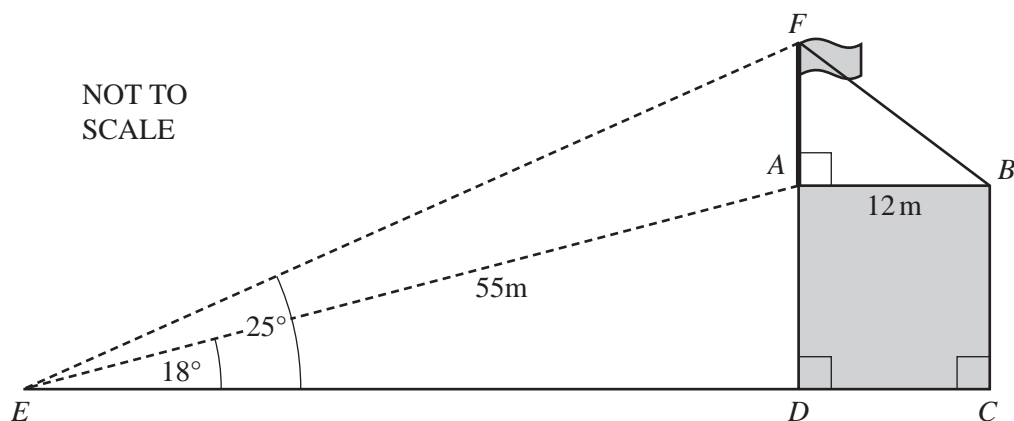
Answer(b)(ii) [2]

- (iii) How much remains of the \$30 000 now?

Answer(b)(iii)\$ [1]

- (c) They invest \$12 500.
After one year this has increased to \$15 500.
Calculate this percentage increase.

Answer(c) % [3]



$ABCD$ represents a building with a vertical flagpole, AF , on the roof.

The points E , D and C are on level ground. $EA = 55$ metres.

The angle of elevation of A from E is 18° and the angle of elevation of F from E is 25° .

(a) Calculate

(i) ED ,

Answer(a)(i) m [2]

(ii) FD ,

Answer(a)(ii) m [2]

(iii) DA .

Answer(a)(iii) m [2]

(b) Show that $AF = 7.4$ metres, correct to 1 decimal place.

Answer(b)

[1]

(c) The width, AB , of the building is 12 metres.

The top of the flagpole is attached to the point B by a rope.

Calculate

(i) the length of the rope, FB ,

Answer(c)(i) m [2]

(ii) the angle of elevation of F from B .

Answer(c)(ii) [2]

- 3 The table below shows the average daily sunshine, s , and the total monthly rainfall, r , for a city during one year.

| Month | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec |
|-------------|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|
| s (hours) | 6 | 7 | 7 | 9 | 10 | 12 | 12 | 12 | 9 | 8 | 6 | 5 |
| r (mm) | 70 | 52 | 72 | 41 | 20 | 6 | 1 | 4 | 16 | 52 | 65 | 67 |

(a) For s , find

(i) the mode

Answer(a)(i) hours [1]

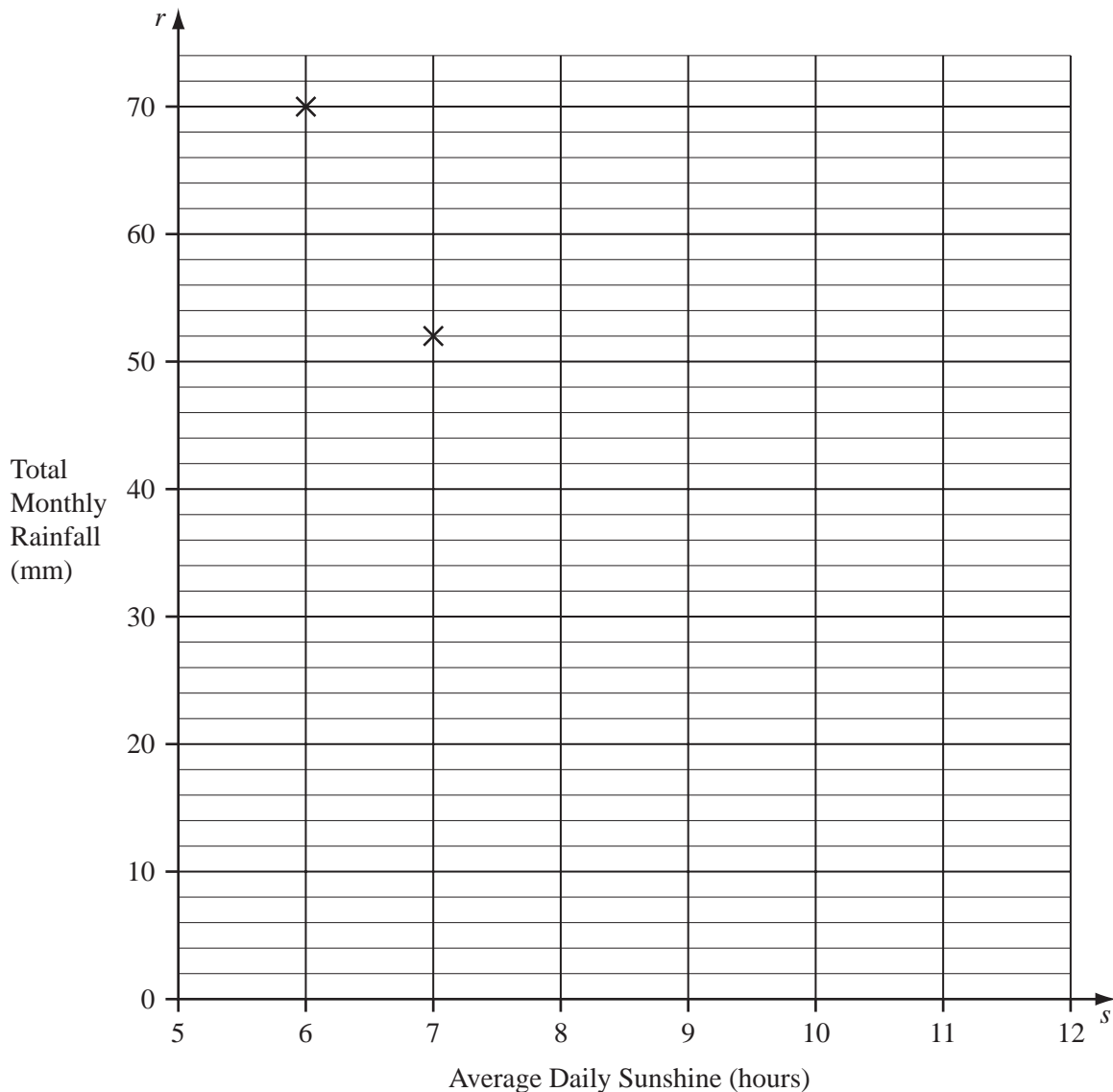
(ii) the range,

Answer(a)(ii) hours [1]

(iii) the median.

Answer(a)(iii) hours [2]

(b) On the grid below, plot the 10 points for March to December to complete the scatter diagram.



[3]

- (c) (i) Calculate the mean of s .

Answer(c)(i) hours [2]

- (ii) The mean of r is 38.8 millimetres.

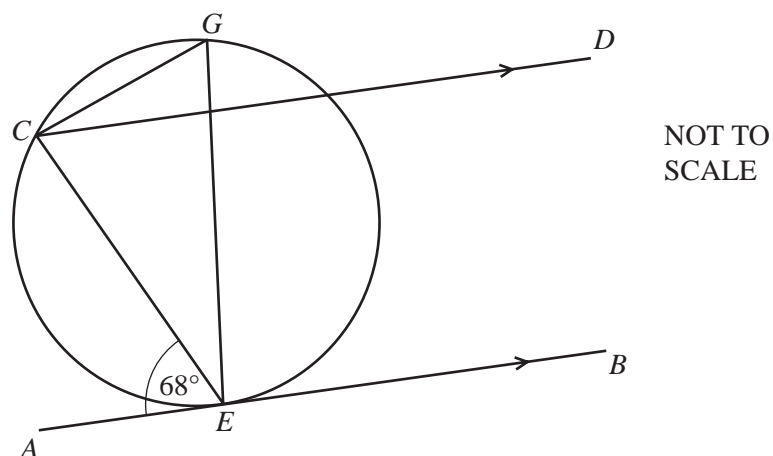
On the grid, plot the point representing these means. Label this point M. [1]

- (d) (i) Draw a line of best fit on the grid. [1]

- (ii) What type of correlation does your scatter diagram show?

Answer(d)(ii) [1]

4



EG is a diameter of the circle through E, C and G .

The tangent AEB is parallel to CD and angle $AEC = 68^\circ$.

Calculate the size of the following angles and give a reason for each answer.

- (a) Angle $CEG =$ because [2]

- (b) Angle $ECG =$ because [2]

- (c) Angle $CGE =$ because [2]

- (d) Angle $ECD =$ because [2]

5 Aminata and her brother live 18 kilometres from a shopping centre.

- (a) Aminata leaves home at 09 00 and runs 3 kilometres to a bus stop.
She arrives there at 09 30.

Write down her average speed, in kilometres per hour.

Answer(a) km/h [1]

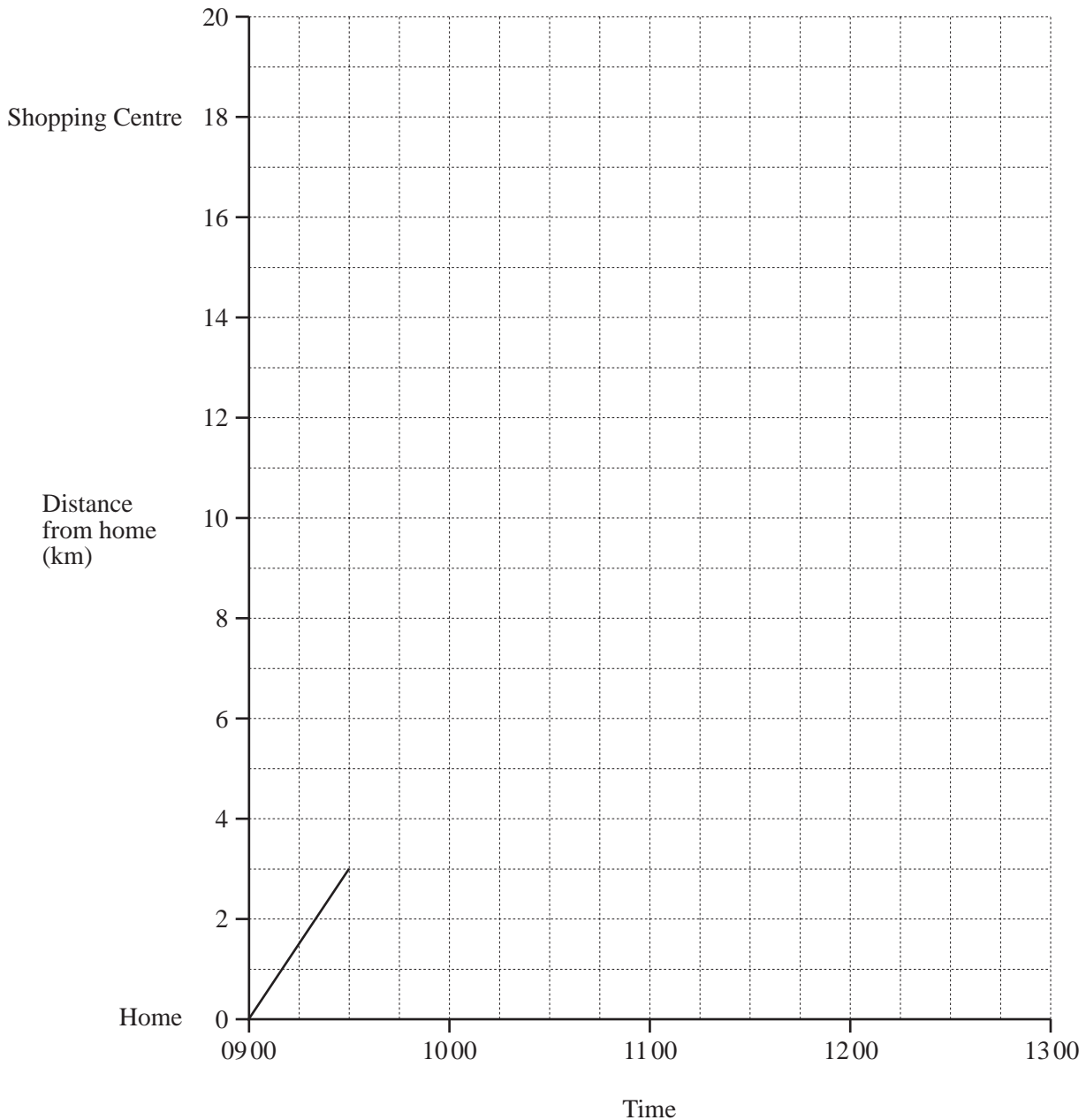
- (b) She waits 15 minutes for the bus.

The bus travels the remaining 15 kilometres to the shopping centre at an average speed of 20 km/h.

- (i) At what time does she arrive at the shopping centre?

Answer(b)(i) [2]

- (ii) On the grid below, complete the travel graph showing her journey to the shopping centre.



[2]

- (c) Her brother leaves home at 11 15.
He travels to the shopping centre by car at an average speed of 54 km/h.

(i) Work out how long, in minutes, he takes to travel to the shopping centre.

Answer(c)(i) minutes [1]

(ii) Show his journey on the grid. [1]

- (d) Aminata and her brother leave the shopping centre at 12 00.
They travel home by car and arrive at 12 45.

(i) Show their journey home on the grid. [1]

(ii) Calculate the average speed of their journey home.

Answer(d)(ii) km/h [2]

6 (a) $2y = 75 - 7x$

(i) Find y when $x = 7$.

Answer(a)(i) $y =$ [2]

(ii) Find x when $y = 6$.

Answer(a)(ii) $x =$ [2]

(b) Make x the subject of the equation $2y = 75 - 7x$.

Answer(b) $x =$ [2]

(c) Solve these simultaneous equations.

$$\begin{aligned} 4x - y &= 45 \\ 7x + 2y &= 75 \end{aligned}$$

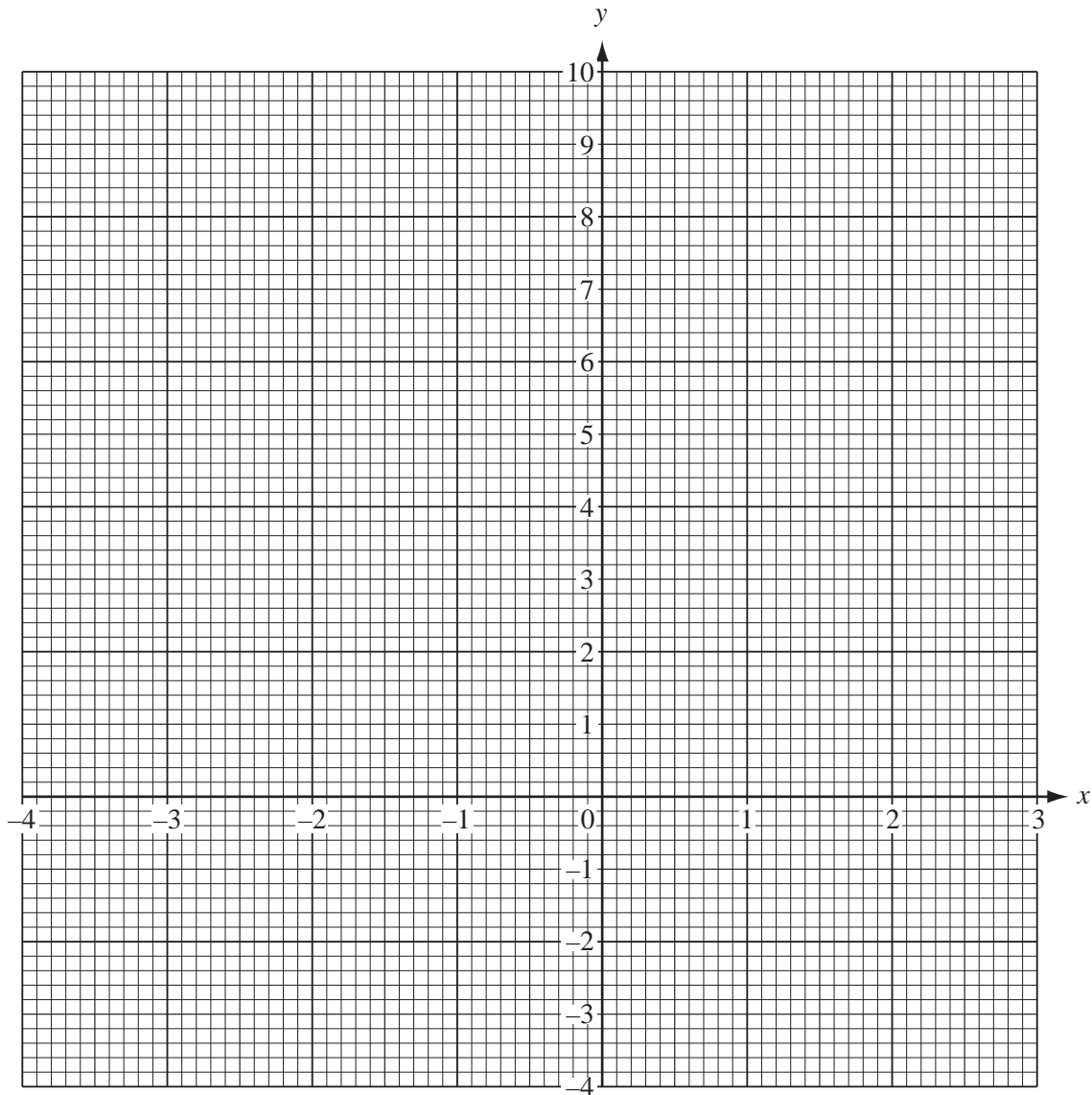
Answer(c) $x =$
 $y =$ [3]

- 7 (a) Complete the table of values for the equation $y = x^2 + x - 3$.

| | | | | | | | | |
|-----|----|----|----|----|---|----|---|---|
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| y | 9 | | -1 | -3 | | -1 | | 9 |

[3]

- (b) On the grid, draw the graph of $y = x^2 + x - 3$.



[4]

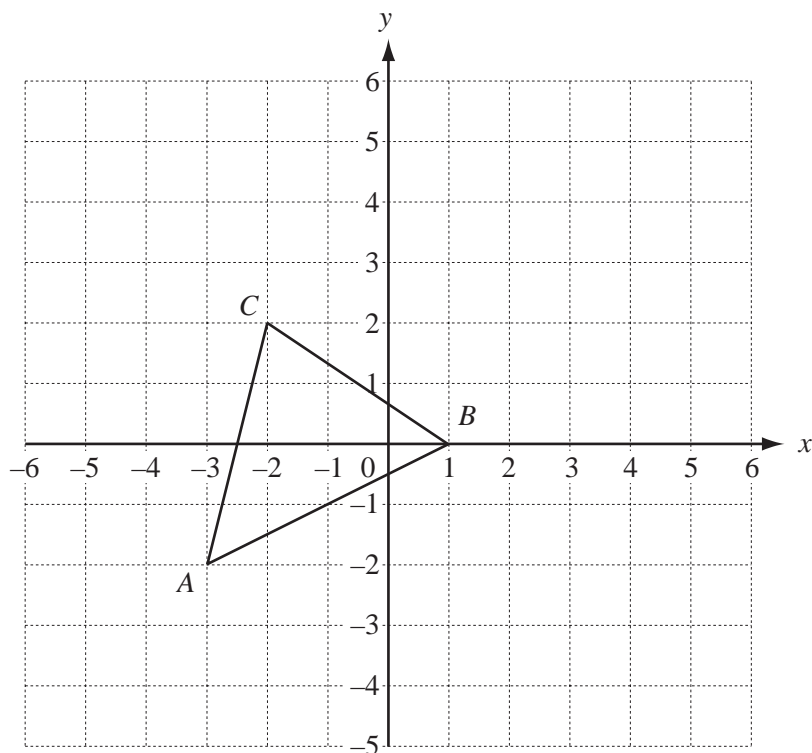
- (c) Write down the coordinates of the lowest point of the curve.

Answer(c) (..... ,) [2]

- (d) (i) Draw the line of symmetry of the graph. [1]

- (ii) Write down the equation of the line of symmetry.

Answer(d)(ii) [1]



Triangle ABC is drawn on the grid.

- (a) (i) Write down the coordinates of A .

Answer(a)(i) (..... ,) [1]

- (ii) Write \vec{AB} and \vec{BC} as column vectors.

Answer(a)(ii) $\vec{AB} = \begin{pmatrix} \\ \end{pmatrix}$ $\vec{BC} = \begin{pmatrix} \\ \end{pmatrix}$ [2]

- (b) Translate triangle ABC by the vector $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$. Label the image T . [2]

- (c) $\vec{AP} = 2\vec{AB}$ and $\vec{AQ} = 2\vec{AC}$.

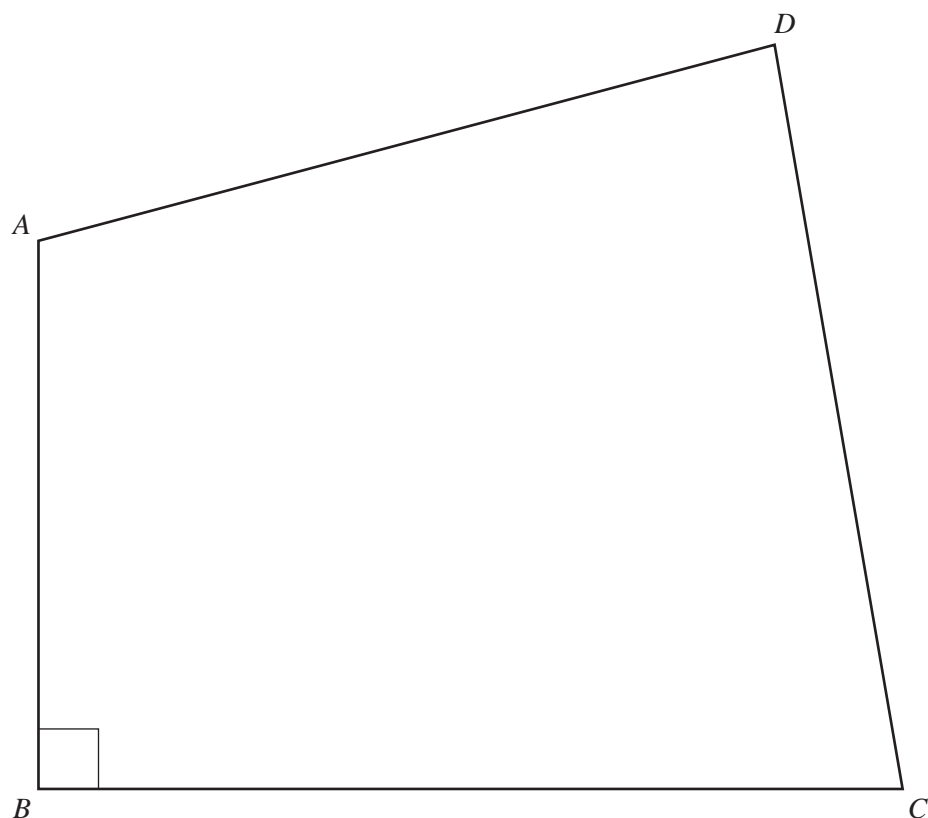
- (i) Plot the points P and Q on the grid. [2]

- (ii) Describe fully the single transformation which maps triangle ABC onto triangle APQ .

Answer(c)(ii) [3]

- (d) Rotate triangle ABC through 180° about the midpoint of the side AB . Label the image R . [2]

- 9 The quadrilateral $ABCD$ is a scale drawing of a park.
Angle $ABC = 90^\circ$ and 1 centimetre represents 10 metres.



(a) Write down

- (i) the actual length, in metres, of the side CD ,

Answer(a)(i) m [1]

- (ii) the size of angle BAD .

Answer(a)(ii) [1]

(b) Two straight paths cross the park.

One path is the same distance from AB as from BC .

The other path is the same distance from A as from D .

- (i) Using a straight edge and compasses only, construct the lines which show each path. [4]

- (ii) Tennis courts in the park are situated in a region closer to AB than to BC and closer to A than to D . Label this region T . [1]

- (c) Keith cycles past the park, so that he is always 30 metres outside the boundary ABC .
Construct the locus of points which shows this part of his route. [2]

- 10 The first three diagrams in a sequence are shown below.
Each diagram has one more trapezium added on the right.

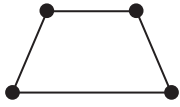


Diagram 1

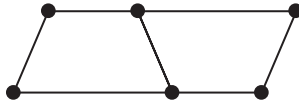


Diagram 2

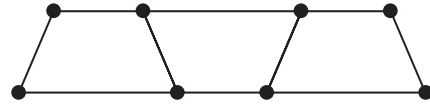


Diagram 3

- (a) Complete the table which shows the number of lines and dots in each diagram.

| Diagram | 1 | 2 | 3 | 4 |
|-----------------|---|---|---|---|
| Number of lines | 4 | 7 | | |
| Number of dots | 4 | 6 | | |

[2]

- (b) Find the number of lines and dots in Diagram 10.

Answer(b) lines and dots [2]

- (c) For Diagram n , write down in terms of n , the number of

- (i) lines,

Answer(c)(i) [2]

- (ii) dots.

Answer(c)(ii) [2]

- (d) Find the **difference**, in terms of n , between your answers to **parts (c)(i) and (c)(ii)**.
Simplify your answer.

Answer(d) [2]

- 1 Work out the value of $\frac{11+4 \times 7}{3}$.

Answer [1]

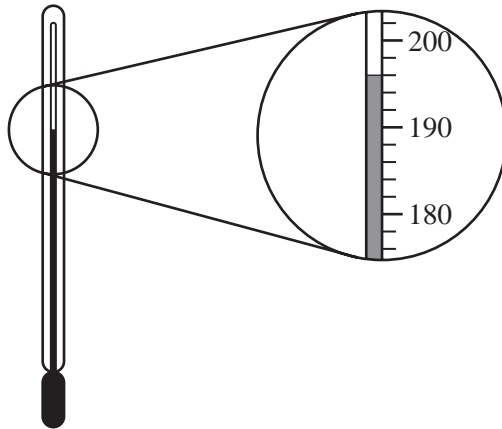
- 2 A train leaves Paris at 10 56 and arrives in Marseille at 13 12.

How long does the journey take?

Give your answer in hours and minutes.

Answer h min [1]

3



The diagram above shows part of a thermometer which measures the temperature in °C inside an oven.

What is the temperature in the oven?

Answer °C [1]

- 4 When Jon opened a packet containing 30 biscuits, he found that 3 biscuits were broken.

What percentage of the biscuits were broken?

Answer % [1]

- 5 Write the following in order, starting with the smallest.

0.35 33% $\frac{1}{3}$

Answer < < [1]

- 6 In May, the average temperature in Kiev was 12 °C.

In February, the average temperature was 26 °C lower than in May.

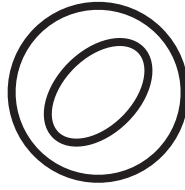
What was the average temperature in February?

Answer °C [1]

- 7 Write 0.00362 in standard form.

Answer [1]

8



For the diagram above, write down

(a) the number of lines of symmetry,

Answer(a) [1]

(b) the order of rotational symmetry.

Answer(b) [1]

- 9 Rehana pays \$284 in tax.
This is $\frac{2}{9}$ of the money she earns.
How much does Rehana earn?

Answer \$ [2]

- 10 The height, h metres, of a telegraph pole is 12 metres correct to the nearest metre.

Complete the statement about the value of h .

Answer $\leq h <$ [2]

- 11 A packet of sweets costs \$2.45.

Felipe and his brother share the cost in the ratio 4 : 3.

How much does Felipe pay?

Answer \$ [2]

- 12 (a) There are 11 boys and 13 girls in a choir.

The teacher chooses one choir member at random.

What is the probability that this is a girl?

Write your answer as a fraction.

Answer(a) [1]

- (b) The probability that Carla arrives at school before 08 00 is $\frac{9}{20}$.

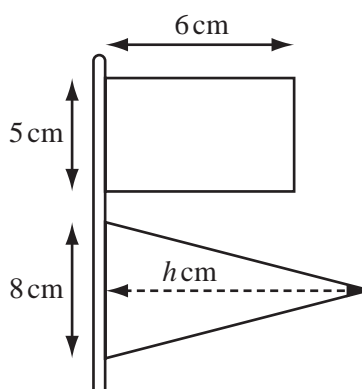
What is the probability that Carla does not arrive before 08 00?

Write your answer as a fraction.

Answer(b) [1]

13

NOT TO
SCALE



A model ship is flying two flags.

The first is a rectangle 5 centimetres by 6 centimetres.

The second is an isosceles triangle with base 8 centimetres and height h centimetres.

The flags are equal in area.

Find the value of h .

Answer $h =$ [2]

- 14 Find the circumference of a circle of radius 5.7 cm.
Write down your answer

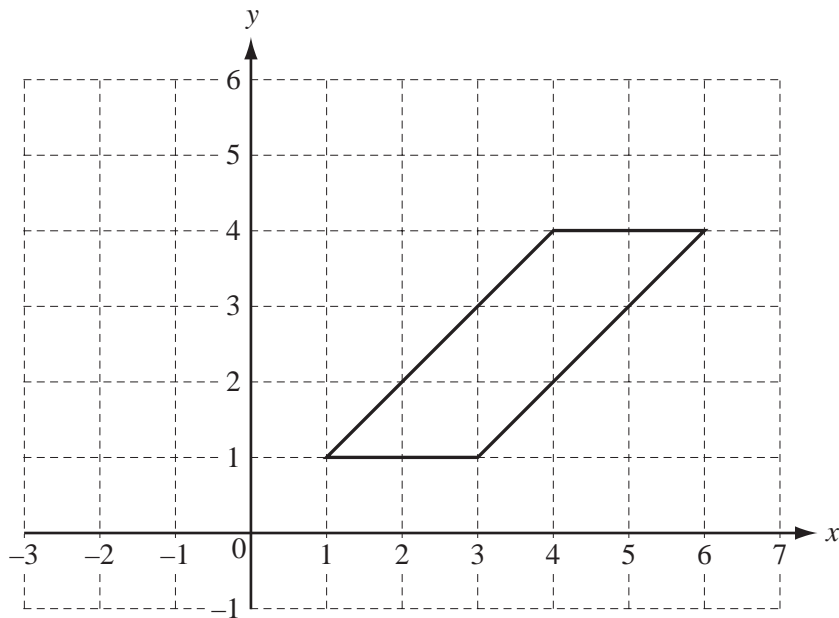
(a) exactly as it appears on your calculator,

Answer(a) cm [1]

(b) correct to the nearest centimetre.

Answer(b) cm [1]

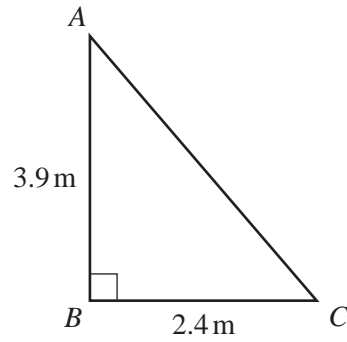
15



On the grid, draw the reflection of the parallelogram in the line $x = 3$.

[2]

16

NOT TO
SCALE

ABC is a right-angled triangle.
 $AB = 3.9\text{ m}$ and $BC = 2.4\text{ m}$.
 Calculate the length of AC .

Answer $AC =$ m [2]

- 17 A shop sells batteries at 68 cents each, or \$2.15 for a pack of four.
 How much will Daniel save if he buys two packs of four instead of 8 single batteries?

Answer \$ [2]

- 18 Factorise completely

$$6x - 9x^2y.$$

Answer [2]

19 (a) When $x = -3$ and $y = 4$, find the value of

(i) x^3 ,

Answer(a)(i) [1]

(ii) xy^2 .

Answer(a)(ii) [1]

(b) Simplify $\frac{z^{-1}}{z^{-2}}$.

Answer(b) [1]

20

$\sqrt{4}$ $\sqrt{14}$ $\sqrt{36}$ $\sqrt{64}$ $\sqrt{81}$ $\sqrt{100}$

From the list above, write down

(a) a prime number,

Answer(a) [1]

(b) a factor of 27,

Answer(b) [1]

(c) a multiple of 4,

Answer(c) [1]

(d) an irrational number.

Answer(d) [1]

21

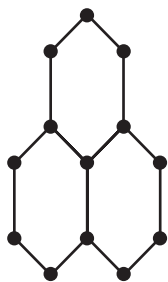


Diagram 1

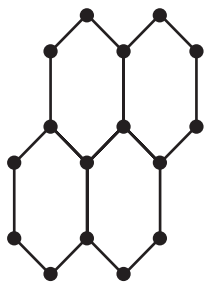


Diagram 2

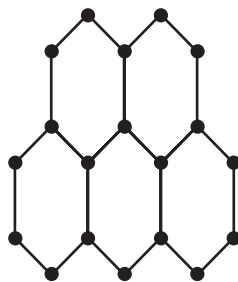


Diagram 3

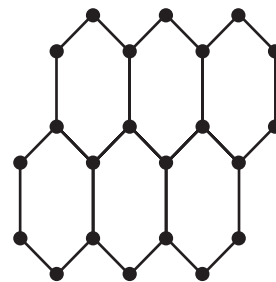


Diagram 4

Look at the sequence of diagrams above.

The number of dots in each diagram is given in the table below.

| | | | | | |
|----------------|----|----|----|----|--|
| Diagram number | 1 | 2 | 3 | 4 | |
| Number of dots | 13 | 16 | 19 | 22 | |

Find the number of dots in

(a) Diagram 5,

Answer(a) [1]

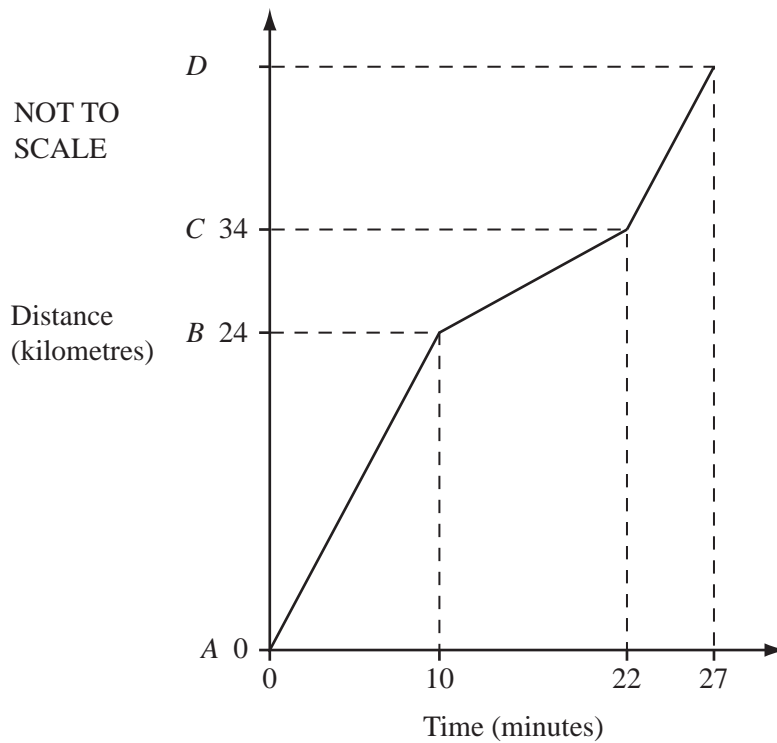
(b) Diagram 11,

Answer(b) [1]

(c) Diagram n .

Answer(c) [2]

22



The diagram shows the graph of Rachel's journey on a motorway. Starting at A , she drove 24 kilometres to B at a constant speed. Between B and C she had to drive slowly through road works. At C she drove a further distance to D at her original speed.

- (a) For how many minutes was she driving through the road works?

Answer(a) min [1]

- (b) At what speed did she drive through the road works?
Give your answer in

(i) kilometres/minute,

Answer(b)(i) km/min [1]

(ii) kilometres/hour.

Answer(b)(ii) km/h [1]

- (c) What is the total distance from A to D ?

Answer(c) km [2]

23 Nicolas needs to borrow \$4000 for 3 years. The bank offers him a choice:

| Offer A | Offer B |
|--|--|
| Interest Rate 8.5% per year | Interest Rate 8% per year |
| Pay the interest at the end of each year | Pay all the interest at the end of three years |

Nicolas recognises that offer A is simple interest and offer B is compound interest.

(a) If he takes offer A, what is the total amount of interest he will pay?

Answer(a) \$ [2]

(b) If he takes offer B, how much **interest** will he pay?
Give your answer correct to 2 decimal places.

Answer(b) \$ [3]

24

$$\mathbf{a} = \begin{pmatrix} 3 \\ -2 \end{pmatrix} \quad \text{and} \quad \mathbf{b} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$$

(a) Work out

(i) $\mathbf{a} + 3\mathbf{b}$,

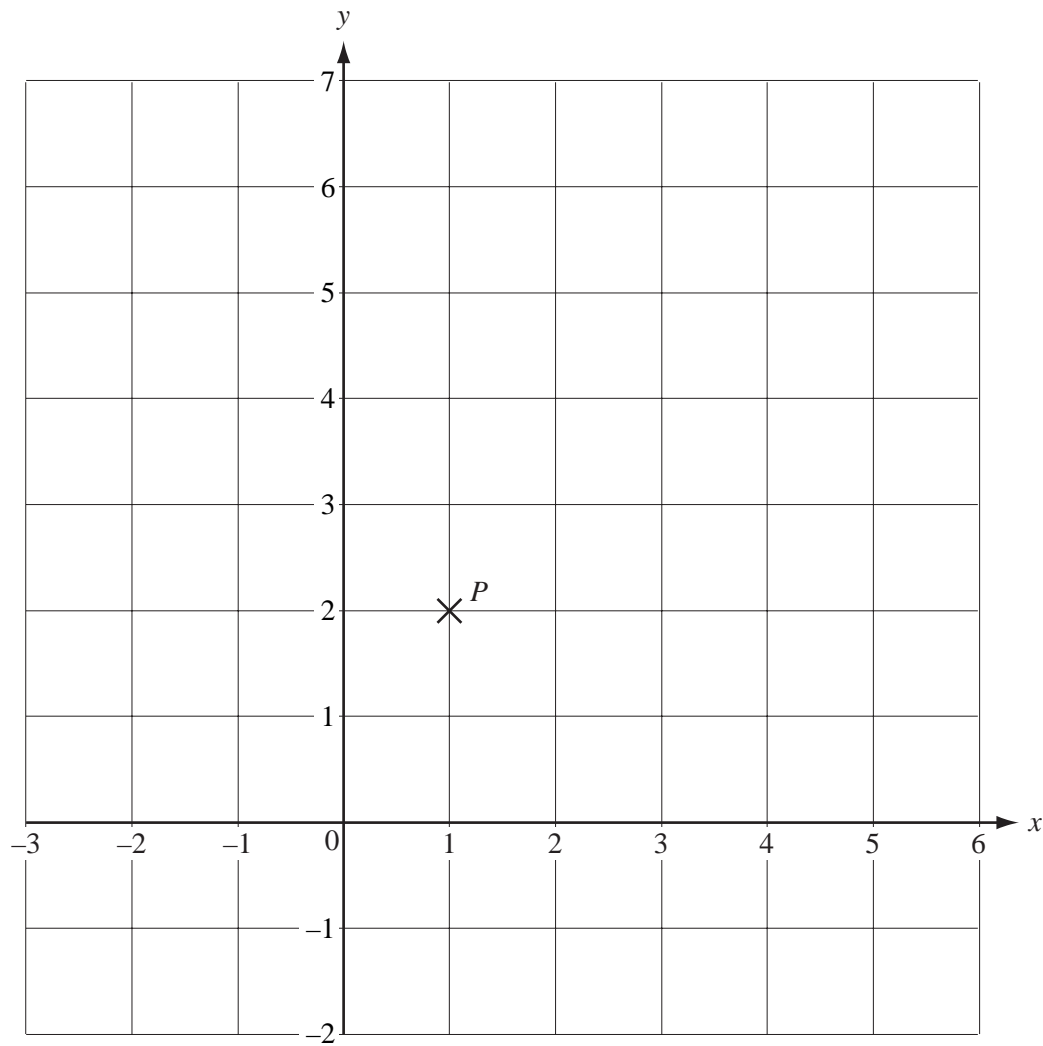
$$\text{Answer(a)(i)} \quad \begin{pmatrix} \\ \end{pmatrix} \quad [2]$$

(ii) $\mathbf{b} - \mathbf{a}$.

$$\text{Answer(a)(ii)} \quad \begin{pmatrix} \\ \end{pmatrix} \quad [2]$$

(b) $\vec{PQ} = 2\mathbf{b}$.

The point P is marked on the grid below.
Draw the vector \vec{PQ} on the grid.



[2]

- 1 Alphonse, his wife and child fly from Madrid to the Olympic Games in Beijing.
The adult plane fare is 450 euros.
The child fare is 68% of the adult fare.

(a) Show that the total plane fare for the family is 1206 euros. Show all your working clearly.

Answer (a)

[3]

(b) The ratio of the money spent on plane fares : accommodation : tickets = 6 : 5 : 3.

Calculate the **total** cost.

Answer(b) euros [3]

(c) Alphonse changes 500 euros into Chinese Yuan at a rate of 1 euro = 9.91 Chinese Yuan.

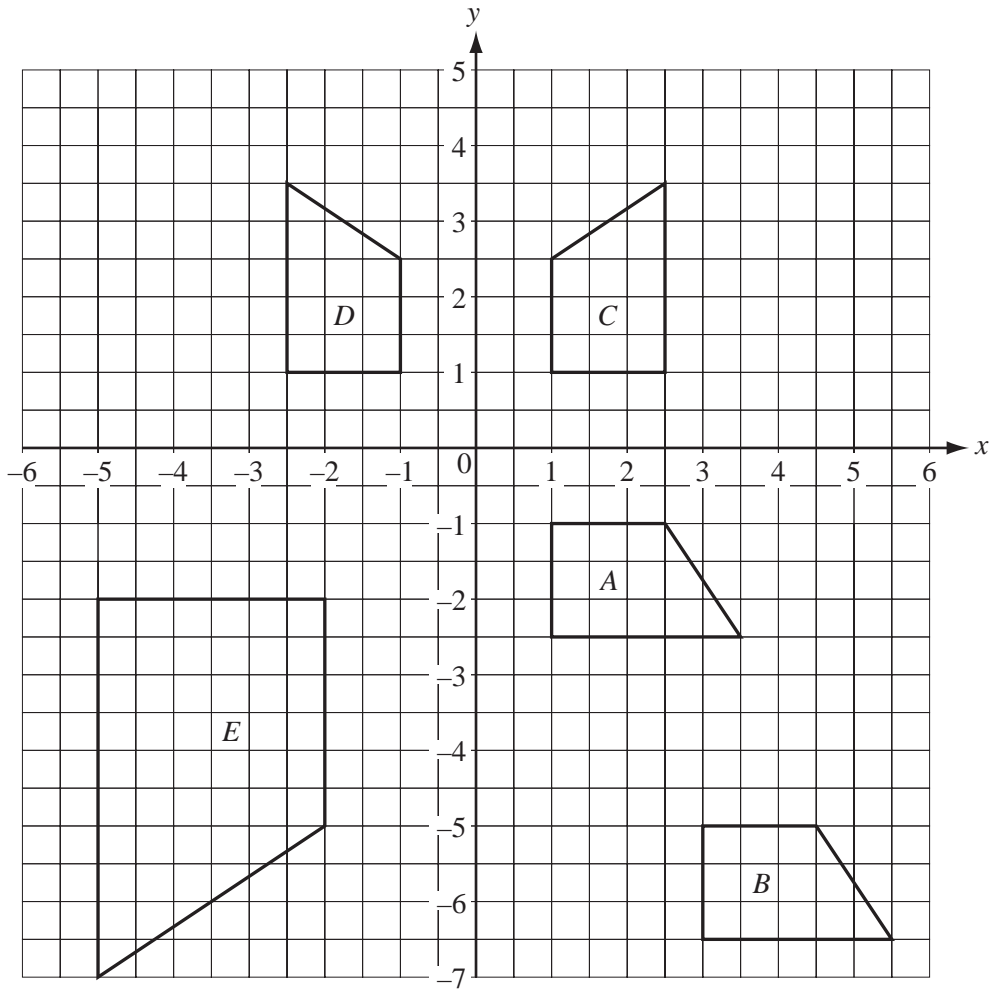
How many Chinese Yuan does he receive?

Answer(c) Yuan [2]

(d) Their plane leaves Madrid at 05 45. The journey takes 11 hours 35 minutes.
Beijing time is 6 hours ahead of Madrid time.

Find the time in Beijing when they arrive.

Answer(d) [2]



Describe fully the **single** transformation which maps

(a) A onto B ,

Answer(a) [3]

(b) C onto D ,

Answer(b) [2]

(c) A onto C ,

Answer(c) [3]

(d) C onto E .

Answer(d) [3]

3 Marie counts the number of people in each of 60 cars one morning.

(a) She records the first 40 results as shown below.

| Number of people in a car | Tally | Number of cars |
|---------------------------|-------|----------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |

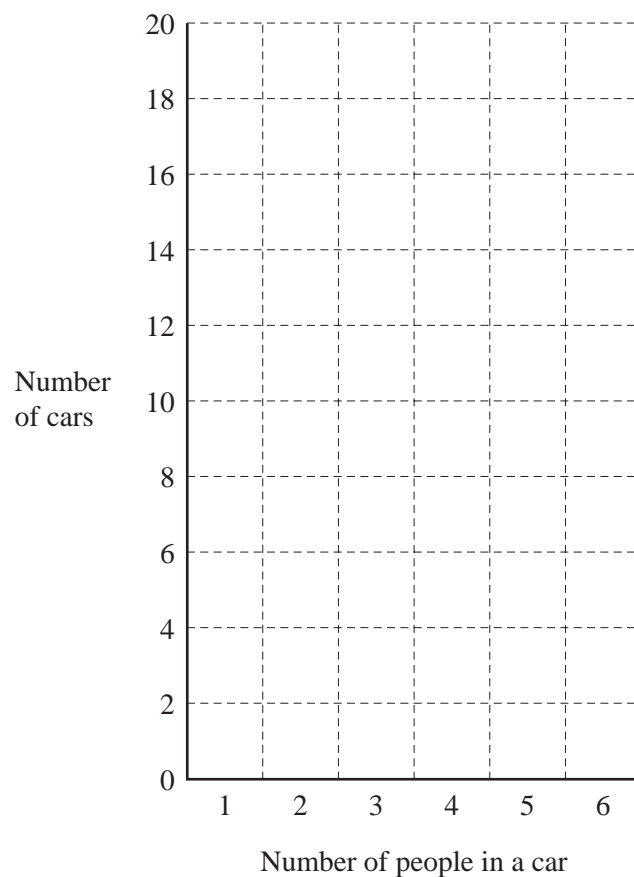
The remaining 20 results are

2, 2, 5, 2, 2, 4, 2, 6, 5, 3, 4, 5, 4, 6, 2, 5, 3, 2, 1, 6.

(i) Use these results to complete the frequency table above.

[2]

(ii) On the grid below, draw a bar chart to show the information for the 60 cars.



[1]

(iii) Write down the mode.

Answer(a)(iii) [1]

(iv) Find the median.

Answer(a)(iv) [1]

(v) Work out the mean.

Answer(a)(v) [3]

(b) Manuel uses Marie's results to draw a pie chart.

Work out the sector angle for the number of cars with 5 people.

Answer(b) [2]

4 (a) Solve the equations

(i) $3x - 4 = 14$,

Answer(a)(i) $x =$ [2]

(ii) $\frac{y+1}{5} = 2$,

Answer(a)(ii) $y =$ [2]

(iii) $3(2z - 7) - 2(z - 3) = -9$.

Answer(a)(iii) $z =$ [3]

(b) Donna sent p postcards and q letters to her friends.

(i) The total number of postcards and letters she sent was 12.

Write down an equation in p and q .

Answer(b)(i) [1]

(ii) A stamp for a postcard costs 25 cents and a stamp for a letter costs 40 cents.
She spent 375 cents on stamps altogether.

Write down another equation in p and q .

Answer(b)(ii) [1]

(iii) Solve these equations to find the values of p and q .

Answer(b)(iii) $p =$ and $q =$ [3]

- 5 (a) (i) Calculate the area of a circle with radius 3.7 centimetres.

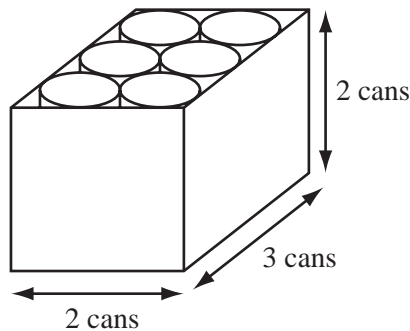
Answer(a)(i) cm^2 [2]

- (ii) A can of tomatoes is a cylinder with radius 3.7 centimetres and height h centimetres. The volume of the cylinder is 430 cubic centimetres.

Calculate h .

Answer(a)(ii) h = [2]

NOT TO
SCALE



- (b) Twelve cans fit exactly inside a box 3 cans long, 2 cans wide and 2 cans high.

- (i) Write down the length, width and height of the box.

Answer(b)(i) length = cm

width = cm

height = cm [3]

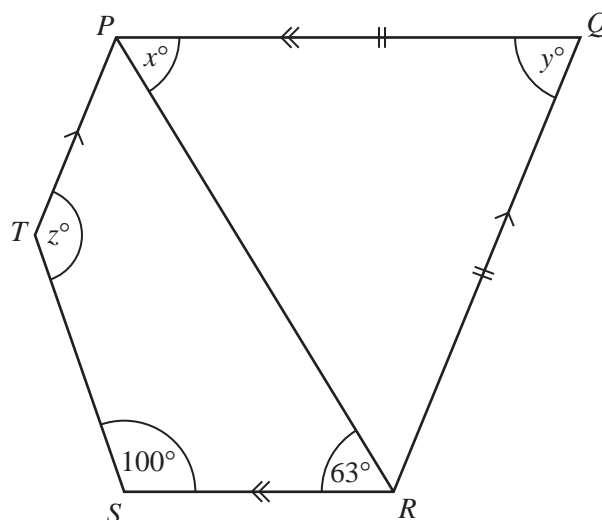
- (ii) Calculate the volume of the box.

Answer(b)(ii) cm^3 [2]

- (iii) Calculate the percentage of the volume of the box occupied by the cans.

Answer(b)(iii) % [3]

6

NOT TO
SCALE

- (a) In the diagram PQ is parallel to SR , and QR is parallel to PT .
 $PQ = QR$, angle $PRS = 63^\circ$ and angle $RST = 100^\circ$.

Find the value of

- (i) x ,

Answer(a)(i) $x =$ [1]

- (ii) y ,

Answer(a)(ii) $y =$ [2]

- (iii) z .

Answer(a)(iii) $z =$ [2]

- (b) The shape of a flower bed is a regular octagon, $ABCDEFGH$, with sides of 4 metres.

- (i) Show that the interior angle of a regular octagon is 135° .

Answer(b)(i)

[2]

- (ii) Use a ruler and protractor to complete an accurate scale drawing of the flower bed.
 Use a scale of 1 centimetre to represent 1 metre.
 The line AB and the centre O are already shown.

$O \bullet$

$A \quad \quad \quad 4\text{ m} \quad \quad \quad B$

[2]

- (iii) Measure and write down the distance from the centre, O , to the mid-point of AB .

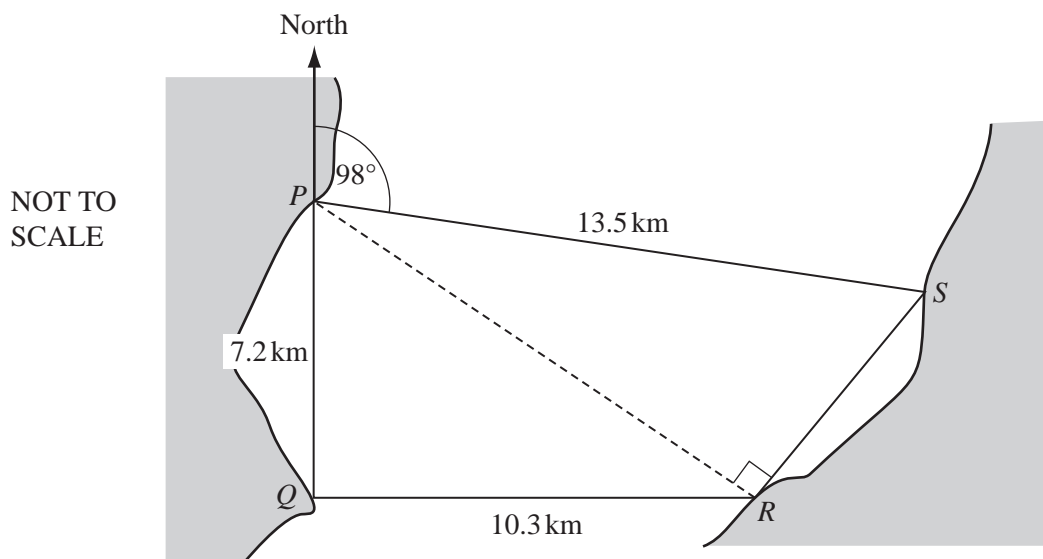
Answer(b)(iii) cm [1]

- (iv) Calculate the area of triangle OAB in the scale drawing.

Answer(b)(iv) cm^2 [2]

- (v) Calculate the actual area of the flower bed.

Answer(b)(v) m^2 [1]



P , Q , R and S are ferry ports on a wide river, as shown in the diagram above.

A ferry sails from P , stopping at Q , R and S before returning to P .

(a) Q is 7.2 kilometres due south of P and R is 10.3 kilometres due east of Q .

(i) Show by calculation that angle $QPR = 55^\circ$.

Answer(a)(i)

[2]

(ii) Write down the bearing of R from P .

Answer(a)(ii) [1]

(b) The bearing of S from P is 098° and $SP = 13.5$ km.

(i) Explain why angle $RPS = 27^\circ$.

Answer (b)(i)

[1]

(ii) Angle $PRS = 90^\circ$. Calculate the distance RS .

Answer(b)(ii) $RS =$ km [2]

(iii) Find the total distance the ferry sails.

Answer(b)(iii) km [1]

(c) The total sailing time for the ferry is 4 hours 30 minutes.

Calculate the average sailing speed, in kilometres per hour, for the whole journey.

Answer(c) km/h [2]

- 8 (a) The width of a rectangle is x centimetres.

The length of the rectangle is 3 centimetres more than the width.

Write down an expression, in terms of x , for

- (i) the length of the rectangle,

Answer(a)(i) cm [1]

- (ii) the area of the rectangle.

Answer(a)(ii) cm^2 [1]

- (iii) The area of the rectangle is 7 square centimetres.

Show that $x^2 + 3x - 7 = 0$.

Answer (a)(iii)

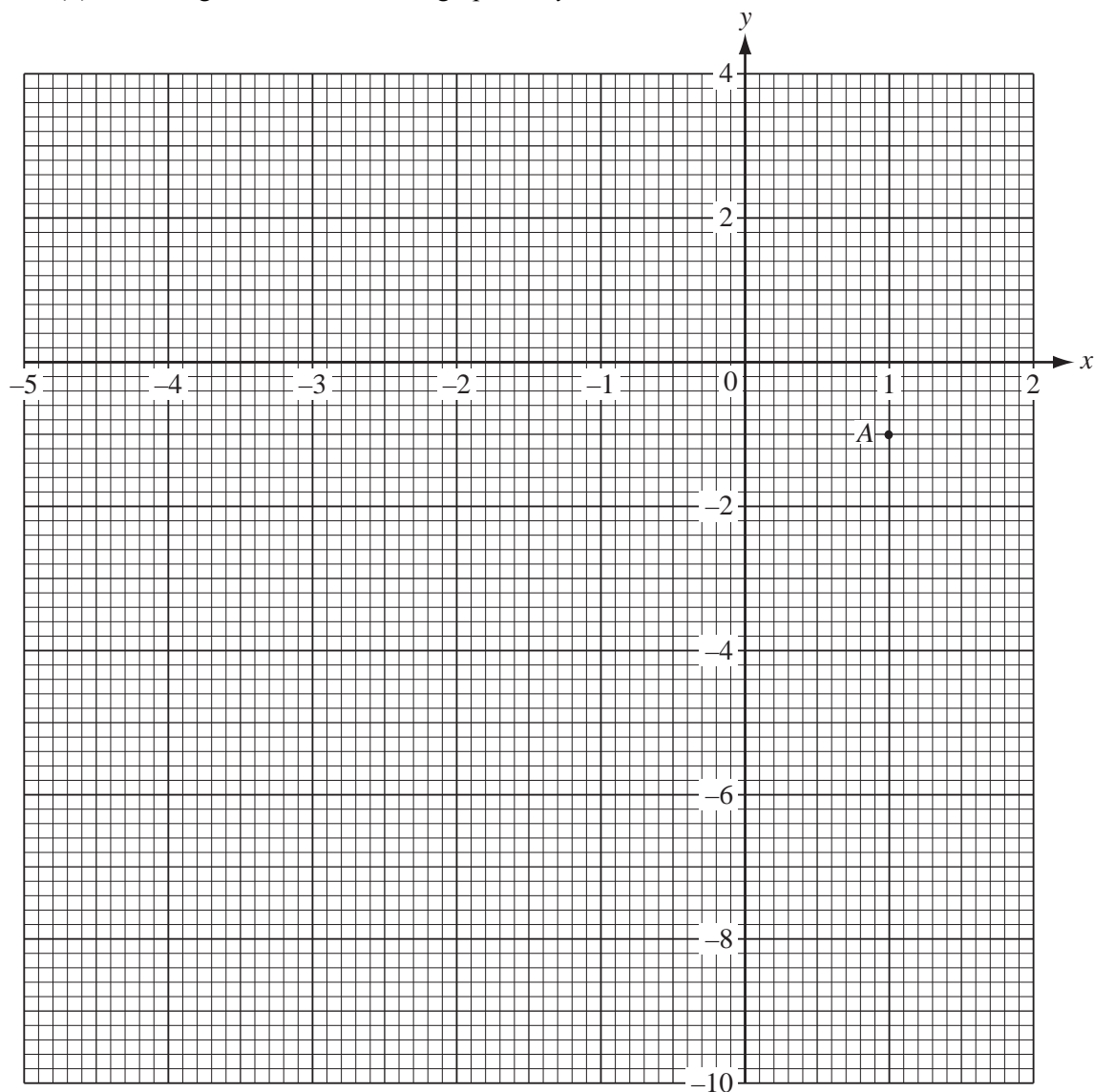
[1]

- (b) (i) Complete the tables of values for the equation $y = x^2 + 3x - 7$.

| | | | | | | | | |
|-----|----|----|----|----|----|----|---|---|
| x | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 |
| y | 3 | | -7 | -9 | | -7 | | 3 |

[3]

- (ii) On the grid below, draw the graph of $y = x^2 + 3x - 7$ for $-5 \leq x \leq 2$.



- (c) (i) Use your graph to find the solutions to the equation $x^2 + 3x - 7 = 0$.

[4]

Answer(c)(i) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

- (ii) Find the length of the rectangle in **part (a)**.

Answer(c)(ii) $\dots\dots\dots$ cm [1]

- (d) The point $A(1, -1)$ is marked on the grid.

- (i) Draw a straight line through A with a gradient of 2. [1]

- (ii) Write down the equation of this line in the form $y = mx + c$.

Answer(d)(ii) $y = \dots\dots\dots$ [2]

9 In this question, all construction arcs must be shown clearly.

Jalal buys an area of land on which to build a school.

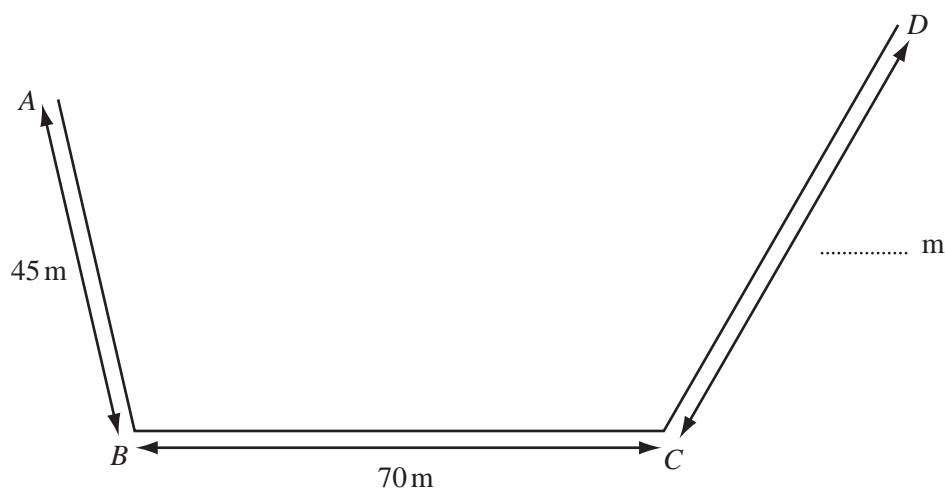
The land, $ABCDE$, is in the shape of a polygon with 5 sides.

(a) Write down the mathematical name of this polygon.

Answer(a) [1]

(b) Jalal starts to make an accurate plan of the land, as shown below.

He uses a scale of 1 centimetre to represent 10 metres.



(i) The actual lengths of AB and BC are written on the plan.

Write the actual length of CD on the plan. [1]

(ii) Use compasses to find the point E such that $AE = 64$ m and $DE = 58$ m.

Draw the lines AE and DE . [2]

- (c) The land is to be divided into distinct regions.

Construct, using a straight edge and compasses only,

(i) the perpendicular bisector of BC , [2]

(ii) the bisector of angle ABC . [2]

- (d) The music department building will be nearer to B than to C **and** nearer to BC than to BA .

Write a letter M on the plan where the music department could be. [1]

- (e) The school gate, PQ , will be 8 metres wide.

It will lie along AB so that $AP = QB$.

Mark P and Q accurately on the plan. [2]

- 1 On a winter's day in Vienna the maximum temperature was -2°C .
The minimum temperature was 11°C lower than this.
Write down the minimum temperature.

Answer $^{\circ}\text{C}$ [1]

- 2 Chris and Roberto share \$35 in the ratio 5:2.
Calculate how much Roberto receives.

Answer \$ [2]

- 3 Solve the equation $1 - 2x = x + 4$.

Answer $x =$ [2]

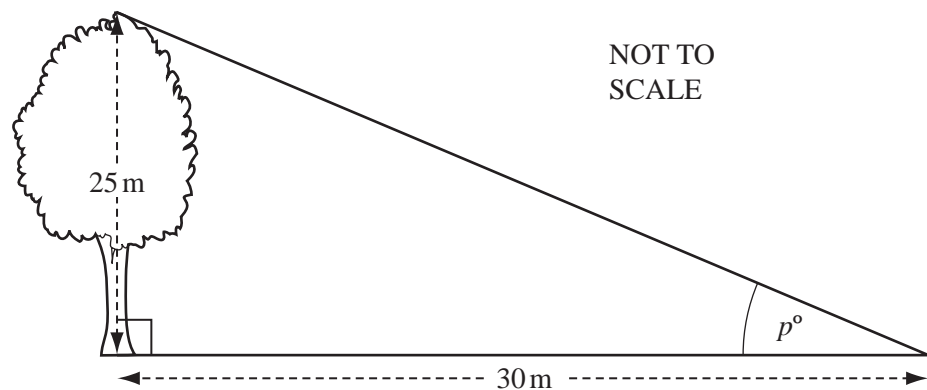
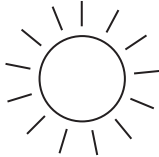
- 4 In 2005, a toy cost 52.50 reals in Brazil.
In Argentina, 1 peso = 0.875 reals.
Work out the cost of the toy in pesos.

Answer pesos [2]

- 5 Factorise completely $4xy - 2x$.

Answer [2]

6



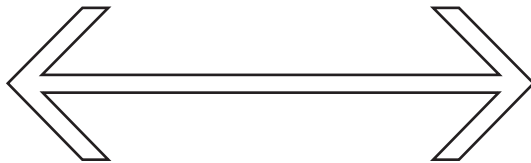
The height of a tree is 25 metres.
The shadow of the tree has a length of 30 metres.
Calculate the size of the angle marked p° in the diagram.

Answer $p =$ [2]

- 7 The distance, d kilometres, between Windhoek and Cape Town is 1300 km, correct to the nearest 100 kilometres.
Complete the statement about the value of d .

Answer $\leq d <$ [2]

8 (a)



Draw all the lines of symmetry on the shape above.

[1]

- (b) A quadrilateral has rotational symmetry of order 2 and no lines of symmetry. Write down the geometrical name of this shape.

Answer(b) [1]

- 9 (a) Write in the missing number. $\frac{5}{6} = \frac{\dots}{18}$

- (b) Without using your calculator and writing down all your working, show that

[1]

$$1\frac{2}{9} - \frac{5}{6} = \frac{7}{18}.$$

Answer(b)

[2]

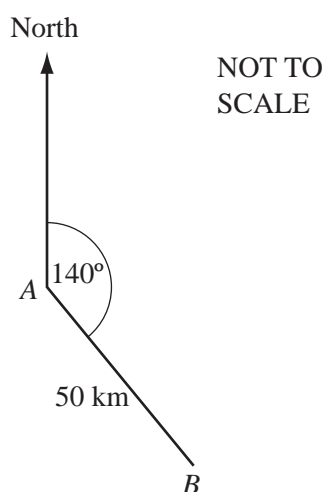
- 10 Each interior angle of a regular polygon is 150° .
(a) Work out the size of each exterior angle.

Answer(a) [1]

- (b) Work out the number of sides of this polygon.

Answer(b) [2]

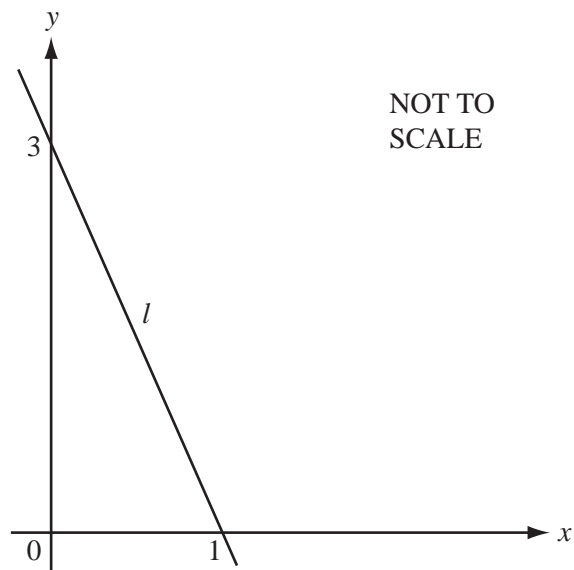
11



A ship travels 50 kilometres from A to B on a bearing of 140° , as shown in the diagram.
Calculate how far south B is from A .

Answer km [3]

12



A straight line, l , crosses the x -axis at $(1, 0)$ and the y -axis at $(0, 3)$.

- (a) Find the gradient of the line l .

Answer(a) [1]

- (b) Write down the equation of the line l , in the form $y = mx + c$.

Answer(b) $y =$ [2]

- 13 A school has 240 students.

- (a) There are 131 girls.
What percentage of the students are girls?

Answer(a) [2]

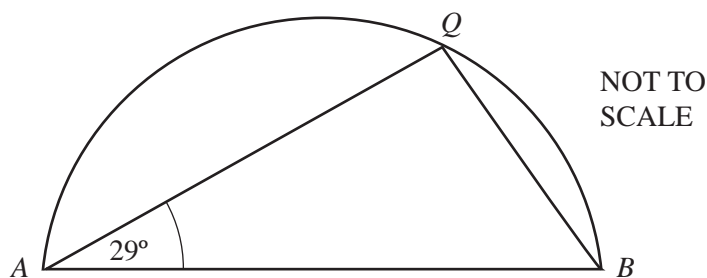
- (b) One day 6.25% of the 240 students are absent.
Work out the number of students who are absent.

Answer(b) [2]

- 14 (a) Calculate the circumference of a circle of diameter 8 cm.

Answer(a) cm [2]

(b)



AQB is a semi-circle.

Angle $QAB = 29^\circ$.

Work out the size of angle ABQ .

Answer(b) Angle $ABQ =$ [2]

- 15 Simplify

(a) a^0 ,

Answer(a) [1]

(b) $(x^3)^2$

Answer(b) [1]

(c) $\left(\frac{3}{x}\right)^{-2}$.

Answer(c) [2]

- 16 (a) (i) Write 17 598 correct to 2 significant figures.

Answer(a)(i) [1]

- (ii) Write your answer to **part (a)(i)** in standard form.

Answer(a)(ii) [1]

- (b) Write 5.649×10^{-2} as a decimal, correct to 3 decimal places.

Answer(b) [2]

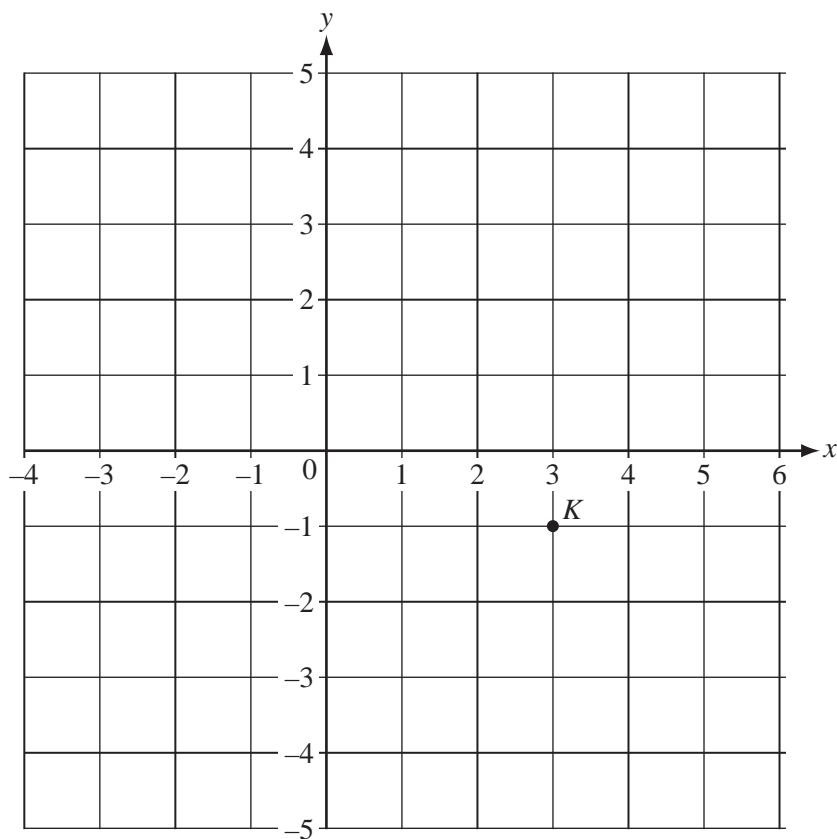
- 17 (a) Alex invests \$200 for 2 years at 4.05% per year **simple** interest.
Calculate how much **interest** Alex receives.

Answer(a) \$ [2]

- (b) Bobbie invests \$200 for 2 years at 4% per year **compound** interest.
Calculate how much **interest** Bobbie receives.
Give your answer to 2 decimal places.

Answer(b) \$ [2]

18



(a) $\vec{KL} = \begin{pmatrix} -3 \\ 3 \end{pmatrix}$. The point K is marked on the diagram.

(i) Draw \vec{KL} on the diagram.

[1]

(ii) Write down the co-ordinates of the point L .

Answer(a)(ii) (..... ,) [1]

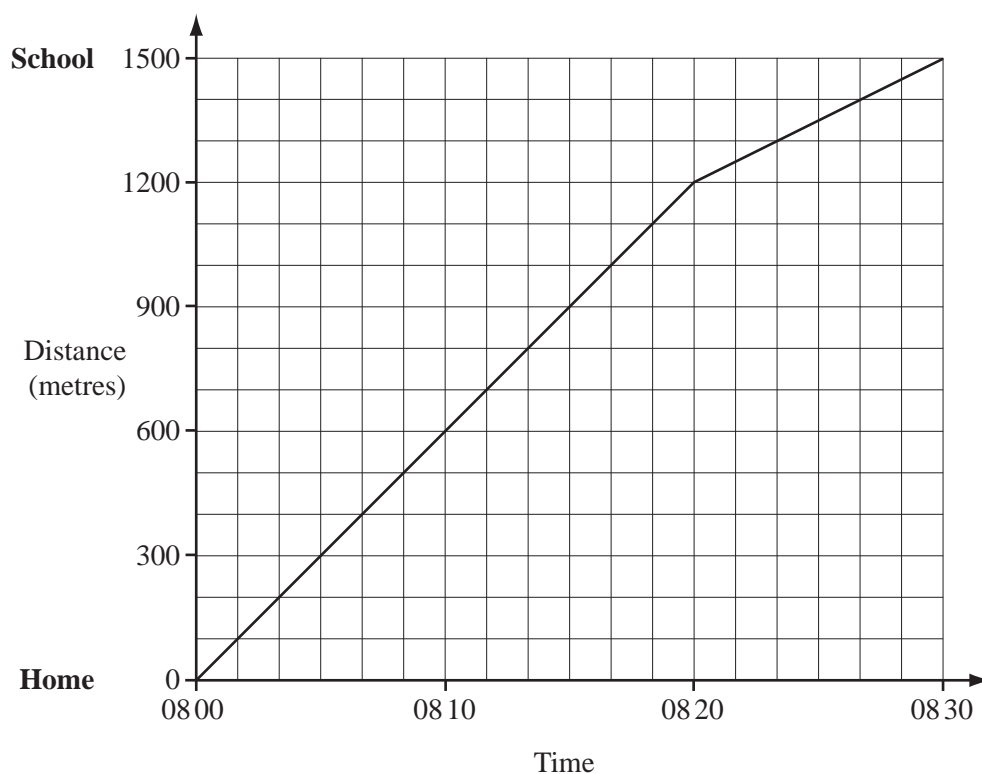
(b) P is the point $(-3, -3)$.

$$\vec{PR} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} \text{ and } \vec{PS} = 2\vec{PR}.$$

Find the co-ordinates of S .

Answer(b) (..... ,) [2]

19



The travel graph shows Maria's walk to school one Monday morning.

(a) Calculate her speed during the first 20 minutes

(i) in metres / minute,

Answer(a)(i) m / min [1]

(ii) in kilometres / hour.

Answer(a)(ii) km / h [2]

(b) Calculate the average speed of her walk from home to school in kilometres / hour.

Answer(b) km / h [2]

- 1 On a winter's day in Lesotho the maximum temperature was -3°C .
The minimum temperature was 9°C lower than this.
Write down the minimum temperature.

Answer $^{\circ}\text{C}$ [1]

- 2 Paulo and Maria share \$45 in the ratio 4:5.
Calculate how much Maria receives.

Answer \$ [2]

- 3 Solve the equation $2 - 3x = x + 10$.

Answer $x =$ [2]

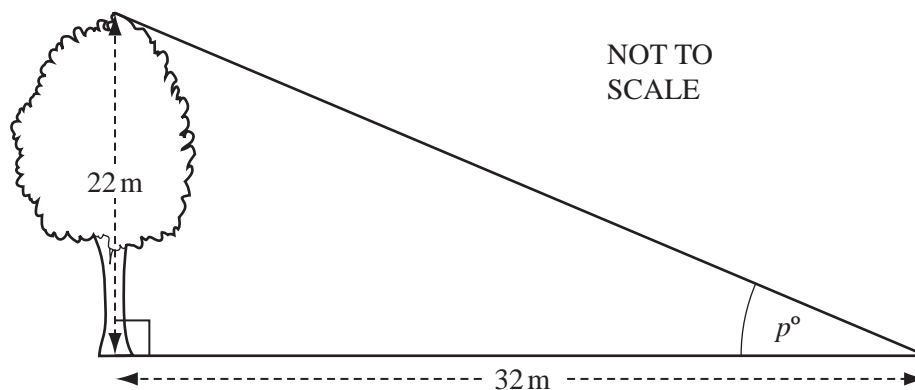
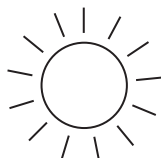
- 4 In 2006, a toy cost 70.80 reals in Brazil.
In Argentina, 1 peso = 0.885 reals.
Work out the cost of the toy in pesos.

Answer pesos [2]

- 5 Factorise completely $2pq - 4q$.

Answer [2]

6



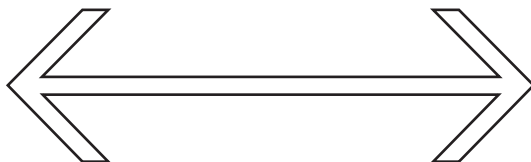
The height of a tree is 22 metres.
The shadow of the tree has a length of 32 metres.
Calculate the value of the angle marked p° in the diagram.

Answer $p =$ [2]

- 7 The distance, d kilometres, between Auckland and Tokyo is 8800 km, correct to the nearest 100 kilometres.
Complete the statement about the value of d .

Answer $\leq d <$ [2]

8 (a)



Draw all the lines of symmetry on the shape above.

[1]

- (b) A quadrilateral has rotational symmetry of order 2 and no lines of symmetry.
Write down the geometrical name of this shape.

Answer(b) [1]

9 (a) Write in the missing number. $\frac{5}{8} = \frac{\dots}{24}$

- (b) Without using your calculator and writing down all your working, show that

[1]

$$1\frac{5}{12} - \frac{5}{8} = \frac{19}{24}.$$

Answer(b)

[2]

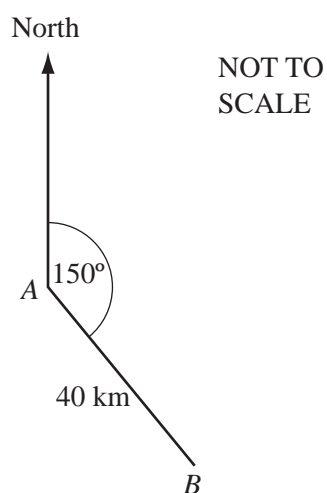
- 10 Each interior angle of a regular polygon is 160° .
(a) Work out the size of each exterior angle.

Answer(a) [1]

- (b) Work out the number of sides of this polygon.

Answer(b) [2]

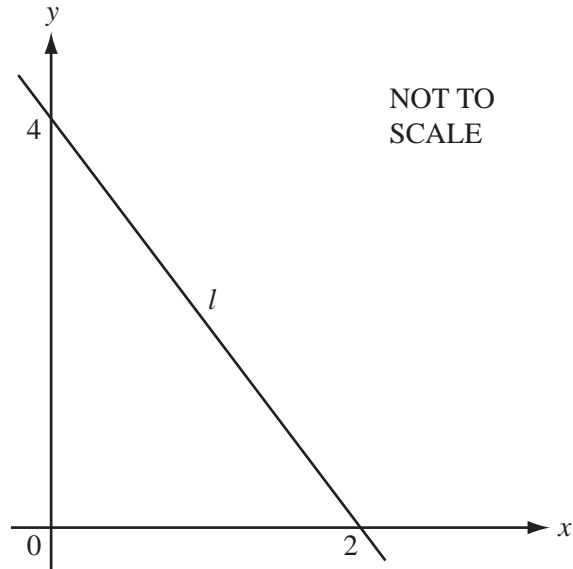
11



A ship travels 40 kilometres from A to B on a bearing of 150° , as shown in the diagram.
Calculate how far south B is from A .

Answer km [3]

12



A straight line, l , crosses the x -axis at $(2, 0)$ and the y -axis at $(0, 4)$.

- (a) Work out the gradient of the line l .

Answer(a) [1]

- (b) Write down the equation of the line l , in the form $y = mx + c$.

Answer(b) $y =$ [2]

- 13 A school has 320 students.

- (a) There are 153 girls.
What percentage of the students are girls?

Answer(a) [2]

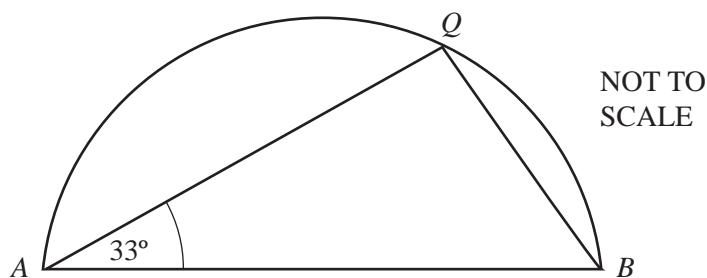
- (b) One day 3.75% of the 320 students are absent.
Work out the number of students absent.

Answer(b) [2]

- 14 (a) Calculate the circumference of a circle of diameter 13 cm.

Answer(a) cm [2]

(b)



AQB is a semi-circle.

Angle $QAB = 33^\circ$.

Work out the value of angle ABQ .

Answer(b) Angle $ABQ =$ [2]

- 15 Simplify

(a) t^0 ,

Answer(a) [1]

(b) $(y^2)^4$

Answer(b) [1]

(c) $\left(\frac{5}{p}\right)^{-2}$.

Answer(c) [2]

- 16 (a) (i) Write 15 583 correct to 2 significant figures.

Answer(a)(i) [1]

- (ii) Write your answer to **part (a)(i)** in standard form.

Answer(a)(ii) [1]

- (b) Write 3.718×10^{-3} as a decimal, correct to 4 decimal places.

Answer(b) [2]

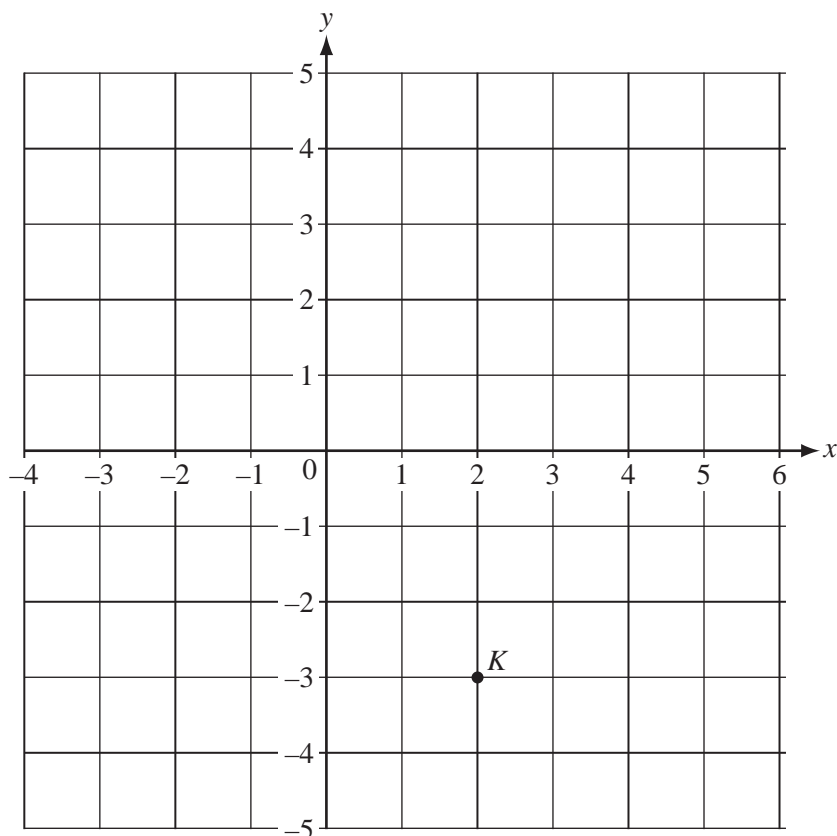
- 17 (a) Abdul invests \$400 for 2 years at 6.05% per year **simple** interest.
Calculate how much **interest** Abdul receives.

Answer(a) \$ [2]

- (b) Samia invests \$400 for 2 years at 6% per year **compound** interest.
Calculate how much **interest** Samia receives.
Give your answer to 2 decimal places.

Answer(b) \$ [2]

18



(a) $\vec{KL} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$. The point K is marked on the diagram.

(i) Draw \vec{KL} on the diagram. [1]

(ii) Write down the co-ordinates of the point L .

Answer(a)(ii) (..... ,) [1]

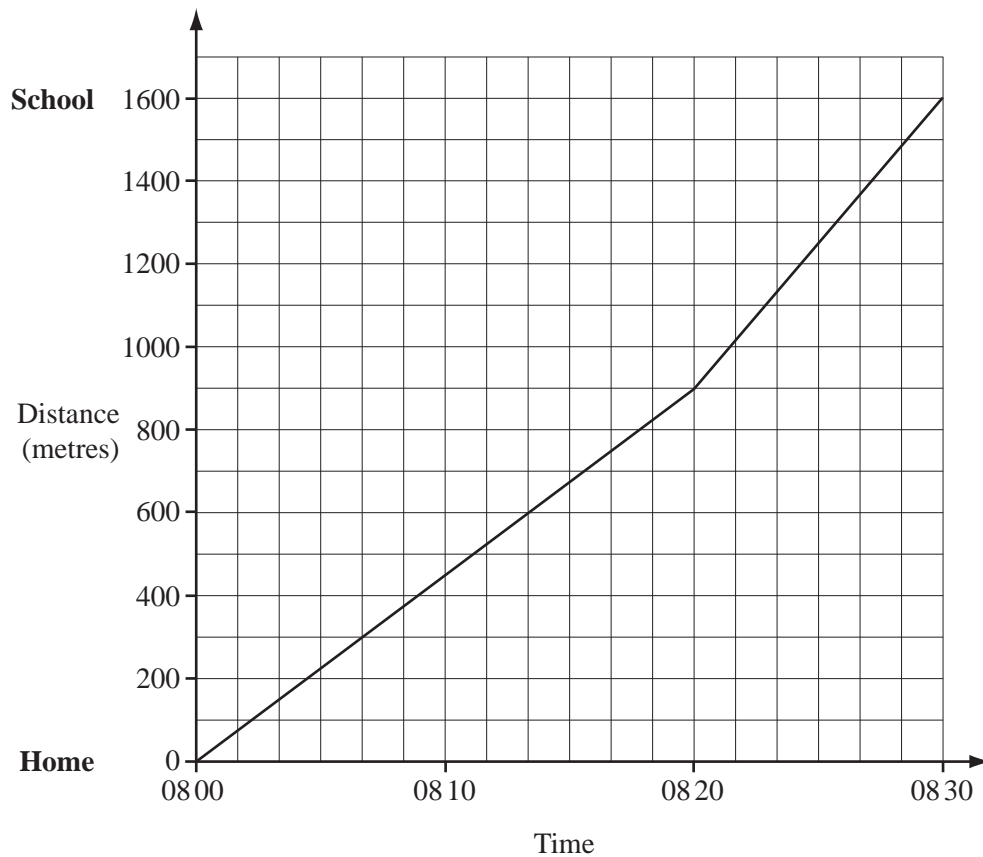
(b) P is the point $(-4, -4)$.

$$\vec{PR} = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \text{ and } \vec{PS} = 2\vec{PR}.$$

Find the co-ordinates of S .

Answer(b) (..... ,) [2]

19



The travel graph shows Cecilia's walk to school one Monday morning.

(a) Calculate her speed during the first 20 minutes

(i) in metres/minute,

Answer(a)(i) m/min [1]

(ii) in kilometres/hour.

Answer(a)(ii) km/h [2]

(b) Calculate the average speed of her walk from home to school in kilometres/hour.

Answer(b) km/h [2]

- 1 Margarita keeps a record of all her marks for science experiments, as shown in the table below.

| | | | | | | |
|-----------|---|---|----|---|---|----|
| Mark | 5 | 6 | 7 | 8 | 9 | 10 |
| Frequency | 1 | 5 | 10 | 9 | 7 | 3 |

- (a) (i) How many science experiments did Margarita do?

Answer(a)(i) [1]

- (ii) Write down the mode.

Answer(a)(ii) [1]

- (iii) Find the median.

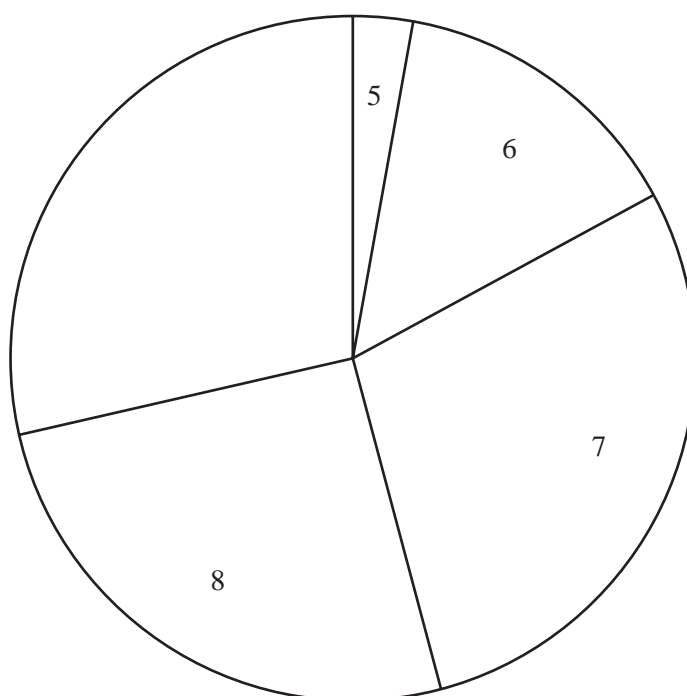
Answer(a)(iii) [1]

- (iv) Calculate the mean.

Answer(a)(iv) [3]

- (b) Margarita draws a pie chart to show this information.

The sectors for her marks of 5, 6, 7 and 8 have already been drawn.



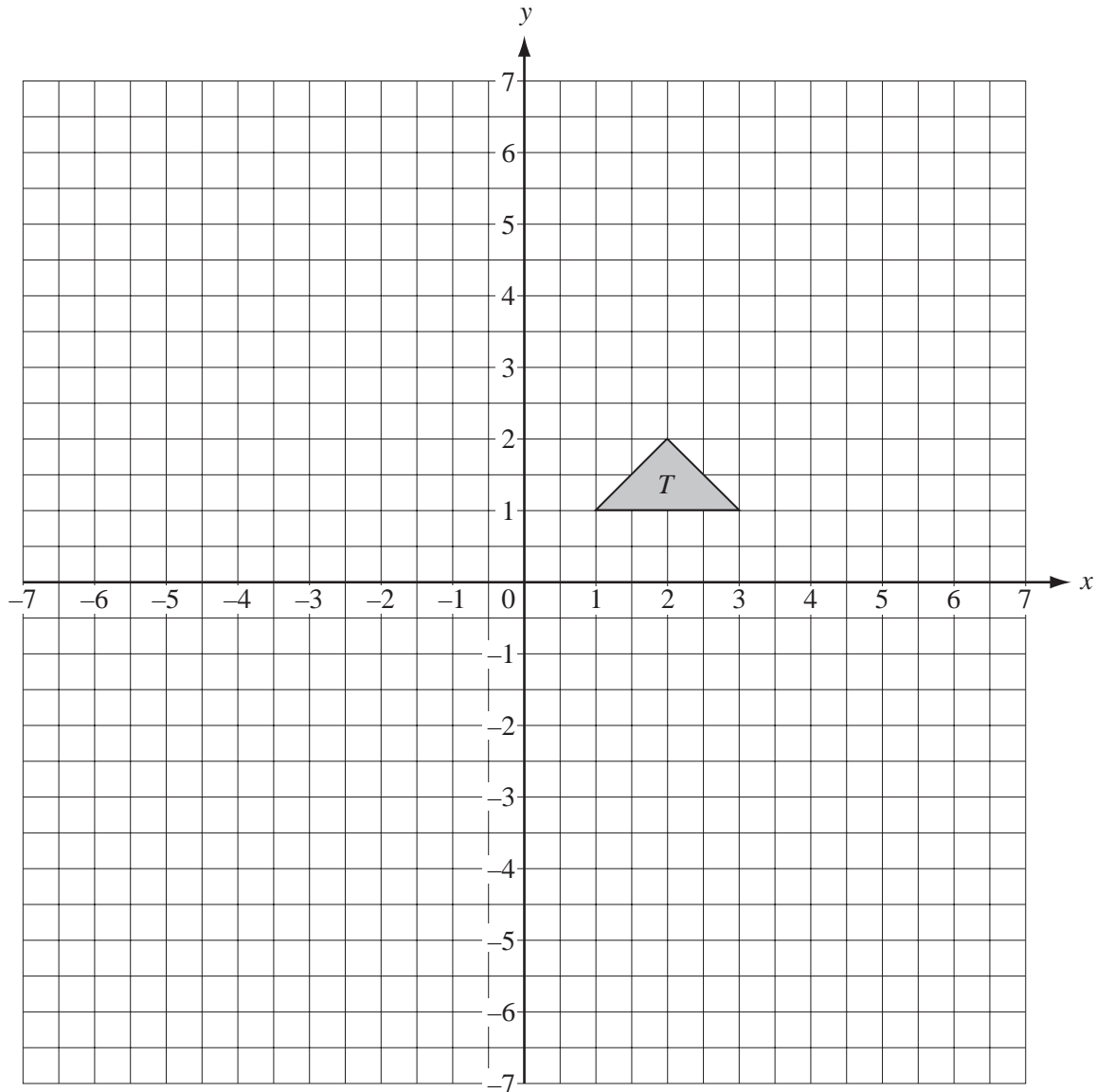
- (i) Calculate the angle of the sector for her mark of 9.

Answer(b)(i) [2]

- (ii) Complete the pie chart accurately.

[1]

2



- (a) Draw the image of triangle T after translation by the vector $\begin{pmatrix} -6 \\ 3 \end{pmatrix}$. Label it A . [2]
- (b) Draw the image of triangle T after reflection in the line $y = -1$. Label it B . [2]
- (c) Draw the image of triangle T after rotation through 180° about the point $(0, 0)$. Label it C . [2]
- (d) Draw the image of triangle T after enlargement, centre $(0, 0)$, scale factor 2. Label it D . [2]
- (e) Describe clearly the **single** transformation which maps triangle D onto triangle T .

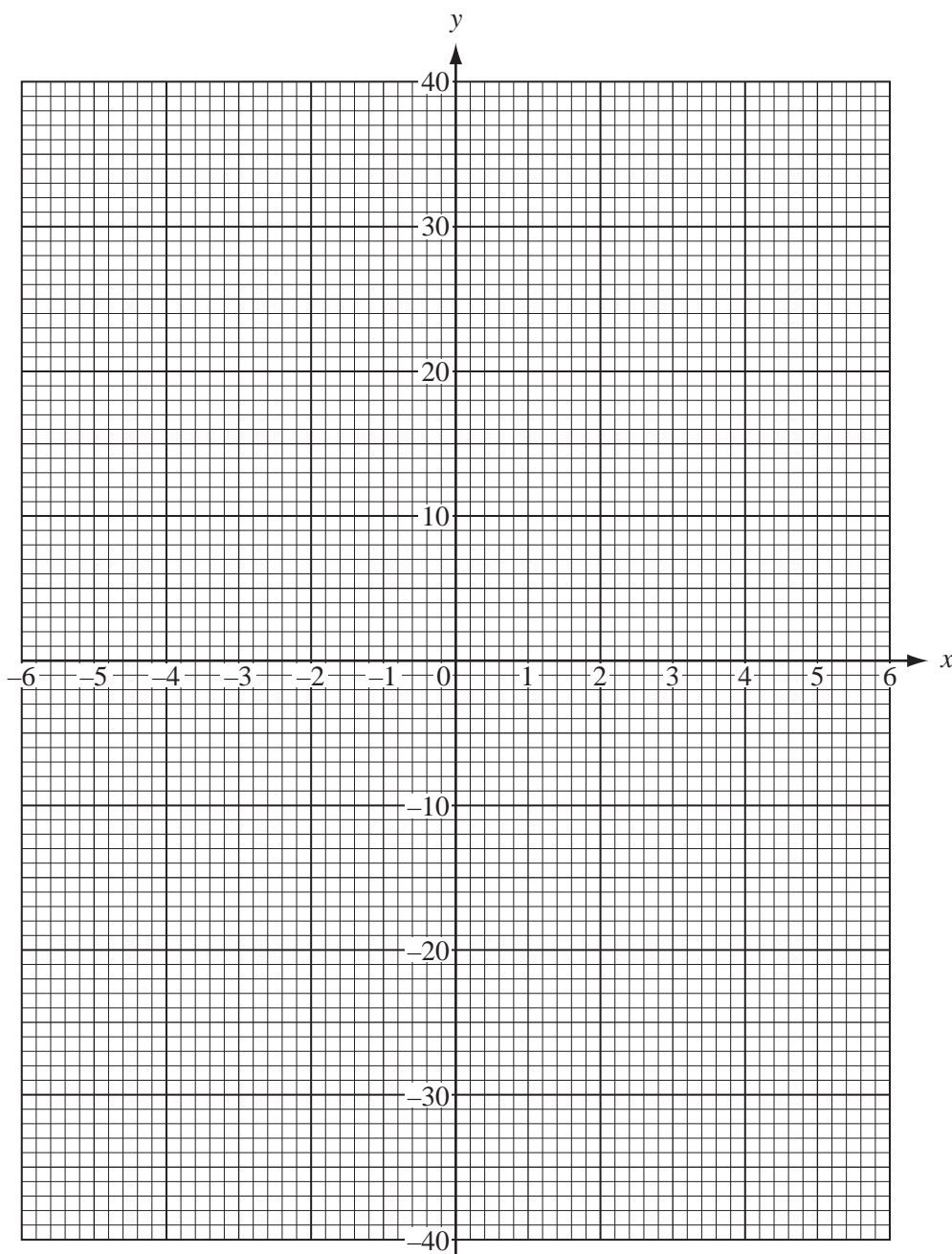
Answer(e) [3]

- 3 (a) Complete the table for the function $y = \frac{36}{x}$, ($x \neq 0$).

| | | | | | | | | | | | | | |
|-----|----|------|----|----|-----|----|--|---|----|---|---|-----|---|
| x | -6 | -5 | -4 | -3 | -2 | -1 | | 1 | 2 | 3 | 4 | 5 | 6 |
| y | | -7.2 | -9 | | -18 | | | | 18 | | 9 | 7.2 | |

[3]

- (b) On the grid below, draw the graph of $y = \frac{36}{x}$ for $-6 \leq x \leq -1$ and $1 \leq x \leq 6$.



[4]

- (c) Use your graph to find x when $y = 21$.

Answer(c) $x =$ [1]

(d) Complete the table for the function $y = x^2$.

| | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|---|---|---|---|----|----|---|
| x | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| y | | 25 | 16 | | 4 | 1 | | 1 | 4 | | 16 | 25 | |

[2]

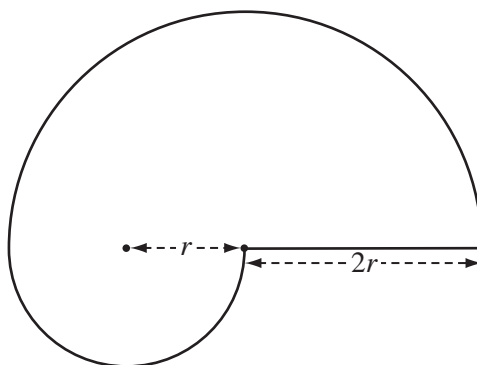
(e) On the same grid, draw the graph of $y = x^2$ for $-6 \leq x \leq 6$.

[4]

(f) Write down the co-ordinates of the point of intersection of the graphs of $y = \frac{36}{x}$ and $y = x^2$.

Answer(f) (..... ,) [1]

4



The area of the shape is given by the formula $A = \frac{5\pi r^2}{2}$.

(a) Calculate the area when $r = 3$ cm.

Answer(a) $A =$ cm^2 [2]

(b) Calculate the value of r when $A = 200 \text{ cm}^2$.

Answer(b) $r =$ cm [3]

(c) Make r the subject of the formula.

Answer(c) [3]

5 (a) -4 -16 0.12 7 144 $\sqrt{7}$ $2\frac{2}{3}$

From this list of numbers, write down

(i) the smallest number,

Answer(a)(i) [1]

(ii) a natural number,

Answer(a)(ii) [1]

(iii) a square number,

Answer(a)(iii) [1]

(iv) an irrational number.

Answer(a)(iv) [1]

(b) Write down 40 as a **product** of prime numbers.
(1 is not a prime number.)

Answer(b) $40 =$ [2]

(c) Three pairs of prime numbers have a **sum** of 40.

One pair is 3 and 37.

Find the other two pairs.

Answer(c) and
..... and [2]

6 (a) Pencils cost 5 cents each and erasers cost 4 cents each.

(i) Work out the **total** cost of 10 pencils and 7 erasers.

Answer(a)(i) cents [1]

(ii) Write down, in terms of p and e , the **total** cost of p pencils and e erasers.

Answer(a)(ii) cents [1]

(b) The cost of a pen is x cents and the cost of a ruler is y cents.

2 pens and 3 rulers have a total cost of 57 cents.

5 pens and 1 ruler have a total cost of 58 cents.

(i) Write down two equations in x and y .

Answer(b)(i)
 [2]

(ii) Find the value of x and the value of y .

Answer(b)(ii) $x =$
 $y =$ [4]

7

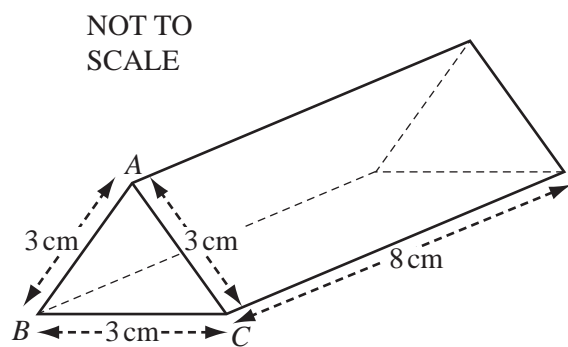


Diagram 1

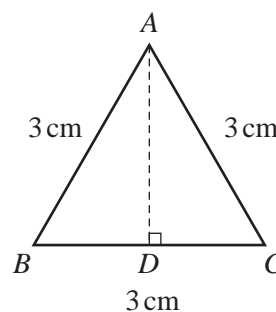


Diagram 2

A physics teacher uses a set of identical triangular glass prisms in a lesson.

Diagram 1 shows one of the prisms.

Diagram 2 shows the cross-section of one prism.

The triangle ABC is equilateral, with sides of length 3 cm and height AD .

(a) (i) Calculate the length of AD .

Answer(a)(i) cm [2]

(ii) Calculate the area of triangle ABC .

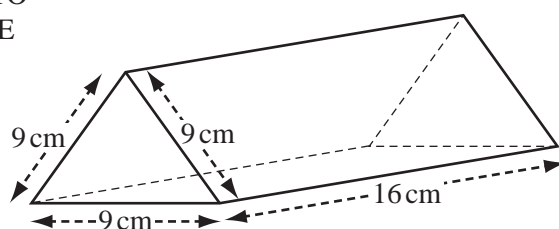
Answer(a)(ii) cm^2 [2]

(iii) The length of the prism is 8 cm. Calculate the volume of the prism.

Answer(a)(iii) cm^3 [2]

- (b) After the lesson, the glass prisms are put into a box, which is also a triangular prism. The cross-section is an equilateral triangle, with sides of length 9 cm. The length of the box is 16 cm.

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- (i) Work out the largest number of glass prisms that can fit into the box.

Answer(b)(i) [2]

- (ii) Sketch a net of the box. (Accurate construction is **not** required.)

[1]

- (iii) Calculate the surface area of the box.

Answer(b)(iii) cm^2 [6]

- (iv) The box was made out of plastic, which cost 6 cents per square centimetre. To make the box, 540 cm^2 of plastic was bought. Calculate the total cost of the plastic, giving your answer in dollars.

Answer(b)(iv) \$ [2]

- 8 Carlos is in a class of 12 students.

He compares the results of the students in a mathematics test with their results in a history test.
The table shows these results.

| Student | A | B | C | D | E | F | G | H | I | J | K | L |
|------------------|----|----|----|----|----|----|----|----|----|----|----|----|
| Mathematics mark | 17 | 8 | 11 | 15 | 14 | 19 | 9 | 12 | 19 | 18 | 13 | 15 |
| History mark | 10 | 13 | 10 | 8 | 11 | 7 | 14 | 11 | 10 | 11 | 11 | 10 |

- (a) A student is chosen at random.

What is the probability that the student scored **more than** 10 marks

- (i) in mathematics,

Answer(a)(i) [1]

- (ii) in mathematics and in history,

Answer(a)(ii) [1]

- (iii) in at least one subject?

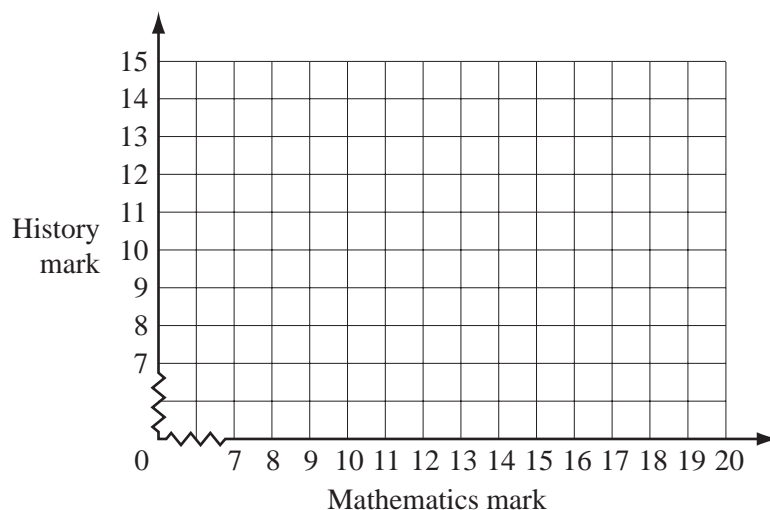
Answer(a)(iii) [1]

- (b) The mean mathematics mark is 14.2.

Calculate the mean history mark.

Answer(b) [2]

- (c)

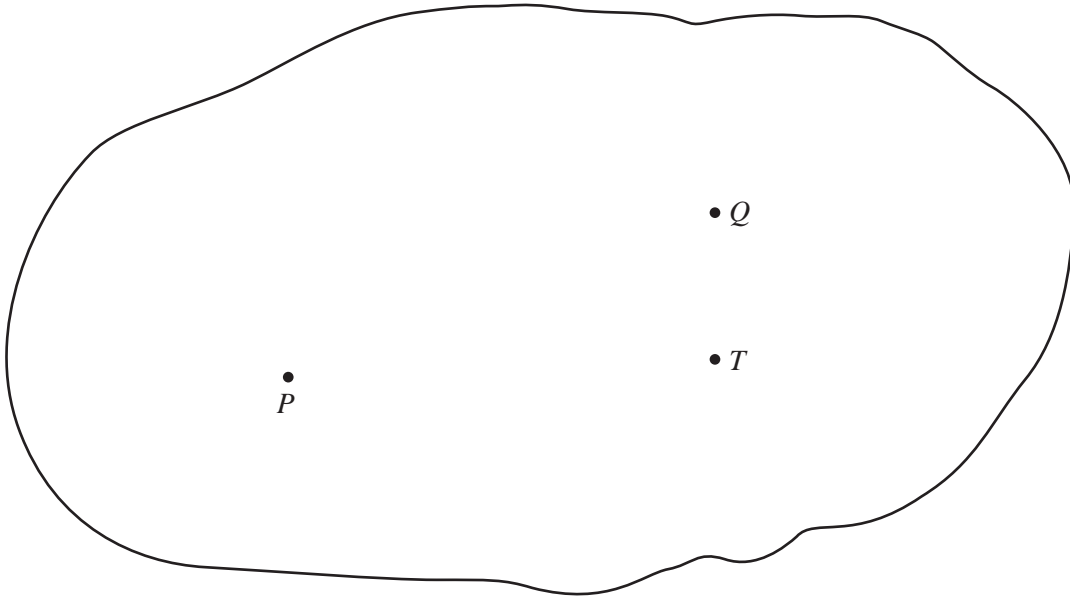


- (i) On the grid, plot the points to show the results of the 12 students. [3]

- (ii) Draw a line of best fit. [1]

- (iii) What type of correlation does this show?

Answer(c)(iii) [1]



The scale drawing shows a map of a town.

The positions of the town hall, T , and two post offices, P and Q , are marked.

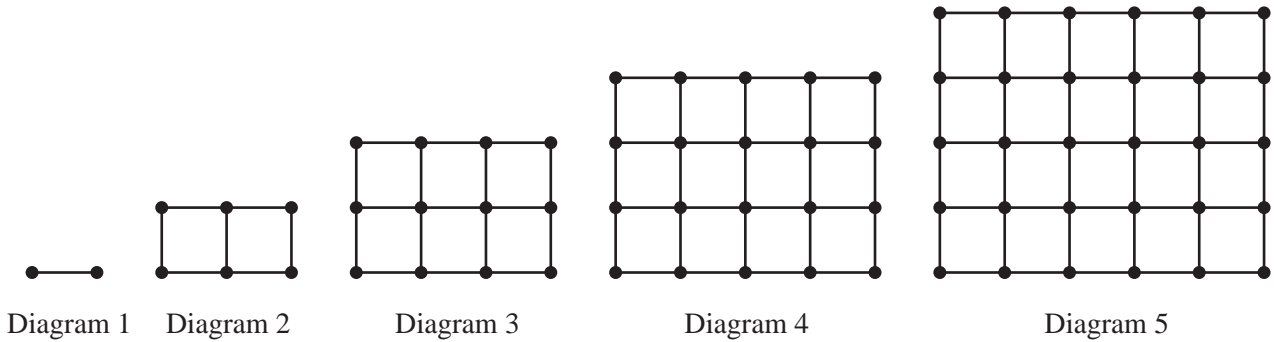
On the scale drawing, 1 centimetre represents 200 metres.

- (a) A new post office in the town is to be built so that it is 800 m from T **and** equidistant from P and from Q .
- (i) On the scale drawing, draw the locus of points which are 800 m from T . [1]
- (ii) On the scale drawing, using a straight edge and compasses only, construct the locus of points which are equidistant from P and from Q . [2]
- (iii) Label the position of the new post office R . [1]
- (iv) Find the actual distance between post offices P and R .

Answer(a)(iv) m [2]

- (b) On the scale drawing, draw straight lines to make triangle PQT .
Using a straight edge and compasses only, construct the locus of points which are equidistant from PT and from QT . [2]
- (c) On the scale drawing, shade the region inside triangle PQT , where points are nearer to Q than to P **and** nearer to PT than to QT . [2]

10



Look at the sequence of five diagrams above.

Diagram 1 has 2 dots and 1 line.

Diagram 2 has 6 dots and 7 lines.

The numbers of dots and lines in each of the diagrams are shown in the table below.

| Diagram number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------|---|---|----|----|----|---|---|
| Number of dots | 2 | 6 | 12 | 20 | 30 | | |
| Number of lines | 1 | 7 | 17 | 31 | 49 | | |

(a) Fill in the empty spaces in the table for Diagrams 6 and 7.

[4]

(b) How many dots are there in Diagram n ?

Answer(b) [2]

(c) The number of lines in Diagram n is $2n^2 - 1$.
Which diagram has 287 lines?

Answer(c) [2]

- 1 Work out the value of $\frac{9-3 \times 7}{3 \times 2}$.

Answer [1]

- 2 Write the following in order, with the smallest first.

$\frac{3}{5}$ 0.58 62%

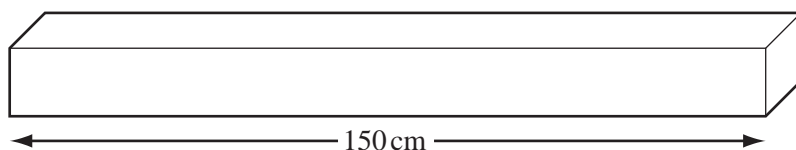
Answer < < [1]

- 3 Jamal arrived at work at 09 20 and left at 17 15.

How long, in hours and minutes, did he spend at work?

Answer h min [1]

4



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A piece of wood is 150 centimetres long.

It has to be cut into equal lengths of $6\frac{1}{4}$ centimetres.

How many of these lengths can be cut from this piece of wood?

Answer [1]

5 Daniel plots a scatter diagram of speed against time taken.

As the time taken increases, speed decreases.

Which one of the following types of correlation will his scatter graph show?

- Positive
- Negative
- Zero

Answer [1]

6 The average temperatures in Moscow for each month are shown in the table below.

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|----------------|-------|------|------|-----|------|------|------|------|------|-----|------|------|
| Temperature °C | −10.2 | −8.9 | −4.0 | 4.5 | 12.2 | 16.3 | 18.5 | 16.6 | 10.9 | 4.3 | −2.0 | −7.5 |

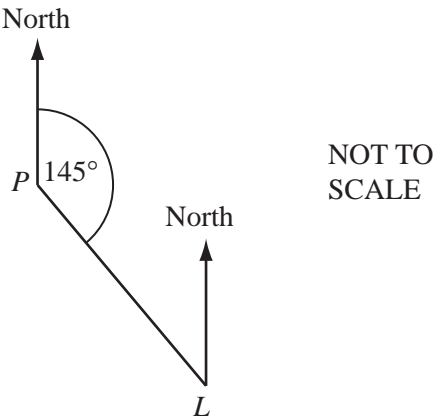
(a) Which month has the lowest average temperature?

Answer(a) [1]

(b) Find the difference between the average temperatures in July and December.

Answer(b) °C [1]

7

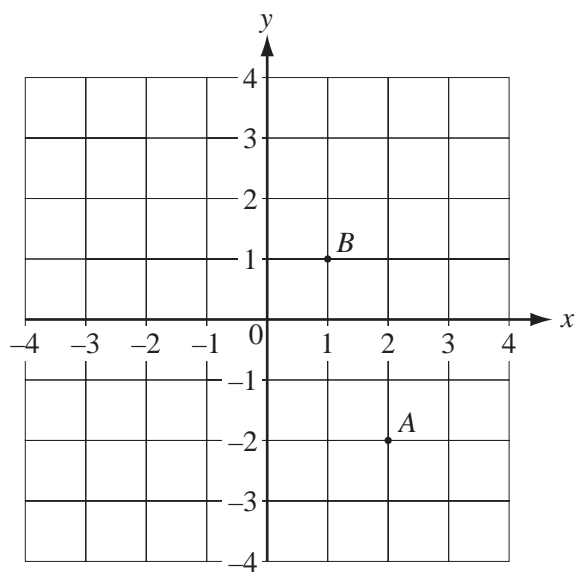


The bearing of a lighthouse, L , from a port, P , is 145° .

Find the bearing of P from L .

Answer [2]

8 The points A and B are marked on the diagram.



(a) Write \overrightarrow{AB} as a column vector.

Answer(a) $\overrightarrow{AB} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $\overrightarrow{BC} = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$.

Write down the co-ordinates of C .

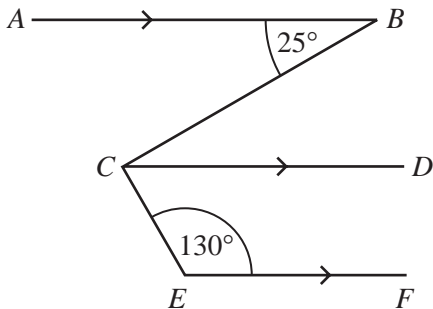
Answer(b) (..... ,) [1]

9 Expand the brackets and simplify

$3x^2 - x(x-3y).$

Answer [2]

10



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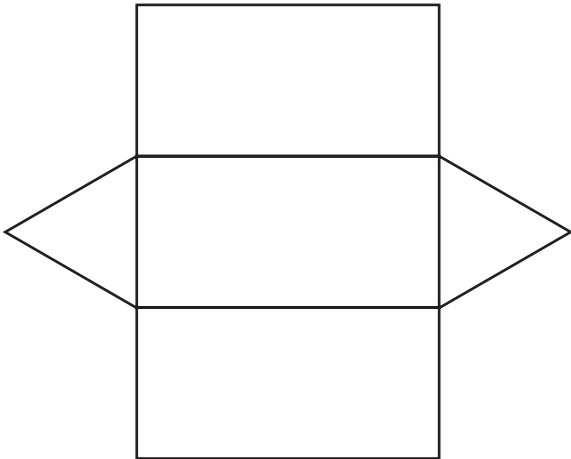
In the diagram, AB , CD and EF are parallel lines.

Angle $ABC = 25^\circ$ and angle $CEF = 130^\circ$.

Calculate angle BCE .

Answer Angle $BCE =$ [2]

11 The net of a solid is drawn **accurately** below.



Write down the special name for

(a) the triangles shown on the net,

Answer(a) [1]

(b) the solid.

Answer(b) [1]

- 12 Write down the equation of the straight line through $(0, -1)$ which is parallel to $y = 3x + 5$.

Answer $y =$ [2]

- 13 (a) $4^p \times 4^5 = 4^{15}$. Find the value of p .

Answer(a) $p =$ [1]

- (b) $2^7 \div 2^q = 2^4$. Find the value of q .

Answer(b) $q =$ [1]

- (c) $5^r = \frac{1}{25}$. Find the value of r .

Answer(c) $r =$ [1]

- 14 (a) Alex changed \$250 into euros (€) when the rate was €1 = \$1.19886.

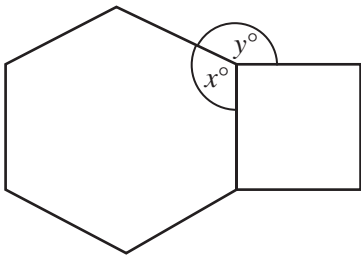
How many euros did he receive?

Answer(a) € [2]

- (b) Write 1.19886 correct to 3 significant figures.

Answer(b) [1]

15 The diagram shows a regular hexagon and a square.



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Calculate the values of x and y .

Answer $x =$

$y =$ [3]

16 Aminata bought 20 metres of cloth at a cost of \$80.
She sold 15 metres of the cloth at \$5.40 per metre and 5 metres at \$3 per metre.

(a) Calculate the profit she made.

Answer(a) \$ [2]

(b) Calculate this profit as a percentage of the original cost.

Answer(b) % [1]

- 17 (a) The surface area of the earth is approximately 510 000 000 square kilometres.

Write this number in standard form.

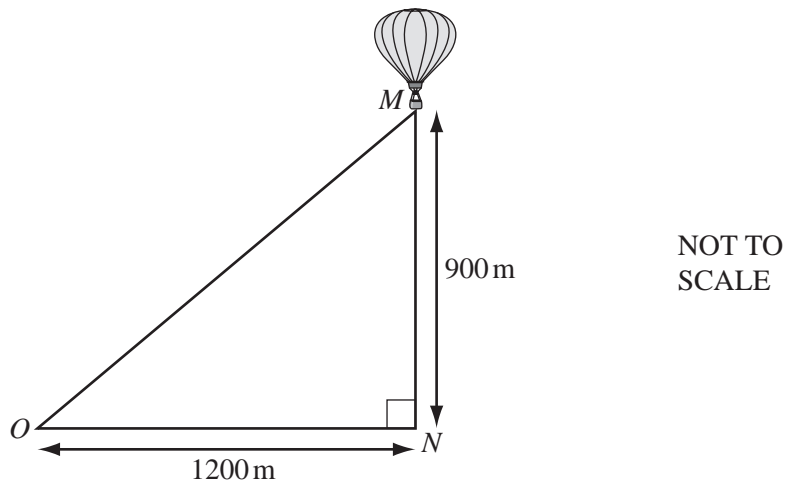
Answer(a) km^2 [2]

- (b) 29.4% of the surface area of the earth is land.

Calculate the area of land.

Answer(b) km^2 [2]

18



A hot air balloon, M , is 900 metres vertically above a point N on the ground.

A boy stands at a point O , 1200 metres horizontally from N .

- (a) Calculate the distance, OM , of the boy from the balloon.

Answer(a) $OM =$ m [2]

- (b) Calculate angle MON .

Answer(b) Angle $MON =$ [2]

19 In triangle ABC , $AB = 110$ mm, $AC = 65$ mm and $BC = 88$ mm.

- (a) Calculate the perimeter of the triangle ABC .

Answer(a) mm [1]

- (b) Construct the triangle ABC , leaving in your construction arcs.

The side AB is drawn for you.

A B
110mm

[2]

- (c) The side AB is 110 mm, **correct to the nearest millimetre**.

Write down the shortest possible length of AB .

Answer(c) mm [1]

20 15 students estimated the area of the rectangle shown below.



Their estimates, in square centimetres, were

| | | | | |
|----|----|----|----|----|
| 45 | 44 | 50 | 50 | 48 |
| 24 | 50 | 46 | 43 | 50 |
| 48 | 20 | 45 | 49 | 47 |

(a) Work out

(i) the mode,

Answer(a)(i) cm² [1]

(ii) the mean,

Answer(a)(ii) cm² [2]

(iii) the median.

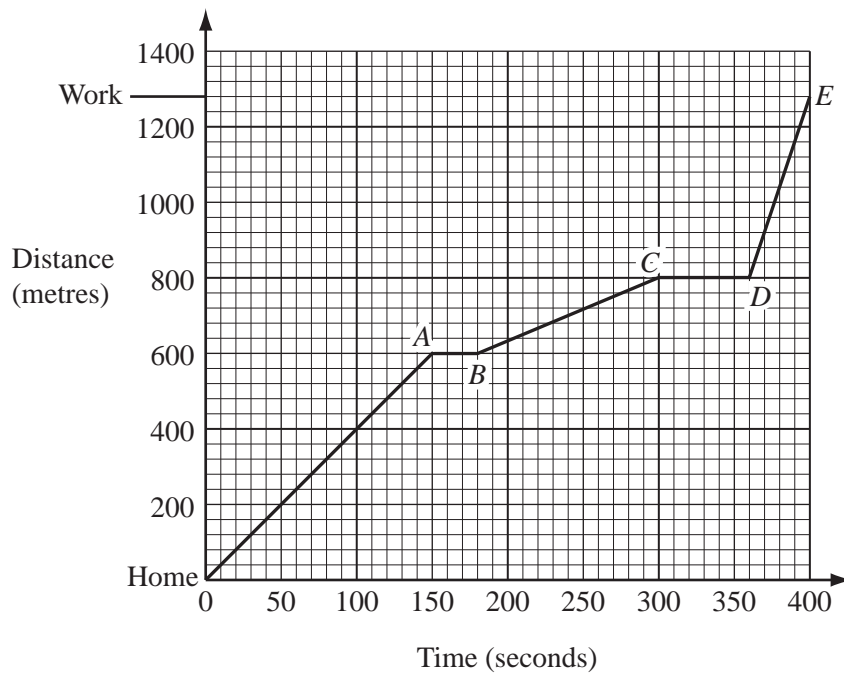
Answer(a)(iii) cm² [2]

(b) Explain why the mean is not a suitable average to represent this data.

Answer(b)

[1]

21



The graph shows the distance travelled by a cyclist on a journey from Home to Work.

- (a) The cyclist stopped twice at traffic lights.

For how many seconds did the cyclist wait altogether?

Answer(a) s [2]

- (b) For which part of the journey did the cyclist travel fastest?

Answer(b) [1]

- (c) (i) How far did the cyclist travel from Home to Work?

Answer(c)(i) m [1]

- (ii) Calculate the cyclist's average speed for the whole journey.

Answer(c)(ii) m/s [3]

- 1 Work out the value of $\frac{6-3 \times 12}{3 \times 2}$.

Answer [1]

- 2 Write the following in order, with the smallest first.

$\frac{4}{5}$ 0.79 81%

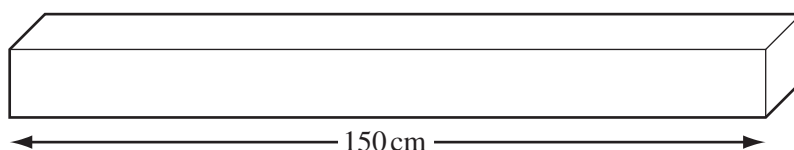
Answer < < [1]

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How long, in hours and minutes, did he spend at work?

Answer h min [1]

4



NOT TO
SCALE

A piece of wood is 150 centimetres long.

It has to be cut into equal lengths of $6\frac{1}{4}$ centimetres.

How many of these lengths can be cut from this piece of wood?

Answer [1]

- 5 Daniel plots a scatter diagram of speed against time taken.

As the time taken increases, speed decreases.

Which one of the following types of correlation will his scatter graph show?

Positive

Negative

Zero

Answer [1]

- 6 The average temperatures in Moscow for each month are shown in the table below.

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|----------------|-------|------|------|-----|------|------|------|------|------|-----|------|------|
| Temperature °C | −10.2 | −8.9 | −4.0 | 4.5 | 12.2 | 16.3 | 18.5 | 16.6 | 10.9 | 4.3 | −2.0 | −7.5 |

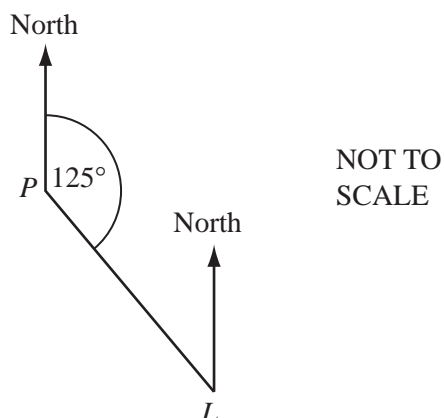
- (a) Which month has the lowest average temperature?

Answer(a) [1]

- (b) Find the difference between the average temperatures in February and October.

Answer(b) °C [1]

7

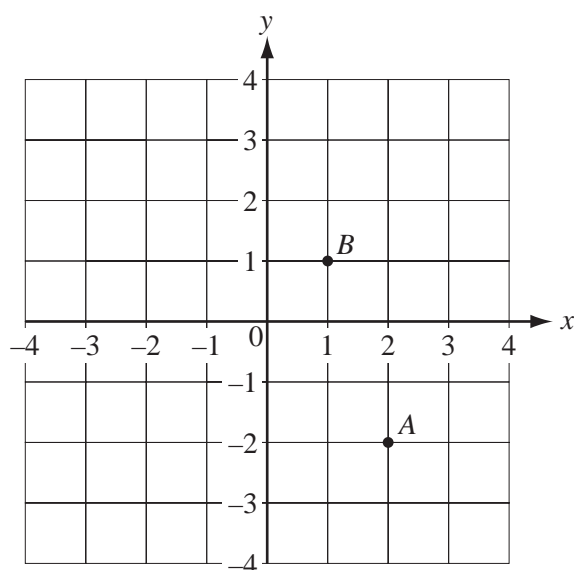


The bearing of a lighthouse, L , from a port, P , is 125° .

Find the bearing of P from L .

Answer [2]

- 8 The points A and B are marked on the diagram.



- (a) Write \vec{AB} as a column vector.

Answer(a) $\vec{AB} = \begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) $\vec{BC} = \begin{pmatrix} -3 \\ -2 \end{pmatrix}$.

Write down the co-ordinates of C .

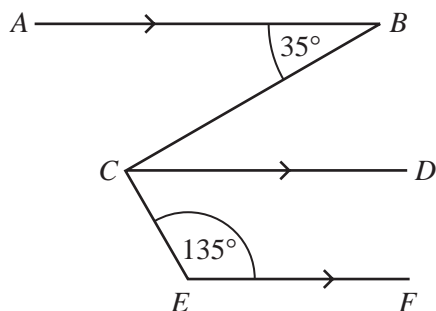
Answer(b) (..... ,) [1]

- 9 Expand the brackets and simplify

$$4x^2 - x(x - 2y).$$

Answer [2]

10



NOT TO
SCALE

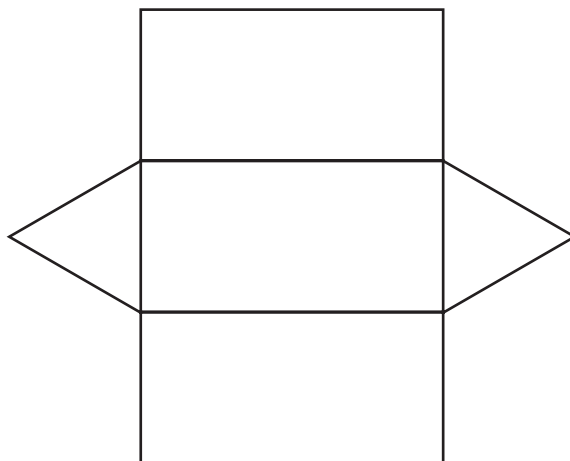
In the diagram, AB , CD and EF are parallel lines.

Angle $ABC = 35^\circ$ and angle $CEF = 135^\circ$.

Calculate angle BCE .

Answer Angle $BCE = \dots\dots\dots$ [2]

11 The net of a solid is drawn **accurately** below.



Write down the special name for

(a) the triangles shown on the net,

Answer(a) $\dots\dots\dots$ [1]

(b) the solid.

Answer(b) $\dots\dots\dots$ [1]

- 12 Write down the equation of the straight line through $(0, -3)$ which is parallel to $y = 2x + 3$.

Answer $y =$ [2]

- 13 (a) $3^p \times 3^5 = 3^{14}$. Find the value of p .

Answer(a) $p =$ [1]

- (b) $2^8 \div 2^q = 2^3$. Find the value of q .

Answer(b) $q =$ [1]

- (c) $6^r = \frac{1}{36}$. Find the value of r .

Answer(c) $r =$ [1]

- 14 (a) Alex changed \$270 into euros (€) when the rate was €1 = \$1.19886.

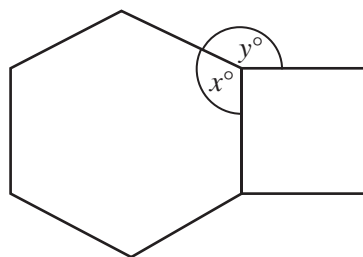
How many euros did he receive?

Answer(a) € [2]

- (b) Write 1.19886 correct to 3 significant figures.

Answer(b) [1]

- 15 The diagram shows a regular hexagon and a square.



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Calculate the values of x and y .

Answer $x =$

$y =$ [3]

- 16 Aminata bought 20 metres of cloth at a cost of \$90.

She sold 15 metres of the cloth at \$5.80 per metre and 5 metres at \$3 per metre.

- (a) Calculate the profit she made.

Answer (a) \$ [2]

- (b) Calculate this profit as a percentage of her original cost.

Answer (b) % [1]

- 17 (a) The surface area of the earth is approximately 510 000 000 square kilometres.

Write this number in standard form.

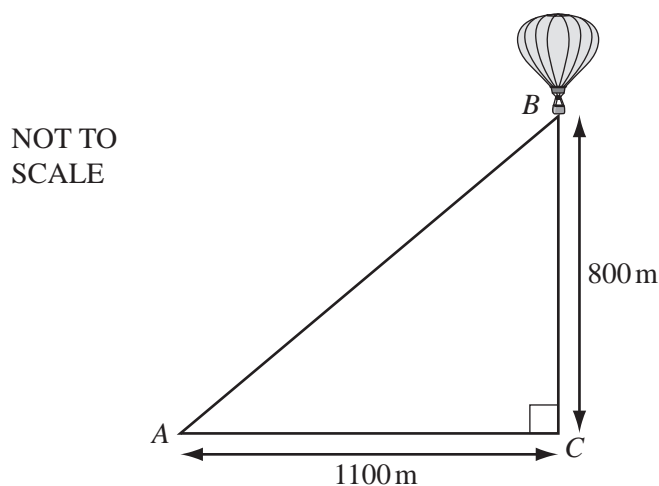
Answer(a) km^2 [2]

- (b) 29.4% of the surface area of the earth is land.

Calculate the area of land.

Answer(b) km^2 [2]

18



A hot air balloon, B , is 800 metres vertically above a point C on the ground.

A girl stands at a point A , 1100 metres horizontally from C .

- (a) Calculate the distance, AB , of the girl from the balloon.

Answer(a) $AB =$ m [2]

- (b) Calculate the angle BAC .

Answer(b) Angle $BAC =$ [2]

19 In triangle LMN , $LM = 120$ mm, $LN = 70$ mm and $MN = 86$ mm.

(a) Calculate the perimeter of the triangle LMN .

Answer(a) mm [1]

(b) Construct the triangle LMN , leaving in your construction arcs.

The side LM is drawn for you.

L M
120 mm

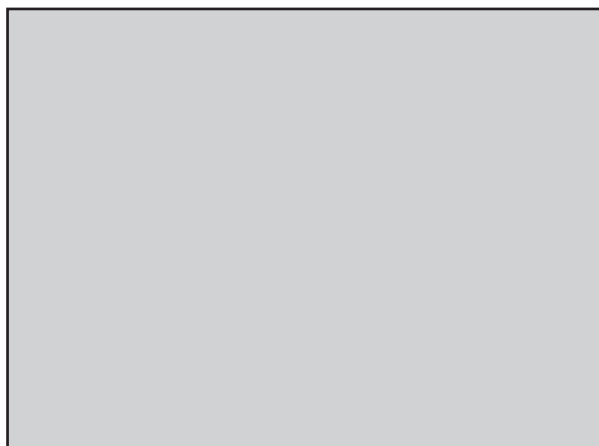
[2]

(c) The side LM is 120 mm, **correct to the nearest millimetre**.

Write down the shortest possible length of LM .

Answer(c) mm [1]

- 20 15 students estimated the area of the rectangle shown below.



Their estimates, in square centimetres were

| | | | | |
|----|----|----|----|----|
| 45 | 44 | 50 | 50 | 51 |
| 21 | 50 | 46 | 43 | 50 |
| 48 | 22 | 45 | 49 | 48 |

(a) Work out

(i) the mode,

Answer(a)(i) cm^2 [1]

(ii) the mean,

Answer(a)(ii) cm^2 [2]

(iii) the median.

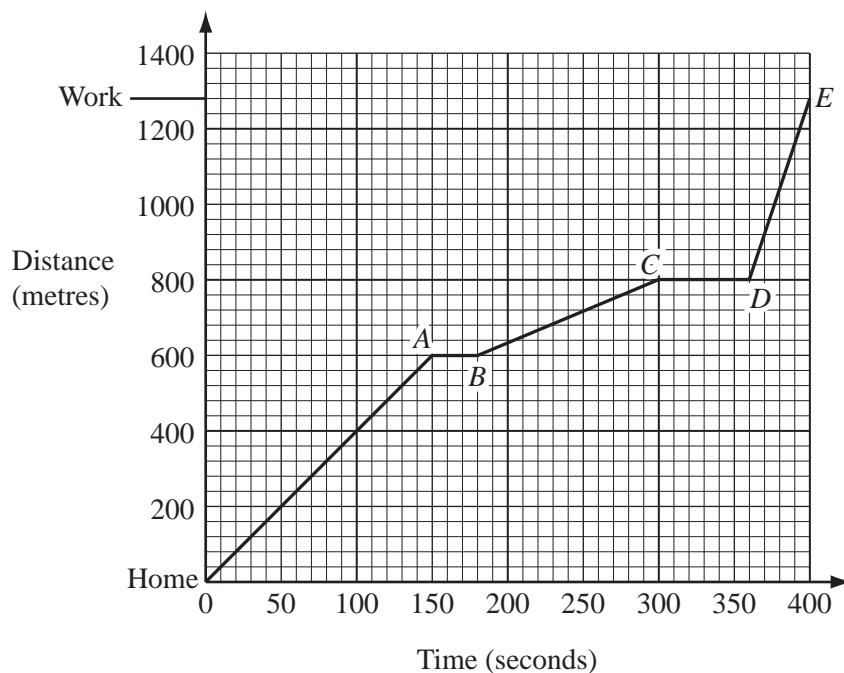
Answer(a)(iii) cm^2 [2]

(b) Explain why the mean is not a suitable average to represent this data.

Answer(b)

[1]

21



The graph shows the distance travelled by a cyclist on a journey from Home to Work.

- (a) The cyclist stopped twice at traffic lights.

For how many seconds did the cyclist wait altogether?

Answer(a) s [2]

- (b) For which part of the journey did the cyclist travel fastest?

Answer(b) [1]

- (c) (i) How far did the cyclist travel from Home to Work?

Answer(c)(i) m [1]

- (ii) Calculate the cyclist's average speed for the whole journey.

Answer(c)(ii) m/s [3]

1 (a) Find the value of

(i) 5^0 ,

Answer(a)(i) [1]

(ii) the square root of 64,

Answer(a)(ii) [1]

(iii) the cube root of 64,

Answer(a)(iii) [1]

(iv) the integer closest in value to $(1.8)^3$.

Answer(a)(iv) [1]

(b) Write down

(i) a common factor of 15 and 27, which is greater than 1,

Answer(b)(i) [1]

(ii) a common multiple of 10 and 12.

Answer(b)(ii) [1]

(c) (i) Two of the factors of 2007 are square numbers. One of these is 1.

Find the other square number.

Answer(c)(i) [1]

(ii) Write down the two factors of 2007 which are prime.

Answer(c)(ii) and [2]

- 2 Marguerite earns \$336 per month.
She divides her earnings between bills, food, savings and personal spending.

- (a) Her bills take $\frac{2}{7}$ of her earnings.

Show that \$240 is left for her other items.

Answer(a)

[2]

- (b) She divides the \$240 between food, savings and personal spending in the ratio 5 : 3 : 4.
Calculate how much she spends on food.

Answer(b) \$ [2]

- (c) She saves the same amount each month.
Show that she saves \$720 in one year.

Answer(c)

[2]

- (d) She invests the \$720 in a bank which pays 6% per year **compound** interest.
How much will this be worth after 2 years?

Answer(d) \$ [3]

- 3 (a) Kinetic energy, E , is related to mass, m , and velocity, v , by the formula

$$E = \frac{1}{2}mv^2.$$

- (i) Calculate E when $m = 5$ and $v = 12$.

Answer(a)(i) $E =$ [2]

- (ii) Calculate v when $m = 8$ and $E = 225$.

Answer(a)(ii) $v =$ [2]

- (iii) Make m the subject of the formula.

Answer(a)(iii) $m =$ [2]

- (b) Factorise completely $xy^2 - x^2y$.

Answer(b) [2]

- (c) Solve the equation $3(x - 5) + 2(14 - 3x) = 7$.

Answer(c) $x =$ [3]

- (d) Solve the simultaneous equations

$$\begin{aligned} 4x + y &= 13, \\ 2x + 3y &= 9. \end{aligned}$$

Answer(d) $x =$
 $y =$ [3]

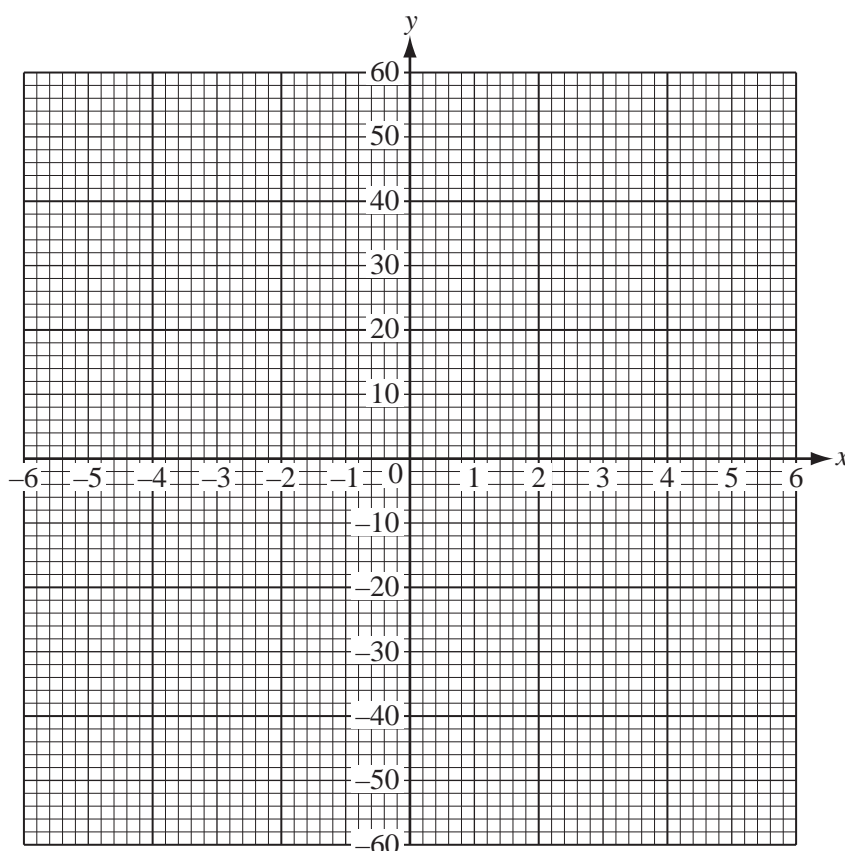
- 4 (a) The table shows corresponding values of x and y for the function

$$y = \frac{60}{x} \quad (x \neq 0).$$

| | | | | | | | | | | | | |
|-----|----|-----|-----|----|-----|----|----|---|---|---|----|----|
| x | -6 | -5 | -4 | -3 | -2 | -1 | 1 | 2 | 3 | 4 | 5 | 6 |
| y | | -12 | -15 | | -30 | | 60 | | | | 12 | 10 |

[2]

- (i) Fill in the missing values of y in the table above.
(ii) Plot the points on the grid below and draw the graph for $-6 \leq x \leq -1$ and $1 \leq x \leq 6$.



[4]

- (b) Write down the order of rotational symmetry of the graph.

Answer(b) [1]

- (c) Draw the lines of symmetry of the graph on the grid.

[2]

- (d) One line of symmetry intersects the graph at two points.

- (i) Write down the co-ordinates of these two points.

Answer(d)(i) (..... ,) and (..... ,) [2]

- (ii) Write down the equation of this line of symmetry.

Answer(d)(ii) [1]

- (e) Find the gradient of the other line of symmetry.

Answer(e) [1]

- 5** A bag contains 24 discs.
10 discs are red, 9 discs are green and 5 discs are yellow.

- (a)** The number of discs of each colour can be shown by three sectors on a pie chart.
The sector angle for the red discs is 150° .

Work out the sector angle for

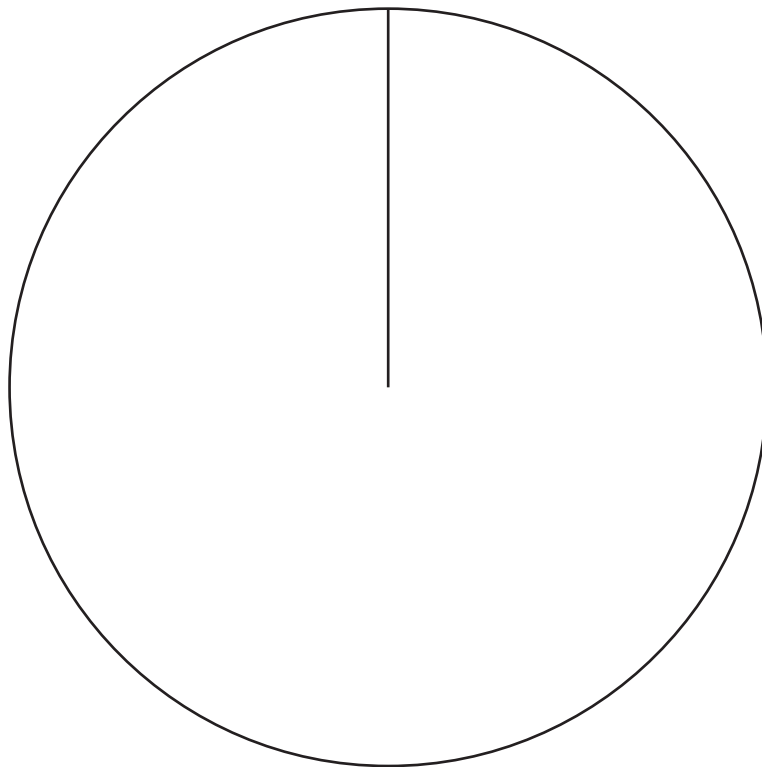
- (i)** the green discs,

Answer(a)(i) [1]

- (ii)** the yellow discs.

Answer(a)(ii) [1]

- (iii)** Complete the pie chart below and label the sectors.



[2]

(b) A disc is chosen at random.

Find, **as a fraction**, the probability of each of the following events.

(i) Event A: the disc is red.

Answer(b)(i) [1]

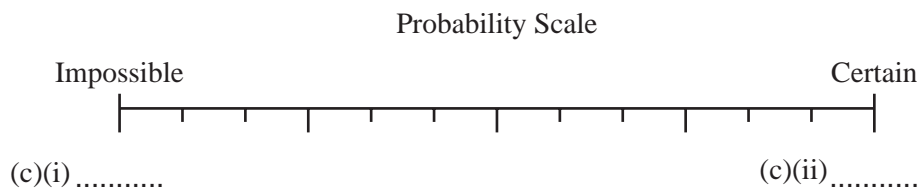
(ii) Event B: the disc is red or yellow.

Answer(b)(ii) [1]

(iii) Event C: the disc is **not** yellow.

Answer(b)(iii) [1]

(c)



The diagram shows a horizontal probability scale.

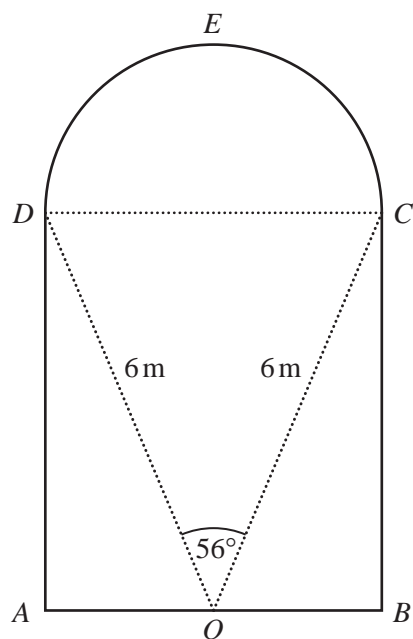
Write on the dotted lines in the diagram, the probability of

(i) an impossible event, [1]

(ii) a certain event. [1]

(d) Using the notation, A, B and C, mark the positions of your three answers in **part (b)** on the Probability Scale diagram in **part (c)**. [3]

6



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$ABCED$ is the cross-section of a tunnel.

$ABCD$ is a rectangle and DEC is a semi-circle. O is the mid-point of AB .

$OD = OC = 6$ m and angle $DOC = 56^\circ$.

(a) (i) Show that angle $COB = 62^\circ$.

Answer(a)(i)

[1]

(ii) Calculate the length of OB .

Answer(a)(ii) $OB =$ m [2]

(iii) Write down the width of the tunnel, AB .

Answer(a)(iii) $AB =$ m [1]

(iv) Calculate the length of BC .

Answer(a)(iv) $BC =$ m [2]

(b) Calculate the area of

(i) the rectangle $ABCD$,

Answer(b)(i) m^2 [2]

(ii) the semi-circle DEC ,

Answer(b)(ii) m^2 [2]

(iii) the cross-section of the tunnel.

Answer(b)(iii) m^2 [1]

(c) The tunnel is 500 metres long.

(i) Calculate the volume of the tunnel.

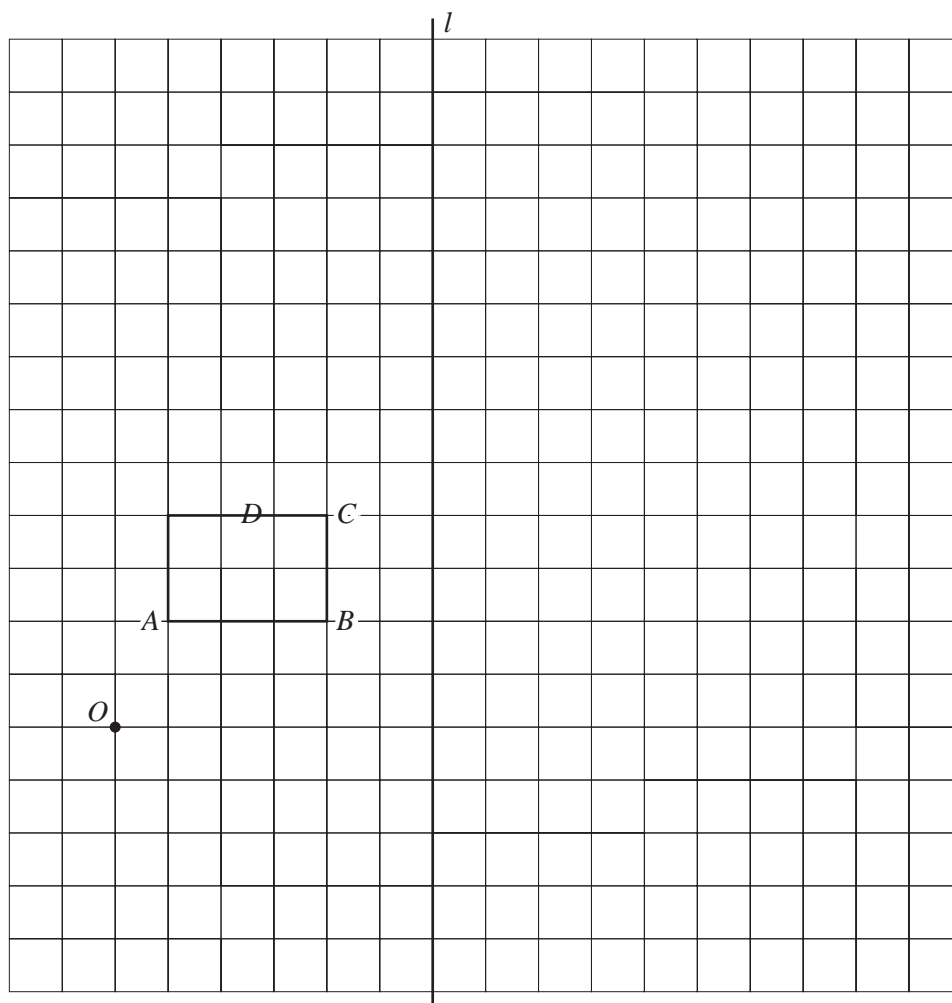
Answer(c)(i) m^3 [2]

(ii) A car travels through the tunnel at a constant speed of 60 kilometres per hour.

How many seconds does it take to go through the tunnel?

Answer(c)(ii) s [3]

7



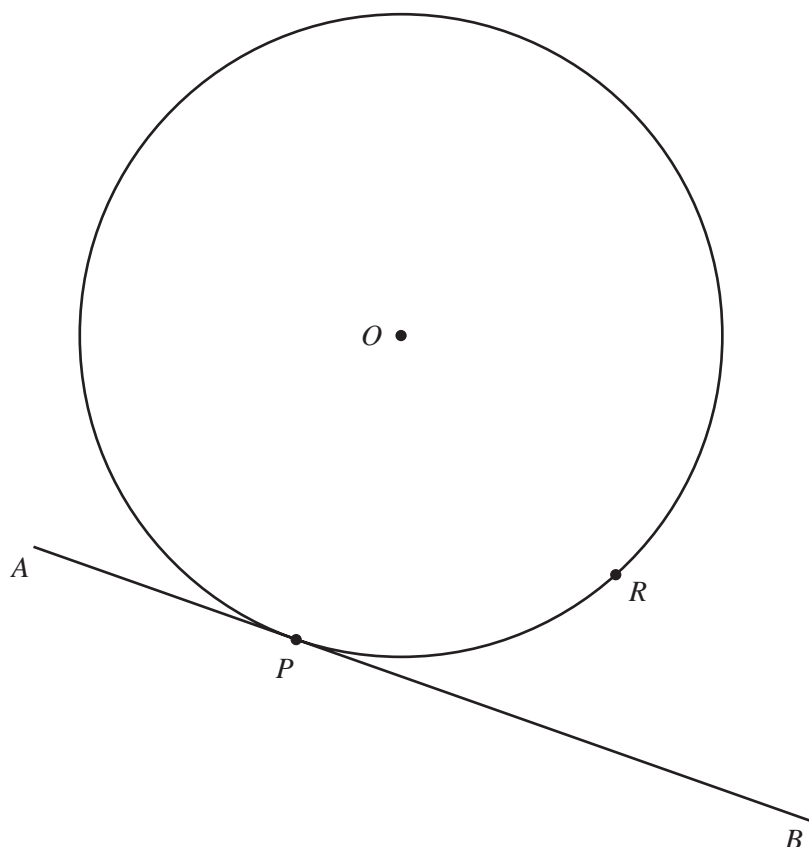
A quadrilateral $ABCD$, a line l and a point O are shown on the grid above.

- (a) Write down the mathematical name for the quadrilateral $ABCD$.

Answer(a) [1]

- (b) On the grid above, draw the images of the quadrilateral $ABCD$ under the following transformations.

- (i) Translation by the vector $\begin{pmatrix} 9 \\ -3 \end{pmatrix}$. Label this image P . [2]
- (ii) Reflection in the line l . Label this image Q . [2]
- (iii) Rotation, centre A , through 90° anti-clockwise. Label this image R . [2]
- (iv) Enlargement, centre O and scale factor 3. Label this image S . [3]



The diagram shows a circular garden, centre O . A straight path AB touches the circle at P .

- (a) (i) Draw on the diagram the **diameter** PQ and label the point Q . [1]

- (ii) Without measuring, write down the size of angle APQ .

Answer(a)(ii) Angle $APQ =$ [1]

- (iii) The point R is marked on the circumference of the circle. Draw the lines PR and QR . [1]

- (iv) Write down the reason why the angle PRQ is 90° .

Answer(a)(iv) [1]

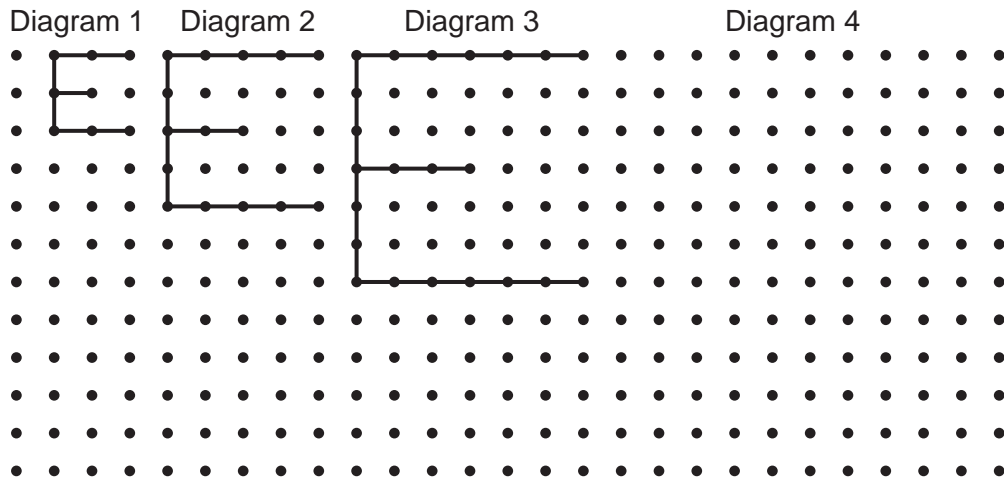
- (b) Showing all your construction lines, use a straight edge and compasses only to construct

- (i) the perpendicular bisector of QR , [2]

- (ii) the bisector of angle PRQ . [2]

- (c) Shade the region of the garden between PQ and QR which is closer to R than to Q and closer to RQ than to RP . [2]

- 9 In the pattern below each diagram shows a letter E formed by joining dots.



- (a) Draw the next letter E in the pattern. [1]

- (b) Complete the table showing the number of dots in each letter E.

| Diagram | 1 | 2 | 3 | 4 | 5 |
|---------|---|----|---|---|---|
| Dots | 8 | 15 | | | |

- (c) How many dots make up the letter E in [3]

- (i) Diagram 10,

Answer(c)(i) [2]

- (ii) Diagram n ?

Answer(c)(ii) [2]

- (d) The letter E in Diagram n has 113 dots.

Write down an equation in n and use it to find the value of n .

Answer(d) $n =$ [3]

- 1 At noon one day the temperature is -9.5°C .
By midnight the temperature has fallen by 3.6°C .
What is the temperature at midnight?

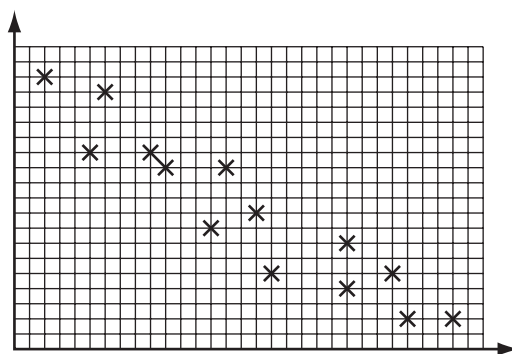
Answer $^{\circ}\text{C}$ [1]

- 2 Insert brackets to make the following statement correct.

$$2 \times 3 - 4 + 5 = 3 \quad [1]$$

- 3 Which word describes the correlation in the scatter graph below?

positive negative none



Answer [1]

- 4 The n th term of a sequence is given by n^2+2 .
Work out the 4th term.

Answer [1]

- 5 $\$1 = 0.78$ euros
Use this exchange rate to change $\$15.50$ into euros.

Answer euros [1]

- 6 Factorise completely $2a^2b - 6a$.

Answer [2]

- 7 (a) Change 56.1 metres into kilometres.

Answer(a) km [1]

- (b) Change 15.3 metres into millimetres.

Answer(b) mm [1]

- 8 Simplify $3x^2y \times x^4y^2$.

Answer [2]

- 9 Work out 43^3 , giving

- (a) your full calculator display,

Answer(a) [1]

- (b) your answer correct to the nearest thousand.

Answer(b) [1]

- 10 Write these fractions in order with the smallest first.

$$\frac{33}{50} \quad \frac{2}{3} \quad \frac{6}{10}$$

Answer < < [2]

- 11 Solve the equation $5x - 2 = 10x - 8$.

Answer $x =$ [2]

- 12 Only two of the following five statements are correct.

- A** $0.07077 \geq 0.07707$
B $0.07077 \neq 0.07707$
C $0.07077 = 0.07707$
D $0.07077 < 0.07707$
E $0.07077 > 0.07707$

Write down the letters which correspond to the two correct statements.

Answer and [2]

- 13 Work out $2.6 \times 10^{-3} + 9.1 \times 10^{-4}$.
 Write your answer in standard form.

Answer [2]

- 14 The length of a mirror is 15.6 centimetres correct to the nearest millimetre.
 Complete the statement below about the length of the mirror.

Answer cm \leq length $<$ cm [2]

- 15 A truck uses 2.5 litres of fuel to travel 8 kilometres.

- (a) How far will the truck travel on 1 litre of fuel?

Answer(a) km [1]

- (b) How far will the truck travel on 120 litres of fuel?

Answer(b) km [1]

16 Write down the value of x when

(a) $2^x = 8$,

Answer(a) $x = \dots\dots\dots$ [1]

(b) $3^x = \frac{1}{81}$.

Answer(b) $x = \dots\dots\dots$ [1]

17 The surface area of a sphere with radius r is $A = 4\pi r^2$.

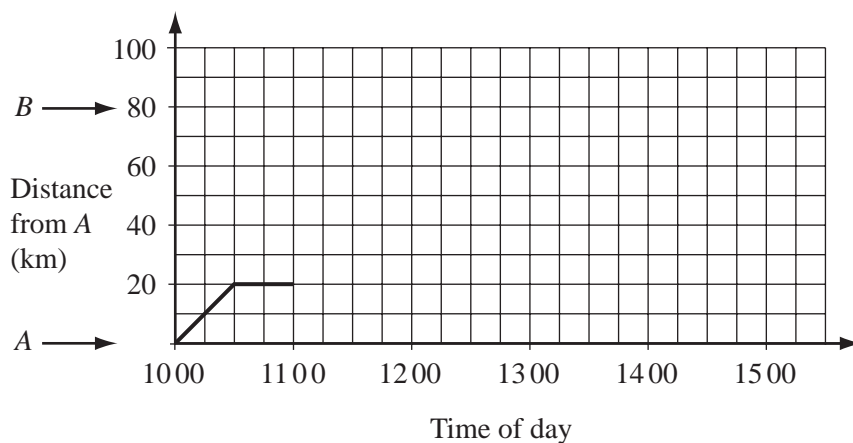
(a) Calculate the surface area of a sphere with a radius of 5 centimetres.

Answer(a) $\dots\dots\dots \text{cm}^2$ [1]

(b) Make r the subject of the formula $A = 4\pi r^2$.

Answer(b) $r = \dots\dots\dots$ [2]

18



(a) Carla drives from town A to a supermarket.
At 11 00 she continues her journey to town B , driving at 80 km/h.
The first part of the journey is shown on the grid above.

(i) How many minutes is Carla at the supermarket?

Answer(a) (i) $\dots\dots\dots$ min [1]

(ii) Draw the rest of her journey to town B on the grid. [1]

(b) Carla spends 1 hour in town B and then drives back to town A , at a constant speed, arriving at 14 30.

Show this information on the grid. [2]

19 A shopkeeper buys some ready-made meals from a supplier.

(a) Complete the bill shown below.

| Meal | Cost of one meal | Number of meals | Total cost |
|---------------|------------------|-----------------|------------|
| Chicken curry | \$3.48 | 15 | \$ |
| Pizza | \$2.99 | 28 | \$ |

[1]

(b) He sells all 15 Chicken curry meals for \$4.00 each.
Work out the total profit on these meals.

Answer(b) \$ [1]

(c) He sells 15 Pizzas for \$3.55 each but is unable to sell the rest.
Calculate his loss on the Pizzas as a **percentage** of the total cost of the Pizzas.

Answer(c) % [2]

20 (a) Draw the lines of symmetry on the two letters below.

H W

[2]

(b) Write down the order of rotational symmetry for each of the figures below.

€ X

Order

Order

[2]

21 Write the following as single vectors.

(a) $\begin{pmatrix} 2 \\ 3 \end{pmatrix} + \begin{pmatrix} 1 \\ 0 \end{pmatrix} - \begin{pmatrix} 3 \\ -1 \end{pmatrix}$

Answer(a) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

(b) $6 \begin{pmatrix} 5 \\ -4 \end{pmatrix}$

Answer(b) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

22

$$\frac{13.5 + 16}{4.8 - (22 \div 13)}$$

(a) Rewrite this calculation with each number rounded to 1 significant figure.

Answer(a)

[2]

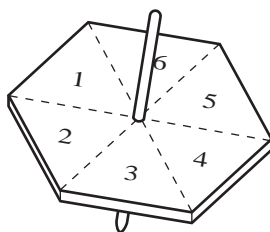
(b) Use your answer to **part (a)** to estimate the answer to the calculation.
Show your working and write your answer correct to 1 significant figure.

Answer(b) [1]

(c) Use your calculator to find the answer to the **original** calculation correct to 3 significant figures.

Answer(c) [2]

23 The diagram shows a six-sided spinner.



- (a) Amy spins a biased spinner and the probability she gets a two is $\frac{5}{36}$.

Find the probability she

- (i) does not get a two,

Answer(a) (i) [1]

- (ii) gets a seven,

Answer(a) (ii) [1]

- (iii) gets a number on the spinner less than 7.

Answer(a) (iii) [1]

- (b) Joel spins his blue spinner 99 times and gets a two 17 times.

Write down the relative frequency of getting a two with Joel's spinner.

Answer(b) [1]

- (c) The relative frequency of getting a two with Piero's spinner is $\frac{21}{102}$.

Which of the three spinners, Amy's, Joel's or Piero's, is most likely to give a two?

Answer(c) [1]

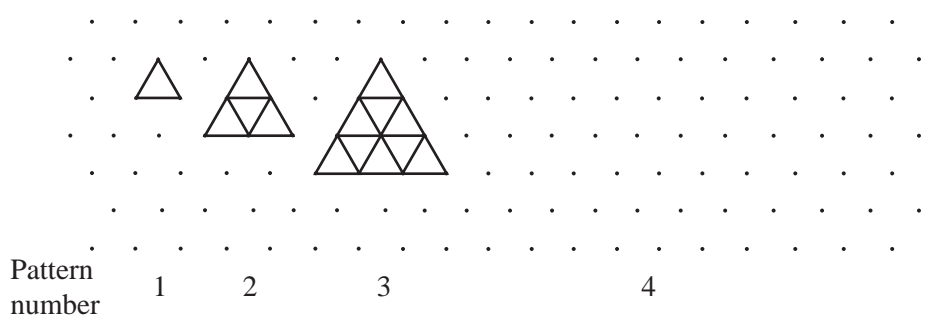
1 (a)

 $\frac{2}{3}$ 2 3 3.14 $\sqrt{35}$ 10 24 37 45 88

From the list of numbers above choose one that is

- (i) an irrational number, *Answer(a) (i)* [1]
- (ii) the cube root of 27, *Answer(a) (ii)* [1]
- (iii) a multiple of 9, *Answer(a) (iii)* [1]
- (iv) a prime number, *Answer(a) (iv)* [1]
- (v) a factor of 44, *Answer(a) (v)* [1]
- (vi) the product of 6 and 4. *Answer(a) (vi)* [1]

(b) The diagram below shows a sequence of patterns made with small triangular tiles.



- (i) Draw the next pattern in the sequence. [1]
- (ii) Complete the table below.

| | | | | | | |
|-----------------|---|---|---|---|---|---|
| Pattern number | 1 | 2 | 3 | 4 | 5 | 6 |
| Number of tiles | 1 | 4 | 9 | | | |

- (iii) How many tiles will be in the 100th pattern? [2]

Answer(b) (iii) [1]

- (iv) How many tiles will be in the n th pattern?

Answer(b) (iv) [1]

- (v) What is the special name given to the numbers in the second row of the table?

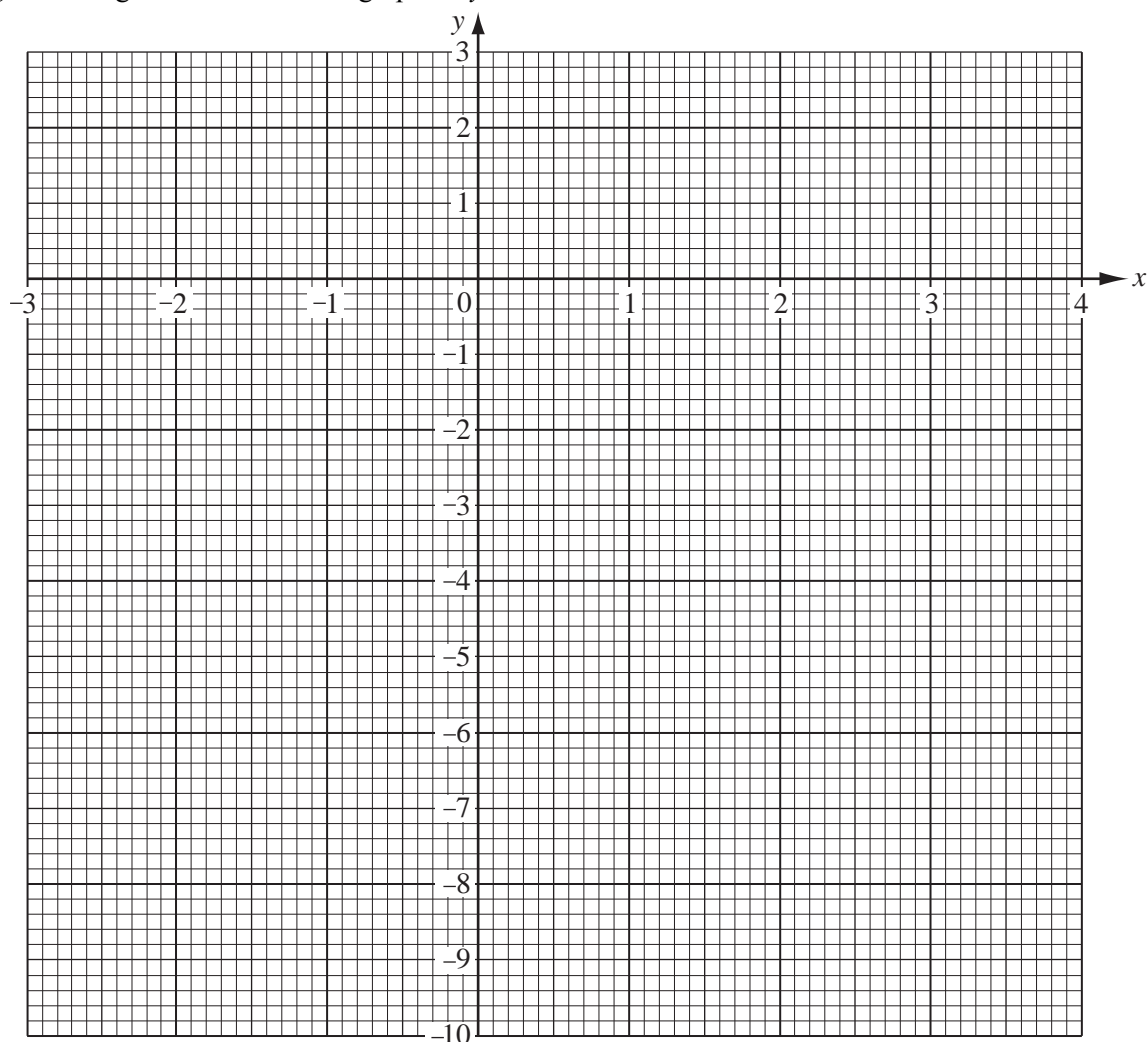
Answer(b) (v) [1]

- 2 (a) Complete the table for the equation $y = -x^2 + x + 2$.

| | | | | | | | | |
|-----|-----|----|----|---|---|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| y | -10 | | 0 | 2 | 2 | 0 | | |

[3]

- (b) On the grid below draw the graph of $y = -x^2 + x + 2$.



[4]

- (c) On the grid, draw the line of symmetry of your graph.

[1]

- (d) Use your graph to find the maximum value of y .

Answer(d) $y = \dots\dots\dots$ [1]

- (e) Draw the line $y = 1$ on the grid.

[1]

- (f) Write down the two values of x for which $-x^2 + x + 2 = 1$.

Answer(f) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

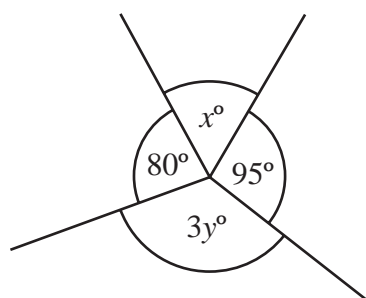
- 3 (a) (i) Calculate the **interior** angle of a regular heptagon (seven-sided polygon).
Write down all the figures on your calculator display.

Answer(a) (i) [2]

- (ii) Round your answer to **part (a)(i)** to 1 decimal place.

Answer(a) (ii) [1]

(b)



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The diagram shows four angles around a point.

- (i) Write down an equation in x and y .

Answer(b) (i) [1]

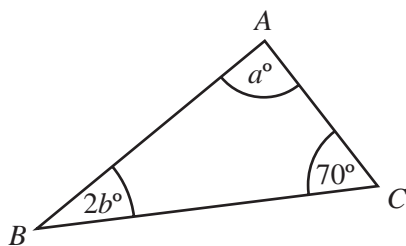
- (ii) Simplify your equation.

Answer(b) (ii) [1]

- (iii) Find y when $x = 65$.

Answer(b) (iii) $y =$ [2]

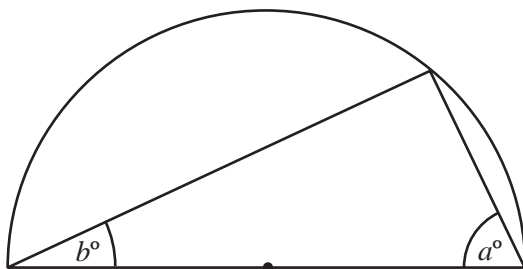
(c) (i)

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Explain why $a + 2b = 110$ in the triangle above.

Answer(c) (i) [1]

(ii)

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Explain why $a + b = 90$ in the semi-circle above.

Answer(c) (ii) [1]

(iii) Solve the equations

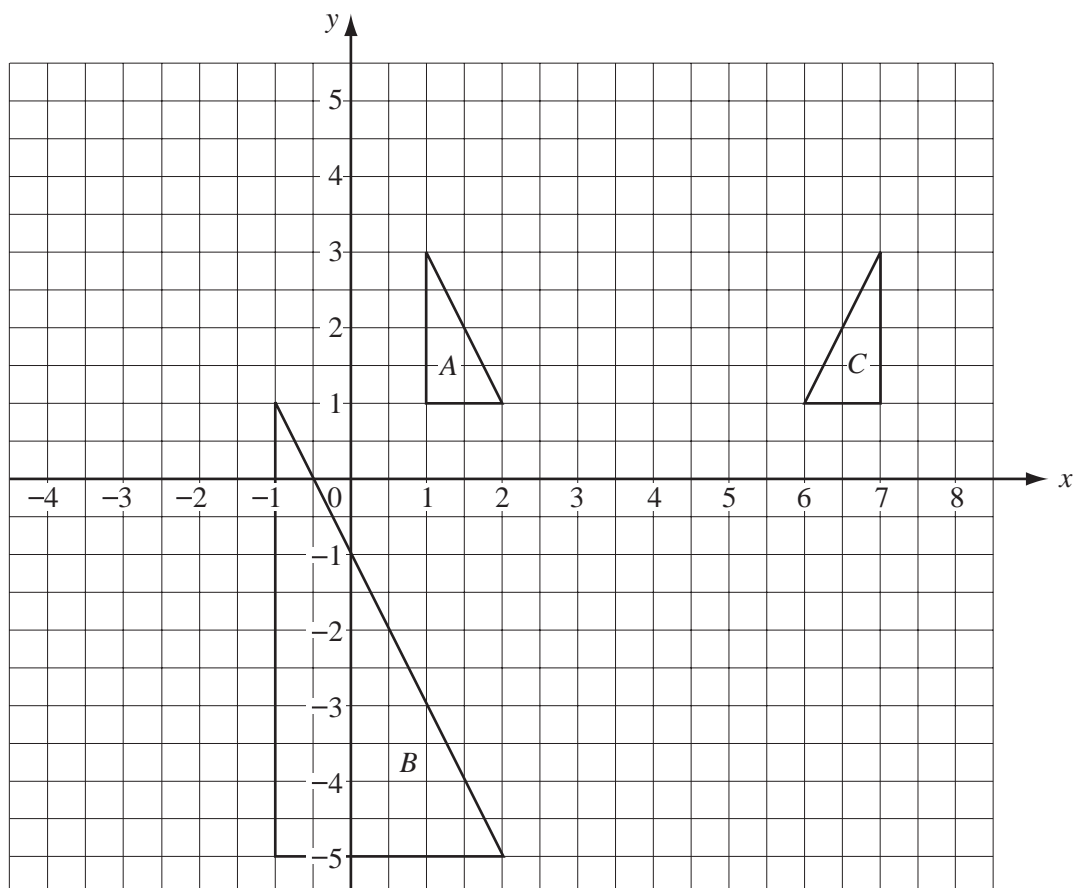
$$\begin{aligned} a + 2b &= 110, \\ a + b &= 90. \end{aligned}$$

Answer(c) (iii) $a =$

$b =$ [2]

(iv) Work out the size of angle ABC in the triangle in **part (c)(i)**.

Answer(c) (iv) Angle $ABC =$ [1]



(a) Describe fully the **single** transformation that maps

(i) triangle *A* onto triangle *B*,

Answer(a) (i) [3]

(ii) triangle *A* onto triangle *C*.

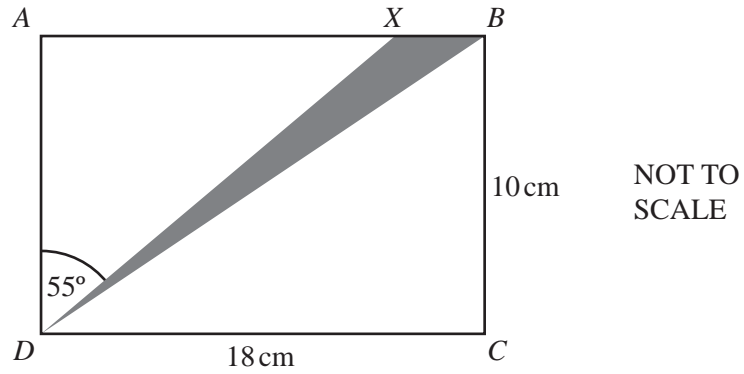
Answer(a) (ii) [2]

(b) On the grid above draw

(i) the translation of *A* by the vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$, [2]

(ii) the rotation of *B* through 180° about the point $(-1, -2)$. [2]

5



The diagram shows a rectangular tile $ABCD$ which has a shaded triangle DXB .
 $DC = 18$ centimetres, $BC = 10$ centimetres and angle $ADX = 55^\circ$.

- (a) Calculate the area of triangle BDC .

Answer(a) cm^2 [2]

- (b) Calculate the length of AX .

Answer(b) cm [2]

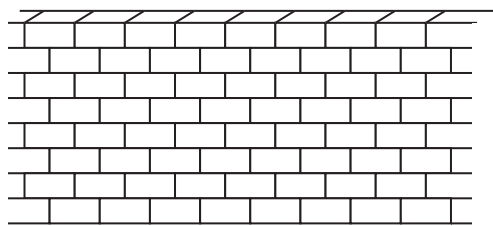
- (c) Calculate the shaded area.

Answer(c) cm^2 [3]

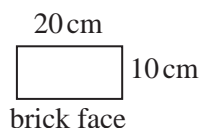
- (d) Calculate the length of BD .

Answer(d) cm [2]

6



Part of the wall

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- (a) A builder estimates the number of bricks in a wall by dividing the area of the wall by the area of the face of a brick.
 A brick wall is 10 **metres** long and 1.5 **metres** high.
 Each brick is 20 **centimetres** long and 10 **centimetres** high.
 Calculate how many bricks the builder estimates are in the wall.
 Show all your working.

Answer(a) bricks [3]

- (b) Another wall will need 720 bricks.
 The builder adds an extra 5% to this number to allow for mistakes.

- (i) Calculate how many bricks the builder needs to buy.

Answer(b) (i) bricks [2]

- (ii) Bricks are sold in packs of 100 which can not be split.
 How many packs should the builder buy?

Answer(b) (ii) packs [1]

- (c) The builder mixes sand and cement in the ratio 5:2 to make mortar.
 He wants 14 buckets of mortar.

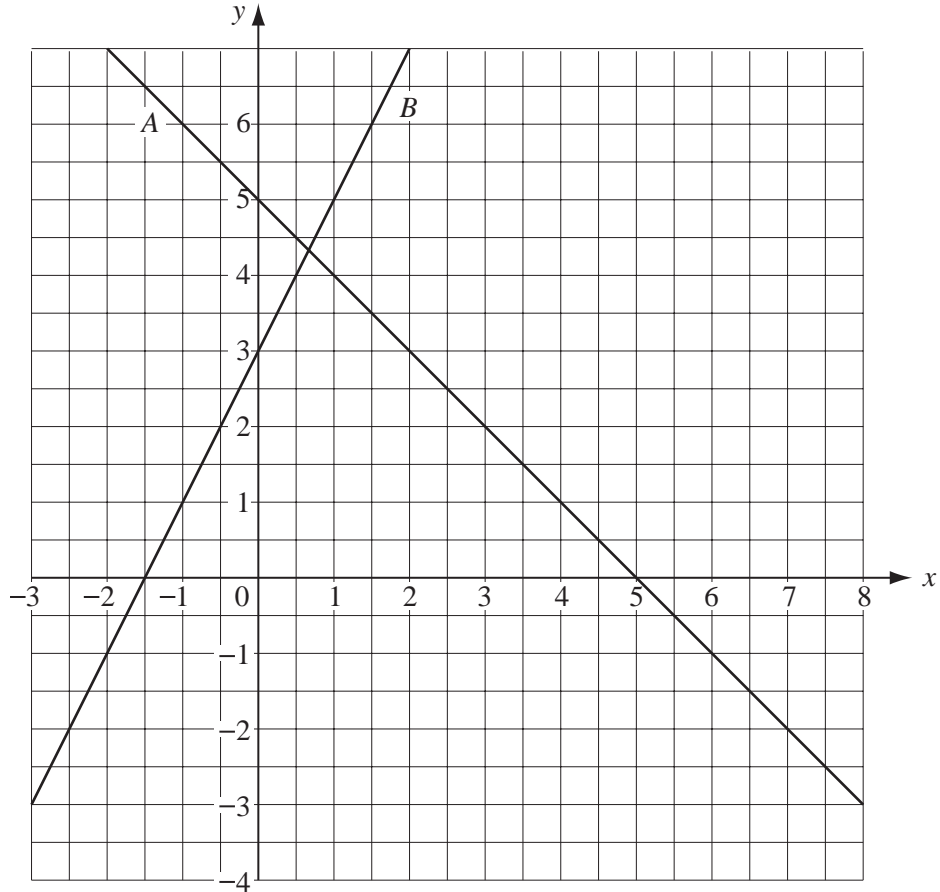
- (i) How many buckets of sand and how many buckets of cement does he need?

Answer(c) (i) He needs buckets of sand and buckets of cement. [2]

- (ii) One bag of cement fills 3.5 buckets.
 How many bags of cement must the builder buy?

Answer(c) (ii) bags [1]

7



Two straight lines labelled A and B are shown on the grid above.

- (a) Find the gradient of line A .

Answer(a) [2]

- (b) The equation of line B can be written as $y = mx + c$.
Find the values of m and c .

Answer(b) $m =$

$c =$ [2]

- (c) (i) On the diagram draw the line which is parallel to B and passes through the point $(1, -1)$.

[1]

- (ii) Write down the equation of this line.

Answer(c) (ii) [2]

- 8 (a) Naomi records the sizes of the 34 pairs of shoes that her shop sells in one day.

4 10 5 6 4 8 6 4 7 3 9 7 4
 7 3 5 4 6 5 10 7 5 5 6 4 7
 7 6 6 5 5 3 5 6

- (i) Using the list above complete the frequency table.

| | | | | | | | | |
|-----------|---|---|---|---|---|---|---|----|
| Shoe size | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Frequency | | | | | | | | |

[3]

- (ii) Calculate the mean of these shoe sizes.

Answer(a) (ii) [3]

- (iii) Find the range of these sizes.

Answer(a) (iii) [1]

- (iv) Find the mode of these sizes.

Answer(a) (iv) [1]

- (v) Work out the median shoe size.

Answer(a) (v) [2]

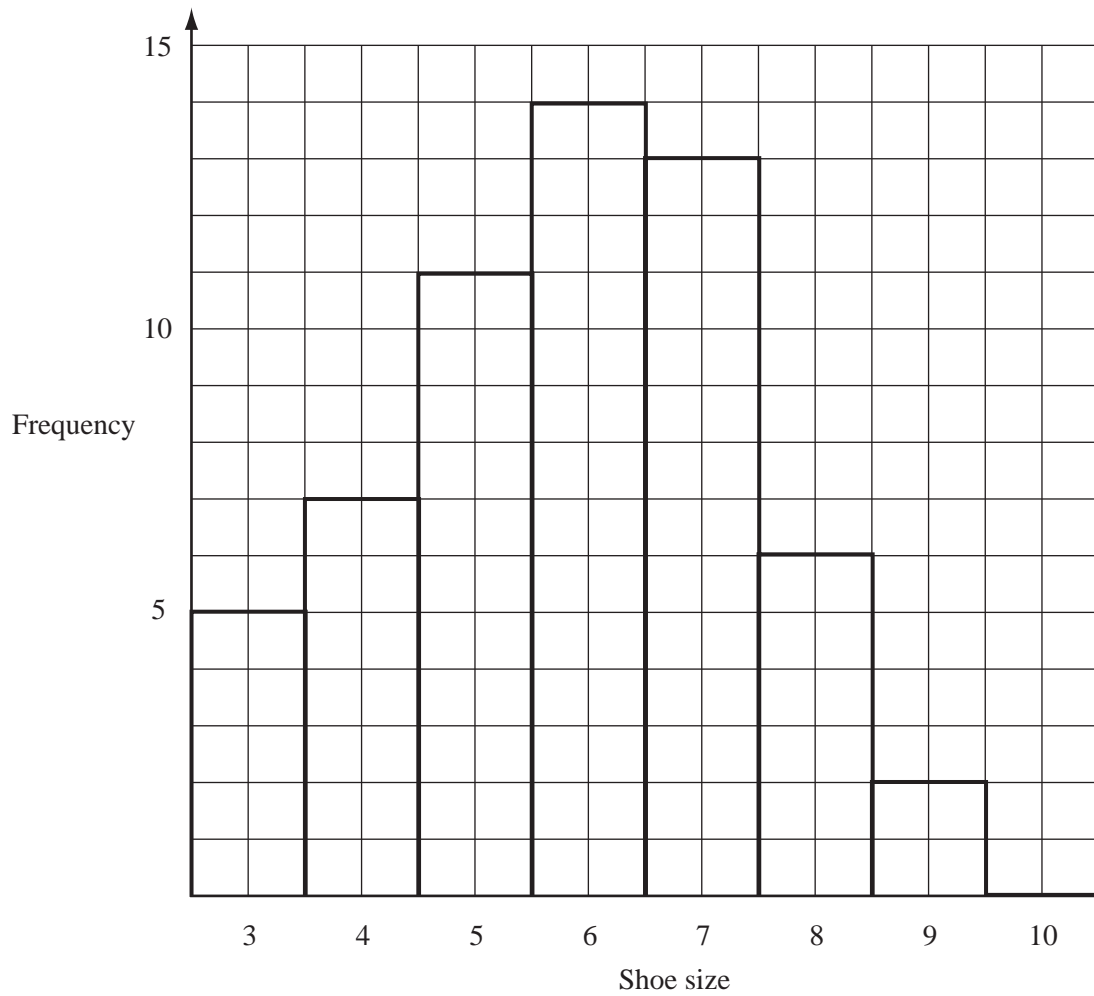
- (vi) Calculate the percentage of all the pairs of shoes that are size 7.

Answer(a) (vi) %. [2]

- (vii) Naomi orders 306 pairs of shoes to sell in her shop.
 Estimate how many of these pairs of shoes should be size 7.

Answer(a) (vii) [2]

(b) Findlay draws a bar chart to show how many pairs of shoes he has sold in his shop in one week.



(i) Use the information in the bar chart to complete the frequency table below.

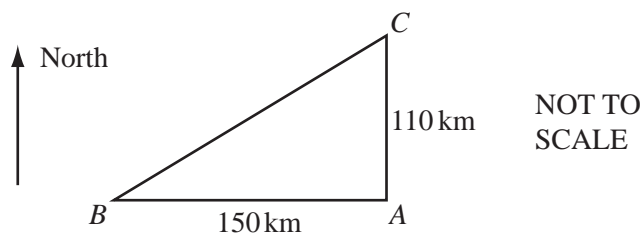
| | | | | |
|-----------|---------|---------|---------|----------|
| Shoe size | 3 and 4 | 5 and 6 | 7 and 8 | 9 and 10 |
| Frequency | | | | |

[2]

(ii) Which is the modal class in the frequency table?

Answer(b) (ii) [1]

- 9 The sketch shows the positions of three islands A , B and C .
 B is 150 kilometres due West of A .
 C is 110 kilometres due North of A .



- (a) Using a scale of 1 centimetre to represent 20 kilometres draw accurately the triangle ABC .
 A is marked for you.

× A

[3]

- (b) A boat sets out from B to sail directly to C .

- (i) Use your protractor to find the three-figure bearing of B from C .

Answer(b) (i) [2]

- (ii) Measure BC on your diagram and hence find the distance in kilometres of B from C .

Answer(b) (ii) km [2]

- (iii) The boat sails at 20 knots.
[1 knot is 1.85 kilometres per hour.]

How long will the boat take for the first 100 kilometres of the journey?
Give your answer in hours and minutes, to the nearest minute.

Answer(b) (iii) hours min [4]

- (iv) The boat takes 45 minutes for the next 18 kilometres.
Calculate this speed in kilometres per hour.

Answer(b) (iv) km/h [2]

- (v) A radio beacon at A has a range of 100 kilometres.
On your diagram in **part (a)** draw accurately the locus of points that are 100 kilometres from A .

[2]

- (vi) For how many kilometres is the boat within range of the beacon?

Answer(b) (vi) km [2]

- 1 The temperature at noon at an Antarctic weather centre was -15°C .
At midnight it had fallen by 12°C .
What was the temperature at midnight?

Answer $^{\circ}\text{C}$ [1]

- 2 0.09 90% $\frac{9}{1000}$ 9% 0.9 $\frac{9}{100}$ 900%

Write down the three numbers from the list above which have the same value.

Answer [1]

- 3 Write down the number of square centimetres in one square metre.

Answer [1]

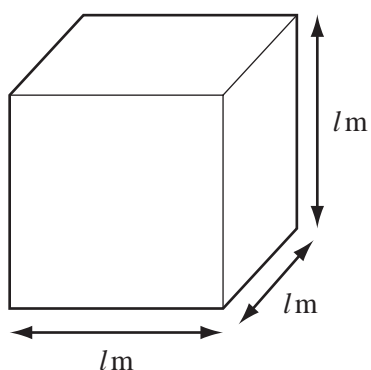
- 4 (a) Write down a number, other than 1, which is a **factor** of both 14 and 35.

Answer(a) [1]

- (b) Write down a number which is a **multiple** of both 14 and 35.

Answer(b) [1]

5



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A cube of side l metres has a volume of 20 cubic metres.
Calculate the value of l .

Answer $l =$ [2]

- 6 (a) Work out

$$\frac{12.48 \times 0.063}{\sqrt{8} + 7.52}.$$

Write down all the figures on your calculator display.

Answer(a) [1]

- (b) Write your answer to
- part (a)**
- correct to 2 significant figures.

Answer(b) [1]

- 7 The population of a city is 350 000 correct to the nearest ten thousand.
Complete the statement about the limits of the population.

Answer \leq population < [2]

- 8 Factorise completely
- $2x^2 - 6xy$
- .

Answer [2]

- 9 (a) A bowl of fruit contains 3 apples, 4 bananas, 2 pears and 1 orange.
Aminata chooses one piece of fruit at random.
What is the probability that she chooses

- (i) a banana,

Answer(a)(i) [1]

- (ii) a mango?

Answer(a)(ii) [1]

- (b) The probability that it will rain in Switzerland on 1
- st
- September is
- $\frac{5}{12}$
- .

State the probability that it will **not** rain in Switzerland on 1st September.

Answer(b) [1]

- 10 Simplify

- (a)
- $p^2 \times p^3$
- ,

Answer(a) [1]

- (b)
- $q^3 \div q^{-4}$
- ,

Answer(b) [1]

- (c)
- $(r^2)^3$
- .

Answer(c) [1]

- 11 Rodriguez puts \$500 into a bank account. The bank pays 5% compound interest per year.

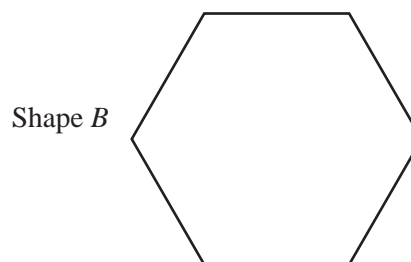
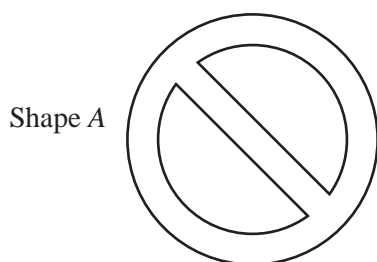
(a) How much is the interest after one year?

Answer(a) \$ [1]

(b) Work out the **total amount** he has in his bank account after two years.

Answer(b) \$ [2]

- 12 (a) Draw all the lines of symmetry on the following shapes. (Shape B is a regular polygon.)



[2]

(b) Write down the order of rotational symmetry of shape A.

Answer(b) [1]

- 13 Solve the simultaneous equations

$$\begin{aligned} 3x - y &= 18, \\ 2x + y &= 7. \end{aligned}$$

Answer x =

y = [3]

- 14 (a) Pierre arrives at school at 08 40 and leaves at 15 30.
How long, in hours and minutes, is he in school?

Answer(a) h min [1]

(b) Each day, Pierre gets up at 07 00 and goes to bed at 22 00.
What percentage of each day is he in bed?

Answer(b) % [2]

15

$$\vec{AB} = \begin{pmatrix} -1 \\ 4 \end{pmatrix} \text{ and } \vec{CD} = 3\vec{AB}.$$

(a) Write \vec{CD} as a column vector.

$$\text{Answer(a)} \vec{CD} = \begin{pmatrix} \\ \end{pmatrix} \quad [1]$$

(b) Make two statements about the relationship between the lines AB and CD .

Statement 1

Statement 2 [2]

16 Yousef asked 24 students to choose their favourite sport.

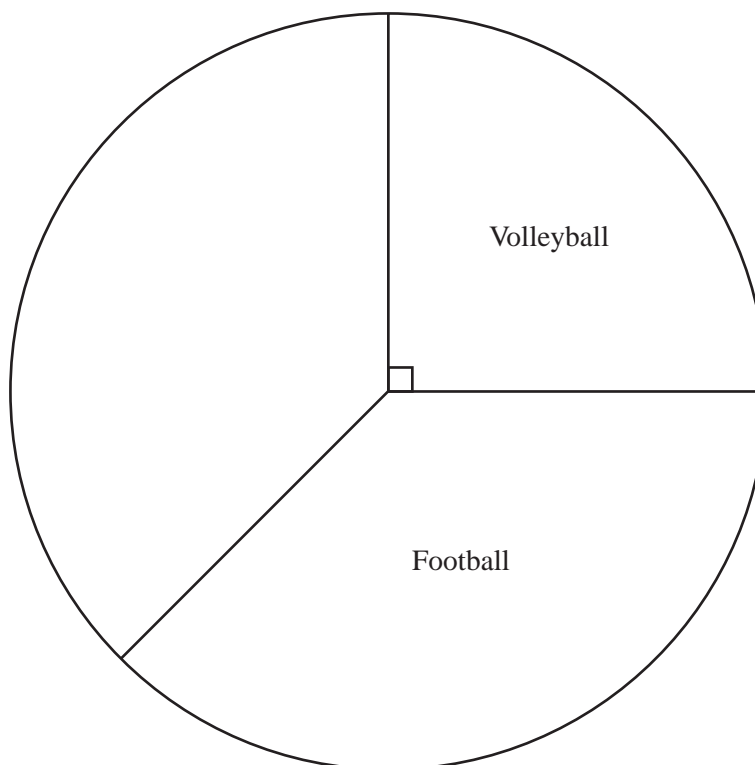
He recorded the information in the table below so that he could draw a pie chart.

(a) Complete the table.

| Sport | Volleyball | Football | Hockey | Cricket |
|--------------------|------------|-------------|--------|---------|
| Number of students | 6 | 9 | 7 | 2 |
| Angle on pie chart | 90° | 135° | | |

[2]

(b) Complete the pie chart accurately to show this data.

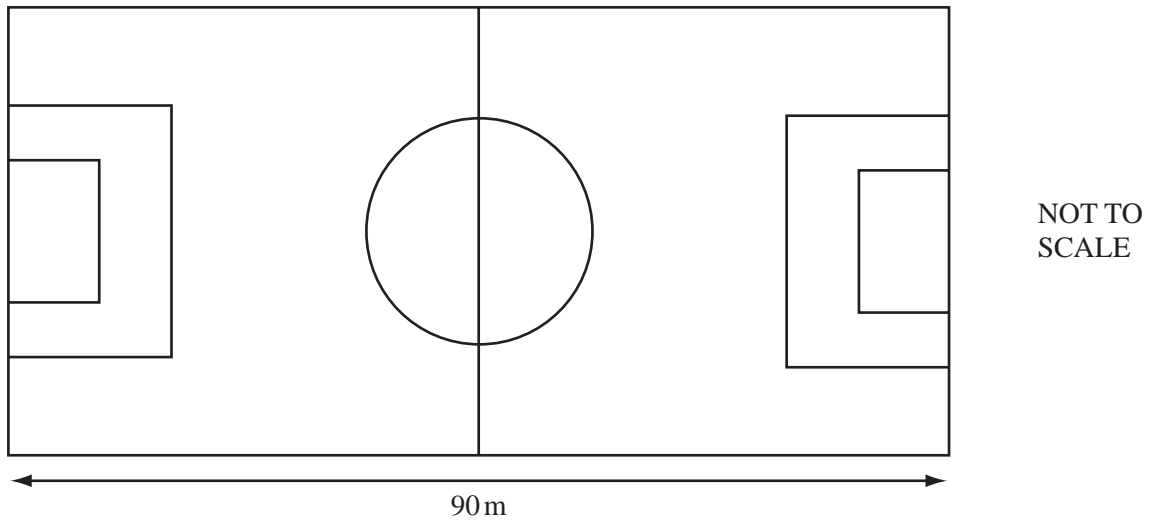


[1]

(c) Which is the modal sport?

Answer(c) [1]

17



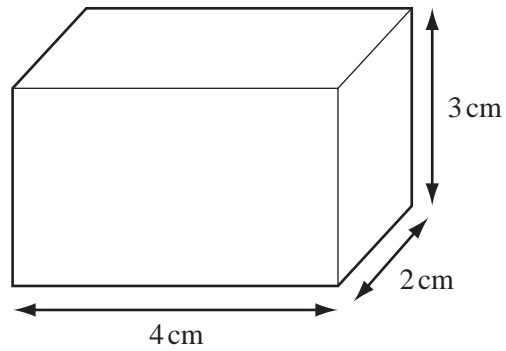
- (a) The diagram shows the plan for a new soccer field.
 The length of the pitch is 90 metres.
 The ratio length : width is 5 : 3.
 Calculate the width of the pitch.

Answer(a) m [2]

- (b) The centre circle has a circumference of 57.5 metres.
 Calculate the radius.

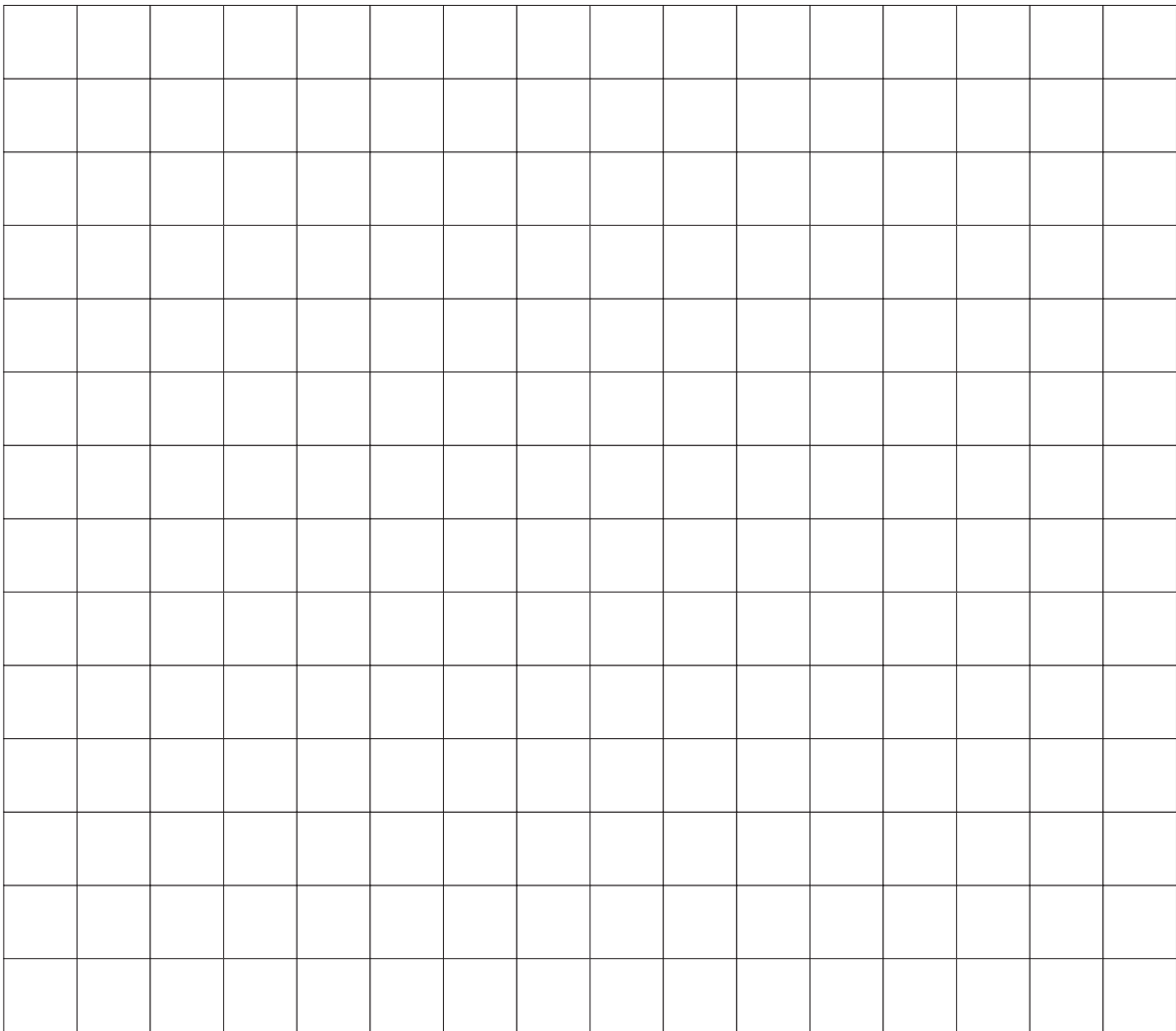
Answer(b) m [2]

18

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The solid shown is a cuboid with length 4 cm, width 2 cm and height 3 cm.

(a) Draw an accurate net of the cuboid on the grid below.



[2]

(b) Using your net, calculate the total surface area of the cuboid.

Answer(b) cm^2 [2]

- 19** Joseph, Maria and Rebecca each win a prize.
Their total prize money is \$30.

Joseph wins $\frac{7}{12}$ of the \$30.

Maria wins 30% of the \$30.

Rebecca wins the rest of the \$30.

Calculate the amount each receives.

Answer Joseph \$..... [2]

Maria \$..... [2]

Rebecca \$..... [1]

- 20** There are 565 sheets of paper in a book.

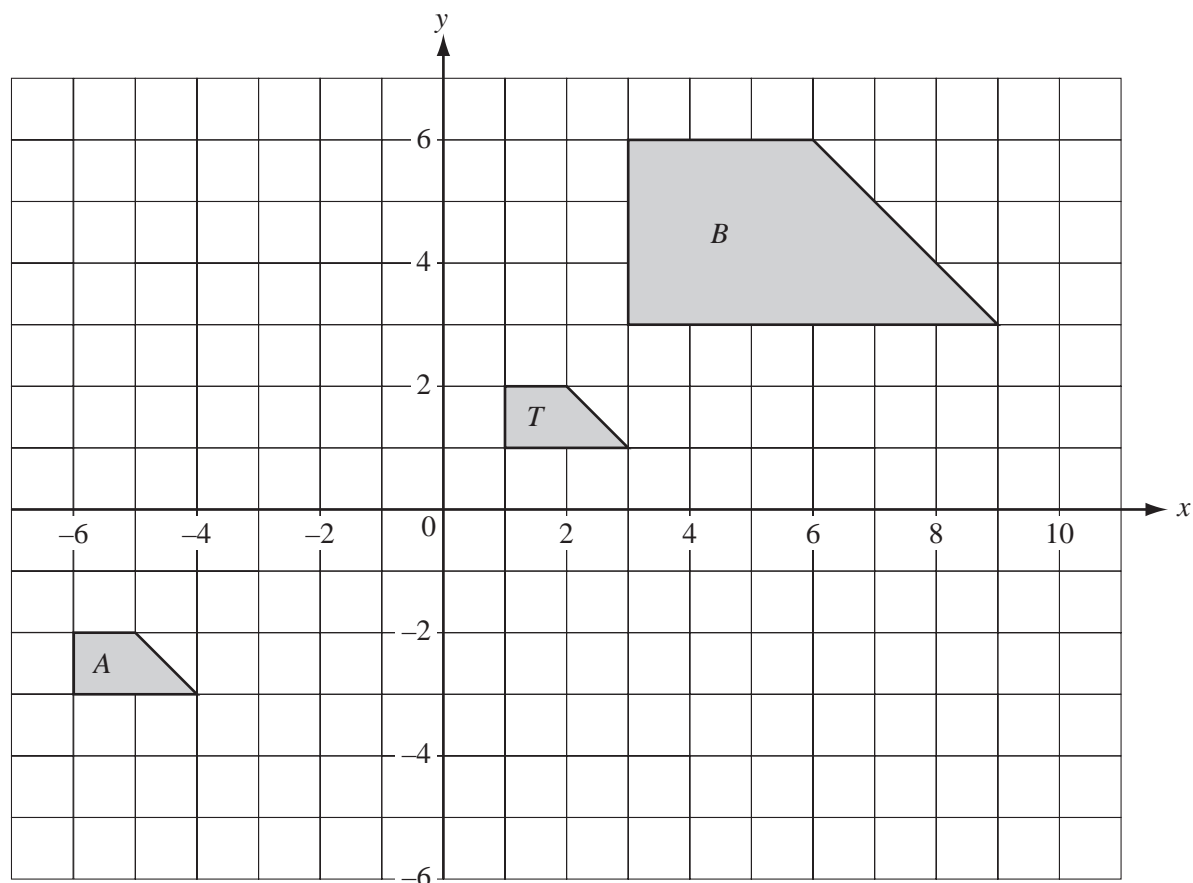
- (a)** How many sheets of paper are there in 2000 of these books?
Give your answer in standard form.

Answer(a) [2]

- (b)** A pile of 565 sheets of paper is 25 millimetres high.
Calculate the thickness of 1 sheet of paper.
Give your answer in standard form.

Answer(b) mm [3]

1



The shapes T , A and B are drawn on the grid above.

(a) In each case describe fully the **single** transformation which maps

(i) T onto A ,

Answer(a)(i) [3]

(ii) T onto B .

Answer(a)(ii) [3]

(b) Draw on the grid the rotation of T by 90° anticlockwise about $(0,0)$.

Label your answer R .

[2]

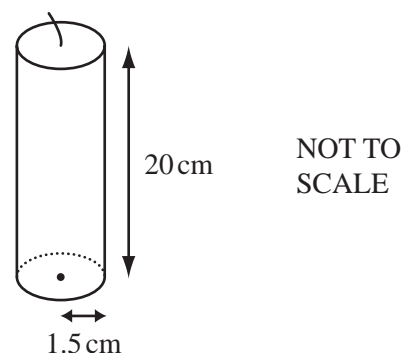
(c) Draw on the grid the reflection of T in the line $y = -2$.

Label your answer M .

[2]

- 2 A candle, made from wax, is in the shape of a cylinder.
The radius is 1.5 centimetres and the height is 20 centimetres.

- (a) Calculate, correct to the nearest cubic centimetre,
the volume of wax in the candle.
[The volume of a cylinder, radius r , height h , is $\pi r^2 h$.]

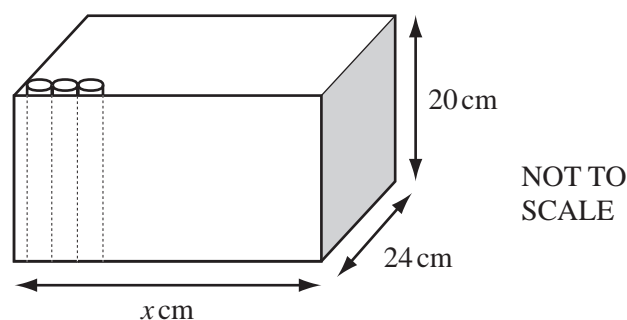


Answer(a) cm^3 [2]

- (b) The candle burns 0.8 cm^3 of wax every minute.
How long, in hours and minutes, will it last?
Write your answer correct to the nearest minute.

Answer(b) h min [3]

- (c) The candles are stored in boxes which
measure $x \text{ cm}$ by 24 cm by 20 cm .
Each box contains 96 candles.
Calculate the minimum value of x .



Answer(c) $x =$ [2]

- (d) A shopkeeper pays \$25 for one box of 96 candles. He sells all the candles for 35 cents each.
(i) How much profit does he make?

Answer(d)(i) \$ [2]

- (ii) Calculate his profit as a percentage of the cost price.

Answer(d)(ii) % [3]

- 3 (a) Simplify the expression $5p - 2q - (p + q)$.

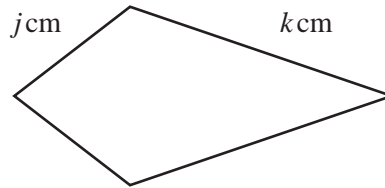
Answer(a) [2]

- (b) Solve the equation $3(2x - 5) = 27$.

Answer(b) $x =$ [3]

- (c) A kite has sides of length j cm and k cm.

- (i) Write down an expression in terms of j and k for the perimeter of the kite.



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Answer(c)(i)cm [1]

- (ii) The perimeter of the kite is 72 centimetres.
Write down an equation in j and k .

Answer(c)(ii) [1]

- (iii) If $k = 2j$, find the value of k .

Answer(c)(iii) $k =$ [2]

- (d) (i) Use the formula $w = \frac{s-t}{r}$ to find the value of w when $s = \frac{5}{6}$, $t = \frac{2}{3}$ and $r = \frac{1}{2}$.

Show all your working clearly.

Answer(d)(i) [3]

- (ii) Rearrange the formula in **part (d)(i)** to find s in terms of w , r and t .

Answer(d)(ii) $s =$ [2]

4



Diagram 1



Diagram 2

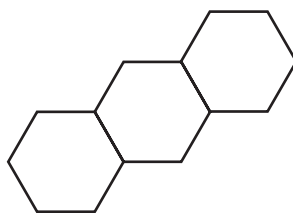


Diagram 3

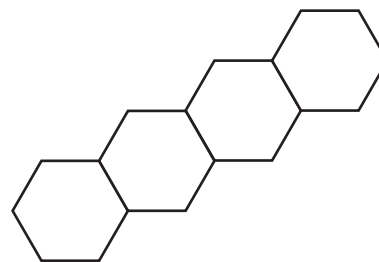


Diagram 4

The diagrams show a sequence of regular hexagons.
Sticks of equal length are used to make the hexagons.

(a) Complete the table for the number of sticks in each diagram.

| Diagram | 1 | 2 | 3 | 4 | 5 |
|---------|---|----|---|---|---|
| Sticks | 6 | 11 | | | |

[3]

(b) How many sticks are there in the 20th diagram?

Answer(b) [2]

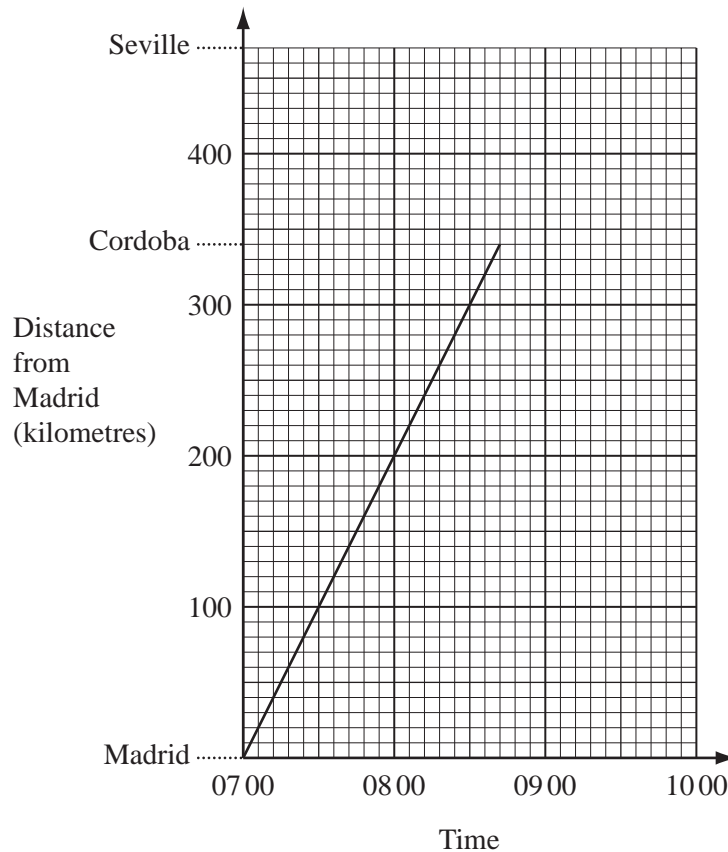
(c) How many sticks are there in the n th diagram?

Answer(c) [2]

(d) How many hexagons are there in a diagram which has 186 sticks?

Answer(d) [2]

- 5 A train leaves Madrid at 07 00 and travels to Cordoba, a distance of 340 kilometres. The distance-time graph shows the journey.



- (a) Find the average speed of the train from Madrid to Cordoba, in kilometres per hour.

Answer(a) km/h [2]

- (b) The train stops for 12 minutes at Cordoba. It then continues its journey at the same average speed to Seville.

(i) Complete the graph to show its journey. [2]

- (ii) At what time does it arrive in Seville?

Answer(b)(ii) [1]

- (c) Another train leaves Seville at 07 30 and travels, without stopping, to Madrid. This train arrives in Madrid at 09 45.

(i) Draw a line on the grid to show this journey. [2]

- (ii) How far from Madrid are the two trains when they pass each other?

Answer(c)(ii) km [1]

- (iii) Calculate the average speed of the train from Seville to Madrid, in kilometres per hour.

Answer(c)(iii) km/h [2]

- 6 Ahmed selected a sample of 10 students from his school and measured their hand spans and heights. The results are shown in the table below.

| | | | | | | | | | | |
|----------------|-----|------|------|-----|-----|-----|------|-----|------|-----|
| Hand span (cm) | 15 | 18.5 | 22.5 | 26 | 19 | 23 | 17.5 | 25 | 20.5 | 22 |
| Height (cm) | 154 | 156 | 164 | 178 | 162 | 170 | 154 | 168 | 168 | 160 |

He calculated the mean hand span to be 20.9 cm and the range of the hand spans to be 11 cm.

(a) Calculate

(i) the mean **height**,

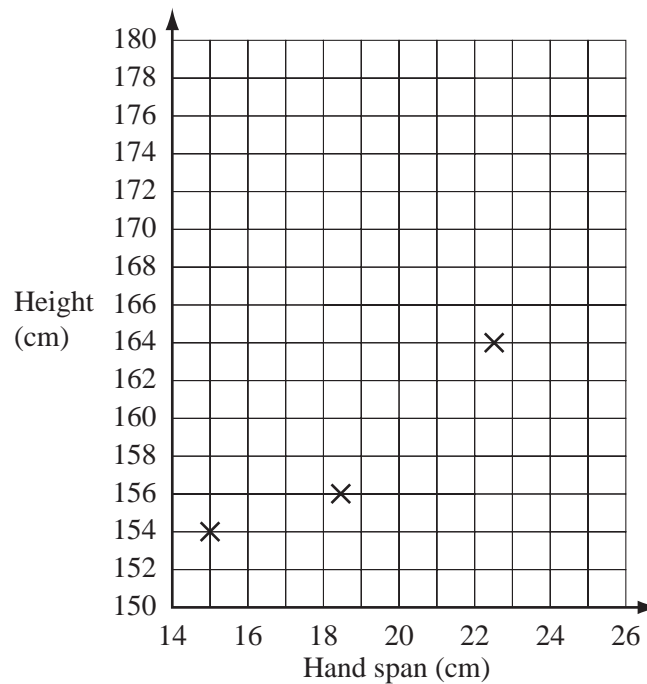
Answer(a)(i) Mean = cm [2]

(ii) the range of the **heights**.

Answer(a)(ii) Range = cm [2]

(b) In order to compare the two measures, he used a scatter diagram.

The first three points are plotted on the grid.



- (i) Complete the scatter diagram by plotting the remaining 7 points. [2]
(ii) Draw the line of best fit on the grid. [1]
(iii) Use the line of best fit to estimate the height of a student with hand span 21 cm.

Answer(b)(iii) cm [1]

(iv) Which one of the following words describes the correlation?

Positive Negative Zero

Answer(b)(iv) [1]

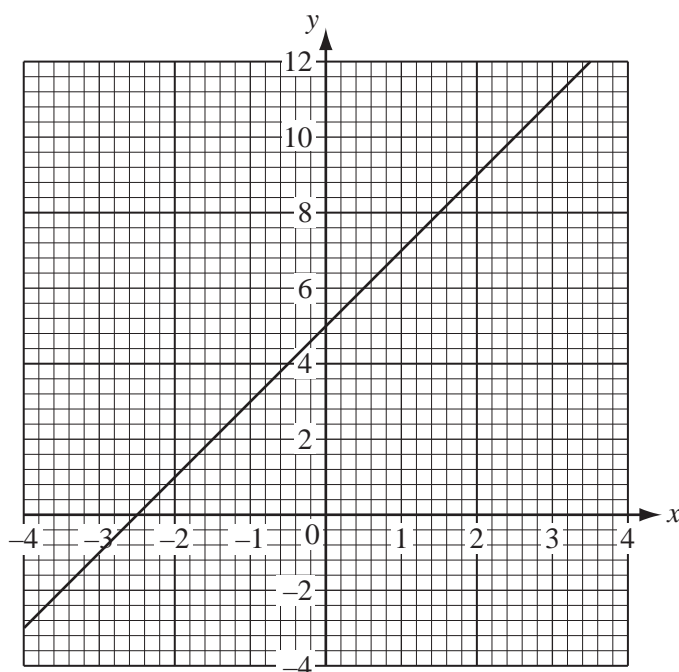
(v) What does this indicate about the relationship between hand span and height?

Answer(b)(v) [1]

- 7 (a) The equation of a straight line is $y = mx + c$.
Which letter in this equation represents the gradient?

Answer(a) [1]

(b)



Write down the equation of the line shown on the grid above.

Answer(b) [2]

- (c) Complete the table of values for $y = 12 - x^2$.

| | | | | | | | | | |
|-----|----|----|----|----|---|----|---|---|----|
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| y | -4 | 3 | | 11 | | 11 | 8 | | -4 |

[3]

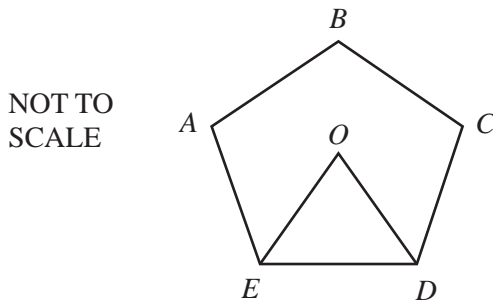
- (d) On the grid above, draw the graph of $y = 12 - x^2$.

[3]

- (e) Write down the coordinates of the points of intersection of the straight line with your curve.

Answer(e) (.....,) and (.....,) [2]

- 8 (a) $ABCDE$ is a regular polygon with centre O .



- (i) What is the special name for the polygon?

Answer(a)(i) [1]

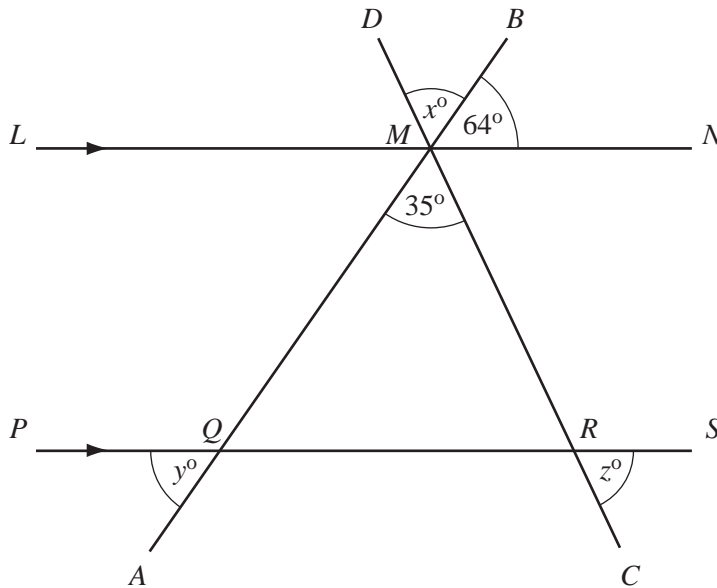
- (ii) Calculate angle EOD .

Answer(a)(ii) Angle EOD = [2]

- (iii) Calculate angle AED .

Answer(a)(iii) Angle AED = [2]

- (b) In the diagram below, AB and CD are straight lines which intersect at M .
 LMN and $PQRS$ are parallel straight lines.
 Angle $QMR = 35^\circ$ and angle $BMN = 64^\circ$.



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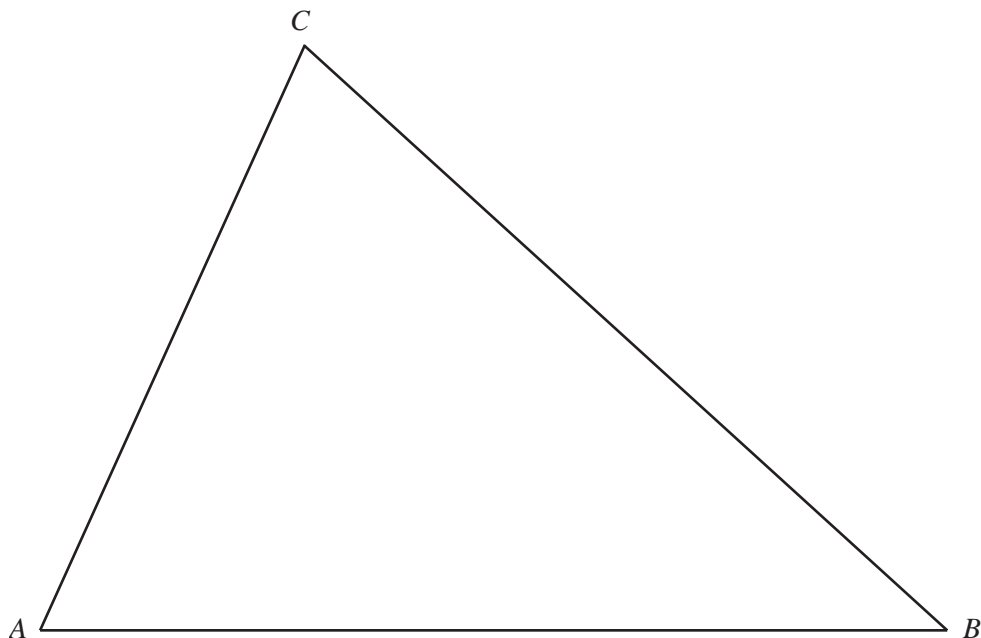
Find the values of x , y and z .

Answer(b) x = [1]

y = [2]

z = [2]

- 9 A farmer owns a triangular field ABC .
A scale diagram of this field is drawn below.
1 centimetre represents 10 metres.

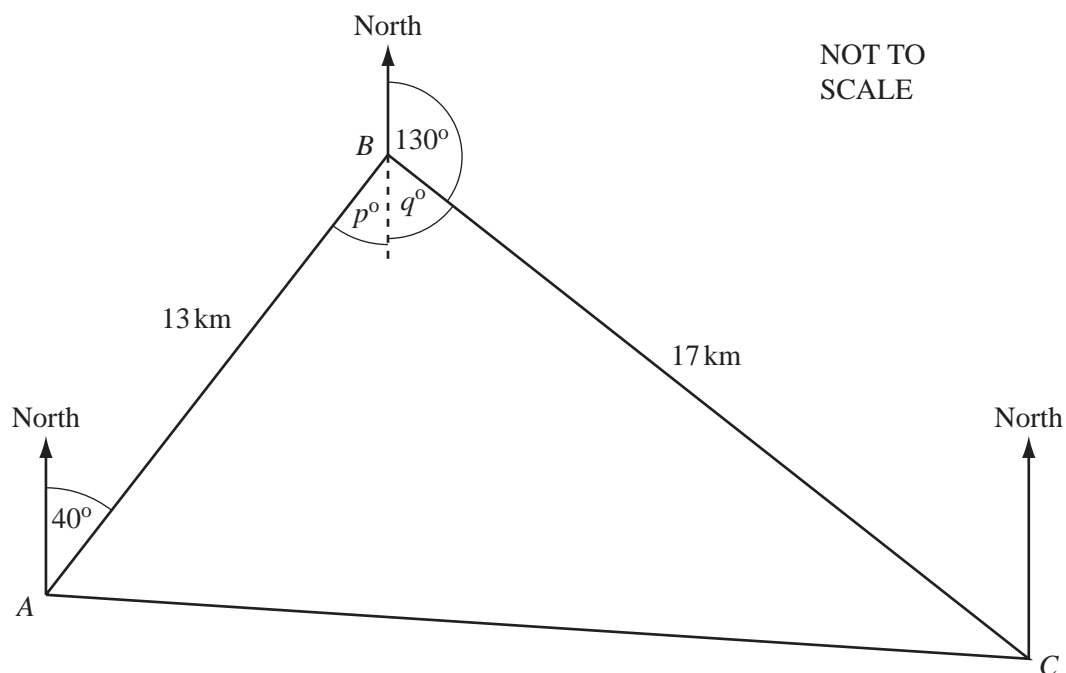


- (a) (i) Complete the following statement.
The side of the field, AC , is metres long. [1]
- (ii) Measure, in degrees, the angle ACB .
Answer(a)(ii) Angle ACB = [1]

In the following parts, leave in all your construction lines.

- (b) The farmer divides the field with a fence from A to the side BC .
Each point on the fence is the same distance from AB as from AC .
- (i) Using a straight edge and compasses only, construct the line representing the fence. [2]
- (ii) Write down the length of this fence, in metres.
Answer(b)(ii) m [1]
- (c) He puts another fence along the perpendicular bisector of the side AC .
Using a straight edge and compasses only, construct the line representing this fence. [2]
- (d) He decides to keep goats in the region of the field which is closer to AC than to AB and closer to A than to C .
Label the region G in the field where he can keep goats. [2]

- 10 Bashira lives in town A and works in town B , which is 13 kilometres from A on a bearing of 040° . She drives from home to work and then drives to visit her mother who lives in town C . Town C is 17 kilometres from B on a bearing of 130° from B .



- (a) By writing down the values of p and q , show that angle $ABC = 90^\circ$.

Answer(a) $p = \dots\dots\dots$ and $q = \dots\dots\dots$ [1]

- (b) Use trigonometry to calculate the size of angle ACB .

Answer(b) Angle $ACB = \dots\dots\dots$ [2]

- (c) Calculate the distance CA .

Answer(c) $CA = \dots\dots\dots$ km [2]

- (d) Calculate the area of the triangle ABC .

Answer(d) $\dots\dots\dots$ km^2 [2]

- (e) Work out the bearing of A from C .

Answer(e) $\dots\dots\dots$ [2]

- 1 The distance from Buenos Aires to Wellington is approximately 10 100 kilometres.
Write this number in standard form.

Answer km [1]

- 2 Factorise $3xy - 2x$.

Answer [1]

- 3 The highest mountain in Argentina is Aconcagua.
Its height is 6960 metres, correct to the nearest **twenty** metres.
Write down the smallest possible height of Aconcagua.

Answer m [1]

- 4 Which one of the numbers below is **not** a rational number?

$$7 \quad \frac{2}{3} \quad \sqrt{5} \quad -1\frac{1}{2} \quad \sqrt{81}$$

Answer [1]

- 5 Solve the equation $5x - 7 = 8$.

Answer $x =$ [2]

- 6 A bottle of lemonade contains $1\frac{1}{2}$ litres.

A glass holds $\frac{1}{8}$ litre.

How many glasses can be filled from one bottle of lemonade?

Answer [2]

- 7 The table below shows the average monthly temperatures ($^{\circ}\text{C}$) in the Islas Orcadas, Argentina.

| Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec |
|-----|-----|-----|-----|-----|------|------|-----|------|-----|-----|-----|
| 1 | 1 | 0.5 | -1 | -5 | -8 | -9 | -8 | -5 | -3 | -1 | 0.5 |

- (a) Work out the difference between the highest and the lowest average monthly temperature.

Answer(a) $^{\circ}\text{C}$ [1]

- (b) The highest recorded temperature for July is $x^{\circ}\text{C}$.
This is 21°C above the average for July shown in the table.
Work out the value of x .

Answer(b) $x =$ [1]

- 8 The formula for the perimeter, P , of a rectangle with length a and width b is

$$P = 2a + 2b.$$

Make a the subject of the formula.

Answer $a =$ [2]

- 9 0.072 72% 0.702 $\frac{7}{10}$ $\frac{7}{100}$ 7.2%

From the values listed above, write down

- (a) the smallest,

Answer(a) [1]

- (b) the largest,

Answer(b) [1]

- (c) the two which are equal.

Answer(c) and [1]

- 10 An integer n is such that $60 \leq n \leq 70$.
Write down a value of n which is

(a) a prime number,

Answer(a) [1]

(b) a multiple of 9,

Answer(b) [1]

(c) a square number.

Answer(c) [1]

11

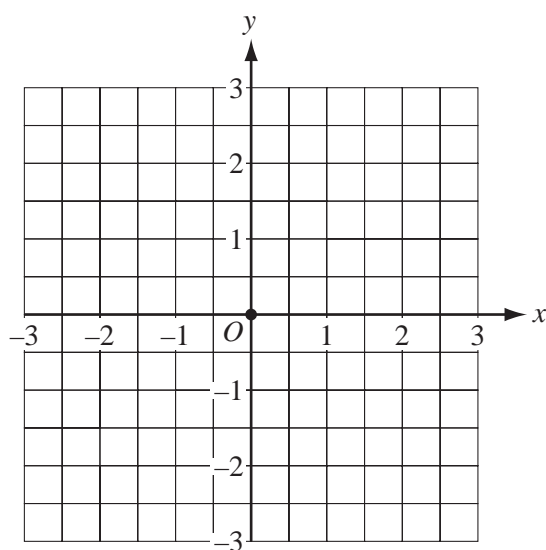
$$\mathbf{p} = \begin{pmatrix} 2 \\ -3 \end{pmatrix} \text{ and } \mathbf{q} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}.$$

(a) Write $\mathbf{p} + \mathbf{q}$ as a column vector.

Answer (a) $\mathbf{p} + \mathbf{q} = \begin{pmatrix} \\ \end{pmatrix}$ [2]

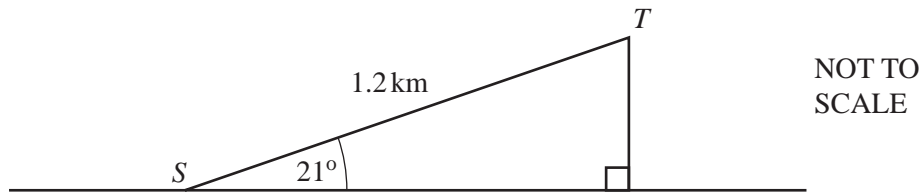
(b) The point O is marked on the grid below.

Draw the vector \vec{OP} where $\vec{OP} = \mathbf{p}$.



[1]

12



The diagram shows a path, ST , up a hill.

The path is 1.2 kilometres long and slopes at an angle of 21° to the horizontal.

Calculate the height of the hill, showing all your working.

Give your answer in **metres**.

Answer m [3]

- 13 The population of Latvia in 1989 was 2 700 000.
In 1994 it was 2 500 000.

Calculate the percentage **decrease** in the population between 1989 and 1994.

Answer % [3]

14

= < >

Choose one of the symbols given above to complete each of the following statements.

When $x = 6$ and $y = -7$, then

(a) x y [1]

(b) x^2 y^2 [1]

(c) $y - x$ $x - y$ [1]

- 15 (a) Write 0.48 correct to 1 significant figure.

Answer(a) [1]

- (b) (i) Find an approximate answer for the sum

$$9.87 - 5.79 \times 0.48$$

by rounding each number to 1 significant figure. Show your working.

Answer(b)(i) [1]

- (ii) Use your calculator to find the exact answer for the sum in **part (b) (i)**.
Write down all the figures on your calculator.

Answer(b)(ii) [1]

- 16 Simplify the following expressions.

(a) $9r - 4s - 6r + s$

Answer(a) [1]

(b) $q^4 \div q^3$

Answer(b) [1]

(c) $p^6 \times p^{-2}$

Answer(c) [1]

- 17 Three friends, Cleopatra, Dalila and Ebony go shopping.

The money they each have is in the ratio

$$\text{Cleopatra} : \text{Dalila} : \text{Ebony} = 5 : 7 : 8.$$

Cleopatra has \$15.

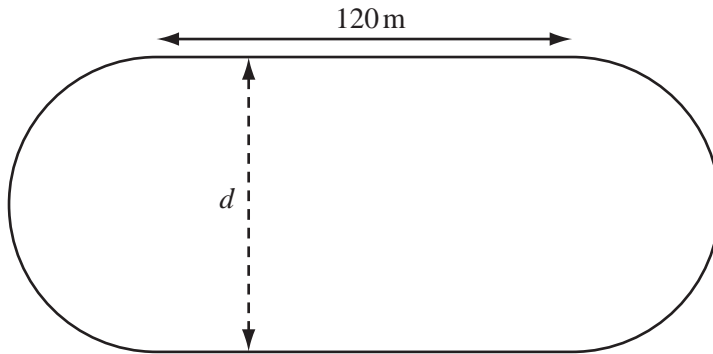
- (a) How many dollars do they have in total?

Answer(a) [2]

- (b) Dalila spends \$12 on a hat.
How many dollars does she have left?

Answer(b) [1]

- 18 A 400 metre running track has two straight sections, each of length 120 metres, and two semicircular ends.



NOT TO
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- (a) Calculate the **total** length of the **curved** sections of the track.

Answer(a) m [1]

- (b) Calculate d , the distance between the parallel straight sections of the track.

Answer(b) $d =$ m [2]

- 19 Joseph buys 45 kilograms of potatoes from a supplier for \$0.65 per kilogram.

- (a) How much does he pay for the potatoes?

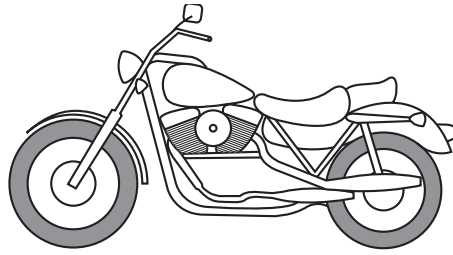
Answer(a) \$ [1]

- (b) He then puts the potatoes into bags which each hold 2.5 kilograms.
How many bags can he fill with the potatoes?

Answer(b) bags [1]

- (c) At the market he sells the bags of potatoes for \$2.20 per bag.
Calculate the smallest number of **complete** bags he needs to sell in order to make a profit.

Answer(c) bags [2]



\$900

Lorenzo saves money for a motorbike.
The marked price of the motorbike is \$900.
He pays a deposit of 35% of the marked price.

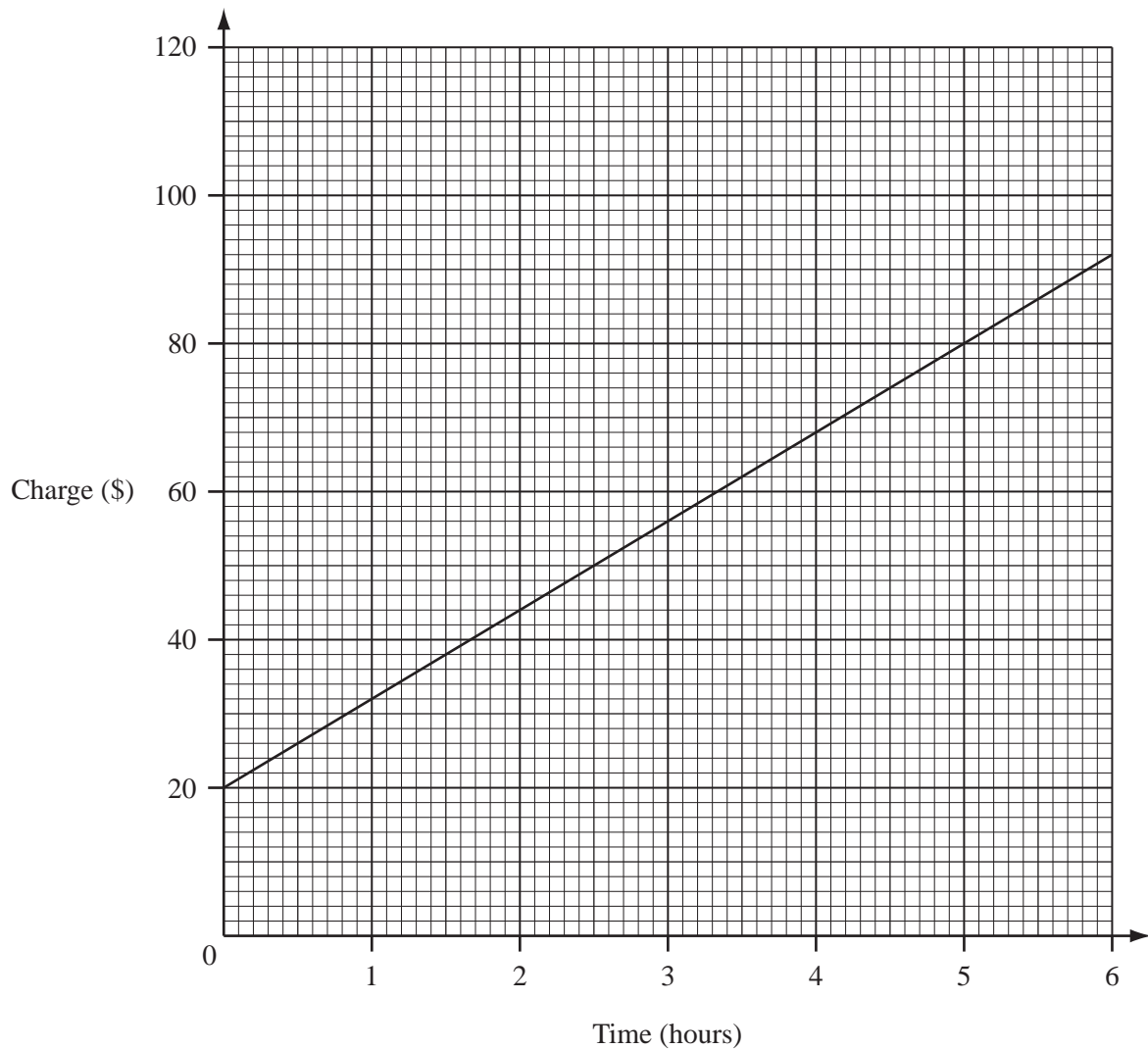
(a) Calculate his deposit.

Answer(a) \$..... [2]

(b) He then makes 12 monthly payments of \$60 each.
How much more than the \$900 marked price does he pay altogether?

Answer(b) \$..... [3]

- 21 The graph below shows the amount a plumber charges for up to 6 hours work.



- (a) How much does he charge for $3\frac{1}{2}$ hours work?

Answer(a) \$..... [1]

- (b) The plumber charged \$50.
How many hours did he work?

Answer(b)hours [1]

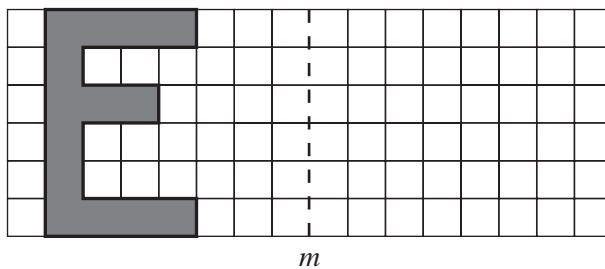
- (c) Another plumber charges \$16 per hour.

(i) Draw a line on the grid above to show his charges. Start your line at (0,0). [2]

- (ii) Write down the number of hours for which the two plumbers charge the same amount.

Answer(c)(ii)hours [1]

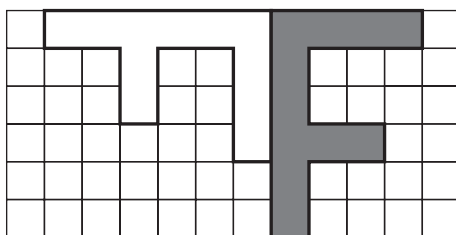
- 1 (a) Draw accurately the reflection of the letter E in the mirror line m .



[2]

- (b) Each diagram below shows a shaded letter and its image. In each case describe fully the single transformation which maps the **shaded** figure onto its image. Mark and label any points you need in your descriptions.

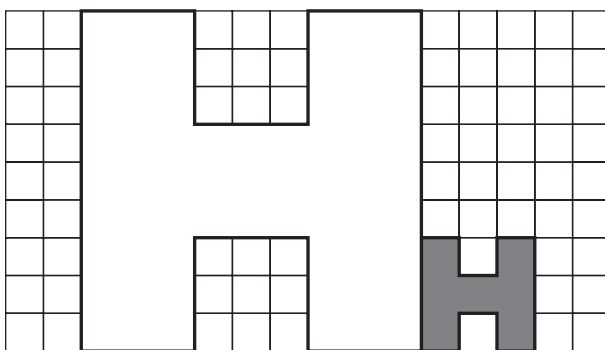
(i)



Answer(b)(i)

[3]

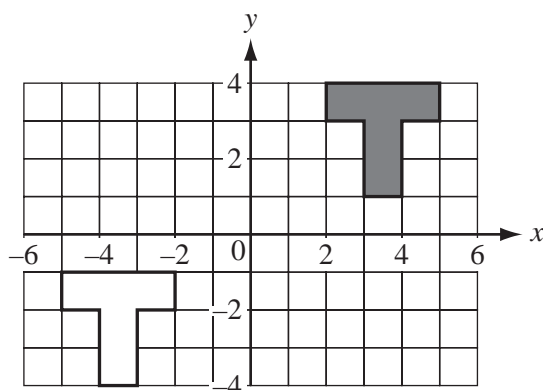
(ii)



Answer(b)(ii)

[3]

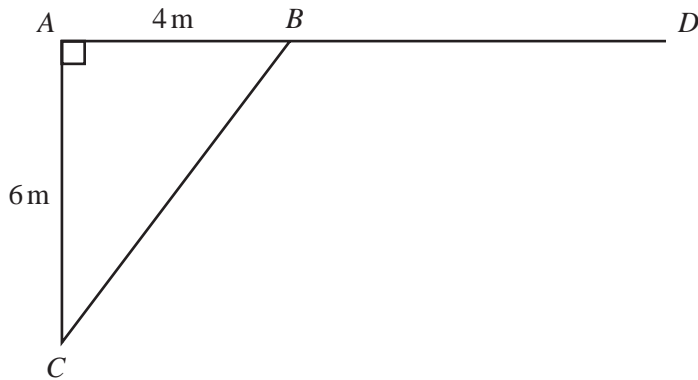
(iii)



Answer(b)(iii)

[3]

- 2 In the diagram below ABD is a straight line.
 $AB = 4$ m and $AC = 6$ m. Angle $BAC = 90^\circ$.



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- (a) (i) Use **trigonometry** to calculate angle ABC .

Answer(a)(i) Angle $ABC =$ [2]

- (ii) Find angle CBD .

Answer(a)(ii) Angle $CBD =$ [1]

- (b) **Calculate** the length of BC .

Answer(b) $BC =$ m [2]

- (c) Work out the perimeter and area of triangle ABC .
 Give the correct units for each.

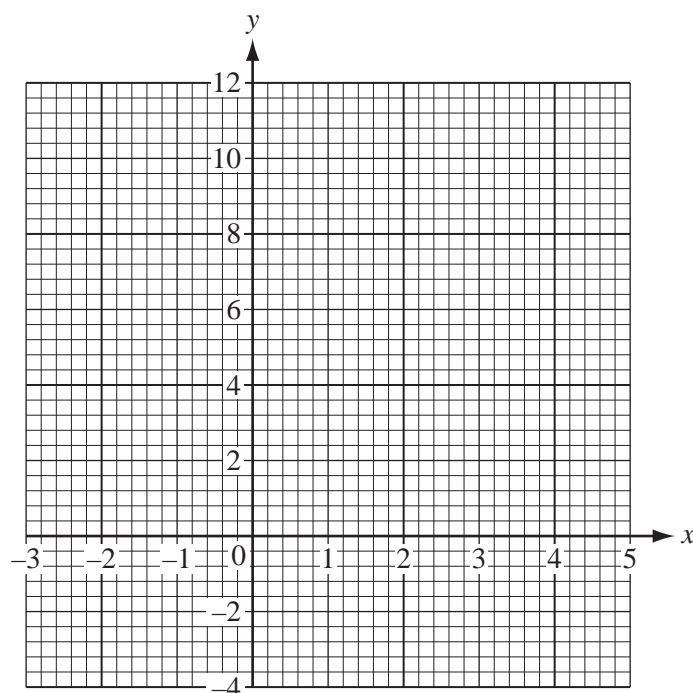
Answer (c) Perimeter = Area = [3]

- 3 (a) (i) Complete the table of values for $y = x^2 - 2x - 3$.

| | | | | | | | | | |
|-----|----|----|----|---|----|----|---|---|---|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| y | 12 | | 0 | | -4 | -3 | 0 | 5 | |

[3]

- (ii) Draw the graph of $y = x^2 - 2x - 3$ on the grid below.



[4]

- (iii) Use your graph to find the solutions to $x^2 - 2x - 3 = -1$.
Give your answers to 1 decimal place.

Answer(a)(iii) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

- (b) (i) Complete the table of values for the equation $y = \frac{2}{x}$.

| | | | | | | | |
|-----|------|-----|---|---|-----|-----|-----|
| x | 0.25 | 0.5 | 1 | 2 | 3 | 4 | 5 |
| y | | 4 | | 1 | 0.7 | 0.5 | 0.4 |

[1]

- (ii) On the same grid draw the graph of $y = \frac{2}{x}$ for $0.25 \leq x \leq 5$.

[3]

- (iii) Write down the x co-ordinate of the point of intersection of your two graphs.

Answer(b)(iii) $x = \dots\dots\dots$ [1]

- 4 Jane records the number of telephone calls she receives each day for two weeks.

5 6 10 0 15 6 12 2 13 16 0 16 6 10

- (a) Calculate the mean.

Answer(a) [3]

- (b) Find the median.

Answer(b) [2]

- (c) Write down the mode.

Answer(c) [1]

- (d) Complete the frequency table below.

| | | | | |
|-----------------|-------|-------|---------|---------|
| Number of calls | 0 – 4 | 5 – 9 | 10 – 14 | 15 – 19 |
| Frequency | | | | |

[2]

- (e) Find the probability that Jane receives

- (i) ten or more calls,

Answer(e)(i) [1]

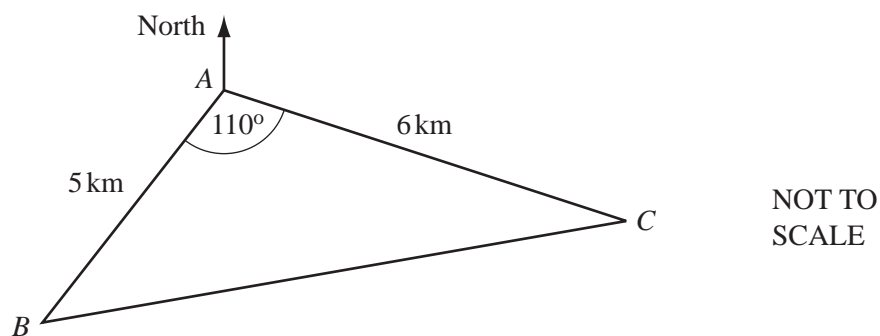
- (ii) less than five calls.

Answer(e)(ii)..... [1]

- (f) Estimate the number of days in the next six weeks that Jane can expect to receive 10 – 14 calls.

Answer(f) days [2]

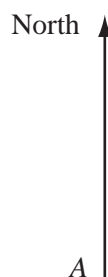
5



In triangle ABC , $AB = 5\text{ km}$, $AC = 6\text{ km}$ and angle $BAC = 110^\circ$.

The bearing of C from A is 100° .

- (a) Make a scale drawing of the triangle ABC .
 Use a scale of 1 centimetre to represent 1 kilometre.
 Start at the point A marked below, where a North line has been drawn.



(b) Measure and write down

(i) angle ABC ,

Answer(b)(i) Angle $ABC = \dots\dots\dots$ [1]

(ii) the bearing of B from C .

Answer(b)(ii)..... [1]

(c) Find the distance in kilometres between B and C .

Answer(c) km [1]

(d) A well is 4 kilometres from A and 5 kilometres from C .

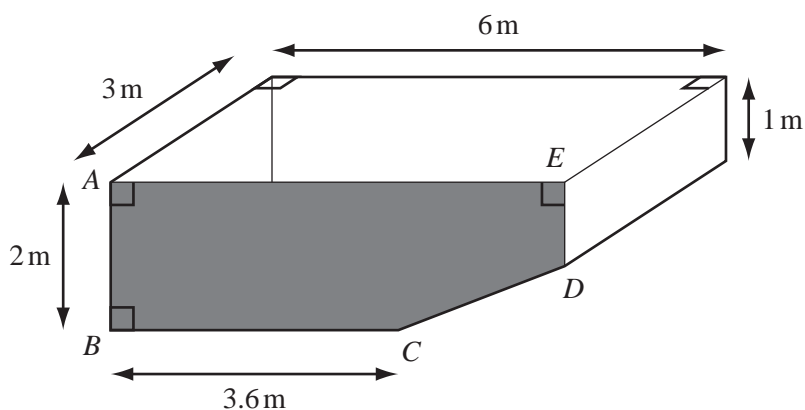
(i) Use your compasses to find **two** possible positions for the well.
Label the two positions P and Q .

[3]

(ii) The well is less than 6 kilometres from B .
Use a measurement from your drawing to complete the following statement.

Answer(d)(ii) The well is at position and is kilometres from B . [2]

- 6 The diagram shows a swimming pool with cross-section $ABCDE$.
The pool is 6 metres long and 3 metres wide.
 $AB = 2$ m, $ED = 1$ m and $BC = 3.6$ m.



- (a) (i) Calculate the area of the cross-section $ABCDE$.
Show your working.

Answer(a)(i) m^2 [4]

- (ii) Calculate the volume of the water in the pool when it is full.
Give your answer in **litres**.
[1 cubic metre is 1000 litres.]

Answer(a)(ii)..... litres [2]

- (iii) One litre of water evaporates every hour for each square metre of the water surface.
How many litres of water will evaporate in 2 hours?

Answer(a)(iii) litres [2]

- (b) **Another pool** holds 61 500 litres of water.

Jon uses a hosepipe to fill this pool.

Water flows through the hosepipe at 1000 litres per hour.

- (i) Calculate how long it takes to fill the pool.
Give your answer in hours and minutes.

Answer(b)(i) hours minutes [2]

- (ii) Change 61 500 litres to gallons.
[4.55 litres = 1 gallon.]

Answer(b)(ii) gallons [1]

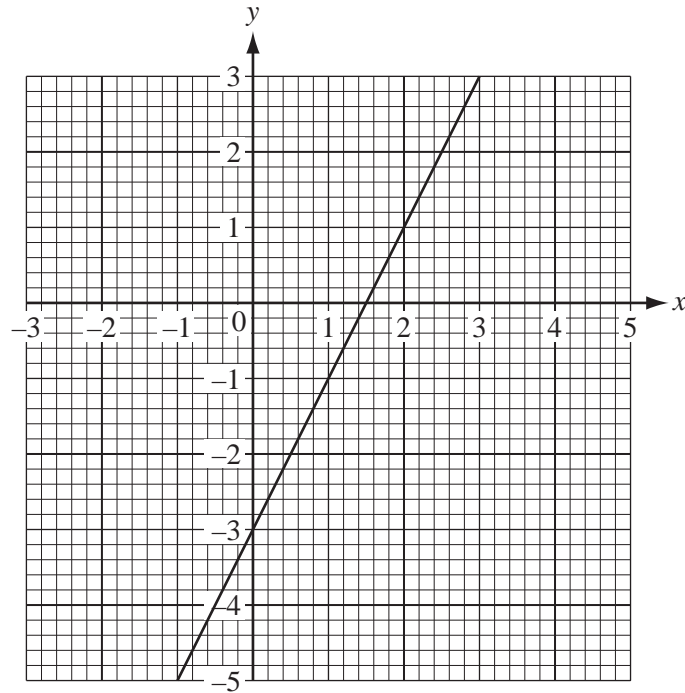
- (iii) Every 10 000 **gallons** of water needs 2.5 litres of purifier.
How many litres of purifier does Jon use for this pool?

Answer(b)(iii) litres [2]

- (iv) The purifier is sold in 1 litre bottles.
How many **bottles** of purifier must Jon buy for this pool?

Answer(b)(iv) [1]

7 (a)



The simultaneous equations $2x - y = 3$ and $x + y = 2$ can be solved graphically.

- (i) Which of these equations is shown by the line on the grid above?

Answer(a)(i) [1]

- (ii) Find the gradient of the line on the grid.

Answer(a)(ii) [2]

- (iii) Complete the table below for the other equation.

| | | | | | |
|-----|----|---|---|---|---|
| x | -1 | 0 | 1 | 2 | 3 |
| y | | | | | |

[2]

- (iv) Draw this line on the grid above.

[1]

- (v) Use **your graphs** to write down the solution to the two equations.

Give your values correct to 1 decimal place.

Answer(a)(v) $x =$

$y =$ [3]

- (b) Use algebra to solve the following simultaneous equations **exactly**.
Show all your working.

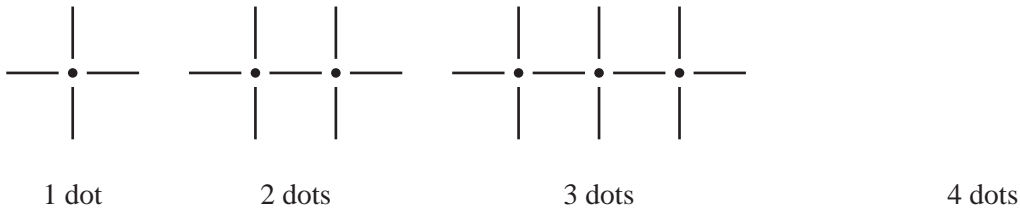
$$\begin{aligned} 2x - y &= 3, \\ x + y &= 2. \end{aligned}$$

For
Examiner's
Use

Answer(b) $x = \dots\dots\dots$

$y = \dots\dots\dots$ [4]

- 8 The diagram below shows a sequence of patterns made from dots and lines.



- (a) Draw the next pattern in the sequence in the space above. [1]
- (b) Complete the table for the numbers of dots and lines.

| | | | | | | |
|-------|---|---|----|---|---|---|
| Dots | 1 | 2 | 3 | 4 | 5 | 6 |
| Lines | 4 | 7 | 10 | | | |

[2]

- (c) How many lines are in the pattern with 99 dots?

Answer(c) $\dots\dots\dots$ [2]

- (d) How many lines are in the pattern with n dots?

Answer(d) $\dots\dots\dots$ [2]

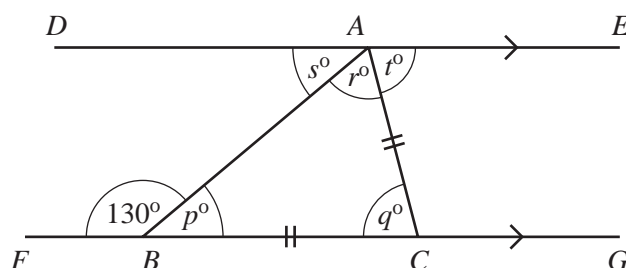
- (e) Complete the following statement.

There are 85 lines in the pattern with $\dots\dots\dots$ dots. [2]

- 9 (a) Calculate the size of one exterior angle of a regular heptagon (seven-sided polygon).
Give your answer correct to 1 decimal place.

Answer(a) [3]

(b)



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In the diagram above, DAE and $FBCG$ are parallel lines.
 $AC = BC$ and angle $FBA = 130^\circ$.

- (i) What is the special name given to triangle ABC ?

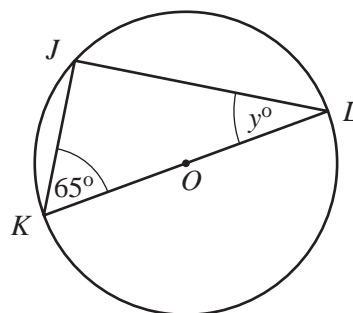
Answer(b)(i) [1]

- (ii) Work out the values of p , q , r , s and t .

Answer (b)(ii) $p = \dots\dots\dots q = \dots\dots\dots r = \dots\dots\dots s = \dots\dots\dots t = \dots\dots\dots$ [5]

(c)

J , K and L lie on a circle centre O .
 KOL is a straight line and angle $JKL = 65^\circ$.
Find the value of y .



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SCALE

Answer(c) $y = \dots\dots\dots$ [2]

- 1 The diameter of the sun is 1 392 530 kilometres.
Write this value correct to 4 significant figures.

Answer km [1]

- 2 A bag of 30 sweets contains 8 chocolates, 13 nougats and 9 toffees.

A sweet is selected at random.

What is the probability that it is a toffee?

Answer [1]

- 3 Anne took a test in chemistry.
She scored 20 marks out of 50.
Work out her percentage mark.

Answer% [1]

- 4 Write, in its simplest form, the ratio

3.5 kilograms : 800 grams.

Answer : [2]

- 5 Work out 4^{-3} as a fraction.

Answer [2]

- 6 2, 3, 5, 9, 12, 15

From the set of numbers above, write down

(a) a multiple of 6,

Answer (a) [1]

(b) a prime factor of 27.

Answer (b) [1]

- 7 Alphonse spends \$28 on food.
This amount is $\frac{4}{9}$ of his allowance.
Calculate his allowance.

Answer \$ [2]

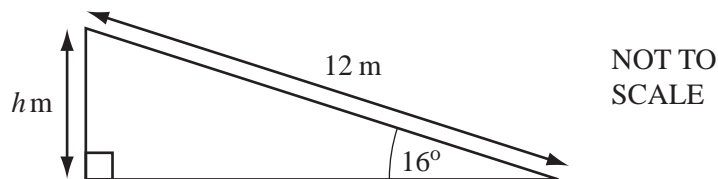
- 8 When $x = -3$ find the value of $x^3 + 2x^2$.

Answer [2]

- 9 At the market, Fernando weighs his fruit to the nearest 10 grams.
He weighs a mango as 260 grams.
Complete the statement in the answer space.

Answer g \leq weight of mango < g [2]

10



A ramp from a car park to a shopping centre slopes upward at an angle of 16° to the horizontal.
The length of the ramp is 12 metres.
Calculate the difference in height, h metres, between the car park and the shopping centre.

Answer m [2]

- 11 Yasmeen is setting up a business.
She borrows \$5000 from a loan company.
The loan company charges 6% per year simple interest.
How much interest will Yasmeen pay after 3 years?

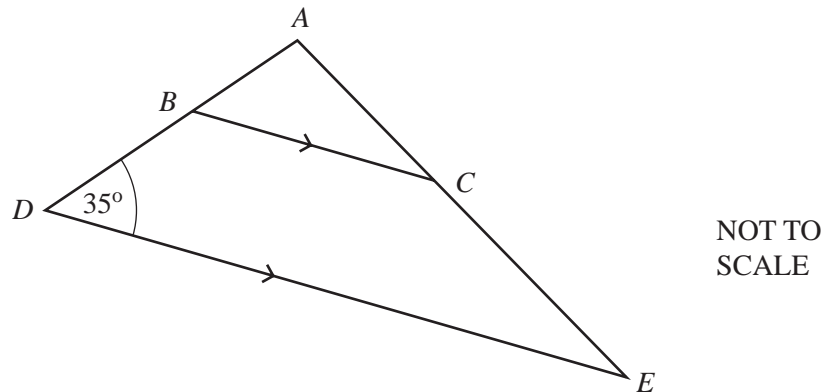
Answer \$ [2]

- 12 Make s the subject of the formula

$$p = st - q.$$

Answer $s =$ [2]

13



In the diagram BC is parallel to DE . ABD and ACE are straight lines.

- (a) Choose one of the following words to complete the statement in the answer space.

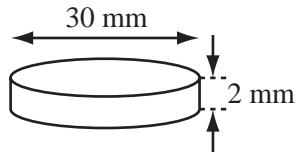
congruent equilateral isosceles similar

Answer (a) Triangle ABC and triangle ADE are [1]

- (b) Angle $BDE = 35^\circ$.
Calculate the size of angle DBC .

Answer (b) Angle $DBC =$ [1]

14

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An old Greek coin is a cylinder with a **diameter** of 30 millimetres and a thickness of 2 millimetres. Calculate, in cubic millimetres, the volume of the coin.
[The volume of a cylinder, radius r , height h , is $\pi r^2 h$.]

Answer mm³ [2]

15 (a) Write down a common multiple of 6 and 8.

Answer (a) [1]

(b) Work out

$$\frac{5}{6} - \frac{3}{8}.$$

Give your answer as a fraction in its lowest terms.
You must show all your working.

Answer (b) [2]

16 Look at the sequence of numbers

7, 11, 15, 19,

(a) Write down the next number in the sequence.

Answer (a) [1]

(b) Find the 10th number in the sequence.

Answer (b) [1]

(c) Write an expression, in terms of n , for the n th number in the sequence.

Answer (c) [1]

- 17 (a) Expand the bracket and simplify the expression

$$7x + 5 - 3(x - 4).$$

Answer (a) [2]

- (b) Factorise $5x^2 - 7x$.

Answer (b) [1]

- 18 Camilla has \$5 to spend in the market.

She buys $1\frac{1}{2}$ kilograms of bananas priced at 80 cents per kilogram and 3 yams priced at 45 cents each.
How much money does she have left?

Answer \$ [3]

19

$$\frac{8.95 - 3.05 \times 1.97}{2.92}$$

- (a) (i) Write the above expression with each number rounded to one significant figure.

Answer (a)(i) [1]

- (ii) Use your answer to find an **estimate** for the value of the expression.

Answer (a)(ii) [1]

- (b) Use your calculator to work out the value of the **original** expression.
Give your answer correct to 2 decimal places.

Answer (b) [1]

20

| Country | Area (km ²) |
|----------|-------------------------|
| Brazil | 8.51×10^6 |
| Panama | 7.71×10^4 |
| Guyana | 2.15×10^5 |
| Colombia | 1.14×10^6 |

The table above gives the areas of four South American countries, correct to 3 significant figures.

- (a) List the countries in order of area, smallest to largest.

Answer (a) < Guyana < < [1]

- (b) Use a whole number to complete the statement in the answer space.

Answer (b) The area of Colombia is approximately times the area of Guyana. [2]

21

| |
|--|
| <p style="text-align: center;">SALE All items 35% Reduction</p> |
|--|

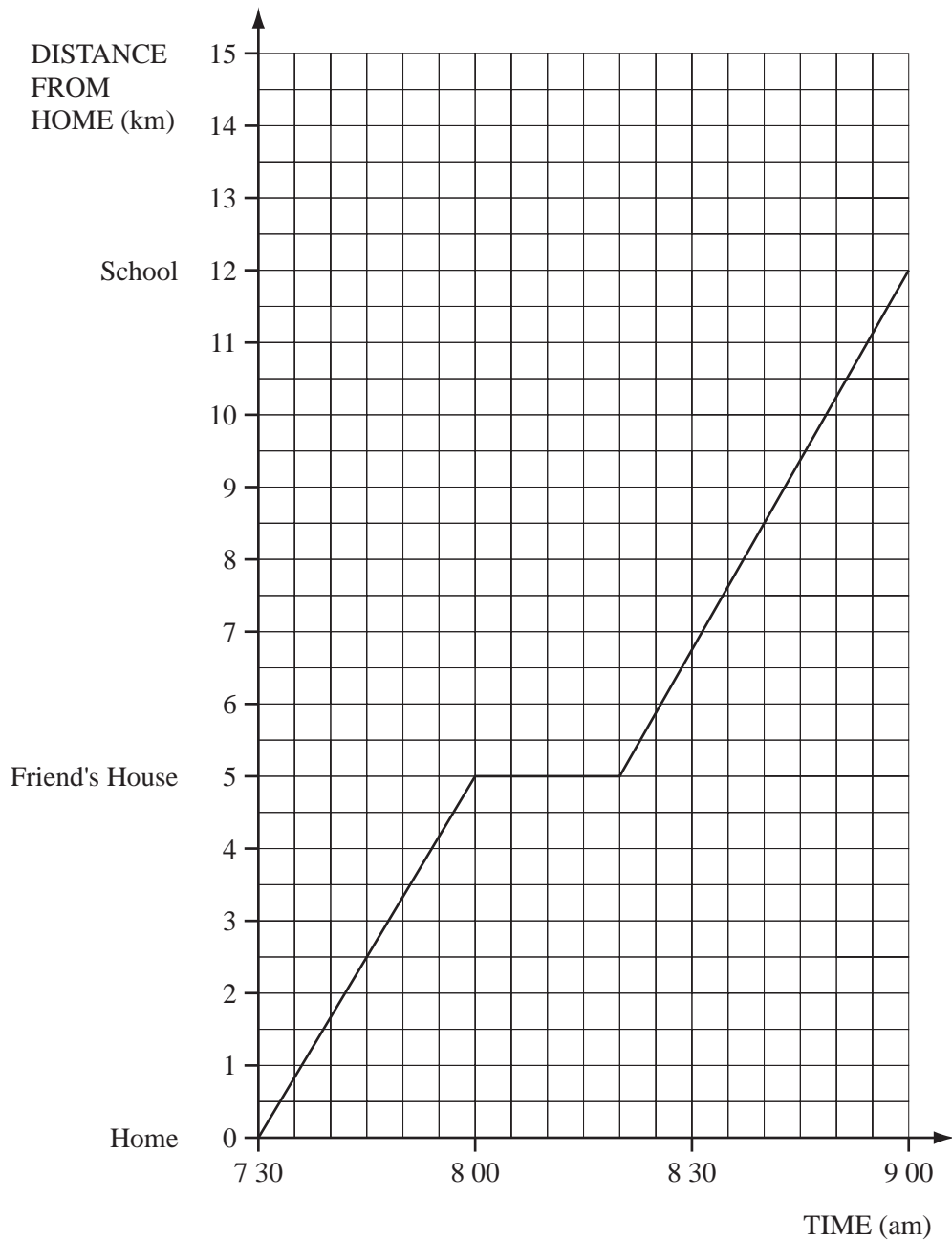
Abdul bought a spade in this sale. Its **original** price was \$16.

- (a) How much did Abdul save?

Answer (a) \$ [2]

- (b) The next day, all items were sold at half the **original** price.
How much **more** would Abdul have saved if he had waited until the next day to buy the spade?

Answer (b) \$ [1]



Ricardo rode to his friend's house. He waited for his friend to get ready. Then they cycled together to school. Ricardo's journey is shown on the grid.

- (a) Work out the speed at which Ricardo cycled to his friend's house.

Answer (a) km/h [2]

- (b) How long did he wait for his friend?

Answer (b) min [1]

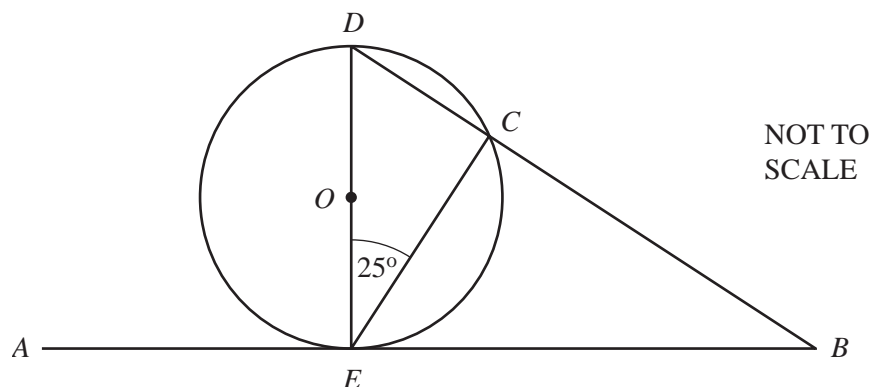
- (c) Ricardo's brother left home at 8 00 am.
He cycled directly to school at a constant speed of 15 kilometres per hour.
Draw his journey on the **grid opposite**.

[1]

- (d) How many minutes earlier than Ricardo did his brother arrive at school?

Answer (d) min [1]

23



In the diagram, DE is a diameter of the circle, centre O .
 AEB is the tangent at the point E . The line DCB cuts the circle at C .
Angle $DEC = 25^\circ$.

- (a) Write down the size of angle DCE .

Answer (a) Angle $DCE = \dots\dots\dots$ [1]

- (b) Calculate the size of angle CDE .

Answer (b) Angle $CDE = \dots\dots\dots$ [2]

- (c) Calculate the size of angle DBE .

Answer (c) Angle $DBE = \dots\dots\dots$ [2]

1 Juana is travelling by plane from Spain to England.

- (a) Her case weighs 17.2 kilograms.
The maximum weight allowed is 20 kilograms.
By how much is the weight of her case below the maximum allowed?

Answer (a) kg [1]

- (b) She changes 150 euros (€) into pounds (£).
The exchange rate is €1 = £0.71.
Calculate how much she receives.

Answer (b) £ [1]

- (c) She travels from her home to the airport by train.
She catches a train at 09 55 and the journey takes 45 minutes.

- (i) Write down the time she arrives at the airport.

Answer (c)(i) [1]

- (ii) She has to wait until 12 10 to get on her plane.
Work out how long she has to wait.

Answer (c)(ii) h min [1]

- (d) The plane takes off at 12 40 Spanish time, which is 11 40 English time.
The flight takes $2\frac{1}{4}$ hours.
What is the time in England when she arrives?

Answer (d) [1]

- (e) The plane has seats for 420 passengers.
15% of the seats are empty.
How many passengers are on the plane?

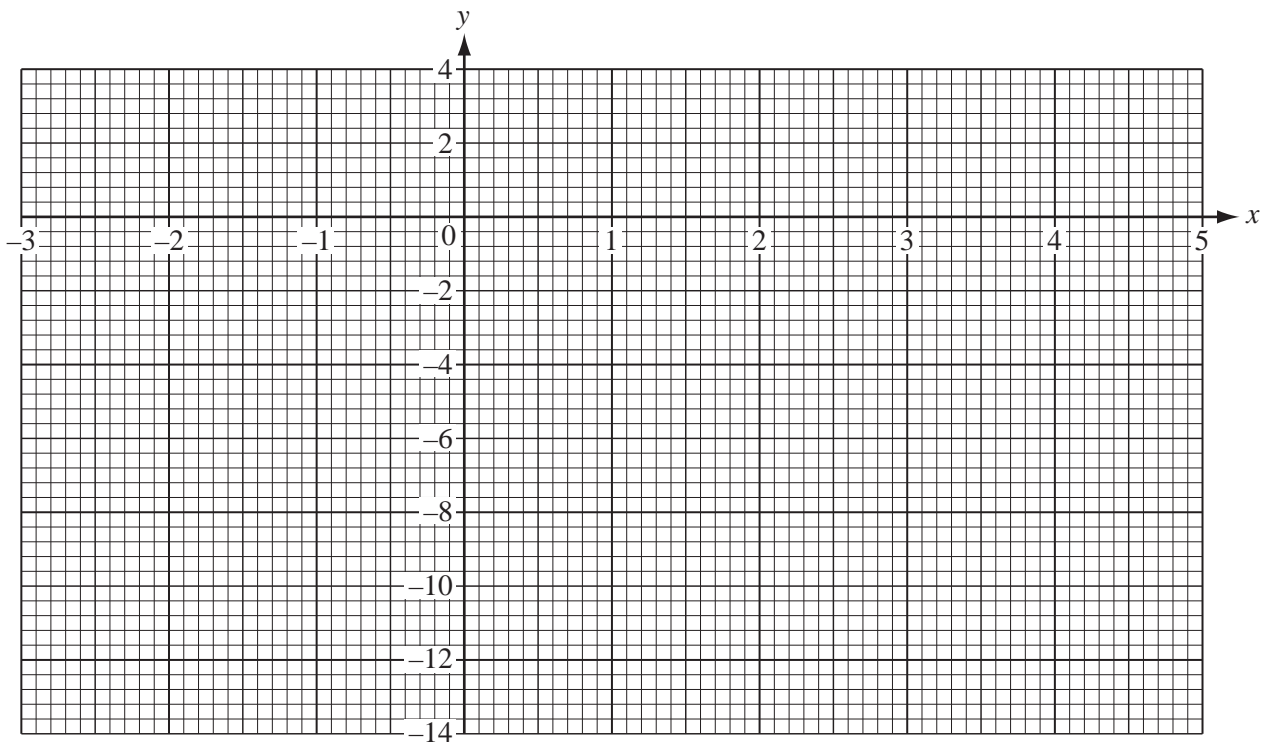
Answer (e) [3]

- 2 (a) Complete the table of values for $y = 1 + 2x - x^2$.

| | | | | | | | | | |
|-----|-----|----|----|---|---|---|----|---|-----|
| x | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| y | -14 | -7 | | | | 1 | -2 | | -14 |

[3]

- (b) Draw the graph of $y = 1 + 2x - x^2$ on the grid below.



[4]

- (c) Use your graph to find the solutions to the equation $1 + 2x - x^2 = 0$.

Answer (c) $x =$

or $x =$ [2]

- (d) (i) On the grid, draw the line of symmetry of the graph. [1]

- (ii) Write down the equation of this line of symmetry.

Answer(d)(ii) [1]

3

| | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|------------------------|--------|---------|-----------|----------|--------|----------|--------|
| Minimum temperature °C | 4 | 6 | 0 | -2 | -4 | 2 | |
| Maximum temperature °C | 8 | 10 | 5 | 7 | 2 | 7 | |

The table shows the minimum and maximum temperatures on six days of a week.

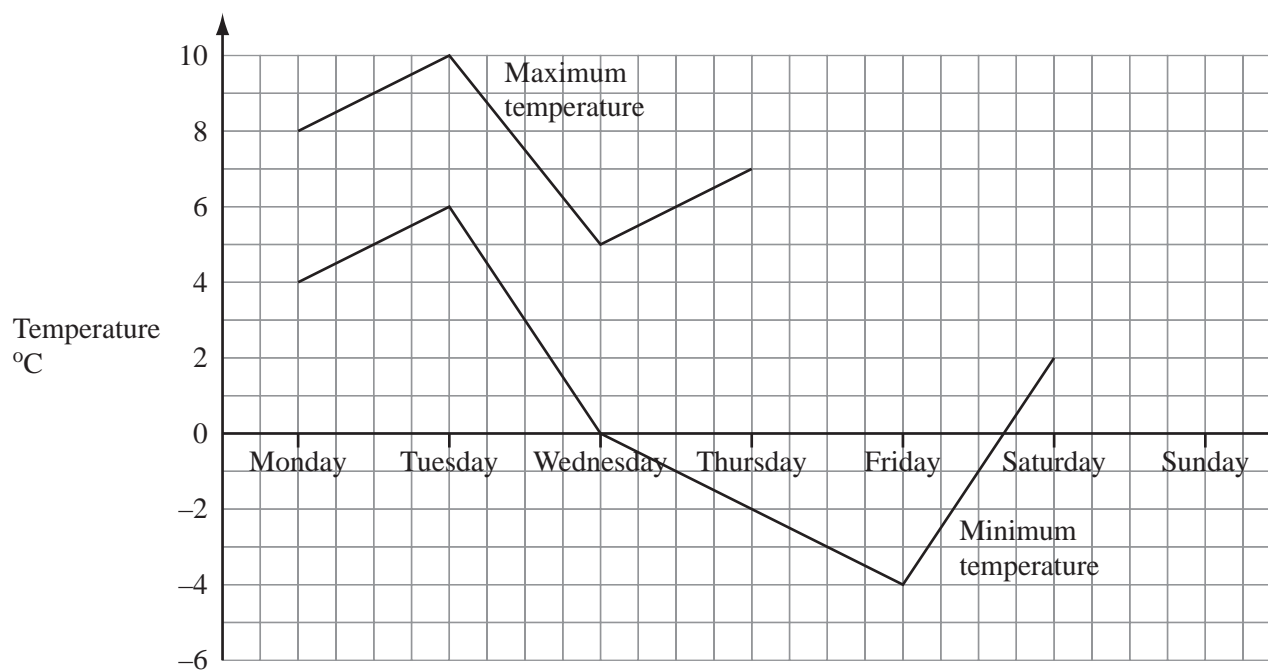
- (a) (i) On Sunday the minimum temperature was 5°C lower than on Saturday.
The maximum temperature was 2°C higher than on Saturday.
Use this information to complete the table.

[2]

- (ii) Find the difference between the minimum and maximum temperatures on Thursday.

Answer(a)(ii) $^{\circ}\text{C}$ [1]

- (b) Use the table to complete the graphs below for all seven days.



[2]

(c) Use your graphs to find

(i) on how many days the temperature fell below -1°C ,

Answer(c)(i) [1]

(ii) which day had the largest difference between minimum and maximum temperatures.

Answer(c)(ii) [1]

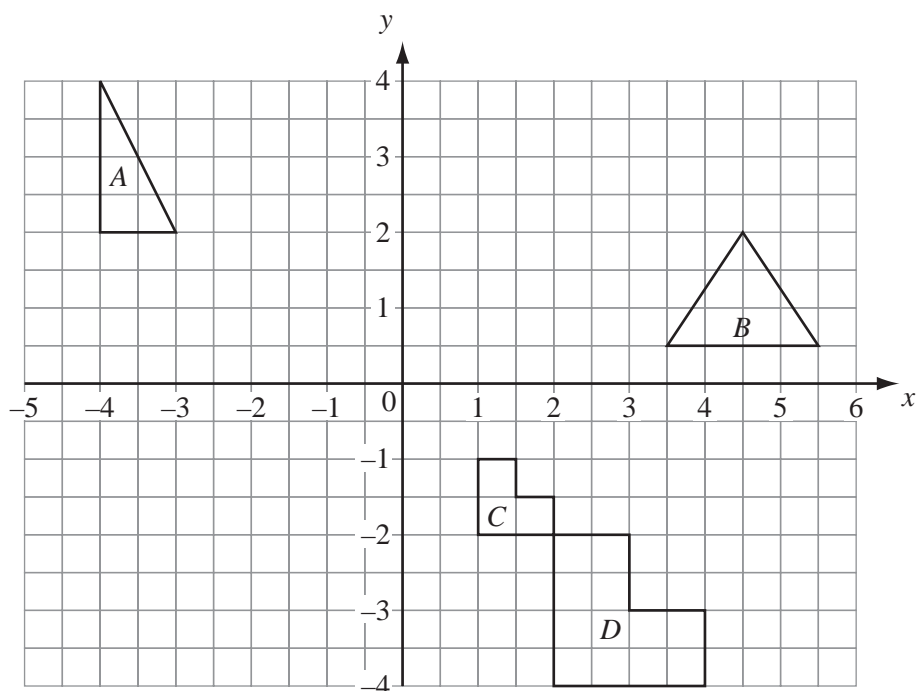
(d) The formula for changing degrees Celsius (C) to degrees Fahrenheit (F) is

$$F = \frac{9C}{5} + 32.$$

Use the formula to change 6 degrees Celsius to degrees Fahrenheit.
Show all your working.

Answer(d) [2]

*For
Examiner's
Use*



(a) A translation is given by $\begin{pmatrix} 6 \\ 3 \end{pmatrix} + \begin{pmatrix} -3 \\ -4 \end{pmatrix}$.

(i) Write this translation as a single column vector.

Answer(a)(i) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

(ii) On the grid, draw the translation of triangle A using this vector. [2]

(b) Another translation is given by $-2 \begin{pmatrix} 1 \\ -1 \end{pmatrix}$

(i) Write this translation as a single column vector.

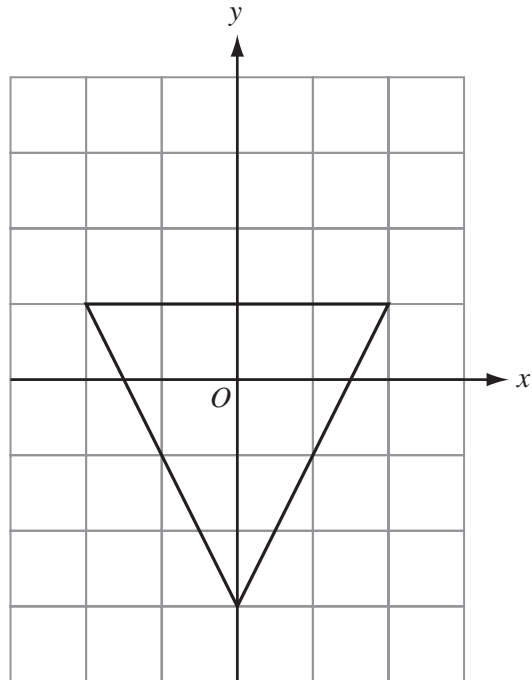
Answer(b)(i) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

(ii) On the grid, draw the translation of triangle B using this vector. [2]

(c) Describe fully the single transformation that maps shape C onto shape D .

Answer(c) [3]

(d)



The triangle in the diagram above is isosceles.

- (i) How many lines of symmetry does this triangle have?

Answer(d)(i) [1]

- (ii) Write down the order of rotational symmetry of this triangle.

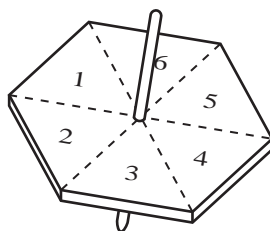
Answer(d)(ii) [1]

- (iii) On the grid above, draw the rotation of this triangle about O through 180° . [2]

- (iv) Describe fully another single transformation that maps this triangle onto your answer for part (d)(iii).

Answer(d)(iv) [2]

5



- (a) Asif tests a six-sided spinner.

The results of 60 spins are shown below.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 3 | 6 | 5 | 6 | 1 | 2 | 6 | 5 | 2 |
| 3 | 4 | 4 | 4 | 3 | 4 | 6 | 5 | 2 | 1 |
| 6 | 3 | 6 | 4 | 1 | 5 | 3 | 6 | 2 | 6 |
| 6 | 6 | 3 | 6 | 1 | 6 | 6 | 5 | 1 | 6 |
| 1 | 6 | 2 | 5 | 3 | 6 | 4 | 2 | 3 | 5 |
| 1 | 4 | 4 | 1 | 5 | 4 | 6 | 6 | 2 | 3 |

- (i) Use these results to complete the frequency table.

| Number | Frequency |
|--------|-----------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |

[3]

- (ii) Write down the mode.

Answer(a)(ii) [1]

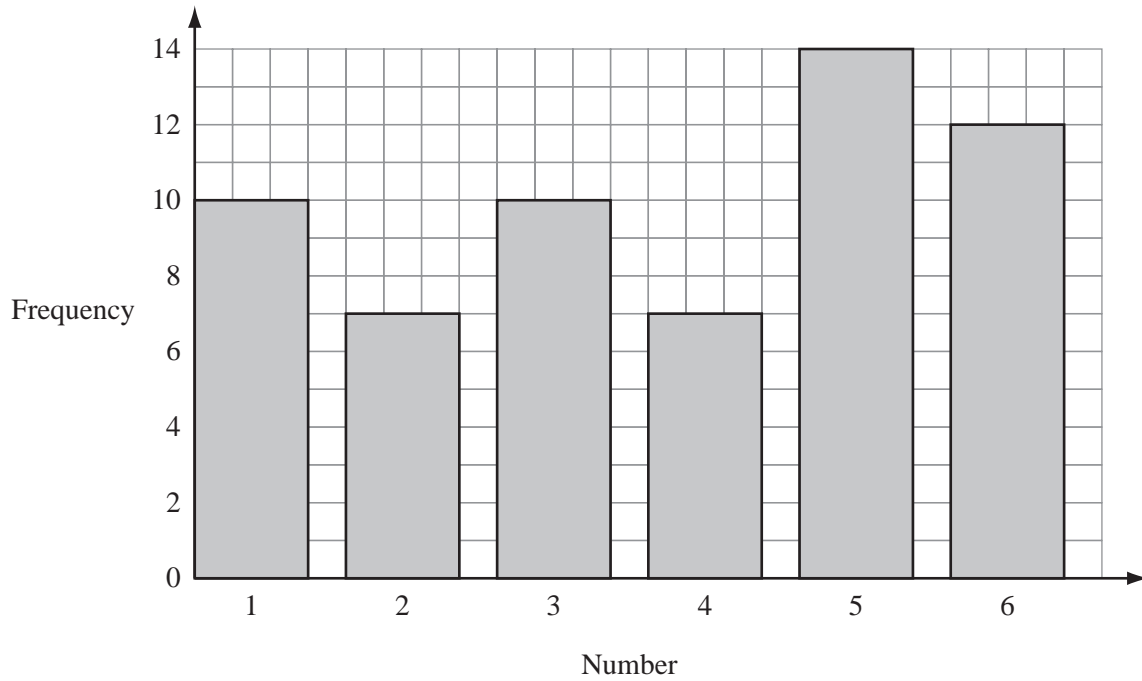
- (iii) Find the median.

Answer(a)(iii) [2]

- (iv) Calculate the mean.
Give your answer correct to one decimal place.

Answer(a)(iv) [3]

- (b) Asif tests a **different** six-sided spinner.
He draws a bar chart to show the results.



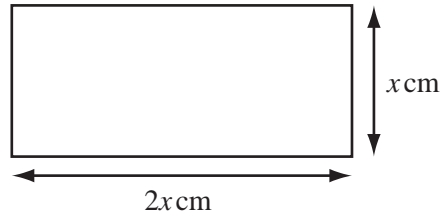
- (i) How many times did he spin this spinner?

Answer(b)(i) [2]

- (ii) Calculate the mean score for this spinner.

Answer(b)(ii) [3]

6 (a)

NOT TO
SCALE

The perimeter of the rectangle in the diagram above is 36 centimetres.

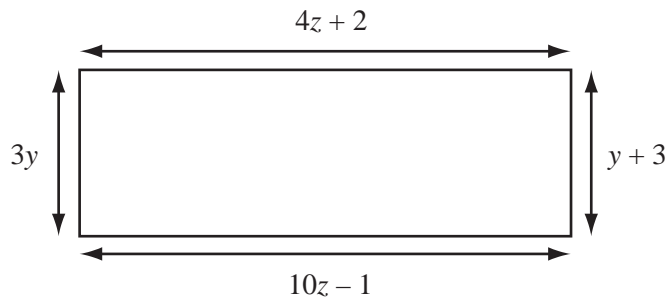
- (i) Find the value of x .

Answer(a)(i) $x =$ [2]

- (ii) Using this value of x , calculate the area of the rectangle.

Answer(a)(ii) cm^2 [2]

(b)

NOT TO
SCALE

The diagram above shows another rectangle.

- (i) In this rectangle $3y = y + 3$.
Solve the equation to find y .

Answer(b)(i) $y =$ [2]

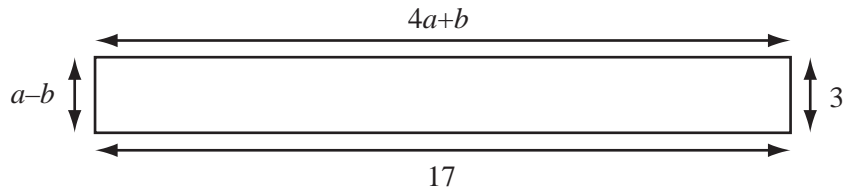
- (ii) Write down an equation in z .

Answer(b)(ii) [1]

- (iii) Solve the equation in part (b)(ii) to find z .

Answer(b)(iii) $z =$ [3]

(c)

NOT TO
SCALE

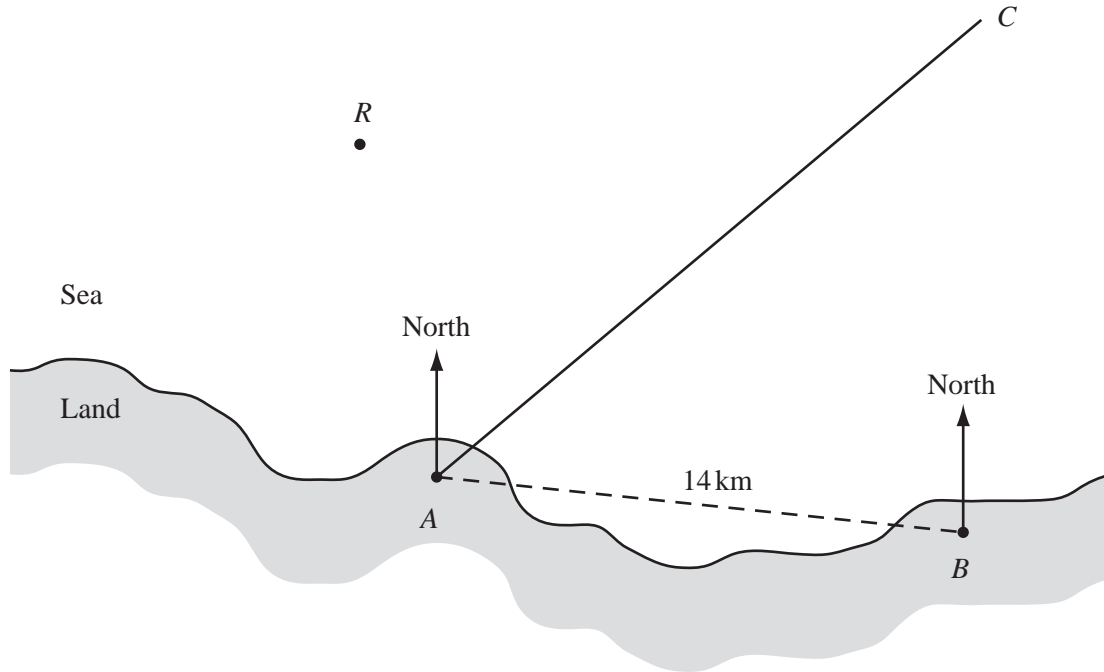
The diagram above shows another rectangle.

(i) Write down two equations in a and b .

Answer(c)(i)
 [2]

(ii) Solve these two equations simultaneously to find a and b .

Answer(c)(ii) $a =$
 $b =$ [3]



At midday, a ship is somewhere along the line from A to C .

- (a) By measuring an angle, write down the three figure bearing of the ship from A .

Answer(a) [2]

- (b) The coastguard at B sees the ship on a bearing of 350° .

(i) On the diagram draw accurately the line showing a bearing of 350° from B . [1]

(ii) On the diagram mark the position of the ship, S . [1]

- (c) (i) Measure the length, in centimetres, of the line AB on the diagram.

Answer(c)(i) cm [1]

- (ii) The distance from A to B is 14 kilometres.
Calculate the scale of the drawing.
Give your answer in the form $1:n$.

Answer(c)(ii) 1: [2]

- (d) The ship is sailing straight for the rocks, R .

There is a lighthouse at A .

The range of the light from the lighthouse is 10 kilometres.

- (i) Using your scale, draw the locus of points that are 10 kilometres from A . [2]

- (ii) Draw the line SR on the diagram.

How far is the ship from the rocks when the light from the lighthouse is first seen on the ship?

Answer(d)(ii) km [2]

- (e) If the ship does not alter course it will hit the rocks at 12 40.

A lifeboat sets off from the coastguard station, B , at 12 00 and sails straight towards the rocks.

- (i) Measure and calculate the distance, in kilometres, from the coastguard station, B , to the rocks, R .

Answer(e)(i) km [2]

- (ii) Calculate the speed, in kilometres per hour, at which the lifeboat must sail to reach the rocks by 12 40.

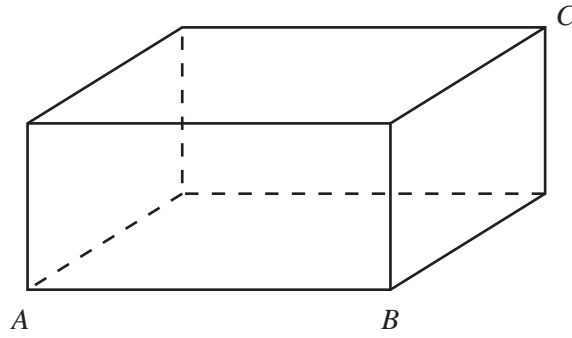
Answer(e)(ii) km/h [3]

- (iii) A knot is 1 nautical mile per hour.

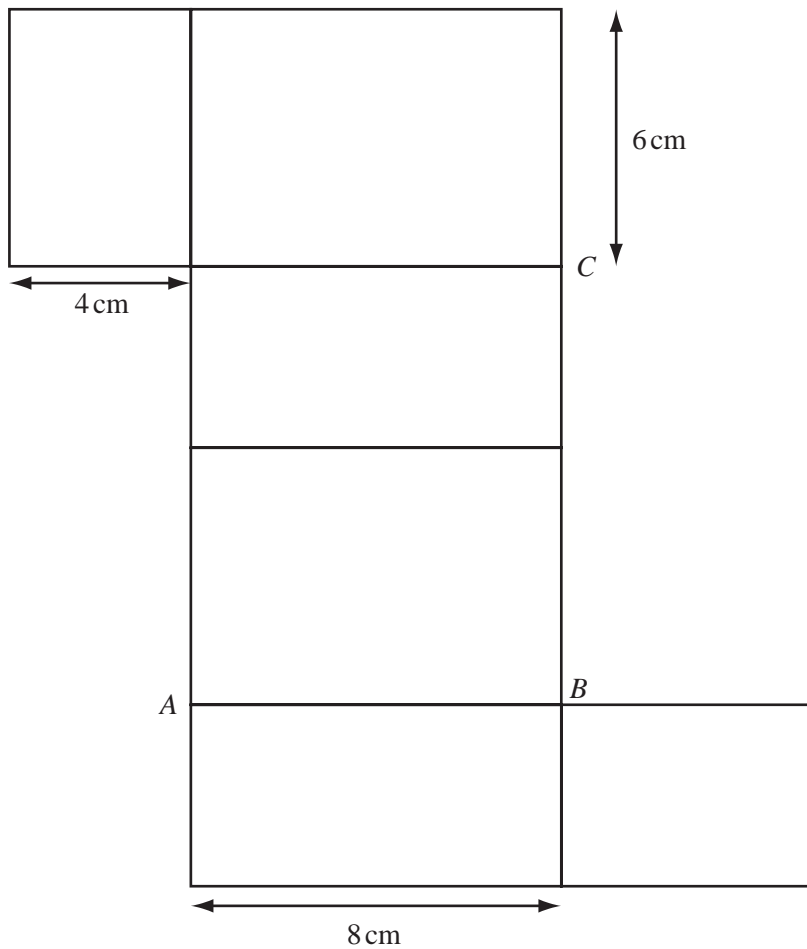
One nautical mile is equal to 1.85 kilometres.

Calculate the speed found in part (e)(ii) in knots.

Answer(e)(iii) knots [2]



NOT TO
SCALE



NOT TO
SCALE

The diagram above shows a cuboid and its net.

(a) Calculate the total surface area of the cuboid.

Answer(a) cm^2 [3]

- (b) Calculate the volume of the cuboid.

Answer(b) cm^3 [2]

- (c) An ant walks directly from A to C on the surface of the cuboid.

(i) Draw a straight line on the net to show this route. [1]

(ii) **Calculate** the length of the ant's journey.

Answer(c)(ii) cm [3]

(iii) **Calculate** the size of angle CAB on the net.

Answer(c)(iii) Angle CAB = [3]

- 1 At a weather centre the temperature at midnight was -21°C .
By noon the next day it had risen to -4°C .
By how many degrees had the temperature risen?

Answer $^{\circ}\text{C}$ [1]

- 2 Place brackets in the following calculation to make it a correct statement.

$$10 - 5 \times 9 + 3 = 60 \quad [1]$$

- 3 Write $\frac{5}{9}$ as a decimal, correct to two decimal places.

Answer [2]

- 4 When $x = 5$ find the value of

(a) $4x^2$,

Answer(a) [1]

(b) $(4x)^2$.

Answer(b) [1]

- 5 Antonia is making a cake.
She uses currants, raisins and sultanas in the ratio

$$\text{currants} : \text{raisins} : \text{sultanas} = 4 : 3 : 5.$$

The total mass of the three ingredients is 3.6 kilograms.
Calculate the mass of sultanas.

Answer kg [2]

6 Write as a 3-figure bearing the direction

(a) West,

Answer(a) [1]

(b) North-East.

Answer(b) [1]

7 Reflex Right Acute Obtuse

Use one of the above terms to describe each of the angles given.

(a) 100°

Answer(a) [1]

(b) 200°

Answer(b) [1]

8

$$\mathbf{a} = \begin{pmatrix} 3 \\ 4 \end{pmatrix} \text{ and } \mathbf{b} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$$

Work out $\mathbf{a} - 2\mathbf{b}$.

Answer $\begin{pmatrix} \\ \end{pmatrix}$ [2]

9

$$\frac{3}{5} \div \frac{7}{10} = \frac{6}{7}$$

Show how this calculation is done without using a calculator.

Write down the working.

Answer

[2]

10 Simplify the following expressions.

(a) $a^2 \times a^5$

Answer(a) [1]

(b) $b^4 \div b^3$

Answer(b) [1]


11 **=** **<** **>**

Use one of the above symbols to complete each of the statements in the answer spaces.


$$Answer(a) \quad 2^3 \quad \text{.....} \quad 3^2 \quad [1]$$

Answer(b) 9% 0.09 [1]

12 Write down the order of rotational symmetry of each of the following shapes.

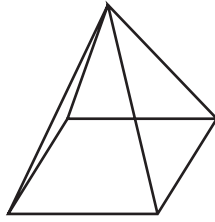
(a)  Equilateral Triangle

Answer(a) [1]

(b)  Rhombus

Answer(b) [1]

13



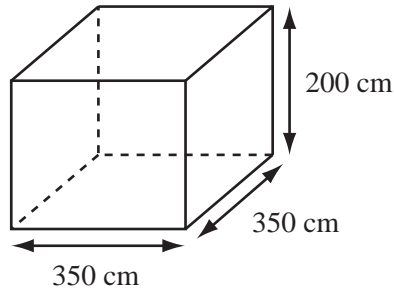
The diagram shows a pyramid with a square base.
All the sloping edges are the same length.
In the space below sketch a net of the pyramid.

[2]

- 14** Bernard is buying a radio priced at \$19.60.
The shopkeeper gives him a 15% discount.
Calculate how much Bernard pays.

Answer \$ [3]

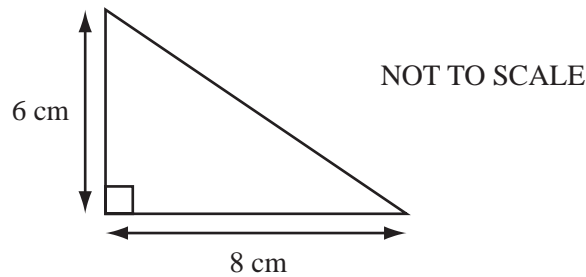
15

NOT TO
SCALE

A large tank, in the shape of a cuboid, has a square base of side 350 cm and height 200 cm. The tank is filled with water. Find, in **litres**, the volume of water it holds when full.

Answer litres [3]

16



The measurements shown are correct to the nearest centimetre.

(a) Write down the least possible measurement of

(i) the base of the right-angled triangle,

Answer(a)(i) base = cm [1]

(ii) the height of the right-angled triangle.

Answer(a)(ii) height = cm [1]

(b) Use your answers to **part (a)** to calculate the least possible area of the triangle.

Answer(b) area = cm^2 [1]

- 17** Ferdinand's electricity meter is read every three months.
The reading on 1st April was 70683 units and on 1st July it was 71701 units.

Use

- (a)** How many units of electricity did he use in those three months?

Answer(a) units [1]

- (b)** Electricity costs 8.78 cents per unit.
Calculate his bill for those three months.
Give your answer in dollars, correct to the nearest cent.

Answer(b) \$ [2]

- 18 (a)** List all the factors of 30.

Answer(a) [2]

- (b)** Write down the prime factors of 30.
(1 is not a prime number.)

Answer(b) [1]

19 In New Zealand, a bus leaves New Plymouth at 8.10 am and arrives in Wellington at 2.55 pm.

(a) How long, in **hours and minutes**, does the journey take?

Answer(a) h min [1]

(b) The distance from New Plymouth to Wellington is 355 kilometres.
Calculate, in kilometres per hour, the average speed for the journey.

Answer(b) km/h [3]

20 Aminata has a bag containing 35 beads.
The beads are either blue, yellow or red.
One bead is chosen at random.

The probability of choosing a blue bead is $\frac{2}{7}$ and the probability of choosing a yellow bead is $\frac{3}{5}$.

Calculate

(a) the number of blue beads in the bag,

Answer(a) [2]

(b) the probability of choosing a red bead.

Answer(b) [2]

21 Calculate, giving your answer in **standard form**,

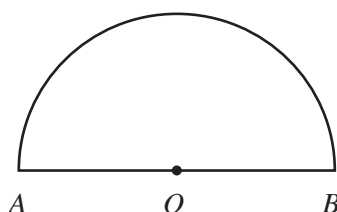
(a) $(1.5 \times 10^3) + (8.4 \times 10^2)$,

Answer(a) [2]

(b) $(1.5 \times 10^3) \times (8.4 \times 10^2)$.

Answer(b) [2]

22



NOT TO SCALE

The diagram shows half of a circle, centre O .

(a) What is the special name of the line AB ?

Answer(a) [1]

(b) $AB = 12$ cm.

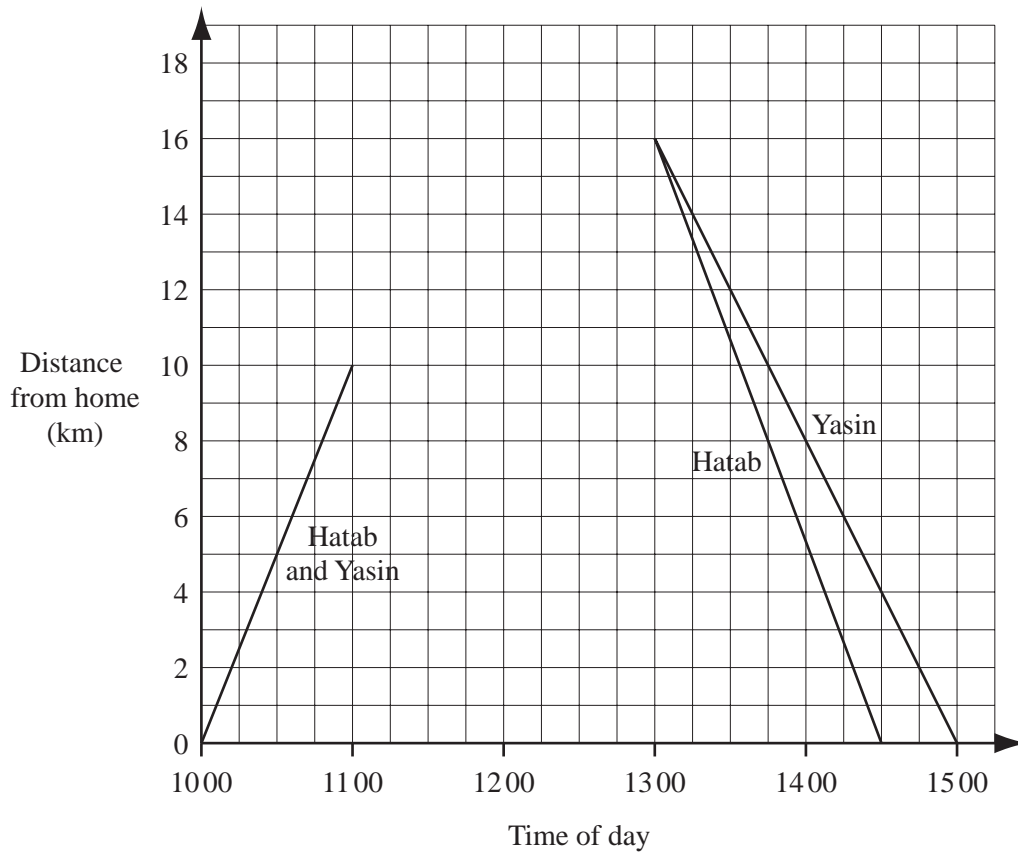
(i) Calculate the perimeter of the shape.

Answer(b)(i) cm [2]

(ii) Calculate the area of the shape.

Answer(b)(ii) cm^2 [2]

- 1 (a) Two friends, Hatab and Yasin, went on a cycle ride.
Part of the distance-time graph for their journey is shown below.



For the first part of the journey they cycled at the same speed.

- (i) Find their speed for the first part of the journey.

Answer(a)(i) km/h [1]

- (ii) At 11 00 they stopped for half an hour. Show this on the graph. [1]

- (iii) They continued on their ride and at 12 45 they were 16 kilometres from home.
Show this part of the journey on the graph. [1]

- (iv) They stopped again and then had a race going home.

- (a) For how long did they stop?

Answer(a)(iv)(a) min [1]

- (b) Who won the race?

Answer(a)(iv)(b) [1]

- (v) What was the total length of their journey?

Answer(a)(v) km [1]

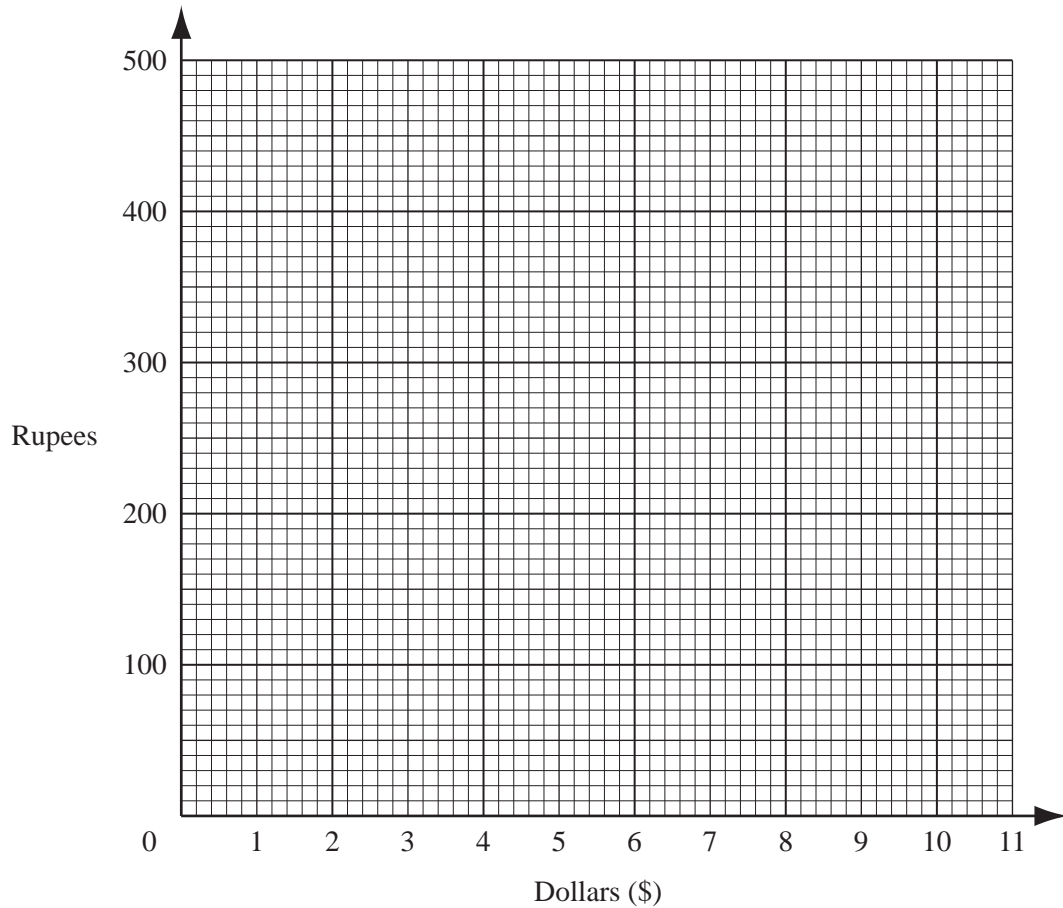
(b) On a certain day the conversion rate between dollars (\$) and Indian rupees was

$$\text{\$1} = 45 \text{ rupees.}$$

(i) How many rupees were equivalent to \\$10?

Answer(b)(i) rupees [1]

(ii) Use this information to draw a conversion graph on the axes below.



[2]

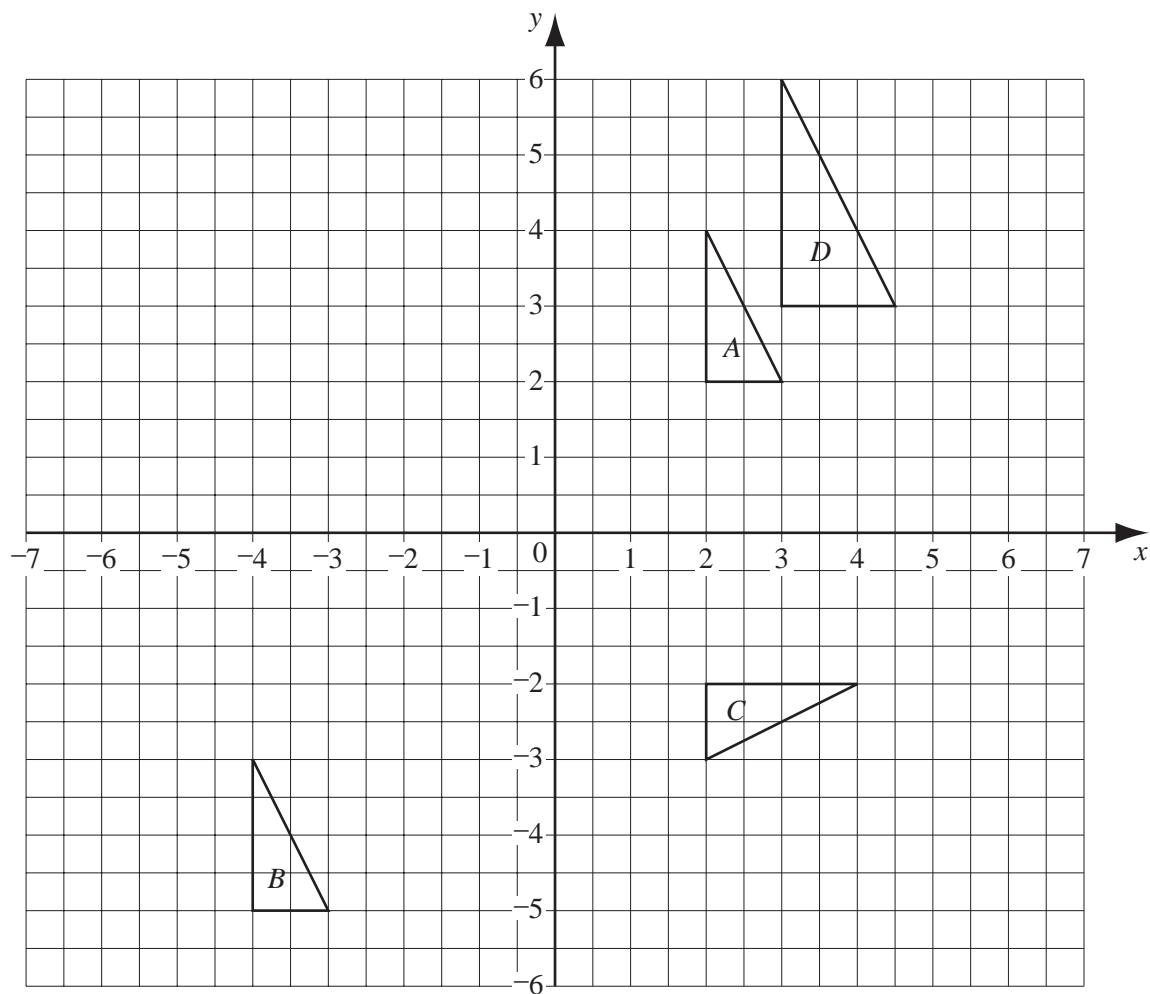
(iii) Use your graph to find

(a) how many rupees were equivalent to \\$6.80,

Answer(b)(iii)(a) rupees [1]

(b) how many dollars were equivalent to 480 rupees.

Answer(b)(iii)(b) \\$ [1]



- (a) Describe fully the single transformation that maps triangle A onto triangle B .

Answer(a)

[3]

- (b) Describe fully the single transformation that maps triangle A onto triangle C .

Answer(b)

[3]

- (c) Find the centre and the scale factor of the enlargement that maps triangle A onto triangle D .

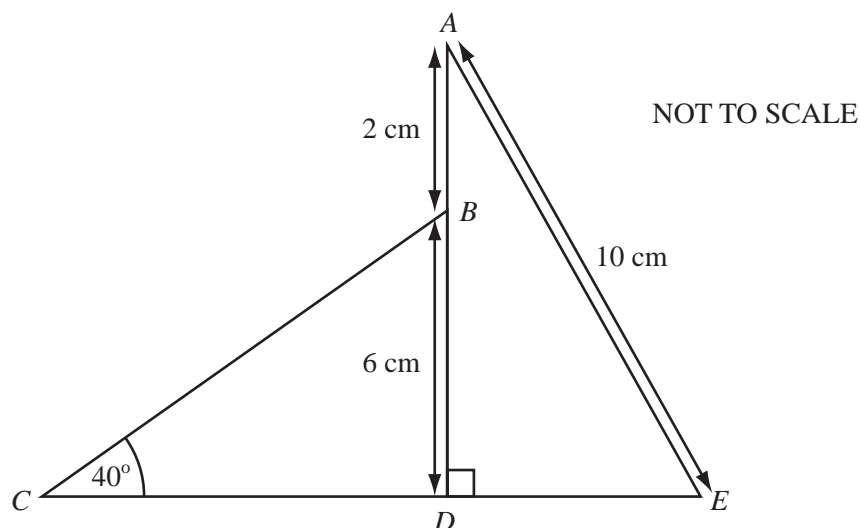
Answer(c) centre (..... ,) scale factor

[2]

- (d) On the grid

(i) draw the image of triangle A under a reflection in the line $x = -1$, [2]

(ii) draw the image of triangle B under a rotation of 180° about $(-4, -3)$. [2]



On the above diagram, $AB = 2$ cm, $BD = 6$ cm, $AE = 10$ cm, angle $BCD = 40^\circ$ and angle $BDE = 90^\circ$.

(a) Write down the length of AD .

Answer(a) $AD = \dots\dots\dots$ cm [1]

(b) Calculate the length of DE .

Answer(b) $DE = \dots\dots\dots$ cm [2]

(c) Calculate the size of angle AED .

Answer(c) angle $AED = \dots\dots\dots$ [2]

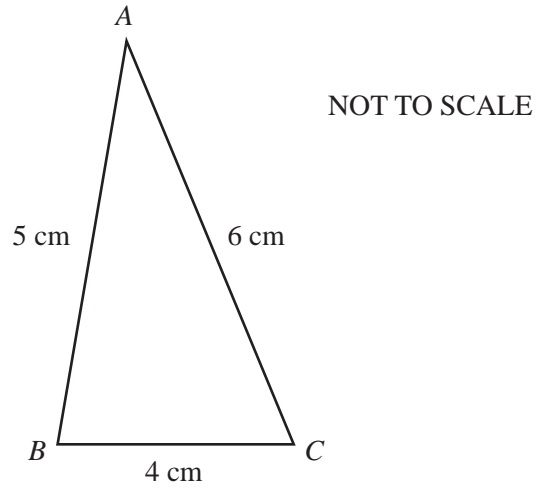
(d) Calculate the length of CD .

Answer(d) $CD = \dots\dots\dots$ cm [3]

(e) Find the length of CE .

Answer(e) $CE = \dots\dots\dots$ cm [1]

4 (a)



- (i) In the space below, using a ruler and compasses only, construct the above triangle accurately.

[3]

- (ii) Using the triangle you have drawn, measure and write down the size of angle ACB .

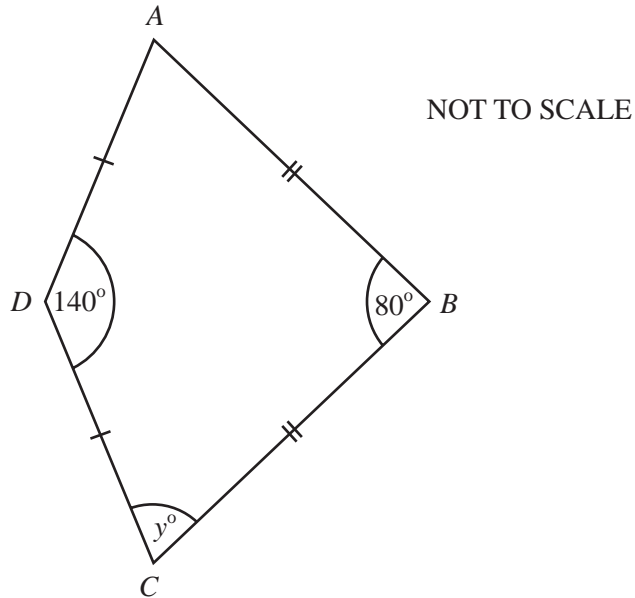
Answer(a)(ii) angle $ACB = \dots\dots\dots$ [1]

- (b) In the diagram below two points, P and Q , are joined by a straight line.



- (i) On the diagram draw the locus of all the points that are 4 centimetres from the line PQ . [3]
- (ii) On the same diagram, using a straight edge and compasses only, construct the locus of the points that are equidistant from P and Q .
Show all your construction lines. [2]
- (iii) Shade the region which contains the points that are closer to P than to Q **and** are less than 4 centimetres from the line PQ . [2]
-

5 (a)



In the diagram above $AB=BC$ and $AD=DC$.

(i) What is the special name of the quadrilateral $ABCD$?

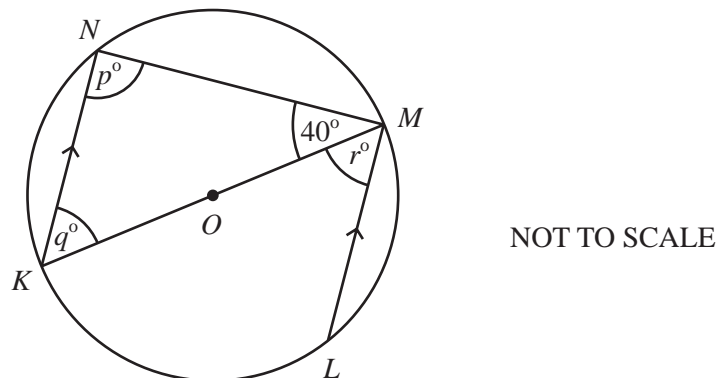
Answer(a)(i) [1]

(ii) On the diagram draw the line of symmetry. [1]

(iii) Calculate the value of y .

Answer(a)(iii) $y =$ [2]

(b)

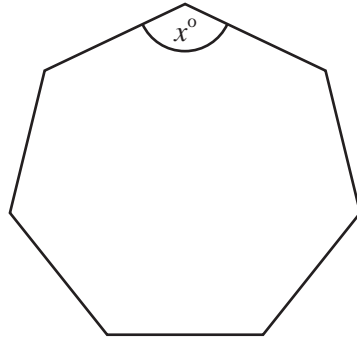


In the diagram above, the points K, L, M and N lie on the circle centre O .
 KN is parallel to LM .

Find the values of p, q and r .

Answer(b) $p =$, $q =$, $r =$ [3]

(c)



NOT TO SCALE

The diagram above shows a regular seven-sided polygon.
Each of the interior angles measures x° .
One of the angles is marked in the diagram.
Calculate the value of x , giving your answer correct to 1 decimal place.
Show all your working.

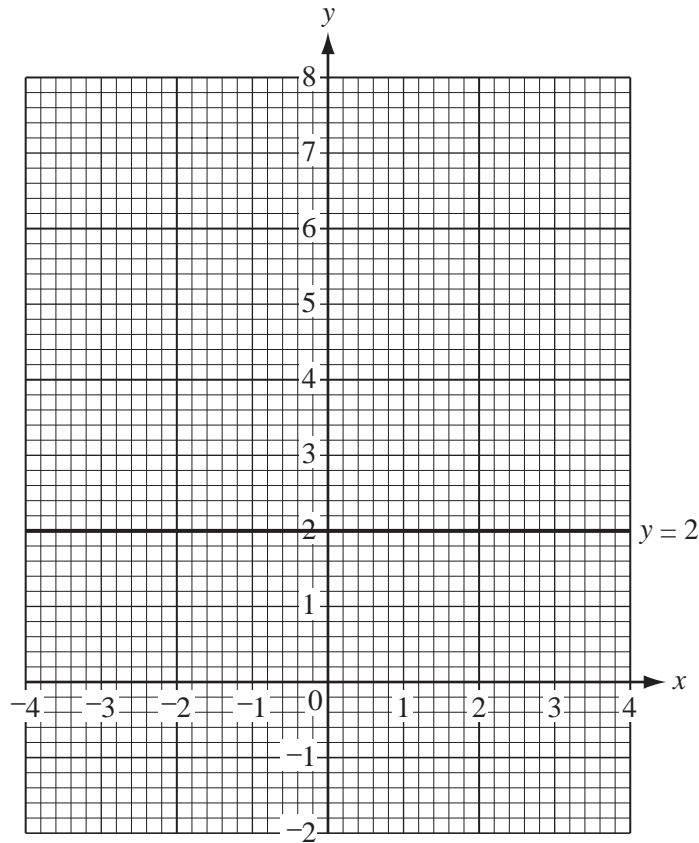
Answer(c) $x =$ [4]

- 6 (a) Complete the table below for $y = x^2 - 2x$.

| | | | | | | | |
|-----|----|----|---|----|---|---|---|
| x | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| y | 8 | | | -1 | | 3 | 8 |

[3]

- (b) On the grid below, draw the graph of $y = x^2 - 2x$ for $-2 \leq x \leq 4$.



[4]

- (c) The line $y = 2$ is drawn on the diagram.

Use your graph to find the values of x that solve the equation $x^2 - 2x = 2$.

Answer(c) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

- (d) Complete the table below for $y = 4 - x$.

| | | | |
|-----|----|---|---|
| x | -4 | 0 | 4 |
| y | 8 | | |

[2]

- (e) On the grid above, draw the line $y = 4 - x$ for $-4 \leq x \leq 4$.

[1]

- (f) Write down the x coordinates of the points of intersection of the graphs of $y = x^2 - 2x$ and $y = 4 - x$.

Answer(f) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

- 7 (a) Rajeesh thought of a number.
He multiplied this number by 2.
He then added 10.
The answer was 42.

(i) What was the number Rajeesh first thought of?

Answer(a)(i) [1]

- (ii) Simon thought of a number x .
He multiplied this number by 3 and then added 8.
Write down an expression in x for his answer.

Answer(a)(ii) [2]

- (b) Simplify $-8a + 7b - a - 2b$.

Answer(b) [2]

- (c) Factorise fully $6a - 9a^2$.

Answer(c) [2]

- (d) Make t the subject of the formula

$$v = u + at.$$

Answer(d) $t =$ [2]

- (e) Solve the simultaneous equations

$$\begin{aligned} 8x + 2y &= 13, \\ 3x + y &= 4. \end{aligned}$$

Answer(e) $x =$, $y =$ [4]

- 8 (a) The list shows the rainfall in millimetres in Prestbury for the 12 months of 2002.

61 146 22 54 67 94 141 22 37 167 87 170

- (i) Write down the mode.

Answer(a)(i) mm [1]

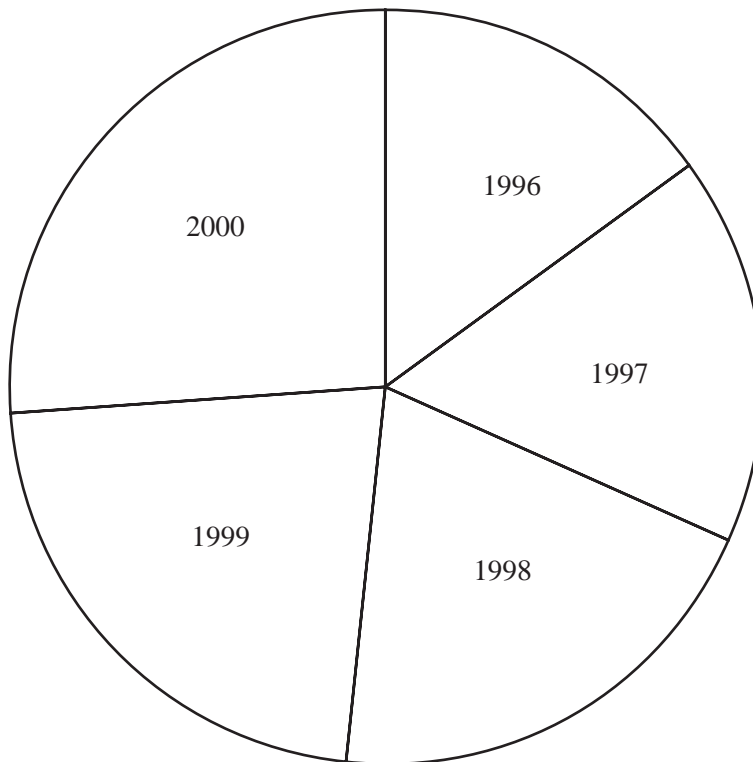
- (ii) Find the median.

Answer(a)(ii) mm [2]

- (iii) Calculate the mean.

Answer(a)(iii) mm [2]

- (b) During the years 1996 - 2000 the total rainfall in Prestbury was 5400 millimetres.
The pie chart shows how this was spread over the five years.



- (i) Measure the angles of the sectors for 1998, 1999 and 2000.
Write your answers in the table below. [3]
- (ii) Work out the annual rainfall, in millimetres, for each of the years 1998, 1999 and 2000.
Write your answers in the table below. [3]

Answers (b)(i) and (ii)

| Year | Angle (degrees) | Rainfall (mm) |
|-------|-----------------|---------------|
| 1996 | 54 | 810 |
| 1997 | 60 | 900 |
| 1998 | | |
| 1999 | | |
| 2000 | | |
| Total | 360 | 5400 |

- (iii) What do you notice about the trend in the rainfall from 1996 to 2000?

Answer(b)(iii)

..... [1]

- 9 (a)** A pattern of numbers is shown below.

[illegible]

- (i) On the diagram complete row 6. [1]

- (ii)** The last numbers in each row form a sequence.

1, 4, 9, 16, 25,

- (a)** What is the special name given to these numbers?

Answer(a)(ii)(a) [1]

- (b) Write down the last number in the 10th row.

Answer(a)(ii)(b) [1]

- (c) Write down an expression for the last number in the n th row.

Answer(a)(ii)(c) [1]

- (iii)** The numbers in the middle column of the pattern form a sequence.

1, 3, 7, 13, 21, 31,

- (a) Write down the next number in this sequence.

Answer(a)(iii)(a) [1]

- (b)** The expression for the n th number in this sequence is $n^2 - n + 1$.
Work out the 30th number.

Answer(a)(iii)(b) [2]

(b) Another pattern of numbers is shown below.

row

| | | | | | | | | | | | | |
|---|-----|---|----|----|----|----|----|----|----|----|----|----|
| 1 | --- | → | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2 | --- | → | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 3 | --- | → | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 4 | --- | → | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |

(i) What is the last number in the 10th row?

Answer(b)(i) [1]

(ii) Find an expression for the last number in the n th row.

Answer(b)(ii) [1]

(iii) What is the **first** number in the 10th row?

Answer(b)(iii) [1]

(iv) Find an expression for the **first** number in the n th row.

Answer(b)(iv) [1]

- 1 Work out $4^3 - 5^2$.

Answer [1]

- 2 The Dead Sea shore is 395 metres **below** sea level.
Hebron is 447 metres **above** sea level.
Find the difference in height.

Answer [1]

- 3 Write as a fraction in its lowest terms

(a) 75%,

Answer (a) [1]

(b) 0.07.

Answer (b) [1]

- 4 Look at the numbers

21, 35, 49, 31, 24.

From this list write down

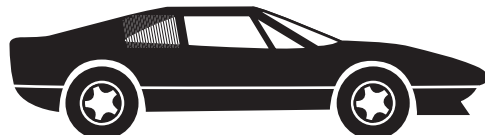
(a) a square number,

Answer (a) [1]

(b) a prime number.

Answer (b) [1]

5



NOT TO
SCALE

A model of a car has a scale of 1:25.
The model is 18 cm long.
Calculate, in metres, the actual length of the car.

Answer m [2]

- 6 Without using a calculator, work out $2\frac{1}{4} \div \frac{1}{2}$ as a single fraction.
Show all your working.

Answer [2]

- 7 Sergio's height is 142 cm, to the nearest centimetre.
 Complete the statement about the limits of his height.

Answer cm \leq height < cm [2]

- 8 Factorise completely $4xy - 6xz$.

Answer [2]

- 9 Alix changed a traveller's cheque for 200 euros (€) into dollars (\$) when she visited the USA.
 The exchange rate was 1 dollar = 1.05 euros.
 How many dollars did she receive?

Answer \$ [2]

10



For the shape shown, write down

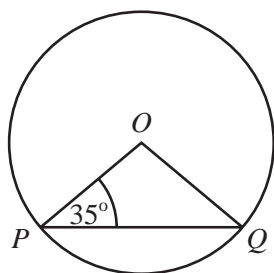
- (a) the number of lines of symmetry,

Answer (a) [1]

- (b) the order of rotational symmetry.

Answer (b) [1]

11

NOT TO
SCALE

PQ is a chord of a circle, centre O . Angle $OPQ = 35^\circ$.
Calculate angle POQ .

Answer Angle $POQ =$ [2]

12 (a) $\left(\frac{1}{2}\right)^x = \frac{1}{8}$

Write down the value of x .

Answer (a) $x =$ [1]

(b) $7^y = 1$

Write down the value of y .

Answer (b) $y =$ [1]

13

$$218 \div 39$$

(a) (i) Write both numbers in the calculation above correct to one significant figure.

Answer (a)(i) \div [1]

(ii) Use your answer to **part (i)** to estimate the value of the calculation.

Answer (a)(ii) [1]

(b) Use your calculator to find the value of the calculation correct to two significant figures.

Answer (b) [1]

- 14 Shampoo is sold in two sizes, A and B .

A



800 millilitres \$1.30

B



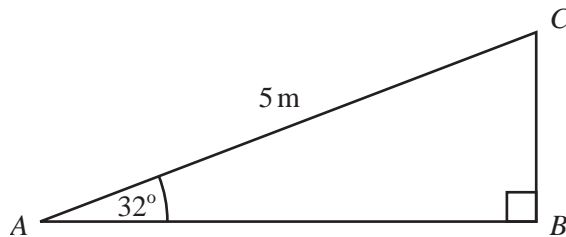
1.5 litres \$2.30

NOT TO
SCALE

A contains 800 ml and costs \$ 1.30.
 B contains 1.5 litres and costs \$ 2.30.
 Which is the better value for money?
Show your working clearly.

Answer [3]

15



NOT TO
SCALE

In the right-angled triangle ABC , $AC = 5$ metres and angle $CAB = 32^\circ$.
 Calculate the length of BC .

Answer $BC =$ m [3]

16

$$y = a + bc$$

(a) Find the value of y when $a = -3$, $b = 2$ and $c = 8$.

Answer (a) $y =$ [2]

(b) Make c the subject of the formula.

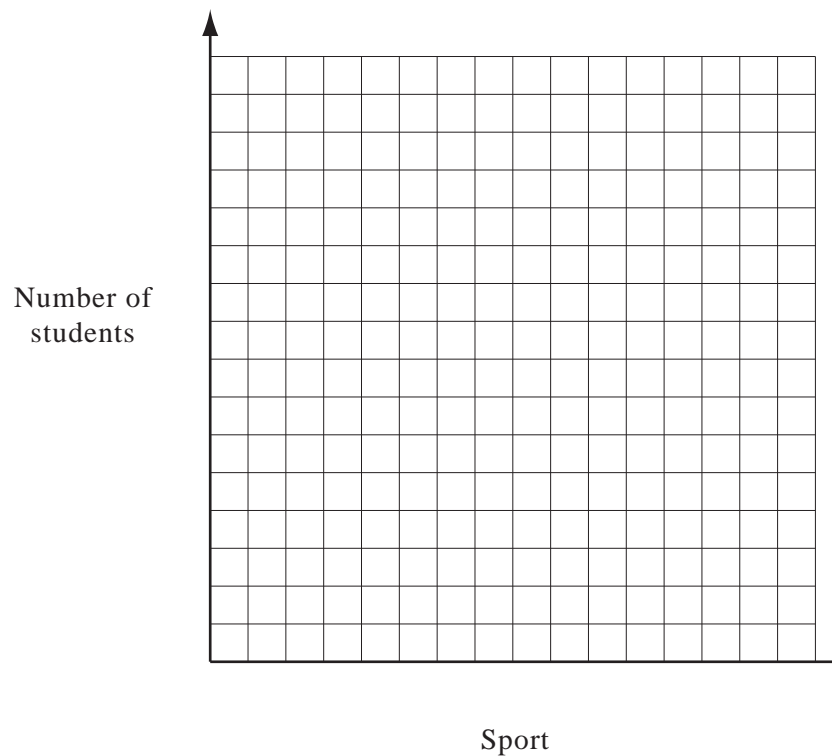
Answer (b) $c =$ [2]

17 In a school, the number of students taking part in various sports is shown in the table below.

| Sport | Number of students |
|------------|--------------------|
| Basketball | 40 |
| Soccer | 55 |
| Tennis | 35 |
| Volleyball | 70 |

Draw a bar chart below to show this data.
Show your scale on the vertical axis and label the bars.

Answer



[4]

- 18** Carlos buys a box of 50 oranges for \$ 8.
He sells all the oranges in the market for 25 cents each.

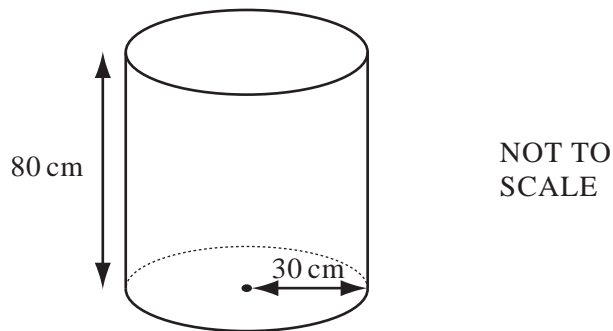
(a) Calculate the profit he makes.

Answer (a) \$ [2]

(b) Calculate the percentage profit he makes on the cost price.

Answer (b) % [2]

19



The diagram shows a cylindrical tank.
The radius is 30 cm and the height is 80 cm.

(a) Calculate the area of the base of the tank.

Answer (a) cm^2 [2]

(b) Calculate the volume of the tank **in litres**.

Answer (b) litres [2]

20 Solve the equations

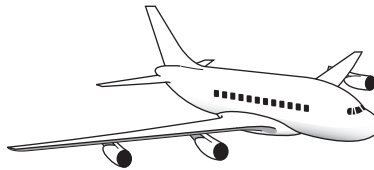
(a) $4x - 5 = 31$,

Answer (a) $x =$ [2]

(b) $4(y - 5) = 36$.

Answer (b) $y =$ [2]

21



The time in Dubai is 3 hours ahead of Birmingham.

(a) If it is 21 15 on Sunday in Birmingham, what time on Monday is it in Dubai?

Answer (a) [1]

(b) An aircraft leaves Birmingham at 21 15 on Sunday and arrives in Dubai on Monday at 07 45 **local time**.

(i) How long did the journey take?

Answer (b)(i) h min [1]

(ii) The distance from Birmingham to Dubai is 5620 km. Calculate the average speed of the aircraft.

Answer (b)(ii) km/h [3]

- 1 (a) The list shows marks in an examination taken by a class of 10 students.

65, 51, 35, 34, 12, 51, 50, 75, 48, 39

- (i) Write down the mode.

Answer(a)(i) [1]

- (ii) Work out the median.

Answer(a)(ii) [2]

- (iii) Calculate the mean.

Answer(a)(iii) [2]

- (b) Grades were awarded for the examination.

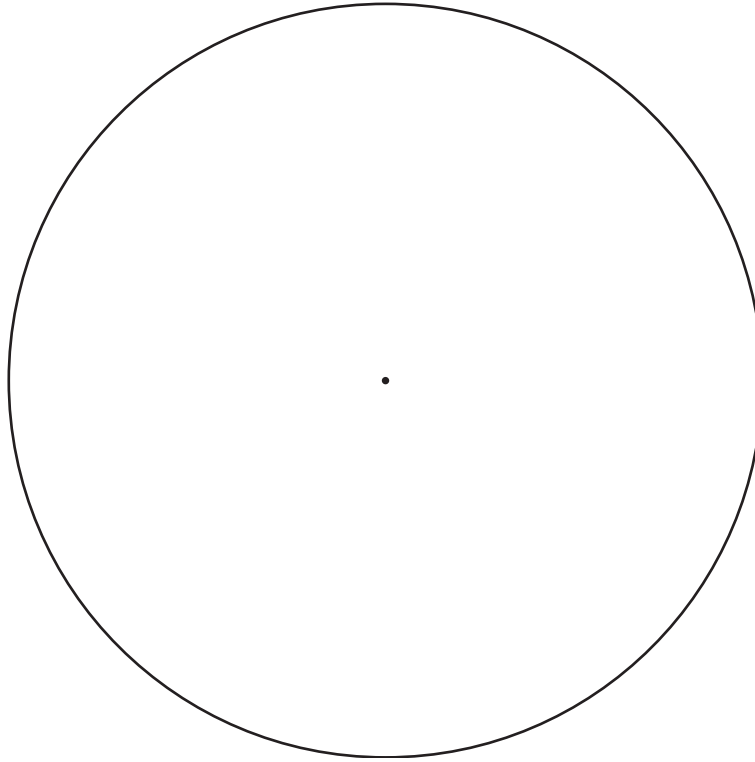
The table below shows the number of students in the whole school getting each grade.

| Grade | Number of students | Angle on a pie chart |
|--------|--------------------|----------------------|
| A | 5 | |
| B | 15 | |
| C | 40 | |
| D | 20 | |
| E | 10 | |
| Totals | 90 | |

- (i) Complete the table above by calculating the angles required to draw a pie chart. [2]

- (ii) Using the circle at the top of the opposite page, draw an accurate pie chart to show the data in the table.

Label the sectors A, B, C, D and E.



[3]

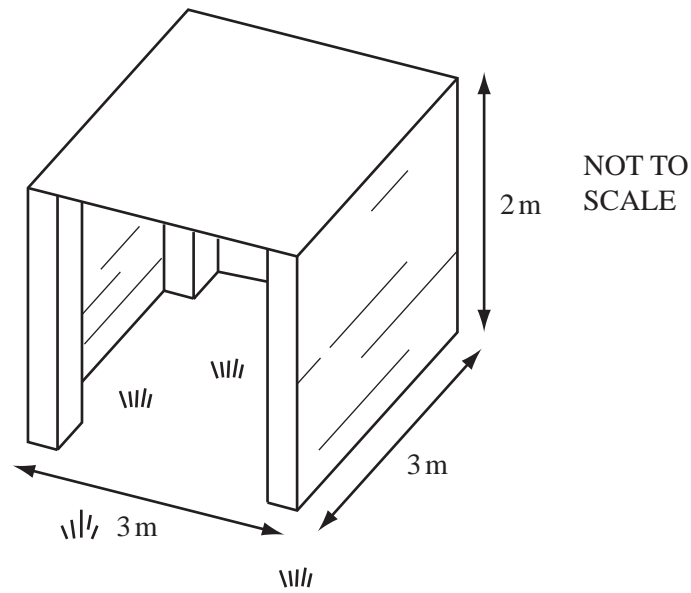
(iii) What is the probability that a student chosen at random from the group taking the examination was awarded

(a) grade C,

Answer(b)(iii)(a) [1]

(b) grade D or grade E?

Answer(b)(iii)(b) [2]



The diagram shows a shelter that Vudnella will build for her goats. The shelter will stand on level ground with four identical vertical posts at the corners. Three walls will be made by attaching thin rectangular pieces of wood to the posts. The front will be left open. The shelter will have a thin square roof, 3 metres by 3 metres. The shelter will be 2 metres high.

- (a) Calculate the area of the roof.

Answer(a) m² [1]

- (b) (i) Calculate the area of one wall.

Answer(b)(i) m² [1]

- (ii) Write down the total area of the three walls.

Answer(b)(ii) m² [1]

- (c) The three walls will be made up from thin rectangular pieces of wood. Each piece of wood is 3 metres long and 20 **centimetres** wide. You may ignore the thickness of the wood.

- (i) Calculate the area, in square metres, of one of the pieces of wood.

Answer(c)(i) m² [2]

- (ii) Calculate the total number of pieces of wood she will need to build the three walls of the shelter.

Answer(c)(ii) [2]

- (d) The four corner posts are each 2 metres high and 10 **centimetres** by 10 **centimetres** in cross-section.

Calculate the volume, in cubic metres, of one post.

Answer(d)m³ [2]

- (e) To build the shelter, she will also need 1.5 kilograms of nails.
Complete the table below.

| Item | | Total cost of item |
|------------------------------|------------------------------|--------------------|
| Posts | at \$1.20 each | \$..... |
| Rectangular pieces of wood | at \$0.30 each | \$..... |
| Roof material | at \$1.60 per m ² | \$..... |
| Nails | at \$1.40 per kg | \$..... |
| Total cost of shelter | | \$..... |

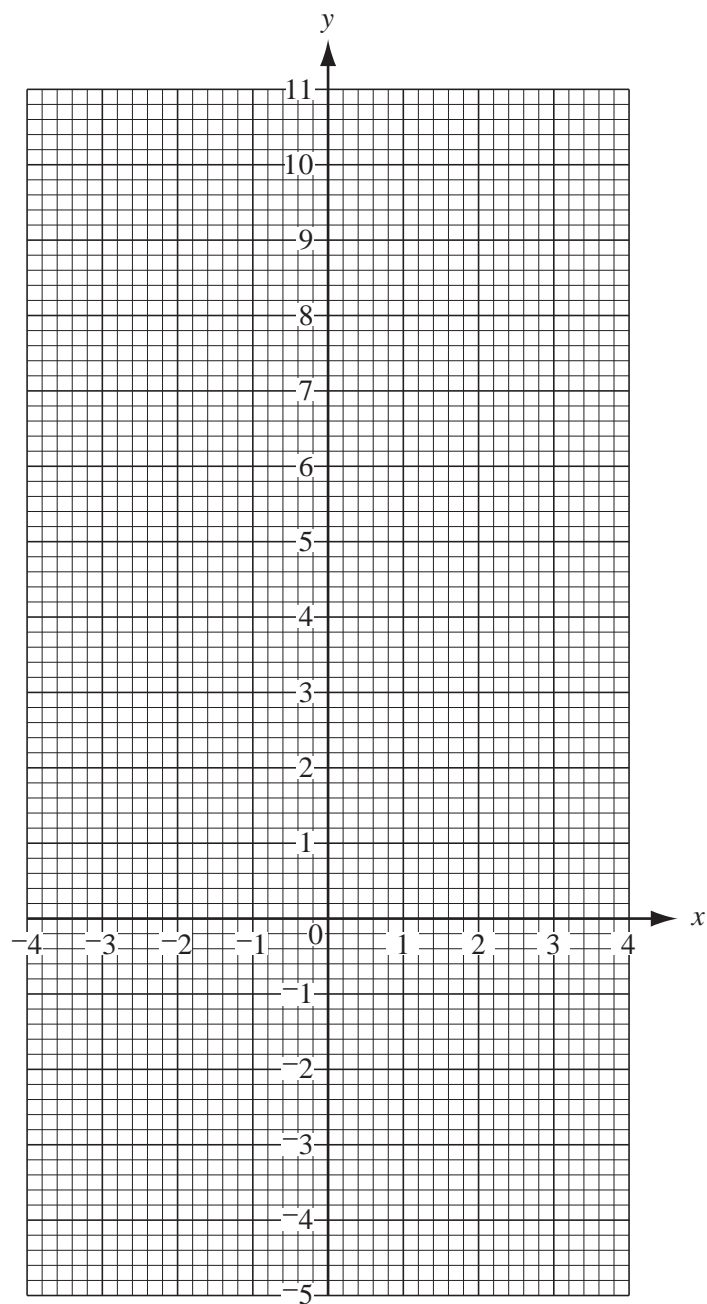
[5]

- 3 (a) Complete the table below for $y = 8 - x^2$.

| | | | | | | | | | | | | | |
|-----|-------|----|------|----|------|----|---|---|------|---|------|---|-------|
| x | -3.5 | -3 | -2.5 | -2 | -1.5 | -1 | 0 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 |
| y | -4.25 | -1 | 1.75 | 4 | 5.75 | | | 7 | 5.75 | | 1.75 | | -4.25 |

[3]

- (b) On the grid below, draw the graph of $y = 8 - x^2$ for $-3.5 \leq x \leq 3.5$.



[4]

- (c) Using the graph, write down the values of x for which $8 - x^2 = 0$.

Answer(c) $x =$ and [2]

- (d) Complete the table below for $y = 2x + 5$.

| | | | |
|-----|------|-----|------|
| x | -3 | 0 | 3 |
| y | | | 11 |

[2]

- (e) On the grid on the opposite page, draw the line $y = 2x + 5$ for $-3 \leq x \leq 3$. [2]

- (f) Find the gradient of the line $y = 2x + 5$.

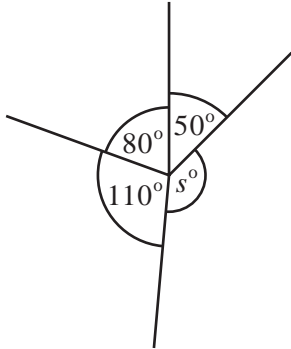
Answer(f) [2]

- (g) Using your graphs, write down the x coordinates of the intersections of the graphs of $y = 8 - x^2$ and $y = 2x + 5$.

Answer(g) $x =$ and [2]

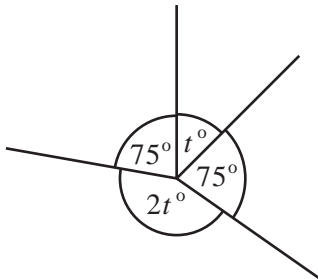
4 In this question the diagrams are not to scale.

(a) Calculate the value of s .



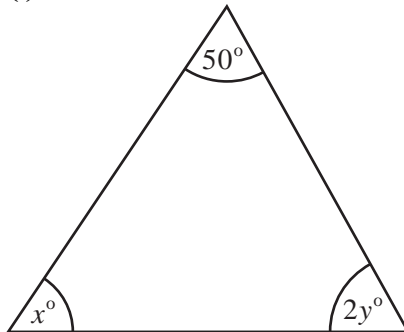
Answer(a) $s =$ [1]

(b) Calculate the value of t .



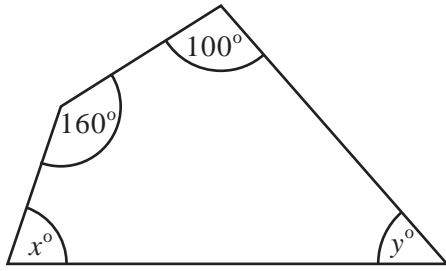
Answer(b) $t =$ [2]

(c) (i)



Complete the equation $x + 2y =$ [2]

(ii)



Complete the equation $x + y =$ [2]

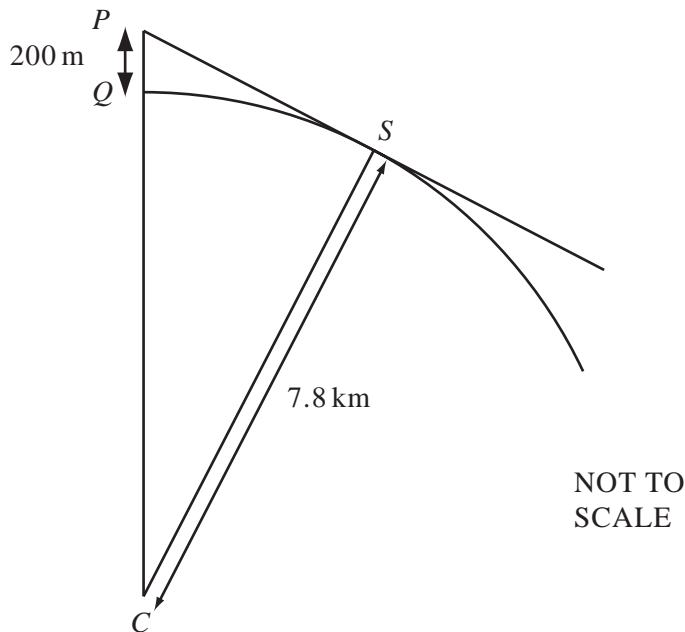
(iii) Solve the simultaneous equations given by your answers to **parts (c)(i) and (c)(ii)** to find the values of x and y .

Answer(c)(iii) $x =$, $y =$ [3]

- 5 (a) Change 200 metres to kilometres.

Answer(a) km [1]

(b)



In the diagram, Q and S lie on a circle, radius 7.8 **kilometres**, centre C .
 CQ is extended by 200 **metres** to P .
 PS is a tangent to the circle at S .

- (i) Why is angle PSC a right angle?

Answer(b)(i) [1]

- (ii) Write down the length of PC in kilometres.

Answer(b)(ii) km [1]

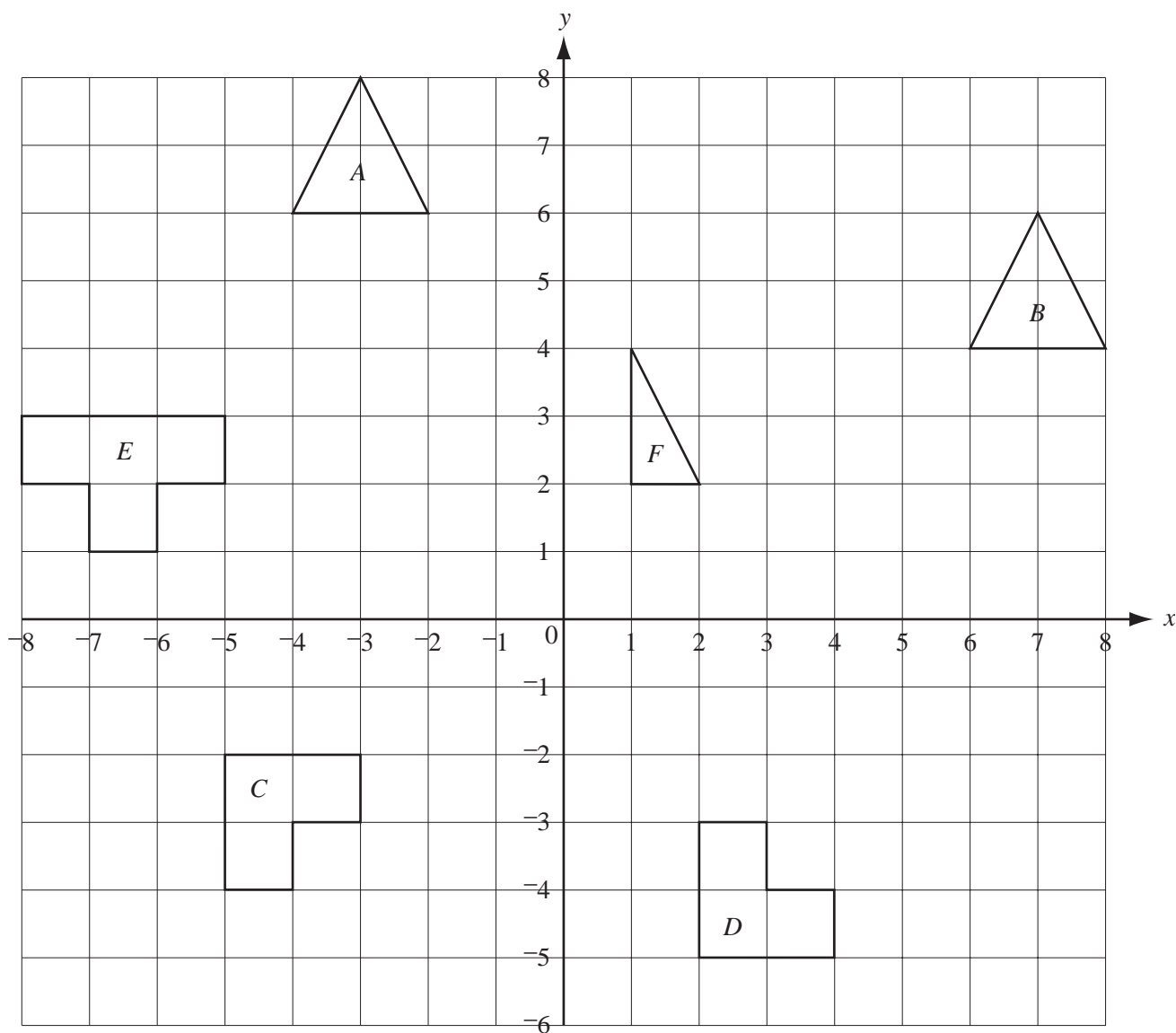
- (iii) Calculate the length of PS in kilometres.

Answer(b)(iii) km [3]

- (iv) Calculate the area of triangle PSC .
 Give your answer correct to 2 significant figures.

Answer(b)(iv) km^2 [3]

6



(a) Describe fully the single transformation that maps

(i) shape *A* onto shape *B*,

Answer(a)(i) [3]

(ii) shape *C* onto shape *D*.

Answer(a)(ii) [3]

(b) On the grid above, draw

(i) the reflection of shape *E* in the *y*-axis, [2]

(ii) the enlargement of shape *F*, with scale factor 2 and centre (0, 0). [2]

- 7 (a) (i) What is the special name given to a five-sided polygon?

Answer(a)(i) [1]

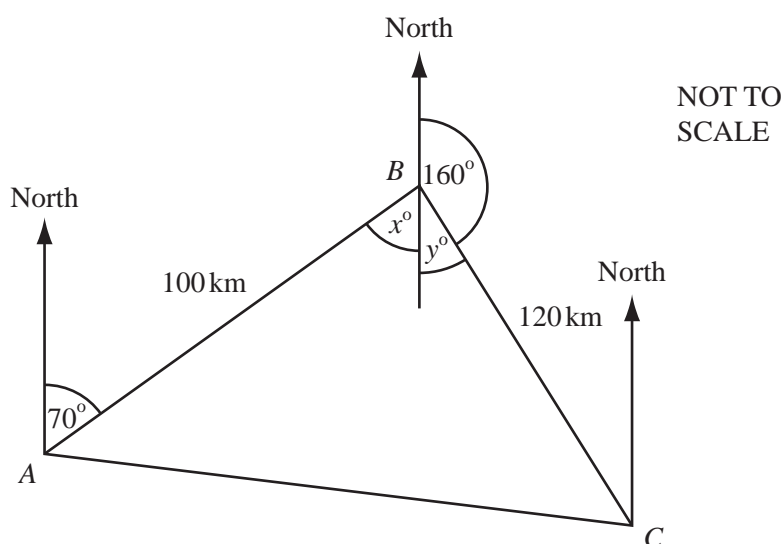
- (ii) Calculate the total sum of the interior angles of a regular five-sided polygon.

Answer(a)(ii) [2]

- (iii) Calculate the size of one interior angle of a regular five-sided polygon.

Answer(a)(iii) [1]

(b)



A ship sails 100 kilometres from A on a bearing of 070° to B .
It then sails 120 kilometres on a bearing of 160° to C .

- (i) Show that $x + y = 90^\circ$.

Answer(b)(i)

[2]

- (ii) Use trigonometry to calculate the size of angle BAC .

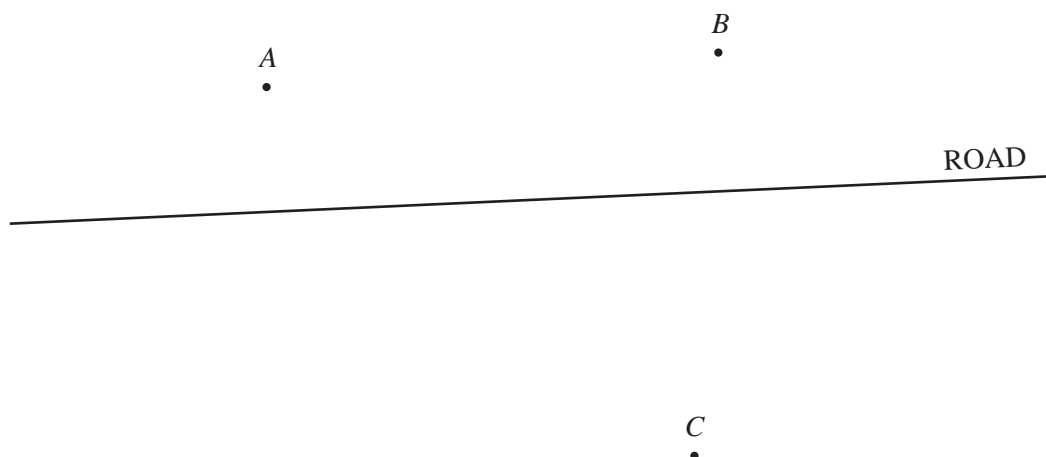
Answer(b)(ii) [2]

(iii) Find the three-figure bearing of C from A .

Answer(b)(iii) [1]

(iv) Find the three-figure bearing of A from C .

Answer(b)(iv) [1]



The map shows three towns, A , B and C and a road.

- (a) (i) Measure and write down the distance, in centimetres, from A to B .

Answer(a)(i) cm [1]

- (ii) The towns A and B are 60 kilometres apart.

The map is drawn to scale.

Complete the statement in the answer space.

Answer(a)(ii) 1 cm represents km [2]

- (iii) Find the actual distance, in kilometres, from town A to town C .

Answer(a)(iii) km [1]

- (b) An airport is to be built 10 kilometres from the road.

On the map, draw accurately the locus of the points that are 10 kilometres from the road. [2]

- (c) The airport must be the same distance from A as it is from B .

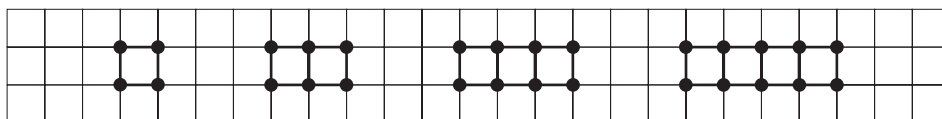
Using compasses and a straight edge only, draw the locus of the points that are equidistant from A and B . [2]

- (d) The airport must be not more than 40 kilometres from C .

Draw the locus of points that are 40 kilometres from C . [2]

- (e) Mark and label L , the position for the airport. [1]

- 9 (a) Look at the sequence of dots and squares below.



| | | | | |
|-------------------|---|---|---|----|
| Number of dots | 4 | 6 | 8 | 10 |
| Number of squares | 1 | 2 | 3 | 4 |

Find the number of dots when there are

- (i) 5 squares,

Answer(a)(i) [1]

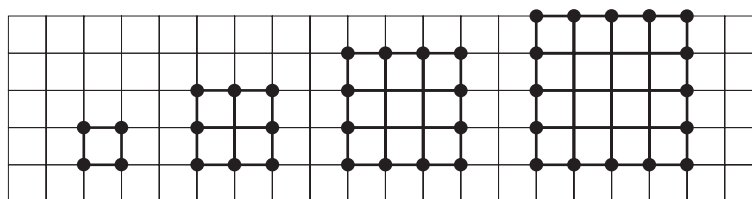
- (ii) 9 squares,

Answer(a)(ii) [1]

- (iii) n squares.

Answer(a)(iii) [2]

- (b) Another sequence of dots and squares is shown below.



| | | | | |
|-------------------|---|---|----|----|
| Diagram | 1 | 2 | 3 | 4 |
| Number of dots | 4 | 8 | 12 | 16 |
| Number of squares | 1 | 4 | 9 | 16 |

- (i) For diagram 5, find

- (a) the number of dots,

Answer(b)(i)(a) [1]

- (b) the number of squares.

Answer(b)(i)(b) [1]

- (ii) Find the number of dots in the diagram that has 144 squares.

Answer(b)(ii) [2]

- (iii) Find the number of squares in the diagram that has 40 dots.

Answer(b)(iii) [2]

- 1 Write 0.4 kilograms in grams.

Answer.....grams [1]

- 2 The price of a book is \$18. Sara is given a discount of 15%.
Work out this discount.

Answer \$..... [2]

3



Susan writes the letters of her name on five cards.
One of the five cards is chosen at random.
Find the probability that the letter on the card is

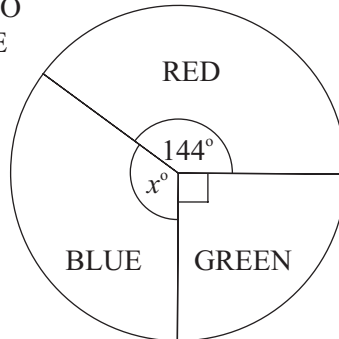
(a) S, Answer (a)..... [1]

(b) E. Answer (b)..... [1]

- 4 A country has three political parties, the Reds, the Blues and the Greens.

The pie chart shows the proportion of the total vote that each party received in an election.

NOT TO
SCALE



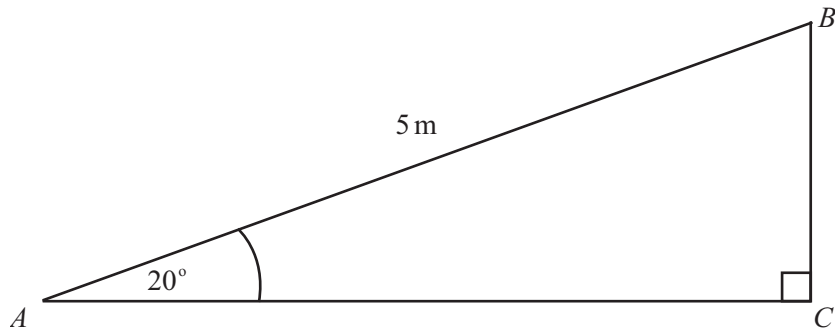
- (a) Find the value of x .

Answer (a) x =..... [1]

- (b) What percentage of the votes did the Red party receive?

Answer (b).....% [2]

5



The diagram shows a right-angled triangle ABC with $AB = 5$ m and angle $BAC = 20^\circ$. Calculate the length BC .

Answer $BC = \dots\dots\dots$ m [2]

- 6 Jeff takes 10 minutes to walk 1 kilometre. Find his average walking speed in kilometres per hour.

Answer $\dots\dots\dots$ km/h [2]

- 7 Find the size of one of the ten interior angles of a regular decagon.

Answer $\dots\dots\dots$ [3]

- 8 The length of a road is 1300 metres, correct to the nearest 100 metres. Complete the statement in the answer space.

Answer $\dots\dots\dots$ m \leq road length $< \dots\dots\dots$ m [2]

- 9 (a) Multiply out the brackets

$$5x(2x - 3y).$$

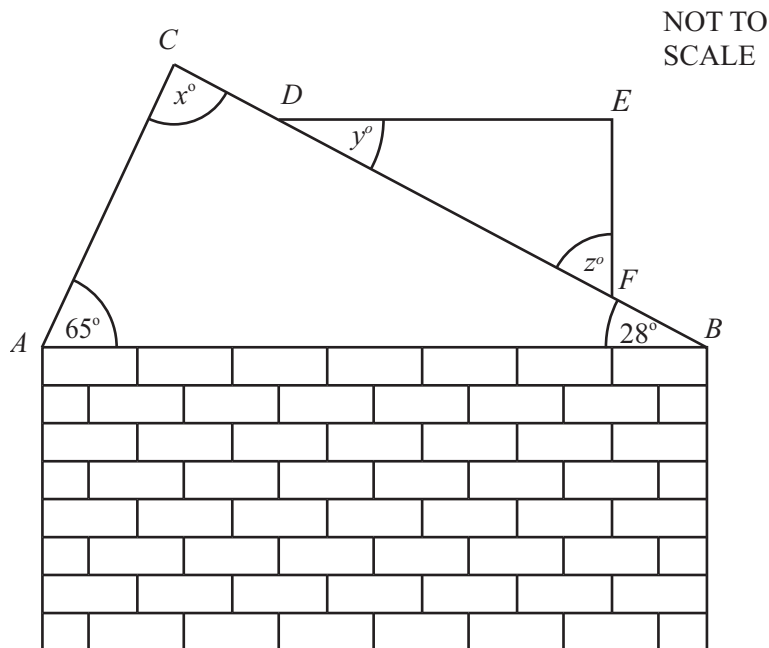
Answer (a)..... [2]

- (b) Factorise completely

$$6x^2 + 12x.$$

Answer (b)..... [2]

10



The diagram shows the side view of the roof of a house. AB and DE are horizontal.
 EF is vertical.

Find the value of

- (a) x ,

Answer (a) $x =$ [1]

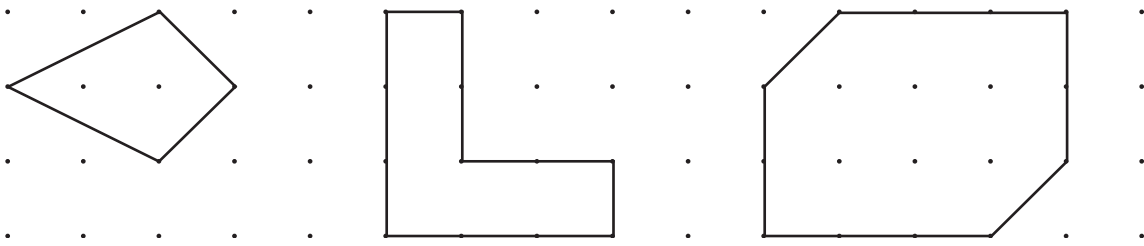
- (b) y ,

Answer (b) $y =$ [1]

- (c) z .

Answer (c) $z =$ [1]

11 In each of the shapes below draw **one** line which divides it into two congruent shapes.



[3]

12 Solve the simultaneous equations

$$\begin{aligned} 3x - y &= 0, \\ x + 2y &= 28. \end{aligned}$$

Answer $x = \dots\dots\dots$

$y = \dots\dots\dots$ [3]

13 (a) Work out

$$2.7 \times 8.3 \div (12 - 2.7),$$

writing down

(i) your full calculator display,

Answer (a)(i) = $\dots\dots\dots$ [1]

(ii) your answer to two decimal places.

Answer (a)(ii) = $\dots\dots\dots$ [1]

(b) Work out $(6 - \sqrt{11})^3$.

Answer (b) = $\dots\dots\dots$ [2]

14 The temperatures at sunrise in Berne on the seven days of one week were:

| | |
|-----------|-------|
| Sunday | -1 °C |
| Monday | -7 °C |
| Tuesday | -6 °C |
| Wednesday | 1 °C |
| Thursday | 3 °C |
| Friday | 0 °C |
| Saturday | -4 °C |

(a) List the days on which the temperature at sunrise was less than -3 °C.

Answer (a)..... [1]

(b) Work out the mean (average) of the seven temperatures.

Answer (b).....°C [3]

15 (a) Work out each of the following as a decimal.

(i) 28%

Answer (a)(i)..... [1]

(ii) $\frac{275}{1000}$

Answer (a)(ii)..... [1]

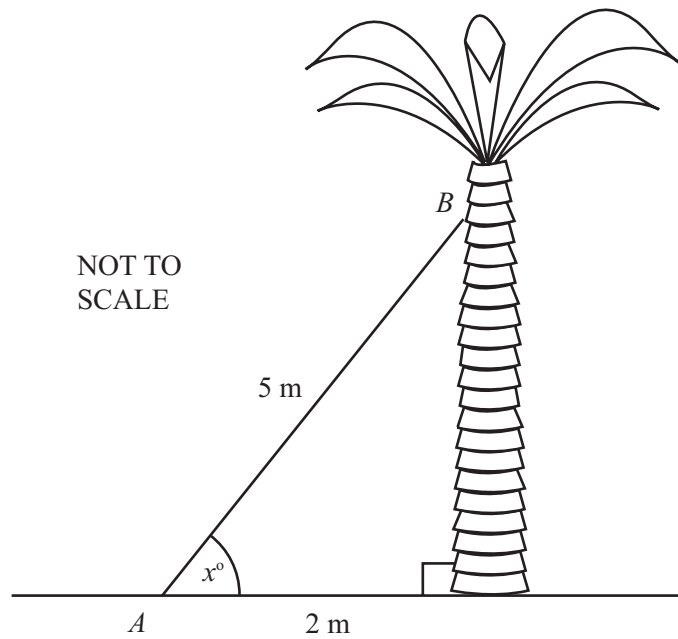
(iii) $\frac{2}{7}$

Answer (a)(iii)..... [1]

(b) Write 28%, $\frac{275}{1000}$ and $\frac{2}{7}$ in order of the size, smallest first.

Answer (b).....<.....<..... [1]

16



The diagram shows a ladder, AB , standing up against a palm tree. The ladder is 5 metres long and its base is 2 metres from the tree.

- (a) Calculate how high up the tree the ladder reaches.

Answer (a).....m [2]

- (b) The ladder makes an angle of x° with the ground. Calculate the value of x .

Answer (b) $x =$ [2]

17 Write down the value of n in each of the following statements.

(a) $1500 = 1.5 \times 10^n$

Answer (a) $n =$ [1]

(b) $0.00015 = 1.5 \times 10^n$

Answer (b) $n =$ [1]

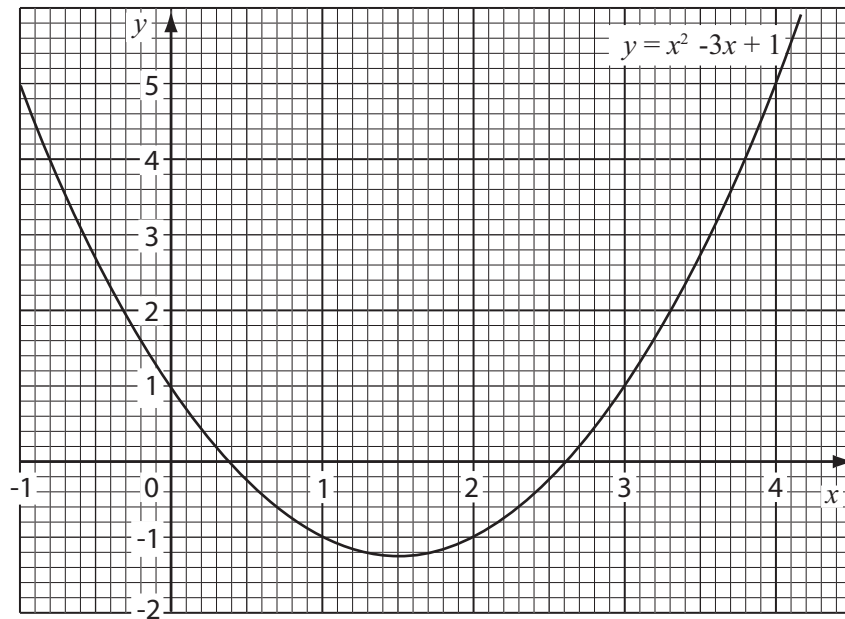
(c) $5^n = 1$

Answer (c) $n =$ [1]

(d) $\frac{1}{36} = 6^n$

Answer (d) $n =$ [1]

- 18 The diagram below shows the graph of $y = x^2 - 3x + 1$.



- (a) Use the graph to solve the equation

$$x^2 - 3x + 1 = 0.$$

Answer (a) $x = \dots\dots\dots$ or $\dots\dots\dots$ [2]

- (b) (i) Complete the table for $y = x + 1$.

| | | | |
|-----|----|---|---|
| x | -1 | 1 | 3 |
| y | | 2 | 4 |

[1]

- (ii) Draw the graph for $y = x + 1$ on the grid above.

[1]

- (c) Write down the coordinates of the intersections of the two graphs.

Answer (c) $(\dots\dots, \dots\dots)$ $(\dots\dots, \dots\dots)$ [2]

1 20 21 22 23 24 25 26 27 28 29 30

From the set of numbers above, write down

(a) a multiple of 8,

Answer (a)..... [1]

(b) a square,

Answer (b)..... [1]

(c) a cube,

Answer (c)..... [1]

(d) two prime numbers,

Answer (d) [2]

(e) a factor of 156,

Answer (e)..... [1]

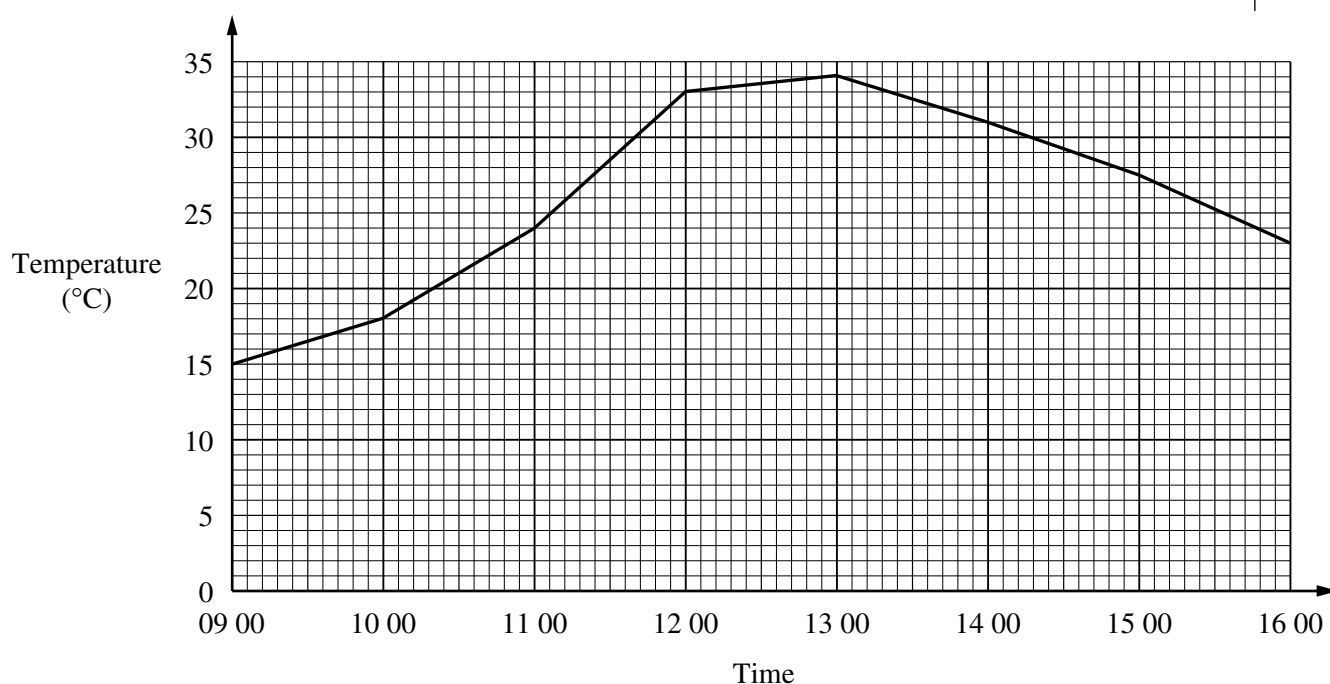
(f) the square root of 784,

Answer (f)[1]

(g) two numbers whose product is 567.

Answer (g).....[1]

- 2 (a) Jorina recorded the temperature every hour during the school day.
The graph shows the results.



- (i) At what time was the highest temperature recorded?

Answer (a)(i)..... [1]

- (ii) At what time was the temperature 21 °C?

Answer (a)(ii).....[1]

- (iii) Find the increase in temperature between 11 00 and 12 00.

Answer (a)(iii) °C [2]

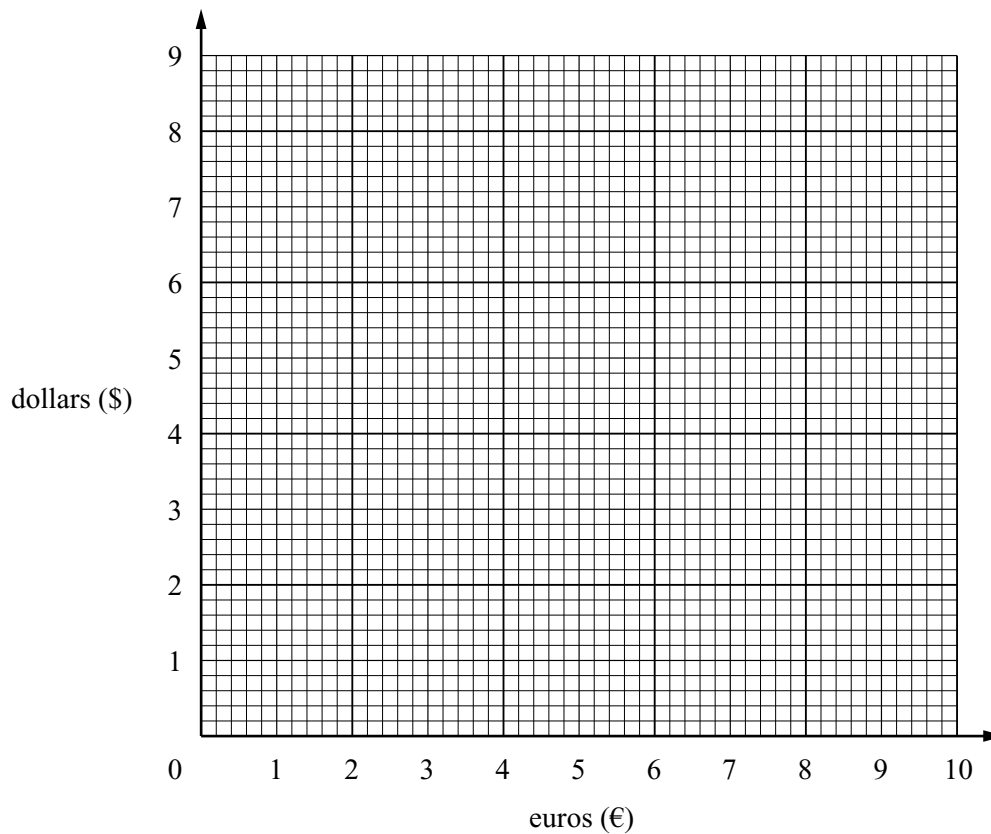
(b) The conversion rate between euros (€) and dollars (\$) was €1 = \$0.87.

(i) Complete the table.

| | | | |
|----|---|---|----|
| € | 0 | 5 | 10 |
| \$ | 0 | | |

[2]

(ii) Draw a graph on the grid below to convert between euros and dollars.



[2]

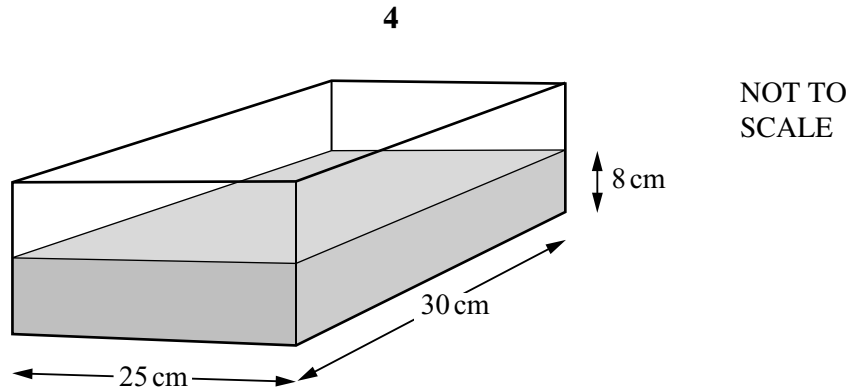
(iii) How many euros were equivalent to \$8?

Answer (b)(iii) €..... [1]

(iv) How many euros were equivalent to \$500?

Answer (b)(iv) €..... [1]

3

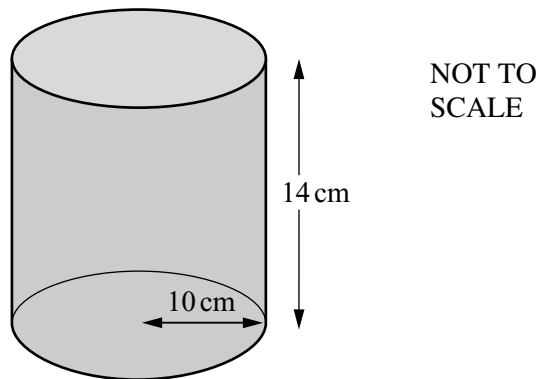


The diagram shows a rectangular tank of base 30 cm by 25 cm. It contains water to a depth of 8 cm.

- (a) Calculate the volume of water in the tank.

Answer (a)cm³ [2]

(b)



The diagram shows a cylinder of radius 10 cm and height 14 cm which is full of water.

- (i) Calculate the volume of water in the cylinder.

Answer (b)(i) cm³ [3]

- (ii) All the water in the cylinder is poured into the rectangular tank. Find the total volume of water now in the tank.

Answer (b)(ii) cm³ [1]

- (iii) Calculate the new depth of water in the tank.

Answer (b)(iii)..... cm [3]

- 4 A dentist recorded the number of fillings that each of a group of 30 children had in their teeth. The results were

2 4 0 5 1 1 3 2 6 0
 2 2 3 2 1 4 3 0 1 6
 1 4 1 6 5 1 0 3 4 2

- (a) Complete this frequency table.

| Number of fillings | Frequency |
|--------------------|-----------|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |

[2]

- (b) What is the modal number of fillings?

Answer (b)..... [1]

- (c) Find the median number of fillings.

Answer (c)..... [2]

- (d) Work out the mean number of fillings.

Answer (d) [2]

- (e) One of these children is chosen at random.
Find the probability that this child has

- (i) exactly one filling,

Answer (e)(i) [1]

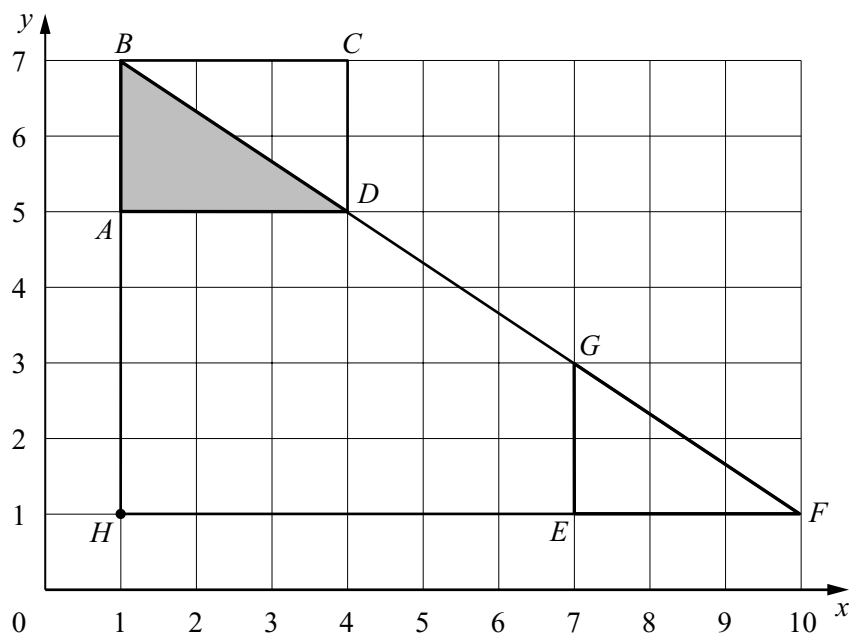
- (ii) more than three fillings.

Answer (e)(ii) [1]

- (f) These 30 children had been chosen from a larger group of 300 children. Estimate how many in the larger group have no fillings in their teeth.

Answer (f) [1]

5



- (a) Triangle ABD is translated onto triangle EGF by the vector $\begin{pmatrix} x \\ y \end{pmatrix}$.

Write down the value of x and the value of y .

Answer (a) $x = \dots\dots\dots$

$y = \dots\dots\dots$ [2]

- (b) Describe **fully** the single transformation which maps triangle ABD onto

- (i) triangle CDB ,

Answer (b)(i).....
 [3]

- (ii) triangle HBF .

Answer (b)(ii)
 [3]

- (c) (i) Work out the area of triangle ABD .

Answer (c)(i) [1]

- (ii) What is the ratio area of triangle ABD : area of triangle HBF ?
 Give your answer in its lowest terms.

Answer (c)(ii)..... : [2]

- (d) Find the gradient of the line BF .

Answer (d) [2]

- 6 (a) The perimeter, P , of a triangle is given by the formula

$$P = 6x + 3.$$

- (i) Find the value of P when $x = 4$.

Answer (a)(i) $P = \dots\dots\dots$ [1]

- (ii) Find the value of x when $P = 39$.

Answer (a)(ii) $x = \dots\dots\dots$ [2]

- (iii) Rearrange the formula to find x in terms of P .

Answer (a)(iii) $x = \dots\dots\dots$ [2]

- (b) The perimeter of another triangle is $(9x + 4)$ centimetres.

Two sides of this triangle are of length $2x$ centimetres and $(3x + 1)$ centimetres.

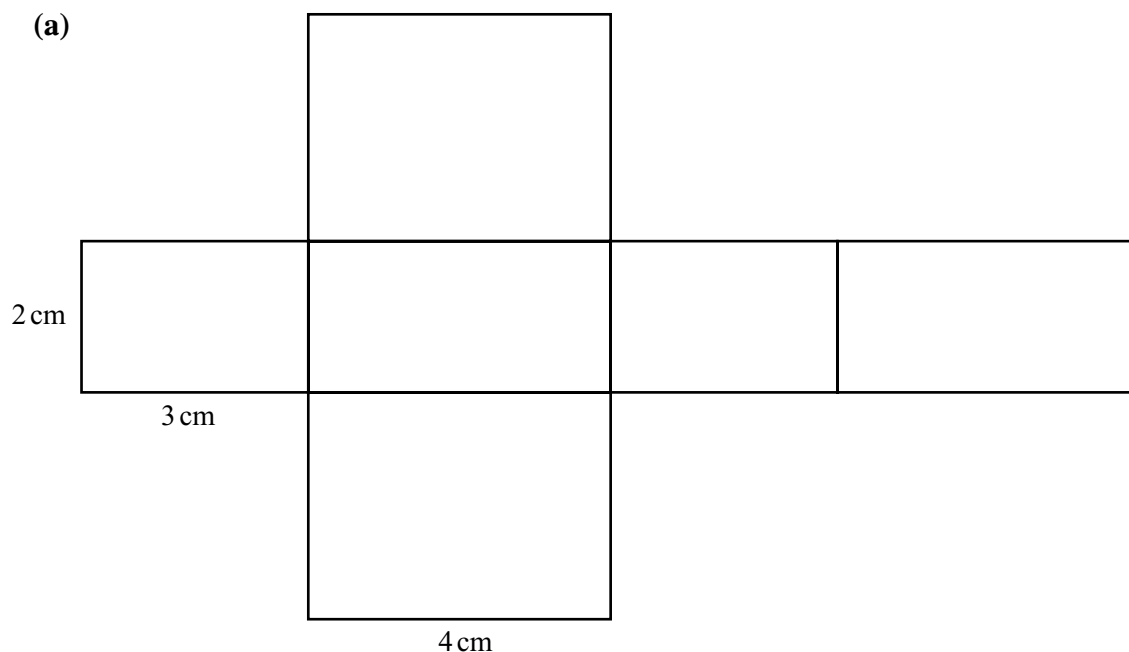
- (i) Find an expression, in terms of x , for the length of the third side.

Answer (b)(i) $\dots\dots\dots$ cm [2]

- (ii) The **perimeter** of this triangle is 49 cm. Find the length of each side.

Answer (b)(ii) $\dots\dots\dots$ cm, $\dots\dots\dots$ cm, $\dots\dots\dots$ cm [3]

7 (a)



The diagram shows the net of a solid.

(i) Work out the perimeter of the net.

Answer (a)(i) cm [2]

(ii) Work out the area of the net.

Answer (a)(ii)cm² [3]

(iii) Write down the mathematical name of the solid.

Answer (a)(iii)..... [1]

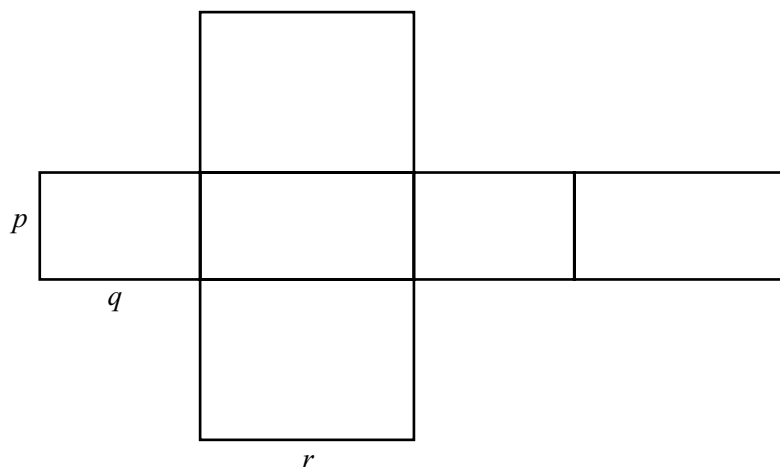
(iv) Write down the surface area of the solid.

Answer (a)(iv)cm² [1]

(v) Work out the volume of the solid.

Answer (a)(v)cm³ [2]

(b)



This is the net of a solid with edges of length p , q and r .

Find an expression for

(i) the surface area of the solid,

Answer (b)(i)..... [2]

(ii) the volume of the solid.

Answer (b)(ii)..... [2]

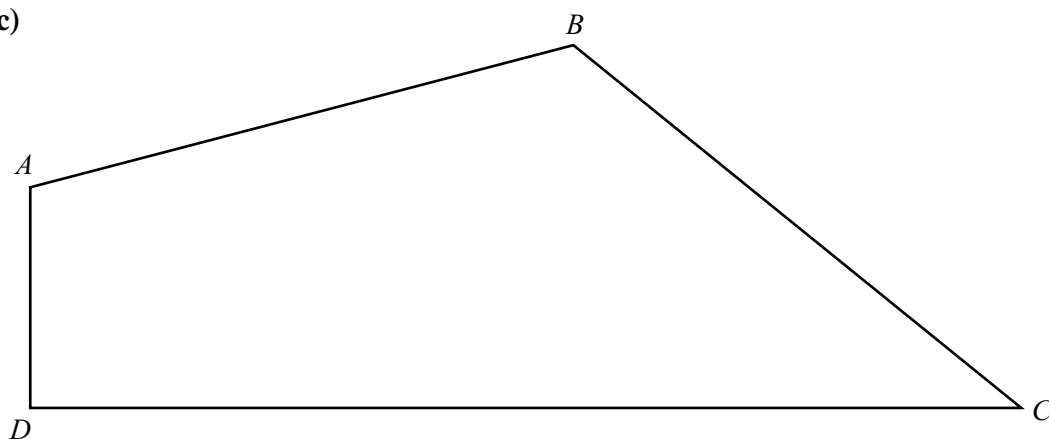
- 8 (a) A mobile phone company changes its rental charge from \$80 per **year** to \$7.50 per **month**.
Work out the percentage increase.

Answer (a) % [3]

- (b) George's phone card lasts for 300 minutes. He has used $\frac{3}{5}$ of this time.
Work out how many minutes are left on his phone card.

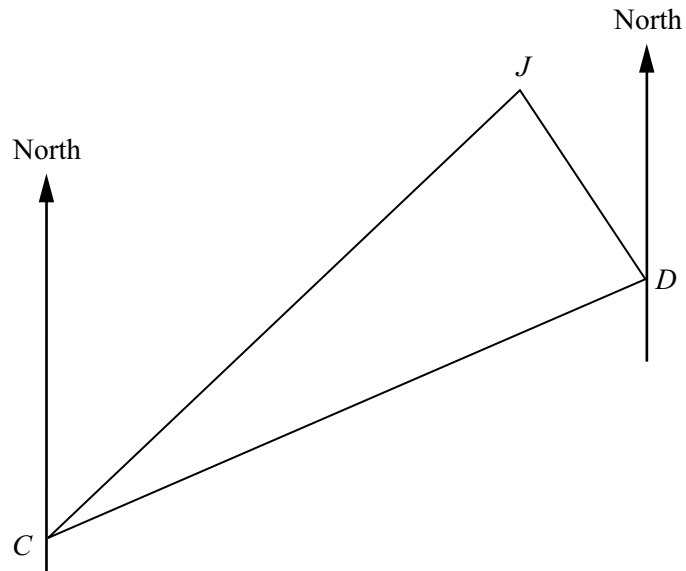
Answer (b) minutes [3]

(c)



- (i) On the diagram above, using a straight edge and compasses only, construct the loci which are
- (1) equidistant from A and from B , [2]
 - (2) equidistant from CB and from CD . [2]
- (ii) The diagram shows a field $ABCD$. The mobile phone company plans to put a mast in the field. The mast must be
- nearer to B than to A
 - nearer to CD than to CB .

Shade the part of the diagram which shows where the mast should be put. [2]



The diagram, drawn to scale, shows the positions of Johannesburg (J), Cape Town (C) and Durban (D).

- (a) The distance from Johannesburg to Durban is 450 kilometres.
On the diagram $JD = 3$ cm.

- (i) How many kilometres are represented by 1 cm on the diagram?

Answer (a)(i) [1]

- (ii) Work out the scale of the diagram as a ratio.

Answer (a)(ii) 1 : [2]

- (b) Use the diagram to find

- (i) the distance from Cape Town to Johannesburg,

Answer (b)(i) km [2]

- (ii) the bearing of Johannesburg from Cape Town,

Answer (b)(ii) [1]

- (iii) the bearing of Cape Town from Durban.

Answer (b)(iii) [2]

10 Look at this arrangement of numbers. It is known as Pascal's Triangle.

| Line | | | | | | | | | | | Sum of numbers |
|------|---|---|---|---|---|----|---|----|---|---|----------------|
| 1 | | | | | 1 | | 1 | | | | 2 |
| 2 | | | | 1 | | 2 | | 1 | | | 4 |
| 3 | | | 1 | | 3 | | 3 | | 1 | | 8 |
| 4 | | | 1 | | 4 | | 6 | | 4 | | 16 |
| 5 | | 1 | | 5 | | 10 | | 10 | | 5 | 32 |
| 6 | | — | | — | | — | | — | | — | — |
| 7 | — | | — | | — | | — | | — | | — |

(a) Complete lines 6 and 7 above. [5]

(b) (i) What is the sum of the numbers on the 9th line?

Answer (b)(i)..... [2]

(ii) What is the sum of the numbers on the n th line?

Answer (b)(ii)..... [2]

(c) The 12th line is given below. Fill in the blanks in the 11th line.

| | | | | | | | | | | | | | |
|----|---|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|---|
| 11 | 1 | 11 | 55 | — | — | — | — | — | — | — | — | — | — |
| 12 | 1 | 12 | 66 | 220 | 495 | 792 | 924 | 792 | 495 | 220 | 66 | 12 | 1 |

[2]

1 Work out $\sqrt{7.1^3 + 2.9^3}$, giving

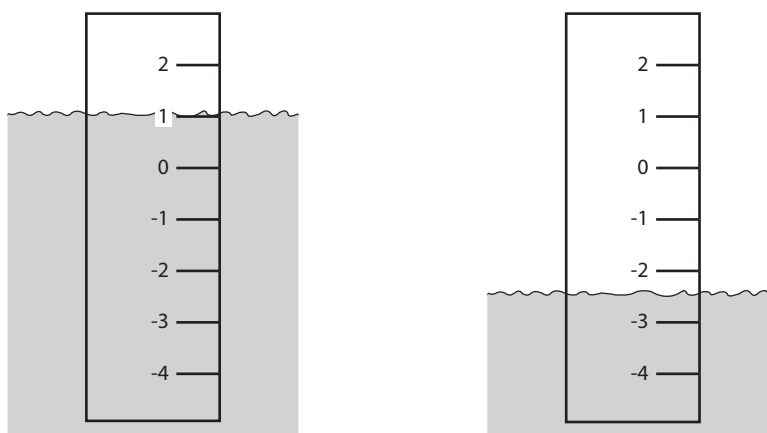
(a) your full calculator display,

Answer (a)..... [1]

(b) your answer to 2 decimal places.

Answer (b)..... [1]

2 The diagram shows how the water level of a river went down during a drought.



The measurements are in metres.

(a) By how many metres did the water level go down?

Answer (a).....m [1]

(b) A heavy rainfall followed the drought and the water level went up by 1.6 metres. What was the water level after the rainfall?

Answer (b).....m [1]

3 (a) Write in order of size, smallest first

0.68, $\frac{33}{50}$, 67%.

Answer (a) < < [1]

(b) Convert 0.68 into a fraction in its lowest terms.

Answer (b)..... [1]

- 4 Mahesh and Jayraj share \$72 in the ratio 7:5.
How much does Mahesh receive?

Answer \$..... [2]

- 5 The population of a city is 550 000.
It is expected that this population will increase by 42% by the year 2008.
Calculate the expected population in 2008.

Answer [2]

- 6 Areeg goes to a bank to change \$100 into riyals.
The bank takes \$2.40 and then changes the rest of the money at a rate of \$1 = 3.75 riyals.
How much does Areeg receive in riyals?

Answerriyals [2]

- 7 Write down the value of $\left(1\frac{1}{2}\right)^{-2}$ as a fraction.

Answer [2]

- 8 (a) $y = 4uv - 3v$.
Find the value of y when $u = -3$ and $v = 2$.

Answer (a) $y =$ [1]

- (b) Factorise $4uv - 3v$.

Answer (b) [1]

- 9 Solve the equation

$$x + 4 = 3(2 - x) .$$

Answer $x =$ [3]

- 10 There are approximately 500 000 grains of wheat in a 2 kilogram bag.

- (a) Calculate the mass of one grain in grams.

Answer (a)g [2]

- (b) Write your answer to **part (a)** in standard form.

Answer (b)g [1]

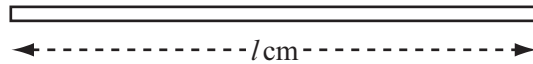
- 11 Solve the simultaneous equations

$$\begin{aligned} 3a + 2b &= 7 , \\ a - 2b &= 5 . \end{aligned}$$

Answer $a =$

$b =$ [3]

- 12 The diagram shows a pole of length l centimetres.



- (a) Hassan says that $l = 88.2$.
Round this to the nearest whole number.

Answer (a) $l = \dots\dots\dots$ [1]

- (b) In fact the pole has a length 86 cm, to the nearest centimetre.
Complete the statement about l .

Answer (b) $\dots\dots\dots \leq l < \dots\dots\dots$ [2]

- 13 On a journey a bus takes 35 minutes to travel the first 10 kilometres.
It then travels a further 20 kilometres in the next 40 minutes.

- (a) The bus started the journey at 18 50.
At what time did it complete the journey?

Answer (a) $\dots\dots\dots$ [1]

- (b) Calculate the average speed of the whole journey in

- (i) kilometres/minute,

Answer (b)(i) $\dots\dots\dots$ km/min [2]

- (ii) kilometres/hour.

Answer (b)(ii) $\dots\dots\dots$ km/h [1]

- 14** Show **all your working** for the following calculations.
The answers are given so it is only your working that will be given marks.

(a) $\frac{1}{2} + \frac{2}{3} = 1\frac{1}{6},$

Answer (a)

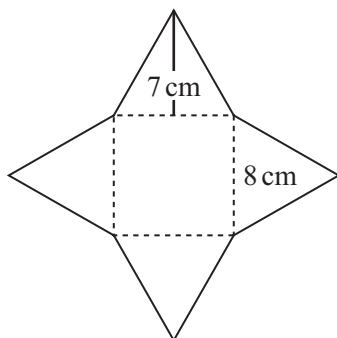
[2]

(b) $1\frac{1}{5} \times 1\frac{3}{4} = 2\frac{1}{10}.$

Answer (b)

[2]

- 15** The diagram shows a square of side 8 cm and four congruent triangles of height 7 cm.



- (a) Calculate

- (i) the area of one triangle,

Answer (a)(i)cm² [2]

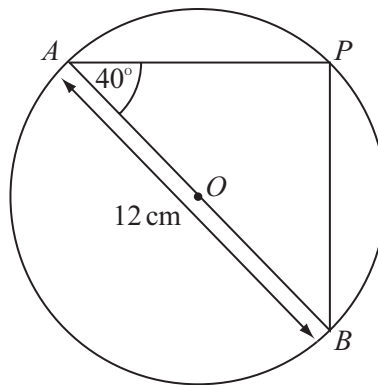
- (ii) the area of the whole shape.

Answer (a)(ii)cm² [2]

- (b) The shape is the net of a solid.
Write down the special name for this solid.

Answer (b) [1]

- 16** In the diagram AB is the diameter of a circle, centre O . The length of AB is 12 cm.



NOT TO
SCALE

- (a)** Write down the size of angle APB .

Answer (a) Angle APB = [1]

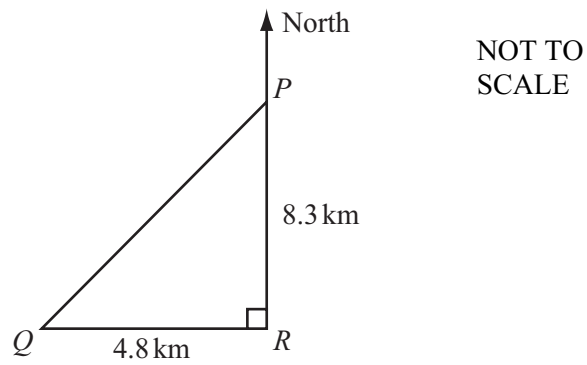
- (b)** Angle $PAB = 40^\circ$.
Calculate the length of PB .

Answer (b) PB =cm [2]

- (c)** Calculate the area of the circle.

Answer (c)cm² [2]

17



A straight road between P and Q is shown in the diagram.
 R is the point south of P and east of Q .
 $PR = 8.3$ km and $QR = 4.8$ km.

Calculate

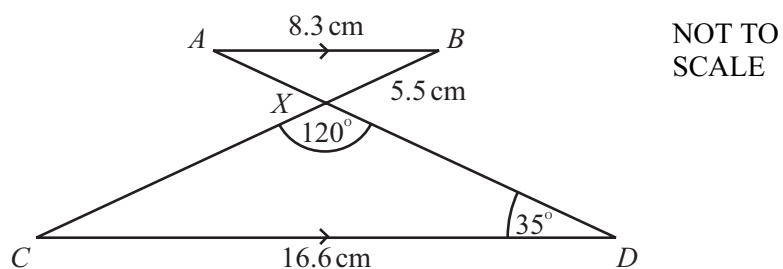
- (a) the length of the road PQ ,

Answer (a)km [2]

- (b) the bearing of Q from P .

Answer (b) [3]

18



In the diagram the lines AB and CD are parallel.

The lines AD and BC intersect at X .

Angle $XDC = 35^\circ$ and angle $CXD = 120^\circ$.

(a) (i) Write down the size of angle BAX .

Answer(a)(i) Angle $BAX = \dots\dots\dots$ [1]

(ii) Write down the size of angle ABX .

Answer(a)(ii) Angle $ABX = \dots\dots\dots$ [1]

(b) Complete the statement

Triangle AXB is $\dots\dots\dots$ to triangle DXC . [1]

(c) $AB = 8.3$ cm, $BX = 5.5$ cm and $CD = 16.6$ cm.
Calculate the length of CX .

Answer (c) $\dots\dots\dots$ cm [2]

- 1** Fifty students take part in a quiz.
The table shows the results.

| | | | | | | | | |
|---------------------------|---|---|---|---|----|----|----|----|
| Number of correct answers | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Number of students | 4 | 7 | 8 | 7 | 10 | 6 | 5 | 3 |

- (a)** How many students had 6 correct answers?

Answer(a)..... [1]

- (b)** How many students had less than 11 correct answers?

Answer(b)..... [1]

- (c)** Find

- (i)** the modal number of correct answers,

Answer(c)(i)..... [1]

- (ii)** the median number of correct answers,

Answer(c)(ii)..... [2]

- (iii)** the mean number of correct answers.

Answer(c)(iii)..... [3]

- (d)** A bar chart is drawn to show the results.
The height of the bar for the number of students who had 5 correct answers is 2 cm.
What is the height of the bar for the number of students who had 9 correct answers?

Answer(d).....cm [2]

- (e) A pie chart is drawn to show the results.
What is the angle for the number of students who had 11 correct answers?

Answer(e)..... [2]

- (f) The students who had the most correct answers shared a top prize of \$22.50.
How much did each of these students receive?

Answer(f) \$..... [2]

- (g) Work out the percentage of students who had **less than** 7 correct answers.

Answer(g).....% [2]

- (h) A student is chosen at random from the fifty students.
What is the probability that this student had

- (i) exactly 10 correct answers,

Answer(h)(i)..... [1]

- (ii) at least 10 correct answers,

Answer(h)(ii)..... [1]

- (iii) more than 1 correct answer?

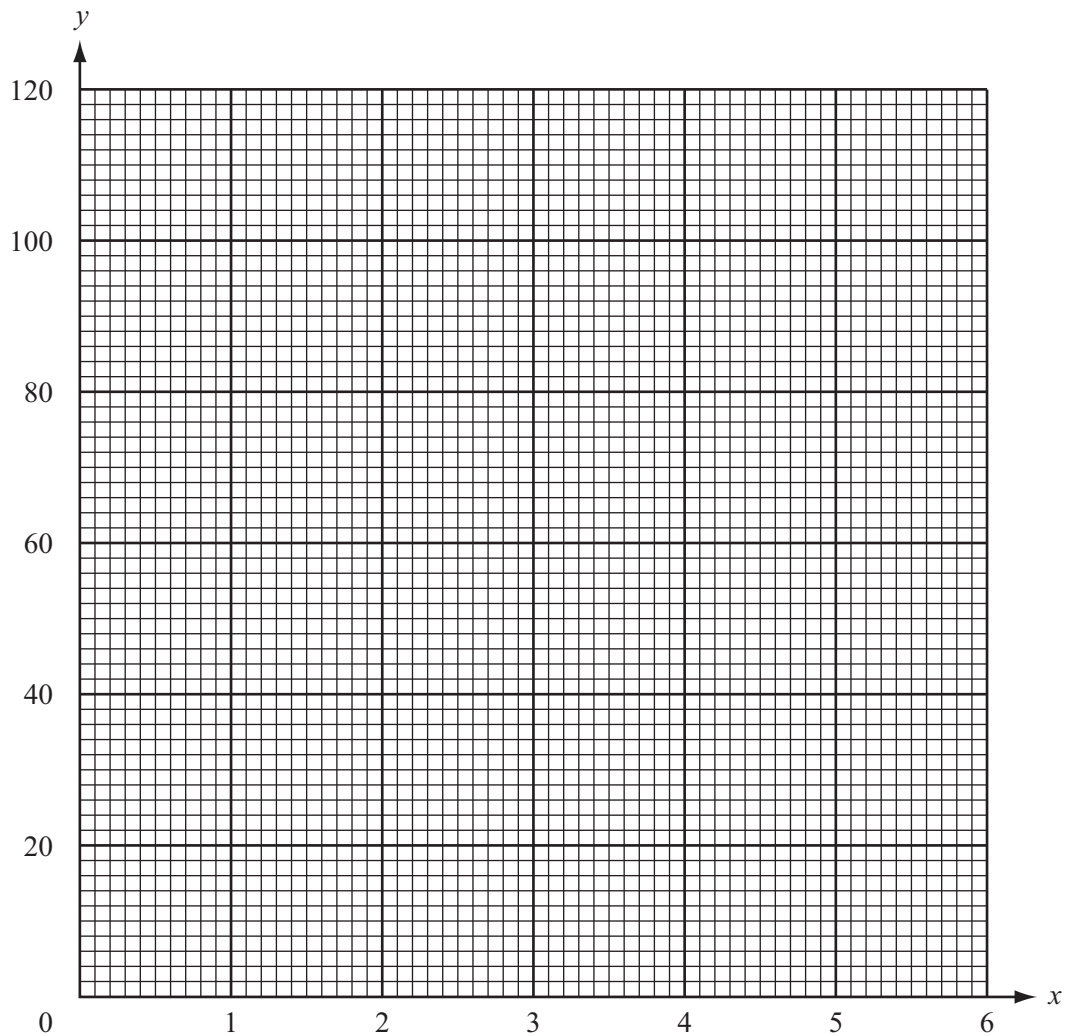
Answer(h)(iii)..... [1]

- 2 (a) Complete the table for the equation $y = \frac{120}{x}$.

| | | | | | | | |
|-----|---|-----|----|----|----|---|---|
| x | 1 | 1.5 | 2 | 3 | 4 | 5 | 6 |
| y | | 80 | 60 | 40 | 30 | | |

[3]

- (b) On the grid below, draw the curve $y = \frac{120}{x}$ for $1 \leq x \leq 6$.



[4]

- (c) Use your graph to find x when $y = 70$.

Answer(c) $x = \dots\dots\dots$ [1]

- (d) Complete the table for the equation $y = 120 - 20x$.

| | | | | |
|-----|---|----|----|---|
| x | 0 | 2 | 4 | 6 |
| y | | 80 | 40 | |

[2]

- (e) On the same grid above, draw the graph of $y = 120 - 20x$ for $0 \leq x \leq 6$.

[2]

- (f) The graphs of $y = \frac{120}{x}$ and $y = 120 - 20x$ intersect at two points.
Write down the coordinates of these two points.

Answer(f) (..... ,) and (..... ,) [2]

- (g) Write down the gradient of the line $y = 120 - 20x$.

Answer(g) [2]

- 3 (a) Bottles of water cost 25 cents each.

- (i) Find the cost of 7 bottles in cents.

Answer(a)(i).....cents [1]

- (ii) Write down an expression in b for the cost of b bottles in cents.

Answer(a)(ii).....cents [1]

- (iii) Change your answer to **part (i)** into dollars.

Answer(a)(iii) \$..... [1]

- (iv) Write down an expression in b for the cost of b bottles in dollars.

Answer(a)(iv) \$..... [1]

- (b) The total cost, T , of n bars of chocolate is given by $T = nc$.

- (i) Write c in terms of T and n .

Answer(b)(i) $c =$ [1]

- (ii) What does c represent?

Answer(b)(ii) [1]

- (c) The average cost of a book is $\$A$.

- (i) The total cost of 8 books is \$36.
Find the value of A .

Answer(c)(i) $A =$ [1]

- (ii) One of the 8 books is removed.
The cost of this book is \$6.60.
Find the new value of A .

Answer(c)(ii) $A =$ [2]

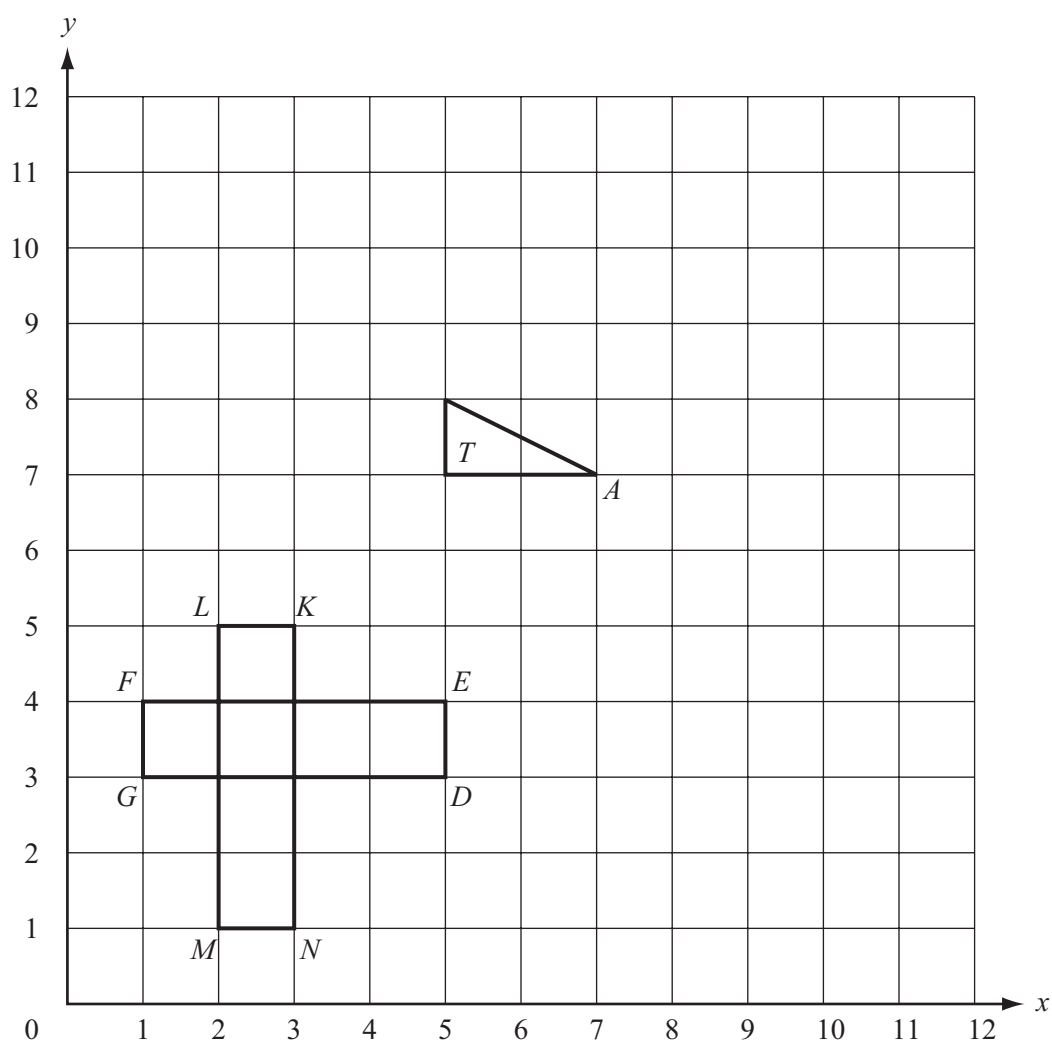
- (iii) The total cost of x books is \$ y .
Write an expression for A in terms of x and y .

Answer(c)(iii) $A = \dots\dots\dots$ [1]

- (iv) One of the x books is removed.
The cost of this book is \$7.
Write a new expression for A in terms of x and y .

Answer(c)(iv) $A = \dots\dots\dots$ [2]

4



- (a) Draw accurately the image of triangle T under the following transformations.
- (i) Translate triangle T by the vector $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$. Label it P . [2]
 - (ii) Reflect triangle T in the line $x = 8$. Label it Q . [2]
 - (iii) Rotate triangle T about the point A through 90° anti-clockwise. Label it R . [2]
 - (iv) Enlarge triangle T with centre of enlargement A and scale factor 2. Label it S . [2]

(b) Describe fully the single transformation which maps

(i) triangle P onto triangle T ,

Answer(b)(i)..... [2]

(ii) triangle S onto triangle T .

Answer(b)(ii)..... [3]

(c) The rectangle $DEFG$ is rotated onto the rectangle $KLMN$, with D mapped onto K .

Write down

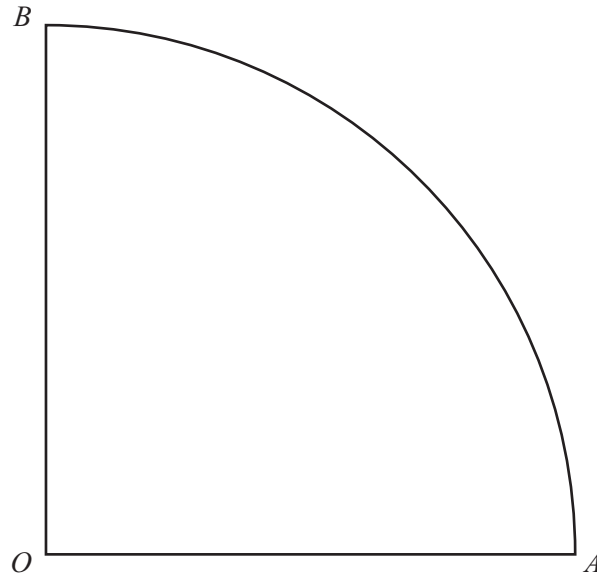
(i) the angle of the rotation,

Answer(c)(i)..... [1]

(ii) the coordinates of the centre of the rotation.

Answer(c)(ii) (..... ,) [2]

5

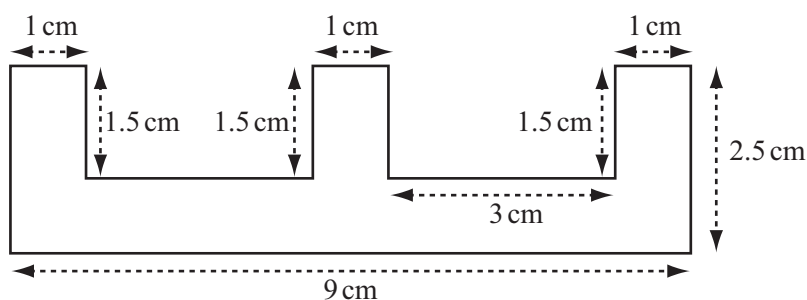


The quarter-circle above has centre O and radius 7 cm.

- (a) Using a straight edge and compasses only construct
- (i) the perpendicular bisector of AO , [2]
 - (ii) the locus of points inside the quarter-circle which are 5 cm from O . [2]
- (b) Shade the region, inside the quarter-circle, containing the points which are more than 5 cm from O and nearer to A than O . [1]
- (c) (i) The line OX bisects angle AOB and is 12 cm long.
Draw OX accurately. [2]
- (ii) Draw accurately the tangent to the quarter-circle at A . [1]
- (iii) This tangent meets the line OX at Y .
Measure the length of AY .

Answer(c)(iii) $AY = \dots\dots\dots$ cm [1]

6



In the diagram above, all the angles are right angles.

- (a) Show that the area of the shape is 13.5 cm^2 .

Answer(a)

[2]

- (b) The shape is the cross-section of a metal prism of length 2.8 metres. Calculate the volume of the prism in cubic centimetres.

Answer(b)..... cm^3 [3]

- (c) A metal cuboid is melted down so that prisms as described in **part (b)** can be made. The cuboid measures 2 metres by 1.2 metres by 0.8 metres.

- (i) Calculate the volume of the cuboid in cubic metres,

Answer(c)(i)..... m^3 [2]

- (ii) Calculate the volume of the cuboid in cubic centimetres.

Answer(c)(ii)..... cm^3 [2]

- (iii) Calculate the number of prisms which can be made.

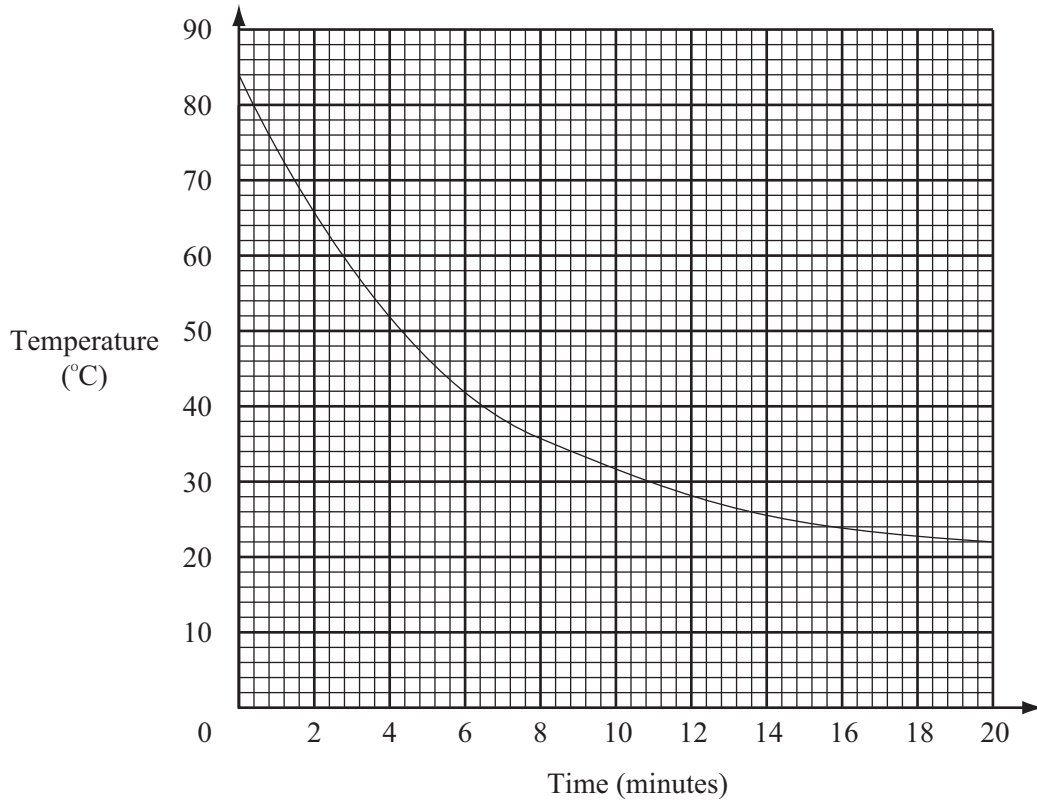
Answer(c)(iii)..... [2]

- (d) Draw any lines of symmetry of the shape on the diagram above. [1]

- (e) Describe the rotational symmetry of the shape above.

Answer(e)..... [1]

7



The graph shows the temperature of a cup of tea cooling down in a room.

(a) What is the temperature of the tea after

(i) 0 minutes,

Answer(a)(i)..... [1]

(ii) 20 minutes?

Answer(a)(ii)..... [1]

(b) After how many minutes is its temperature 30 °C?

Answer(b)..... [1]

(c) By how much has its temperature gone down between 4 minutes and 8 minutes?

Answer(c)..... [1]

(d) (i) Complete the table which shows falls in temperature.

| Between | 0 and 4 minutes | 4 and 8 minutes | 8 and 12 minutes | 12 and 16 minutes |
|---------------------|-----------------|-----------------|------------------|-------------------|
| Fall in temperature | | | | |

[3]

(ii) What pattern do you notice about these falls in temperature?

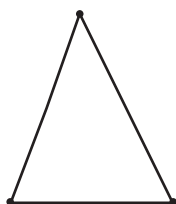
Answer(d)(ii)..... [1]

- (e) Estimate the room temperature.

Answer(e)..... °C [1]

8

Diagram 1



3 dots
1 triangle

Diagram 2



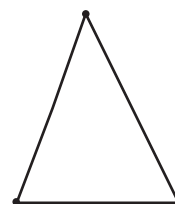
4 dots
3 triangles

Diagram 3



5 dots
6 triangles

Diagram 4



Look at the diagrams above.

- (a) Complete Diagram 4 to continue the pattern. [2]

- (b) Complete the table below.

| Diagram | 1 | 2 | 3 | 4 | 5 | | n |
|----------------|---|---|---|---|---|--|-----|
| Number of dots | 3 | 4 | 5 | | | | |

[3]

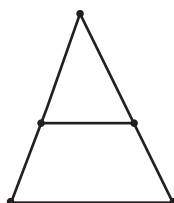
- (c) Complete the table below.

| Diagram | 1 | 2 | 3 | 4 | 5 | 6 | | 10 |
|---------------------|---|---|---|----|---|---|--|----|
| Number of triangles | 1 | 3 | 6 | 10 | | | | |

[3]

- (d) A line is now drawn inside each of the diagrams as shown below.

Diagram 1



2 triangles

Diagram 2



6 triangles

Diagram 3



How many triangles are there in Diagram 3?

Answer(d).....[2]

- 1 Work out $\$50 - \23.46 .

Answer \$..... [1]

- 2 A train leaves Johannesburg at 09 45 and arrives in Pretoria at 10 32.
How many minutes does the journey take?

Answer.....minutes [1]

- 3 Work out $\frac{37^3 + 13^3}{37 + 13}$.

Answer..... [2]

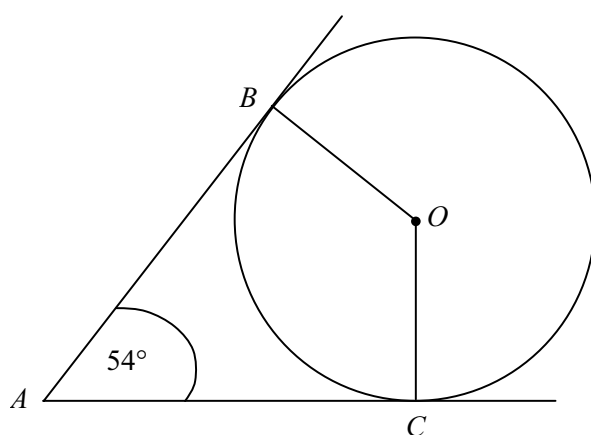
- 4 Write 24% as a fraction in its lowest terms.

Answer..... [2]

- 5 The integer n is such that $-3 \leq n < 3$.
List all the possible values of n .

Answer..... [2]

6



NOT TO
SCALE

AB and AC are tangents to the circle,
centre O .

Angle $BAC = 54^\circ$.

- (a) Write down the size of angle ABO .

Answer (a) Angle $ABO =$ [1]

- (b) Work out angle BOC .

Answer (b) Angle $BOC =$ [1]

- 7 When Carla started work she was paid \$80 each week.
After 3 months her pay was increased by 15%.
After the increase how much was she paid each week?

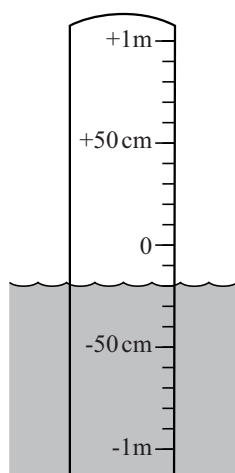
Answer \$..... [2]

- 8 The population of Argentina is 3.164×10^7 . Its area is 2.8×10^6 square kilometres.
Work out the average number of people per square kilometre in Argentina.

Answer.....people/km² [2]

9

The diagram shows a flood-warning post in a river.



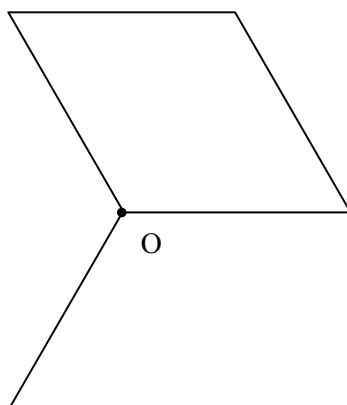
- (a) Write down the water level shown in the diagram.

Answer (a).....cm [1]

- (b) The water level rises by 1 metre.
What is the new level?

Answer (b).....cm [1]

- 10** Complete this diagram accurately so that it has rotational symmetry of order 3 about the point O.



[2]

- 11** An athlete's time for a race was 43.78 seconds.

(a) Write this time correct to

(i) one decimal place,

Answer (a) (i).....seconds [1]

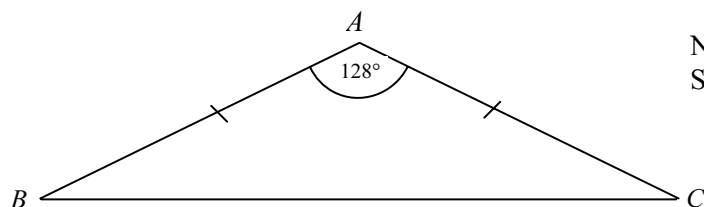
(ii) one significant figure.

Answer (a) (ii).....seconds [1]

(b) Write 43.78 and your answers to **(a)** parts **(i)** and **(ii)** in order, largest first.

Answer (b)>.....>..... [1]

12



NOT TO
SCALE

In triangle ABC , $AB = AC$.

(a) What is the special name of this triangle?

Answer (a)..... [1]

(b) Angle $BAC = 128^\circ$. Work out angle ABC .

Answer (b) Angle $ABC =$ [2]

13

$$T = 2\sqrt{n}.$$

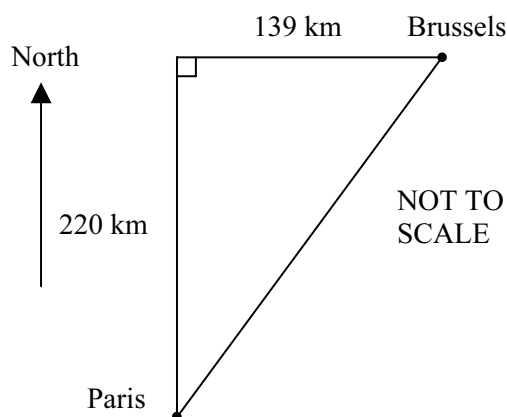
- (a) Find T when $n = 25$.

Answer (a) $T = \dots\dots\dots$ [1]

- (b) Make n the subject of the formula.

Answer (b) $n = \dots\dots\dots$ [2]

14



Brussels is 220 km North and 139 km East of Paris.

Calculate the bearing of Brussels from Paris, to the nearest degree.

Answer..... [3]

- 15 (a) Write down the values of

$$2^0 = \dots\dots\dots, 2^1 = \dots\dots\dots, 2^2 = \dots\dots\dots, 2^3 = \dots\dots\dots, 2^4 = \dots\dots\dots$$
 [2]

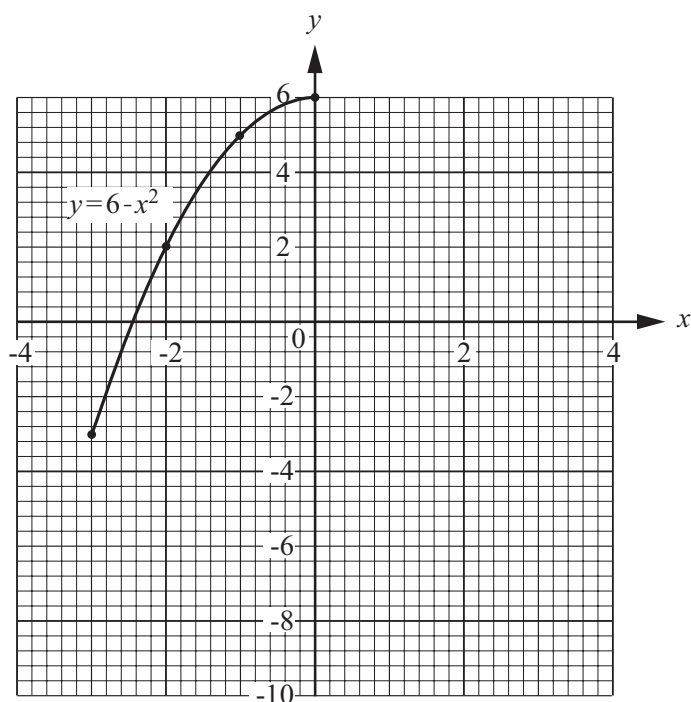
- (b) Change $\frac{5}{49}$ to a decimal. Write down your full calculator display.

Answer (b) $\frac{5}{49} = \dots\dots\dots$ [1]

- (c) What do you notice about your answers to parts (a) and (b)?

Answer (c)
 [1]

16



The diagram shows part of the graph of $y = 6 - x^2$ for $-3 \leq x \leq 0$.

Complete the graph for $-4 \leq x \leq 4$.

[4]

17 The frequency of radio waves (F) is connected to the wavelength (l) by the formula

$$F = \frac{300\,000}{l}.$$

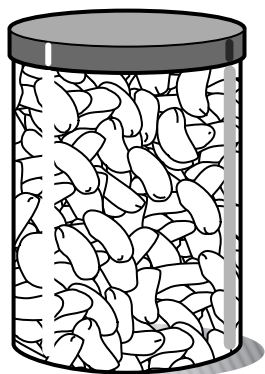
(a) Calculate the value of F when $l = 1500$.

Answer (a) $F = \dots\dots\dots$ [1]

(b) Calculate the value of l when $F = 433$, giving your answer to the nearest whole number.

Answer (b) $l = \dots\dots\dots$ [3]

18



Seven people were asked to guess the number of beans in a jar. Their guesses were

194, 173, 170, 144, 182, 259, 159.

(a) Find the median.

Answer (a) $\dots\dots\dots$ [2]

(b) Work out the mean.

Answer (b) $\dots\dots\dots$ [2]

- 19 (a) Factorise $40a - 8b + 32c$.

Answer (a) [2]

- (b) Solve the equations

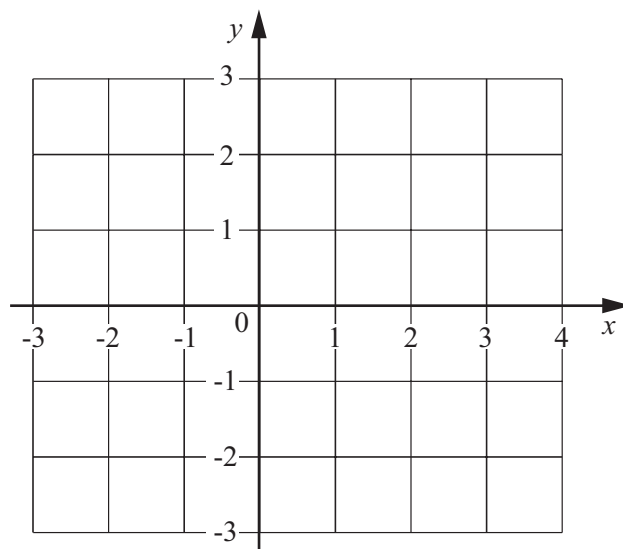
(i) $x - 7 = 9$,

Answer (b) (i) $x =$ [1]

(ii) $2(y + 1) = 3y - 5$.

Answer (b) (ii) $y =$ [2]

20



- (a) On the grid above, plot the points $A(0,2)$, $B(2,2)$, $C(4,1)$ and $D(-2,-1)$. [1]

- (b) Find the area of the quadrilateral $ABCD$.

Answer (b)cm² [2]

- (c) The vector $\overrightarrow{BC} = \begin{pmatrix} x \\ y \end{pmatrix}$.

Find the value of x and the value of y .

Answer (c) $x =$

$y =$ [2]

- 1 (a) A bottle of mass 480 grams contains 75 centilitres of water.

(i) Write 75 centilitres in millilitres.

Answer (a)(i) ml [1]

(ii) Write 75 centilitres in litres.

Answer (a)(ii) l [1]

(iii) The mass of 480 grams is correct to the nearest 10 grams.

Complete the statement on the answer line.

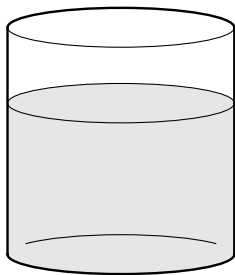
Answer (a)(iii) g \leq mass < g [2]

(iv) Write 480 grams in kilograms.

Answer (a)(iv) kg [1]

- (b) The diagrams below are accurate scale drawings of containers with water in them.

(i)

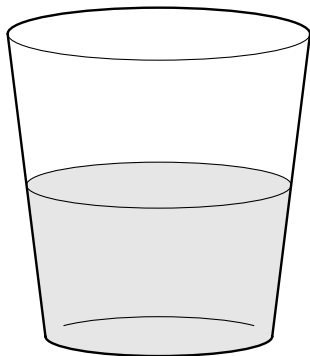


The capacity of this cylindrical jar is 600 ml of water.

By measuring the height of the jar and the height of the water, find the amount of water in the jar.

Answer (b)(i) ml [2]

(ii)



The capacity of this bucket is 7 litres.

Estimate the amount of water in the bucket.

Answer (b)(ii) l [2]

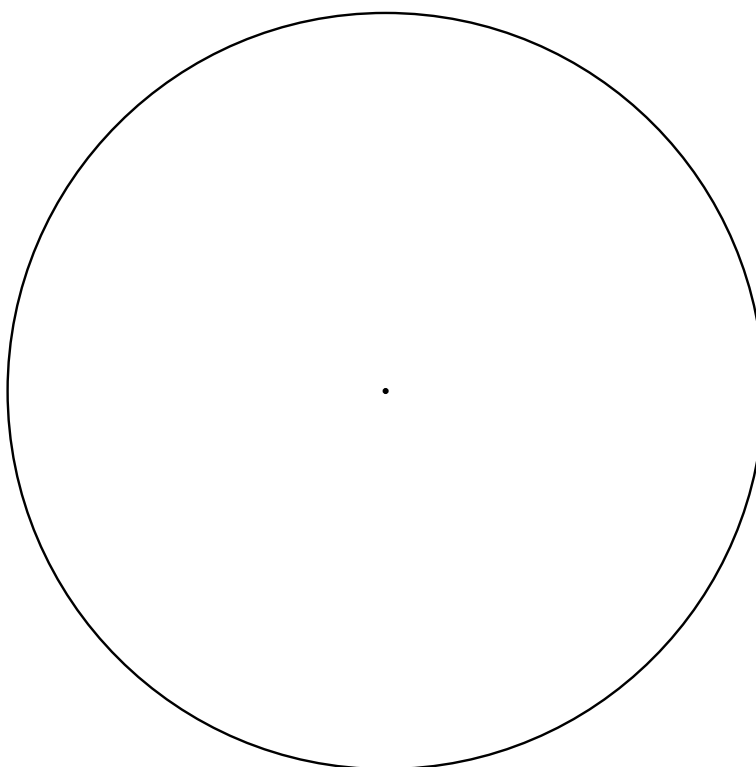
- 2 (a) The results of the school's senior football team during a year are recorded, using W for a win, L for a loss and D for a draw. They are:

L L W D L W L W
 L L D L L W W L
 W L L W D L L W

- (i) Complete the table below to show these results.

Then display this information in the pie chart below.

| | Frequency | Pie chart angle |
|-------|-----------|-----------------|
| W | | |
| L | | |
| D | | |
| TOTAL | | 360° |



[6]

- (ii) The team play another match.

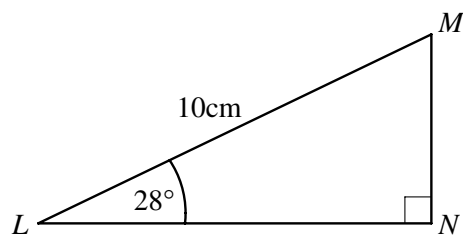
Based on the results above, what is the probability that they will win?

Answer (a)(ii) [1]

- (b) The probability that the school's junior team wins is 0.45 and the probability that it loses is 0.35. What is the probability of a draw?

Answer (b) [2]

3



NOT TO SCALE

In triangle LMN , angle $LMN = 90^\circ$, angle $MLN = 28^\circ$ and $LM = 10\text{ cm}$.

(a) Calculate

(i) MN ,

Answer (a)(i) $MN = \dots\dots\dots\text{ cm}$ [2]

(ii) LN ,

Answer (a)(ii) $LN = \dots\dots\dots\text{ cm}$ [2]

(iii) the area of triangle LMN .

Answer (a)(iii) $\dots\dots\dots\text{ cm}^2$ [2]

(b) A circle is drawn with LM as diameter.

(i) Work out the area of the circle.

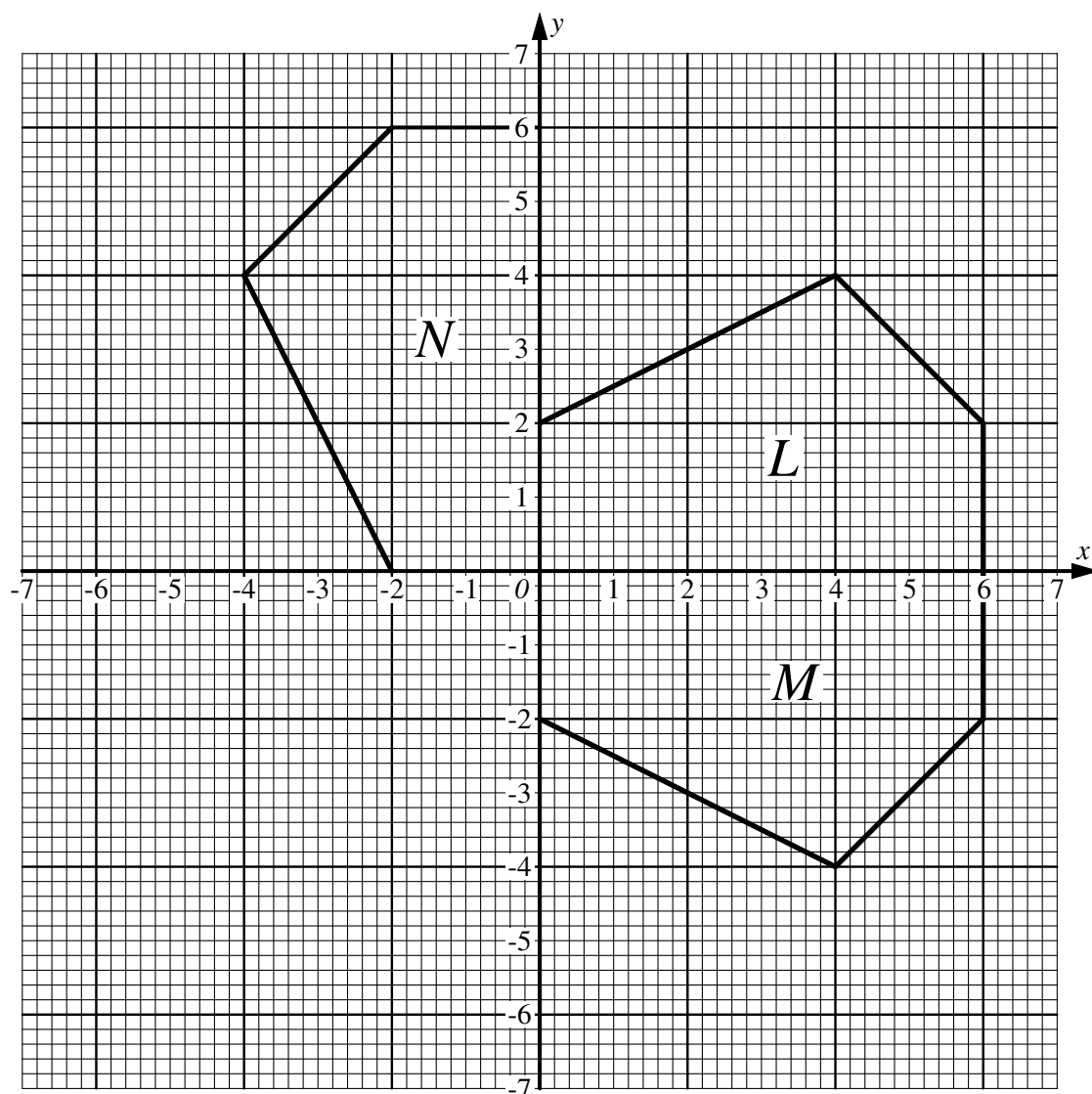
Answer (b)(i) $\dots\dots\dots\text{ cm}^2$ [2]

(ii) **Showing all your working**, find the area of triangle LMN as a percentage of the area of the circle.

Answer (b)(ii) $\dots\dots\dots\%$ [2]

(iii) Explain why the point N is on the circle.

Answer (b)(iii) $\dots\dots\dots$ [1]



(a) Describe fully the transformation which maps

(i) shape L onto shape M ,

Answer (a)(i) [2]

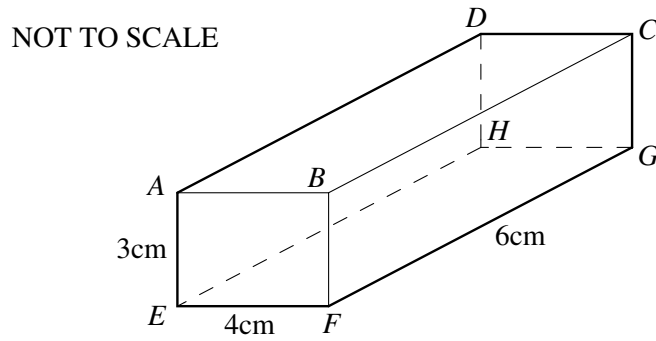
(ii) shape L onto shape N .

Answer (a)(ii) [2]

(b) (i) Translate shape L using the vector $\begin{pmatrix} -7 \\ -4 \end{pmatrix}$. [2]

(ii) Enlarge shape L with centre of enlargement O , scale factor $\frac{1}{2}$. [2]

- 5 The cuboid shown in the diagram has $EF = 4$ cm, $FG = 6$ cm and $AE = 3$ cm.



- (a) Calculate

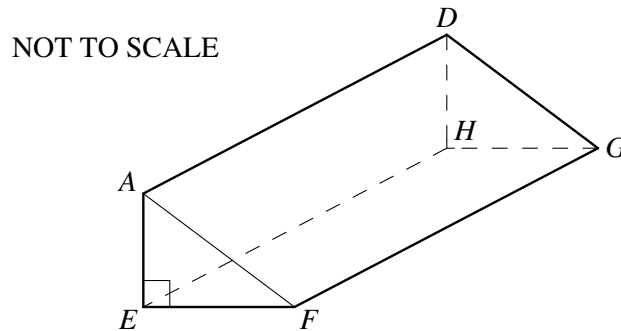
- (i) the volume of the cuboid,

Answer (a)(i) cm^3 [2]

- (ii) the surface area of the cuboid.

Answer (a)(ii) cm^2 [3]

- (b) The cuboid is divided into two equal triangular prisms. One of them is shown in the diagram.



- (i) Write down the volume of the triangular prism.

Answer (b)(i) cm^3 [1]

- (ii) Work out the area of the rectangle $AFGD$.

Answer (b)(ii) cm^2 [3]

6 Ian and Joe start to dig a garden. They both dig at the same rate.

(a) When they are half-way through the job, what fraction of the garden has Ian dug?

Answer (a) [2]

(b) Keith then arrives to help.

All three dig at the same rate until the job is finished.

(i) What fraction of the garden did Ian dig after Keith arrived?

Answer (b)(i) [2]

(ii) What fraction of the garden did Ian dig altogether?

Answer (b)(ii) [2]

(c) Ian and Joe started to dig at 09 00.

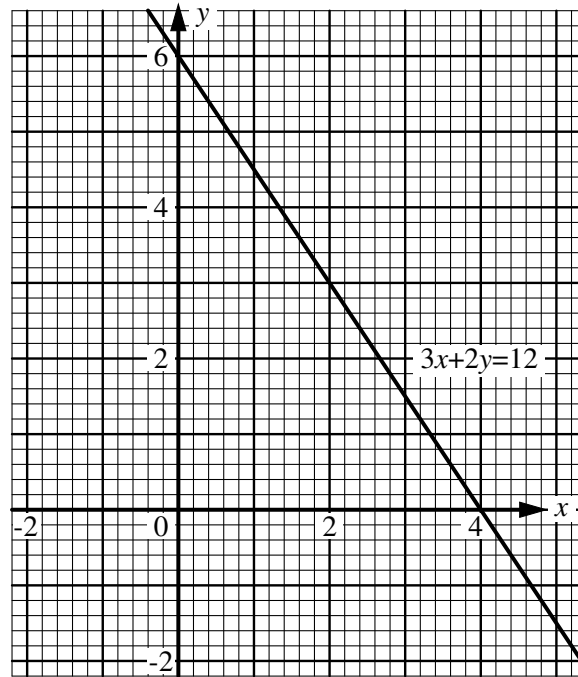
Keith started to dig at 10 00.

Each dug at the same rate throughout.

At what time was the job finished?

Answer (c) [2]

7



The graph of $3x + 2y = 12$ is drawn on the grid above.

- (a) (i) Complete the table of values for $y = 3x - 1$.

| | | | |
|-----|---|---|---|
| x | 0 | 1 | 2 |
| y | | 2 | |

[2]

- (ii) On the grid above, draw the graph of $y = 3x - 1$ for $0 \leq x \leq 2$.

[1]

- (b) Use the graphs to find the solution of the simultaneous equations

$$\begin{aligned} 3x + 2y &= 12, \\ y &= 3x - 1. \end{aligned}$$

Answer (b) $x = \dots\dots\dots$, $y = \dots\dots\dots$ [2]

- (c) Use algebra to find the **exact** solution of the simultaneous equations

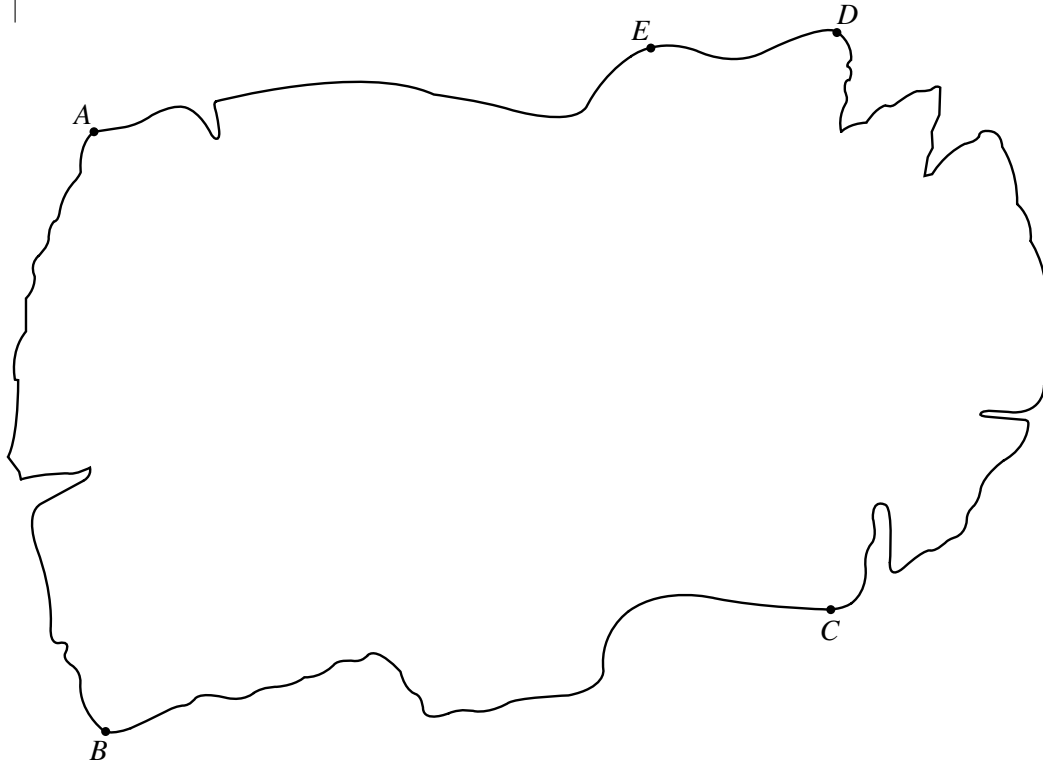
$$\begin{aligned} 3x + 2y &= 12, \\ y &= 3x - 1. \end{aligned}$$

Answer (c) $x \dots\dots\dots$, $y = \dots\dots\dots$ [4]

8



Scale: 1cm to 30km



The diagram shows an island, drawn to a scale of 1 cm to 30 km.

- (a) Find the distance in kilometres between points *A* and *B*.

Answer (a) $AB = \dots\dots\dots$ km [2]

- (b) On the diagram draw the locus of points on the island which are

(i) 150 km from *A*, [1]

(ii) 150 km from *B*. [1]

Label the point *T* on the island where these two loci intersect. [1]

- (c) A tower is built at *T*, to send television signals to the western part of the island. The maximum range of its signals is 150 km.

Draw the locus of points 150 km from *T*. [1]

- (d) A second tower is built, which can send television signals up to 120 km, to reach the rest of the island.

Use the points *C*, *D* and *E* to help you to find a suitable position for the second tower.

Label the position *X*.

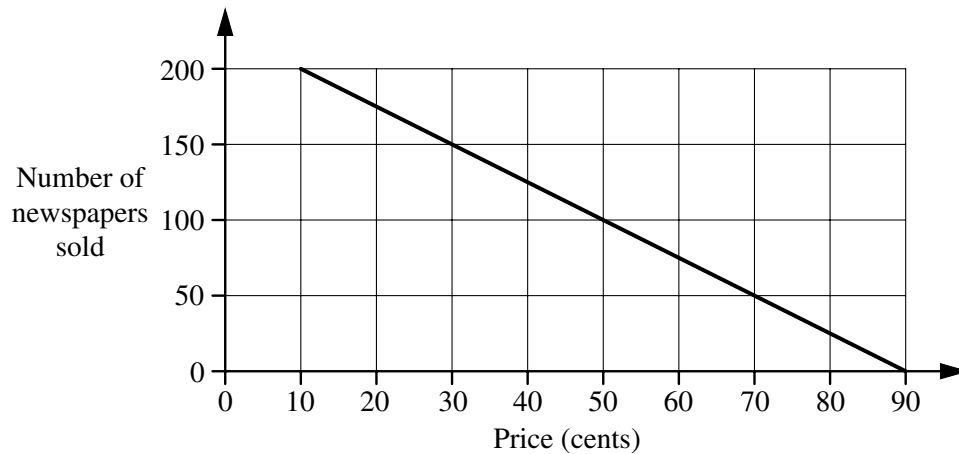
Leave in any construction lines or arcs that you draw. [3]

- 9 Students try to find the best price at which to sell their school newspaper.

When the price was 10 cents, they sold 200 newspapers.

When the price was 60 cents, they sold only 75 newspapers.

They drew the graph below using this information.



- (a) Use the graph to answer these questions.

- (i) At what price will no-one buy the newspaper?

Answer (a)(i) cents [1]

- (ii) 150 newspapers are sold. What was the price?

Answer (a)(ii) cents [1]

- (iii) Complete the table below.

| Price (cents) | Number of newspapers sold | Money received (cents) |
|---------------|---------------------------|------------------------|
| 10 | 200 | 2000 |
| 20 | 175 | 3500 |
| 30 | | |
| 40 | | |
| 50 | | |
| 60 | 75 | 4500 |
| 70 | | |
| 80 | | |
| 90 | | |

[6]

- (b) Use the table in part (a)(iii) to answer these questions.

The total printing cost is \$20.

- (i) When the newspapers are sold at 20 cents each, calculate the profit in dollars.

Answer (b)(i) \$ [2]

- (ii) Estimate the price that will give the greatest profit.

Answer (b)(ii) [1]

- 10** A number that has only two different prime factors is called semi-prime.

For example, 77 is semi-prime since it has only two prime factors, 7 and 11.

[Remember that 1 is not prime.]

- (a) Show that each of the three consecutive numbers 33, 34 and 35 is semi-prime.

Answer (a)

 [3]

- (b) Find the smallest semi-prime number.

Answer (b) [2]

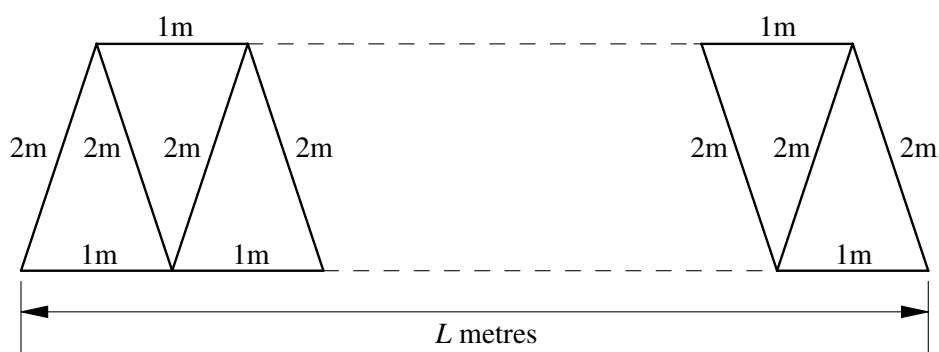
- (c) Find two consecutive numbers between 10 and 20 which are semi-prime.

Answer (c) and [1]

- (d) Find three consecutive numbers between 80 and 90 which are semi-prime.

Answer (d) , and [3]

11



The diagram shows wooden beams which support the roof of a house.

(a) Complete the table below.

| | | | | | | |
|------------------------------------|---|----|---|---|----|---|
| Length of roof (L metres) | 1 | 2 | 3 | 4 | 5 | 6 |
| Number of 2 metre beams (x) | 2 | 4 | | | 10 | |
| Number of 1 metre beams (y) | 1 | 3 | | | 9 | |
| Total length of wood (T metres) | 5 | 11 | | | 29 | |

[4]

(b) When $L = 10$, find the values of x , y and T .

Answer (b) $x = \dots\dots\dots$

$y = \dots\dots\dots$

$T = \dots\dots\dots$

[3]

(c) Write down a formula for

(i) x in terms of L ,

Answer (c)(i) $x = \dots\dots\dots$ [1]

(ii) y in terms of L ,

Answer (c)(ii) $y = \dots\dots\dots$ [1]

(iii) T in terms of L .

Answer (c)(iii) $T = \dots\dots\dots$ [2]

(d) When $T = 83$, find the value of L .

Answer (d) $L = \dots\dots\dots$ [1]