I.G.C.S.E. Trigonometry 01

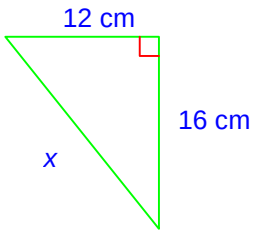
Index:

Please click on the question number you want

You can access the solutions from the end of each question

Question 1

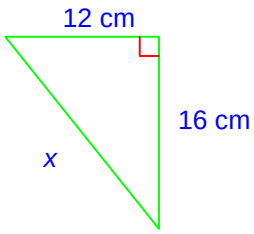
By using Pythagoras' Theorem, find *x* in the diagram below.



Click here to read the solution to this question

Click here to return to the index

Solution to question 1



By using Pythagoras' theorem $x^2 = 12^2 + 16^2$

$= 144 + 256$

$= 400$

$x = \sqrt{400}$

$= 20\,\text{cm}$

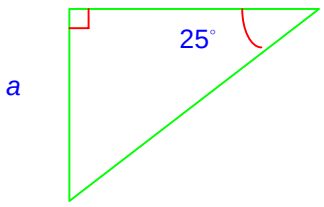
Click here to read the question again

Click here to return to the index

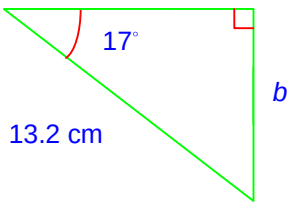
Question 2

Find the missing sides marked with letters

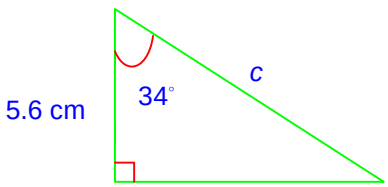
a.



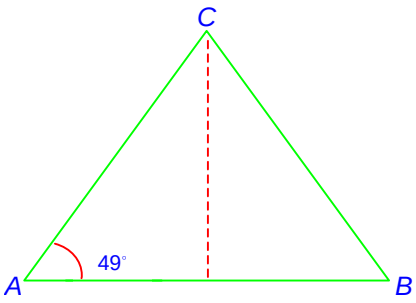
b.



c.



d.



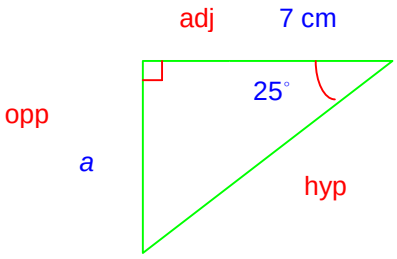
Find the height of the isosceles triangle ABC given $AB = 12$ cm and $B\hat{A}C = 49^\circ$.

Click here to read the solution to this question

Click here to return to the index

Solution to question 2

a.

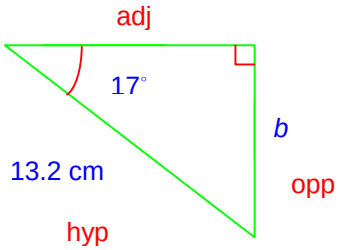


$$\tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 25^\circ = \frac{a}{7}$$

$$\Rightarrow a = 7\tan 25^\circ = 3.26\,\text{cm}$$

b.

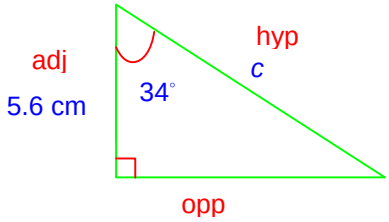


$$\sin\theta = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 17^\circ = \frac{b}{13.2}$$

$$b = 13.2\sin 17^\circ = 3.86\,\text{cm}$$

c.

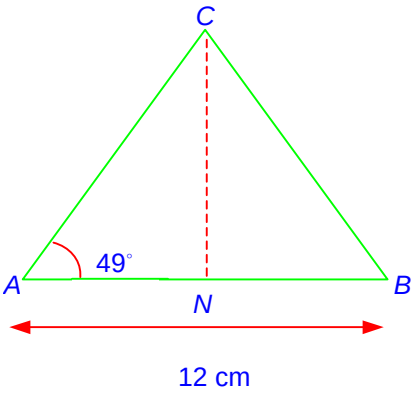


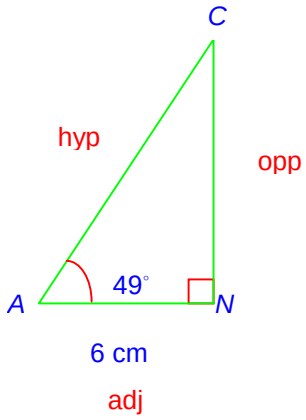
$$\cos\theta = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 34^\circ = \frac{5.6}{c}$$

$$c = \frac{5.6}{\cos 34^\circ} = 6.75\,\text{cm}$$

d.





Considering ΔANC

$$\tan\theta = \frac{\text{opp}}{\text{adj}} \Rightarrow \tan 49^\circ = \frac{CN}{6} \Rightarrow cn = 6\tan 49^\circ = 6.90\,\text{cm}$$

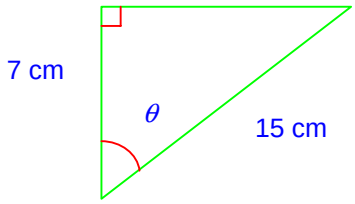
Click here to read the question again

Click here to return to the index

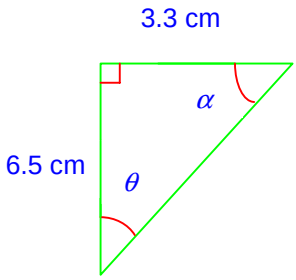
Question 3

Find the missing angles

a.



b.

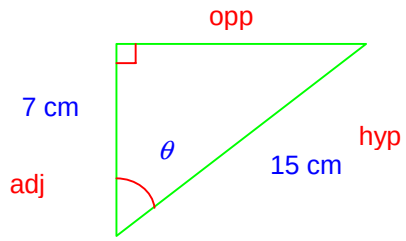


Click here to read the solution to this question

Click here to return to the index

Solution to question 3

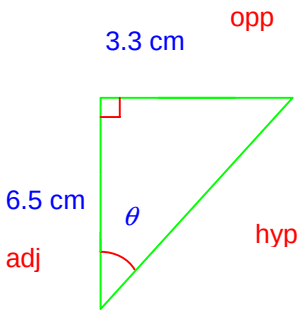
a.



$$\cos\theta = \frac{\text{adj}}{\text{hyp}}$$

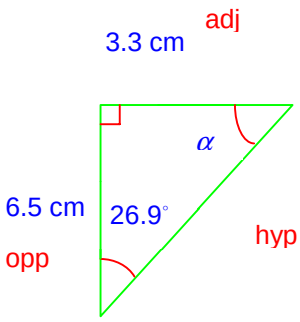
$$\cos\theta = \frac{7}{15} \Rightarrow \theta = \cos^{-1}\left(\frac{7}{15}\right) = 62.2^\circ$$

b.



$$\tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan\theta = \frac{3.3}{6.5} \Rightarrow \theta = \tan^{-1}\left(\frac{3.3}{6.5}\right) = 26.9^\circ$$



Either $\alpha = 180^\circ - 90^\circ - 26.9^\circ = 63.1^\circ$

or $\tan\theta = \frac{\text{opp}}{\text{adj}}$

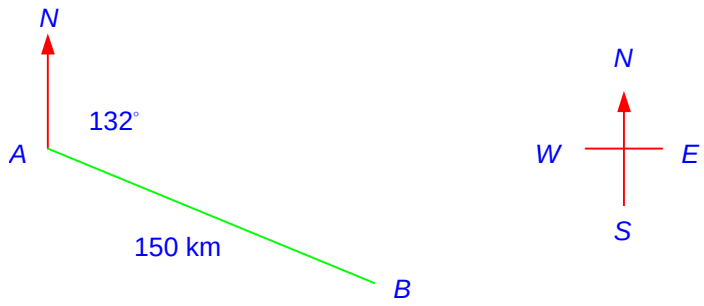
$$\tan\theta = \frac{6.5}{3.3} \Rightarrow \theta = \tan^{-1}\left(\frac{6.5}{3.3}\right) = 63.1^\circ$$

Click here to read the question again

Click here to return to the index

Question 4

An aeroplane flies on a bearing of 132° for 150 km as shown in the diagram in the diagram below. Find how far east and south the aeroplane has flown.

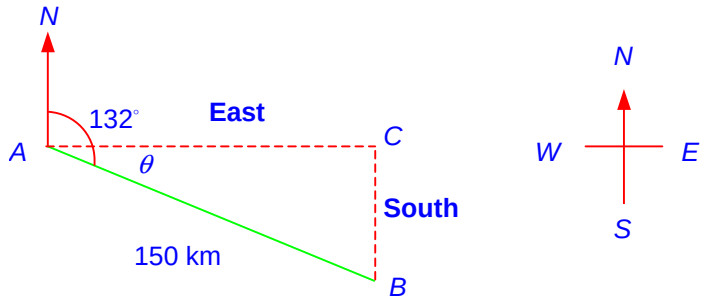


Click here to read the solution to this question

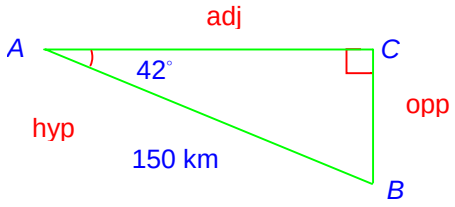
Click here to return to the index

Solution to question 4

An aeroplane flies on a bearing of 132° for 150 km as shown in the diagram in the diagram below.



Consider $\Delta ABC \quad \theta = 132^\circ - 90^\circ = 42^\circ$



The distance travelled east is given by AC.

$$\cos\theta = \frac{\text{adj}}{\text{hyp}} \Rightarrow \cos 42^\circ = \frac{AC}{150} \Rightarrow AC = 150\cos 42^\circ = 111\,\text{km}$$

The distance travelled south is given by CB.

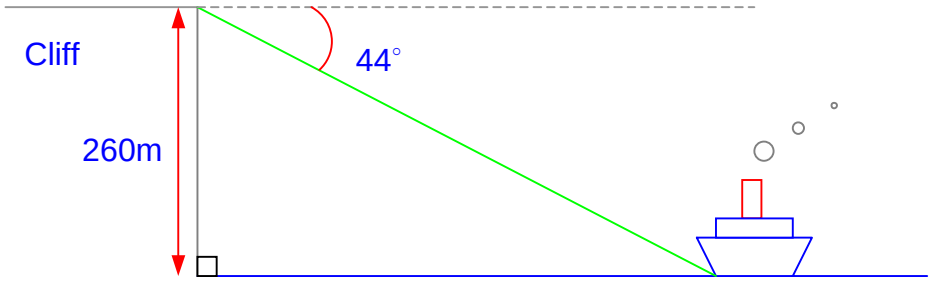
$$\sin\theta = \frac{\text{opp}}{\text{hyp}} \Rightarrow \sin 42^\circ = \frac{CB}{150} \Rightarrow CB = 150\sin 42^\circ = 100\,\text{km}$$

Click here to read the question again

Click here to return to the index

Question 5

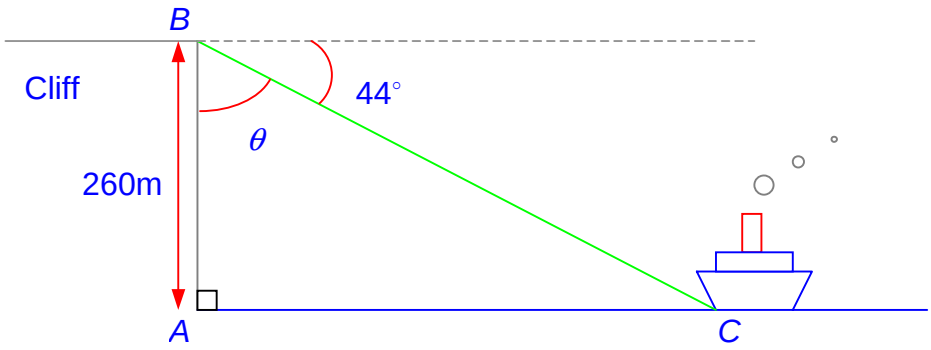
The angle of depression of a ship from the top of a cliff is 44°. If the cliff is 260 m high find how far the boat is form the base of the cliff.



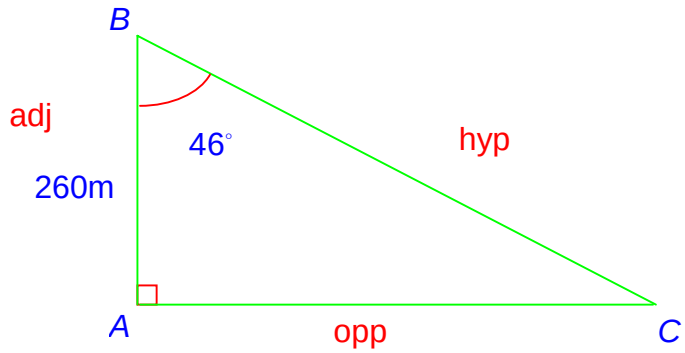
Click here to read the solution to this question

Click here to return to the index

Solution to question 5



Consider ΔABC . $\theta = 90^\circ - 44^\circ = 46^\circ$



$$\tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 46^\circ = \frac{AC}{260}$$

$$AC = 260\tan 46^\circ$$

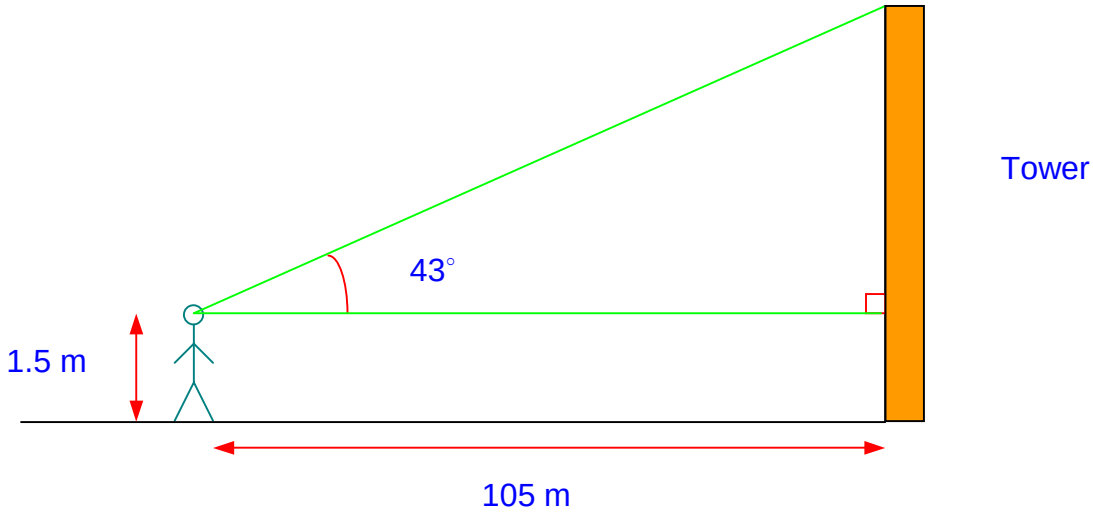
$$= 269\,\text{m}$$

Click here to read the question again

Click here to return to the index

Question 6

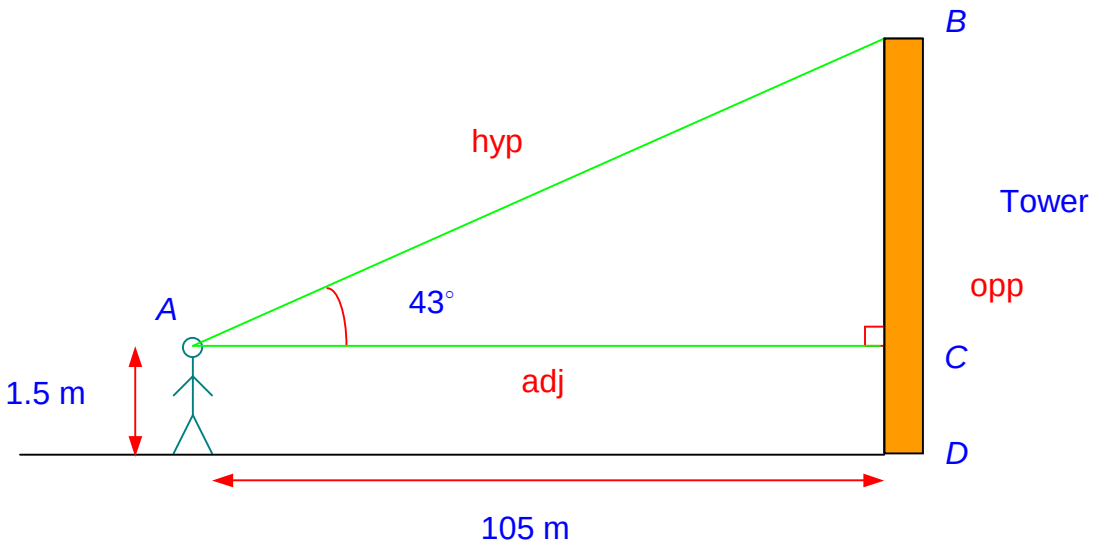
A man is 105 m from the base of a tower. He measures the angle of elevation of the top of the tower to be 43°. If the man is 1.5 m tall, find the height of the tower.



Click here to read the solution to this question

Click here to return to the index

Solution to question 6



The height of the tower is given by $DC + CB$

$$\tan\theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 43^\circ = \frac{CB}{105}$$

$$CB = 105\tan 43^\circ$$

$$= 97.9\,\text{m}$$

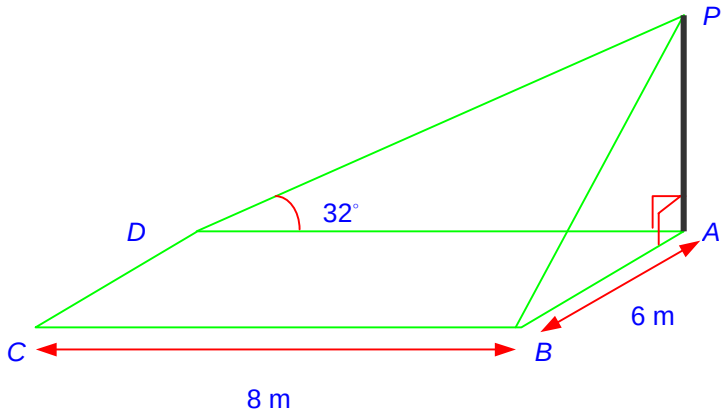
The height of the tower is $DC + CB = 1.5 + 97.9 = 99.4\,\text{m}$

Click here to read the question again

Click here to return to the index

Question 7

A vertical pole *AP* stands at one corner of a horizontal field measuring 8 m by 6 m, as shown in the diagram below.



a. By considering the triangle *ADP* find the height of the pole *AP*.

b. By considering the triangle *ABP* calculate the angle of elevation of *P* from *B*.

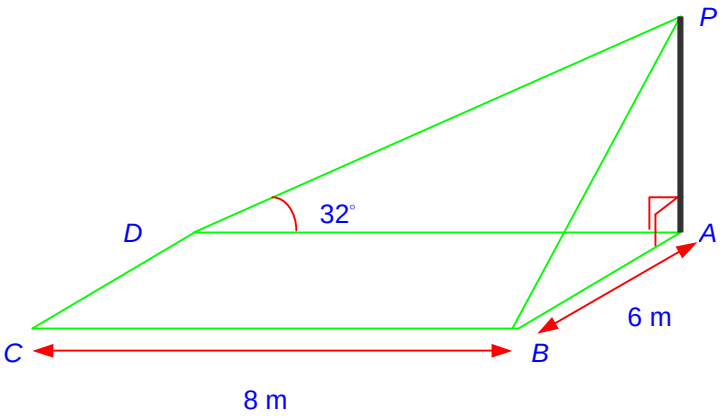
c. Calculate the length of the diagonal of the rectangle *ABCD*.

d. Calculate the angle of elevation of *P* from *C*.

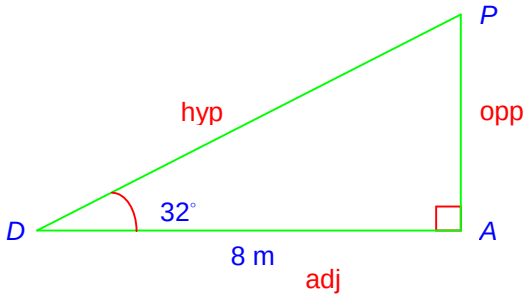
Click here to read the solution to this question

Click here to return to the index

Solution to question 7



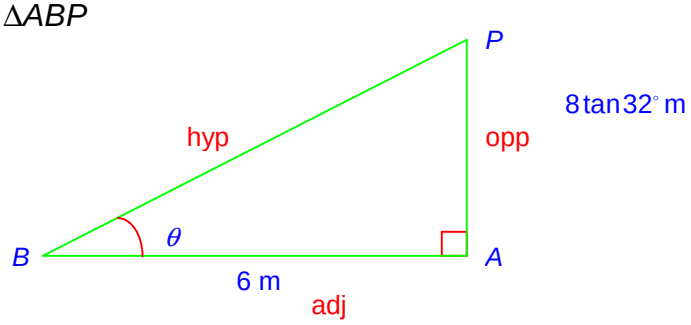
a. Considering the triangle *ADP*



The height of the pole is given by *AP*

$$\tan\theta = \frac{\text{opp}}{\text{adj}} \Rightarrow \tan 32^\circ = \frac{AP}{8} \Rightarrow AP = 8\tan 32^\circ = 5.00\,\text{m}$$

b. Considering ΔABP

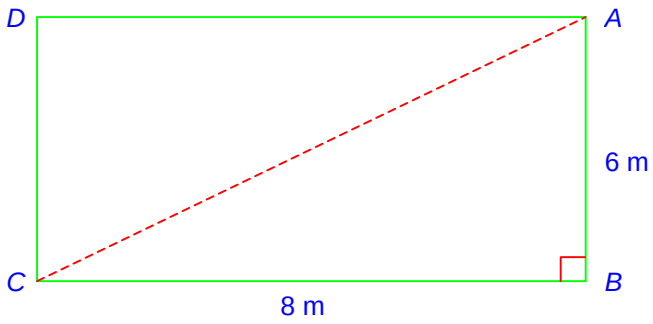


The angle of elevation of *P* from *B* is given by angle $P\hat{B}A$.

$$\tan\theta = \frac{\text{opp}}{\text{adj}} \Rightarrow \tan A\hat{B}P = \frac{8\tan 32^\circ}{6} \Rightarrow A\hat{B}P = \tan^{-1}\left(\frac{8\tan 32^\circ}{6}\right) = 39.8^\circ$$

Click here to continue with solution or go to next page

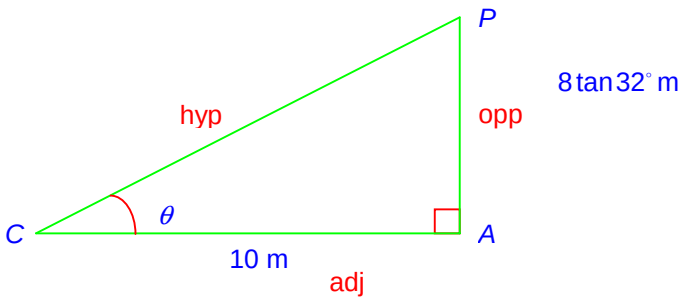
c.



By Pythagoras' theorem we have that

$$\begin{aligned} AC^2 &= 8^2 + 6^2 \\ &= 64 + 36 \\ &= 100 \\ AC &= \sqrt{100} \\ &= 10\,\text{m} \end{aligned}$$

d. Considering ACP



The angle of elevation of P from C is given by angle $P\hat{C}A$.

$$\tan\theta = \frac{\text{opp}}{\text{adj}} \Rightarrow \tan A\hat{C}P = \frac{8\tan 32^\circ}{10} \Rightarrow A\hat{C}P = \tan^{-1}\left(\frac{8\tan 32^\circ}{10}\right) = 26.6^\circ$$

Click here to read the question again

Click here to return to the index