GCSE Bitesize examinations
General Certificate of Secondary Education

MATHEMATICS
Higher Tier

Paper 1 Non-calculator

Marking scheme

Unless otherwise stated, correct answers only should be accepted.

Answer **all** questions in the spaces provided

1. (a) $432 = 3^3 \times 2^4$
$522 = 2 \times 3^2 \times 29$ **(1 mark)**

(b) HCF = 18 **(1 mark)**

2. AC = 8 cm **(2 marks)**
$AC^2 + 6^2 = 10^2$
$10^2 - 6^2 = AC^2$
$100 - 36 = \sqrt{64}$

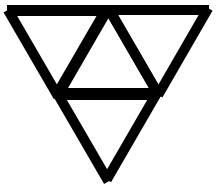
3. (a) (i) $4n - 1$ **(1 mark)**

(ii) $\frac{1}{n^2}$ **(1 mark)**

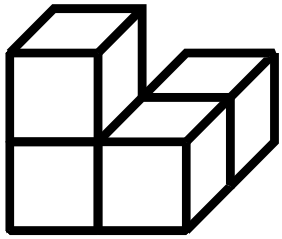
(iii) $n^2 + 3$ or any equivalent **(1 mark)**

(b) 406 **(2 marks)**
1 mark for showing 3, 16, 81, 406

4, (a) **(2 marks)**



(b) **(2 marks)**



5. (a) 0.375 **(1 mark)**

(b) x = 0.24242424… (1)
100x = 24.24242424…(2)
(2) - (1) 99x = 24

x = $\frac{24}{99}$ **(2 marks)**

x = $\frac{8}{33}$ **(1 mark)**

(You must show working for first two marks)

6. (a) $3a^2b(a + 4b + 3a^3b^2)$ **(1 mark)**

(b) x =2, $x = \frac{-3}{2}$ **(2 marks)**

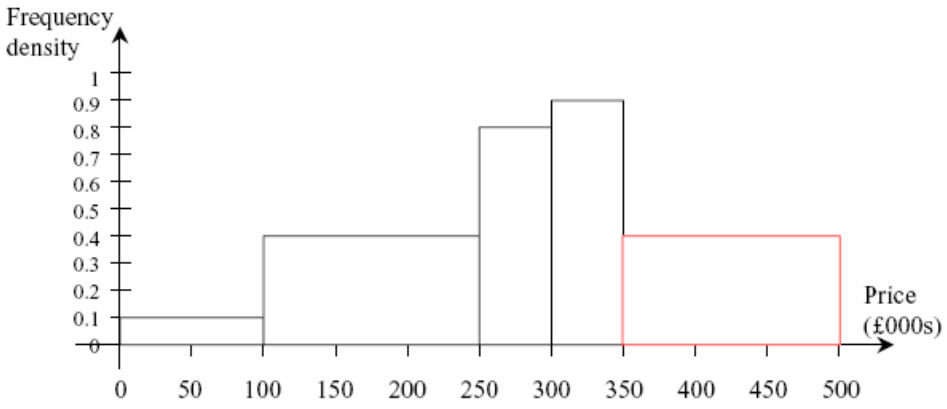
1 mark for showing $(2x+ 3)(x- 2)$

(c) $x = \frac{-3}{2}$ **(2 marks)**

1 mark for showing $3x + 2 + 3x - 3 = 4x - 4$ or equivalent removal of quotient.

7. (a) Add a bar to the histogram showing the frequency density for the interval 350-499.

1 mark for showing 0.4 **(2 marks)**



(b) 1 mark for showing frequency = width x frequency density **(3 marks)**

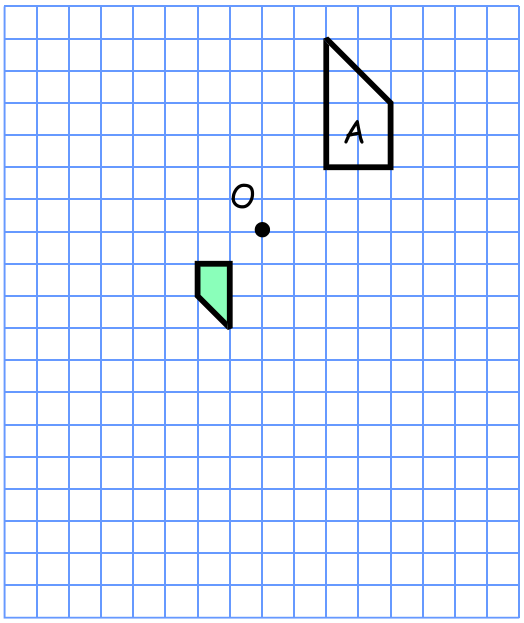
Price £000s	0-99	100-249	250-299	300-349	350-499
Frequency	10	60	40	45	60

8. Using a ruler and pair of compasses only, and making sure you leave all construction lines visible:

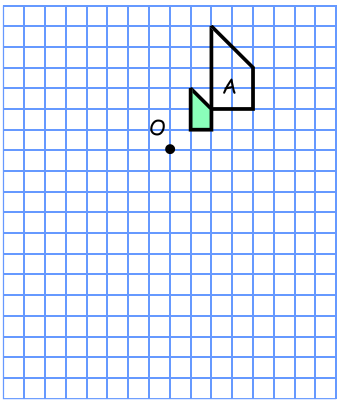
(a) Construct a triangle of side lengths 4cm, 5cm and 6cm **(2 marks)**
or 2 marks for side lengths to within ± 2mm

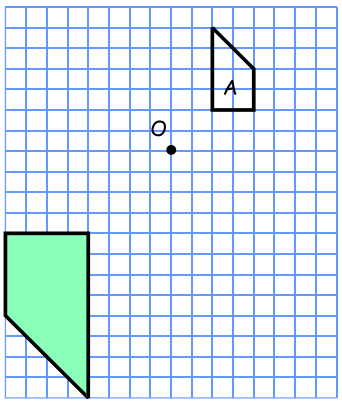
(b) Construct a square of side length 5cm **(3 marks)**
or 2 marks for side lengths to within ± 2mm

9.



(2 marks)

(1 mark for 

or 

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10. (a) $x \leq \frac{-9}{2}$ or equivalent **(1 mark)**

(b) –3, –2, –1, 0, 1, 2, 3 **(1 mark)**

(c) –2, –1, 0, 1, 2, 3, 4, 5, 6, 7 **(2 marks)**

11. (a) **Either:**

$\frac{23}{5} - \frac{7}{3}$

= $\frac{69}{15} - \frac{35}{15}$ **(1 mark)**

= $\frac{34}{15}$ **(1 mark)**

= $2\frac{4}{15}$ **(1 mark)**

Or:

$2 + (\frac{3}{5} - \frac{1}{3})$ **(1 mark)**

= $2 + (\frac{9}{15} - \frac{5}{15})$ **(1 mark)**

= $2\frac{4}{15}$ **(1 mark)**

(b) $\frac{9}{4} \div \frac{3}{5}$ **(1 mark)**

= $\frac{9}{4} \times \frac{5}{3}$ **(1 mark)**

= $\frac{15}{4}$

= $3\frac{3}{4}$ **(1 mark)**

12. (a) (i)

1st die

product	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24

2nd die

1 mark if 2 or less incorrect. **(2 marks)**

(ii) $\frac{1}{8}$ or equivalent **(2 marks)**

(b) $\frac{5}{12}$ or equivalent **(3 marks)**

13. (a) Angle ACB 37.5° **(1 mark)**

(b) Angle BDA 37.5° **(2 marks)**

(c) Angle ABD 112.5° **(2 marks)**
1 mark for indicating triangle ABD and 180°

14.

(a) Are you in favour of the new road? **(2 marks)**
1 mark only for each suggestion biased towards either side.

(b) **(3 marks)**

(i) Range of different places, ie different villages and town
(ii) Different jobs
(iii) Different types of housing or position in each place chosen.

Reasonable equivalents acceptable

(c) 3210 **(1 mark)**

15. (a) $\frac{1}{7}$ **(1 mark)**

(b) 2^{12} **(1 mark)**

(c) 49 **(2 marks)**

16. (a) $2x(x+1) + 2(x+1)(x+2) + 2x(x+2)$ or any equivalent **(3 marks)**

1 mark for showing $x(x + 1)$ or $(x + 1)(x + 2)$ or $x(x + 2)$

(b) Length of shortest side = 2 units **(3 marks)**
OR
1 mark for showing $x^2 + 2x - 8 = 0$ or equivalent
1 mark for showing $(x+4)(x-2) = 0$

17. (a) $\overrightarrow{EF}$ = - b **(1 mark)**

(b) $\overrightarrow{DB}$ = – (b + c) or - b - c **(1 mark)**

(c) $\overrightarrow{FD}$ = a + b **(1 mark)**

(d) $\overrightarrow{AO}$ = ½ (a + b + c) **(2 marks)**
or a + c
or b
1 mark each, maximum 2

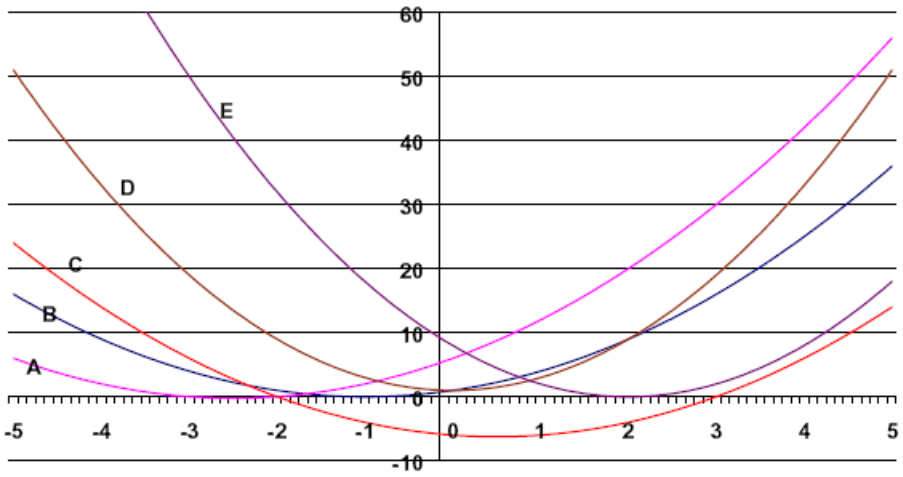
18. $x = -1 \pm \sqrt{5}$
1 mark for a = 1 b = 2 c = - 4 **(4 marks)**

1 mark for showing:

$$\frac{-2x \pm \sqrt{(4+16)}}{2}$$

or 1 mark for showing $\sqrt{5}$

19. 3 marks for one error, 2 marks for 2 errors, 1 mark for 3 errors and 0 marks for more errors. **(4 marks)**



Function	Graph
$y=(x-1)^2$	B
$y=x^2+5x+6$	A
$y=2x^2+1$	D
$y=x^2-x-6$	C
$y=2(x-2)^2$	E

20. (a) 2.310×10^3 **(2 marks)**
(1 mark for 2310 seen)

(b) 5×10^{-2} **(3 marks)**
(1 mark for $\frac{1}{20}$ or 0.05)

(c) 250 000 **(2 marks)**
(1 mark for showing 2.5×10^5)

21. (a) 60° **(2 marks)**

1 mark for showing $4\pi = x^{\circ} / 360 \times 24\pi$

(b) 2.5 cm **(2 marks)**

22. Solutions: (0,1) $\left(\frac{-3}{5}, \frac{-4}{5}\right)$ **(3 marks)**

1 mark for showing $x^2 + y^2 = 1$, $y = 3x + 1$

1 mark for showing either $10x^2 + 6x = 0$ or $x = \frac{-3}{5}$