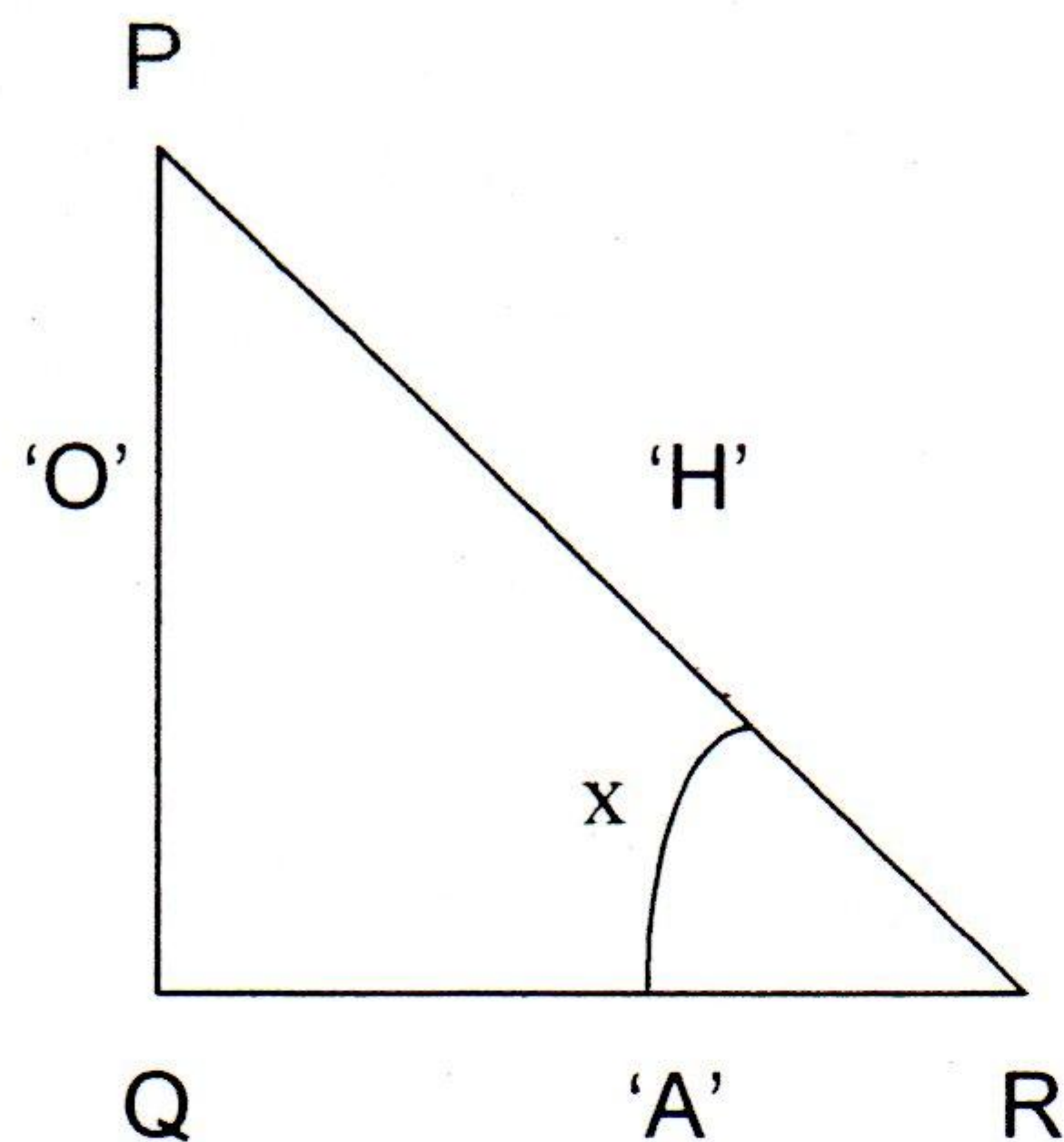


Trigonometric ratios

In the right angled triangle we can write the following 6 ratios if side.



Here PQR is the right angle triangle, we can write the ratio of the sides of the right angled triangle PQR. Here angle R is the reference angle.

Opposite of the Reference angle is the opposite side 'O'
Longest side or opposite side of the right angle is hypotenuse 'H'
And the Remaining side is adjacent side 'A'.

6 different ratios are

O/H A/H O/A

H/O H/A A/O

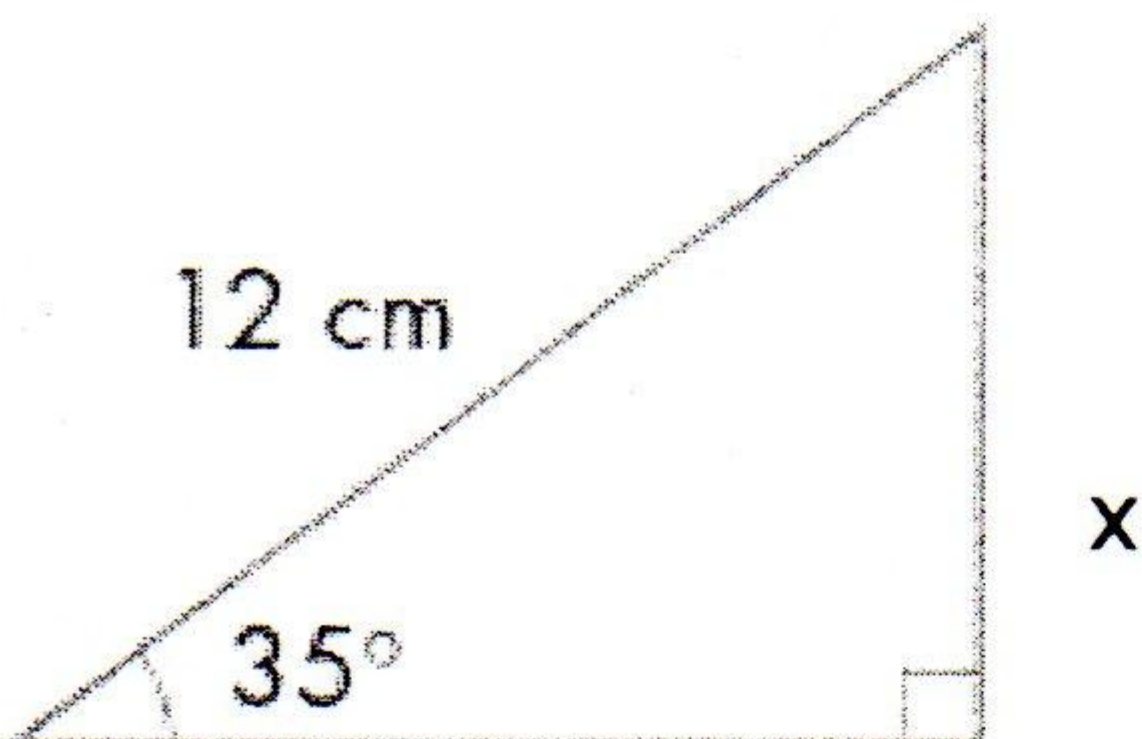
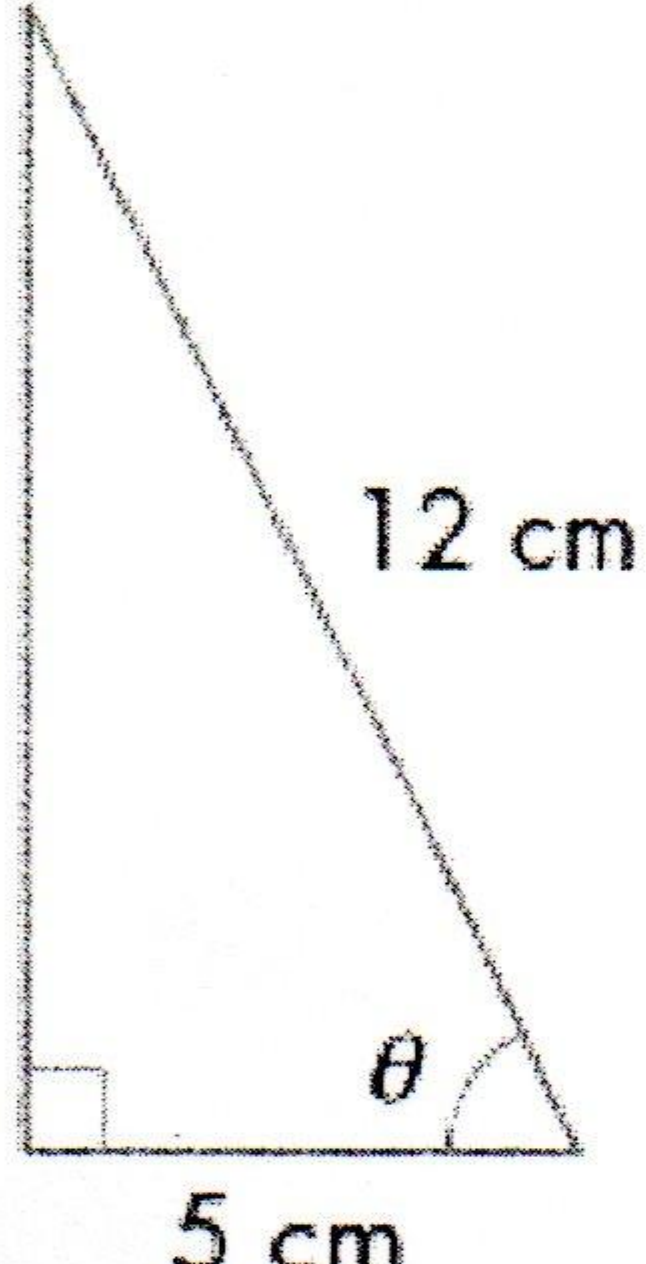
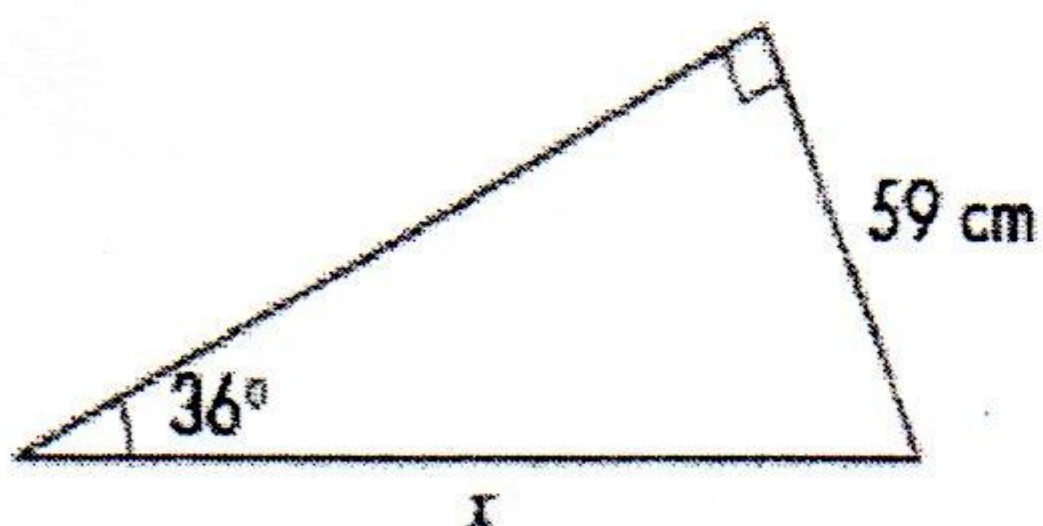
We have the different name for each of the ratios.

Sin ratio = O/H Cos ratio = A/H Tan ratio = O/A

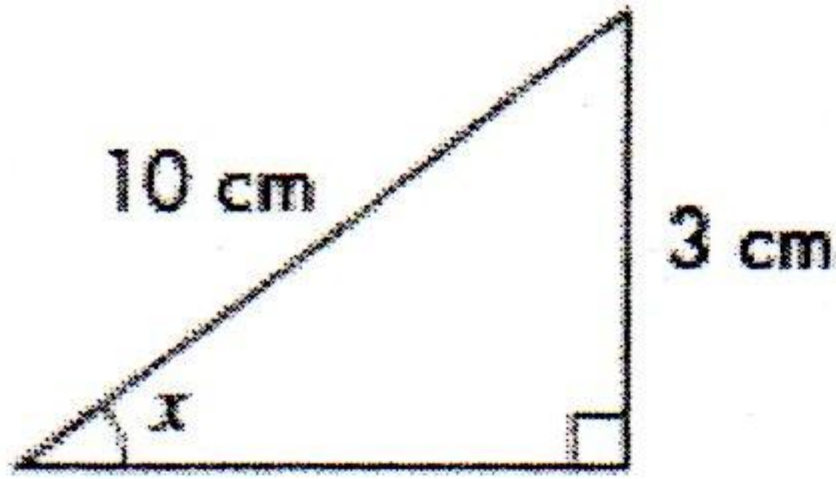
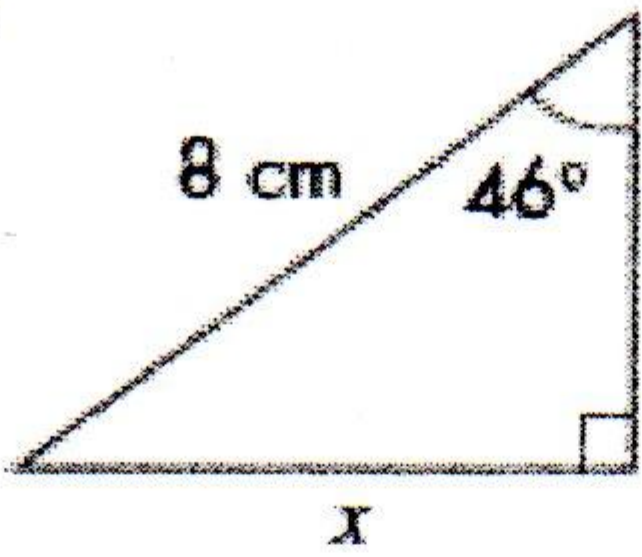
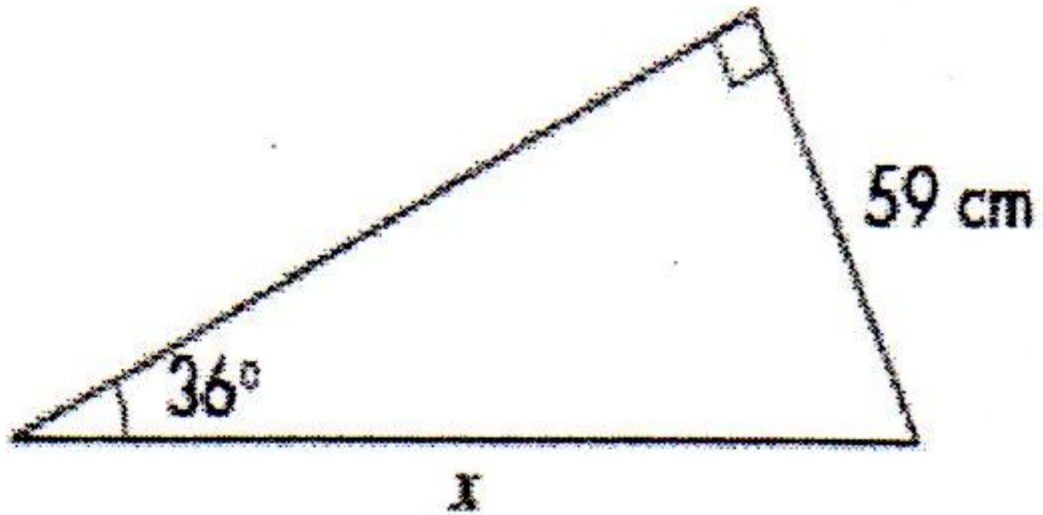
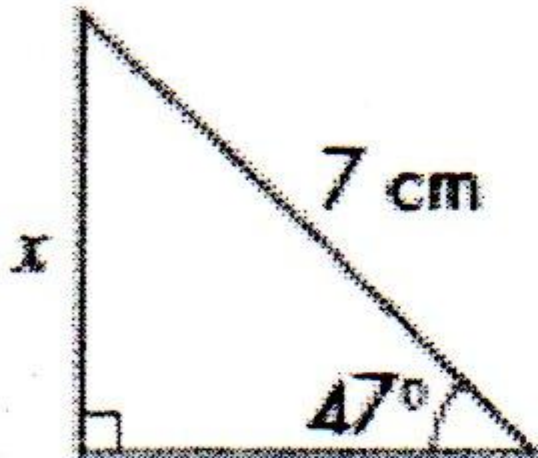
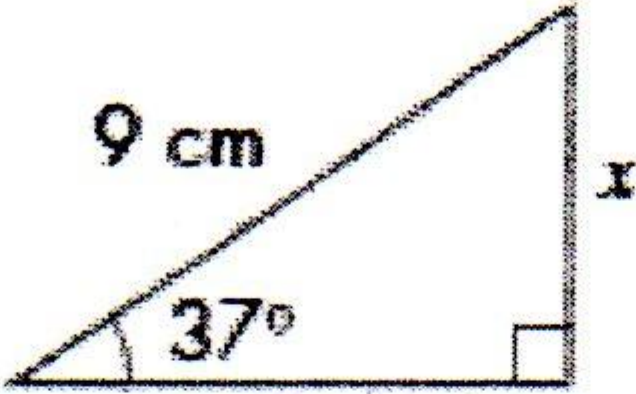
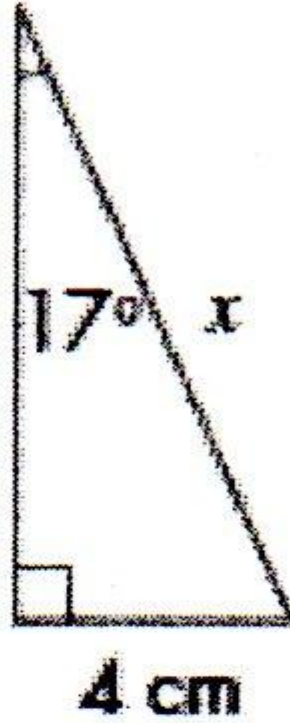
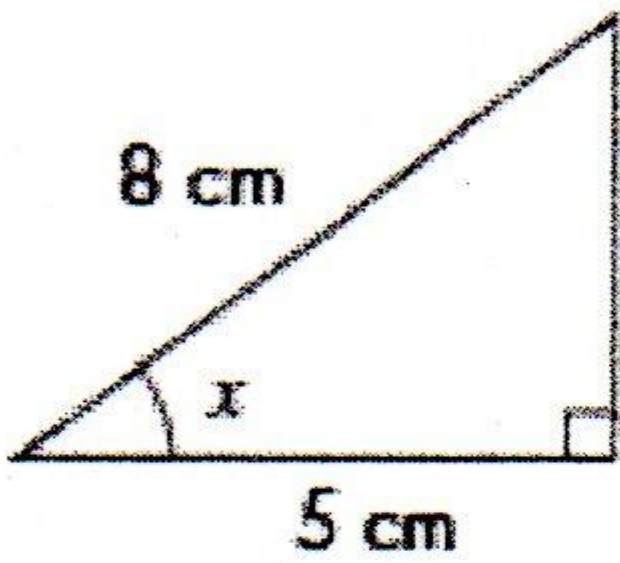
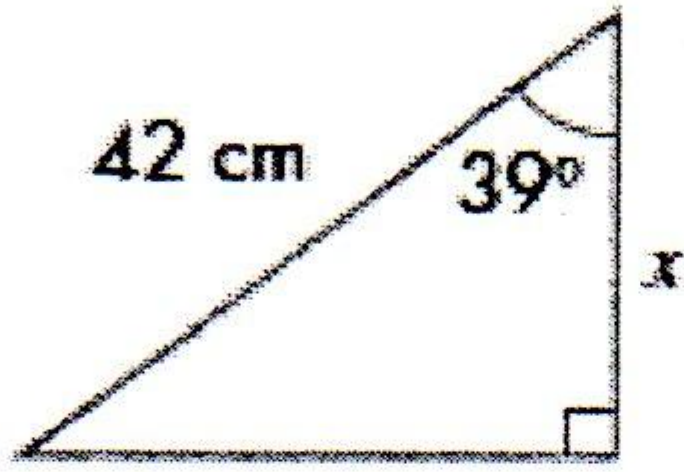
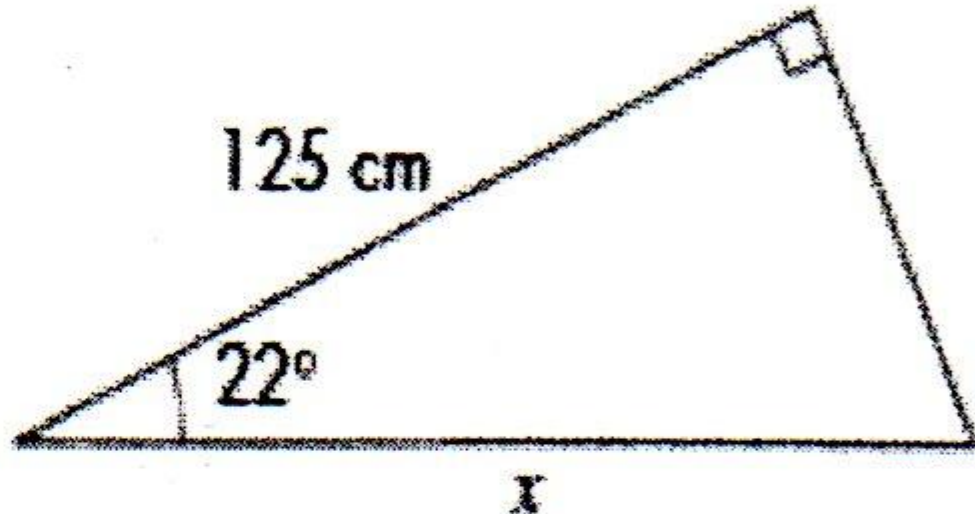
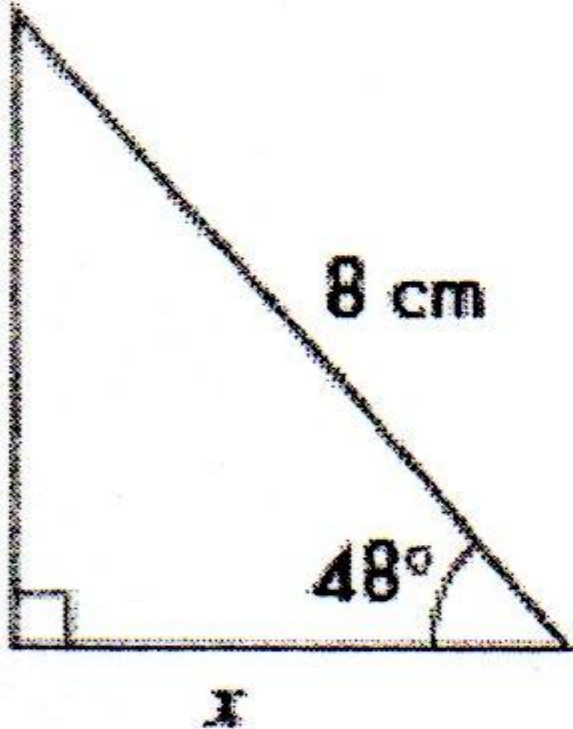
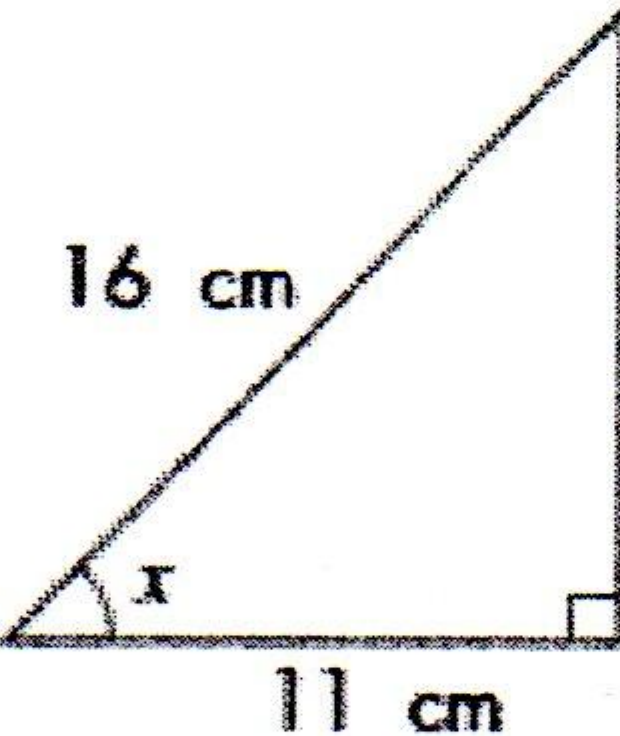
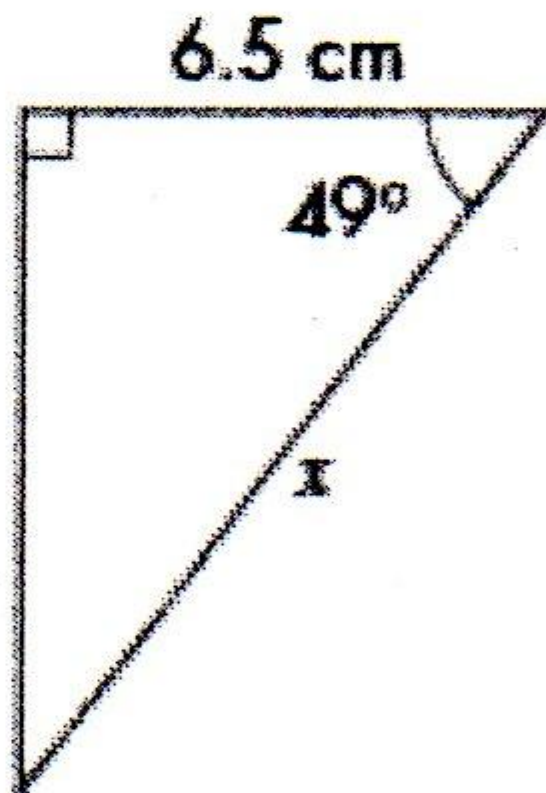
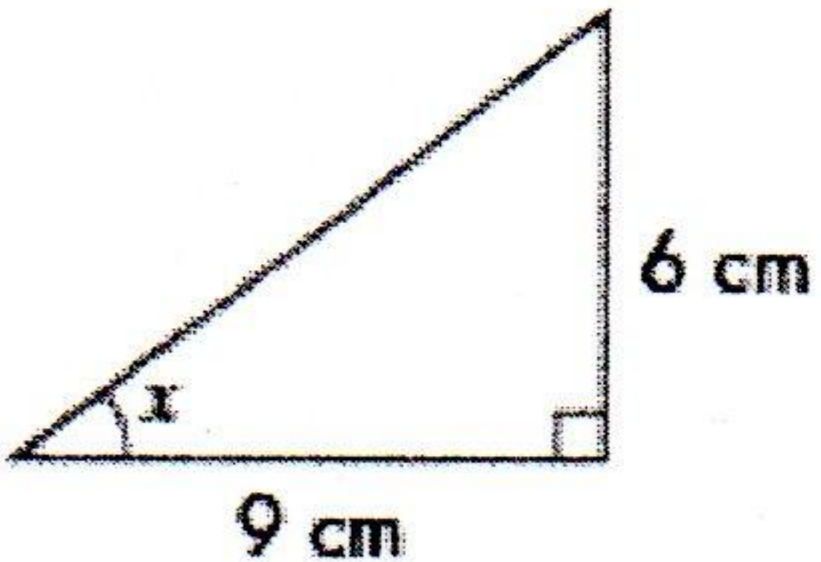
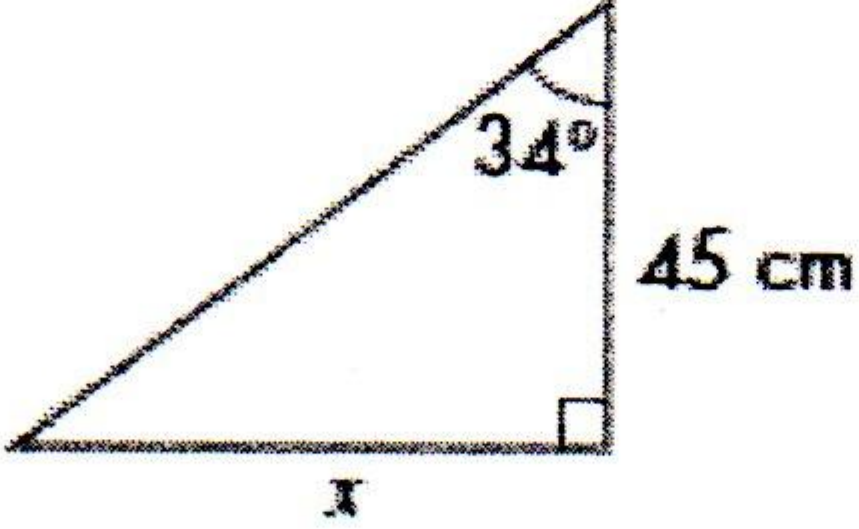
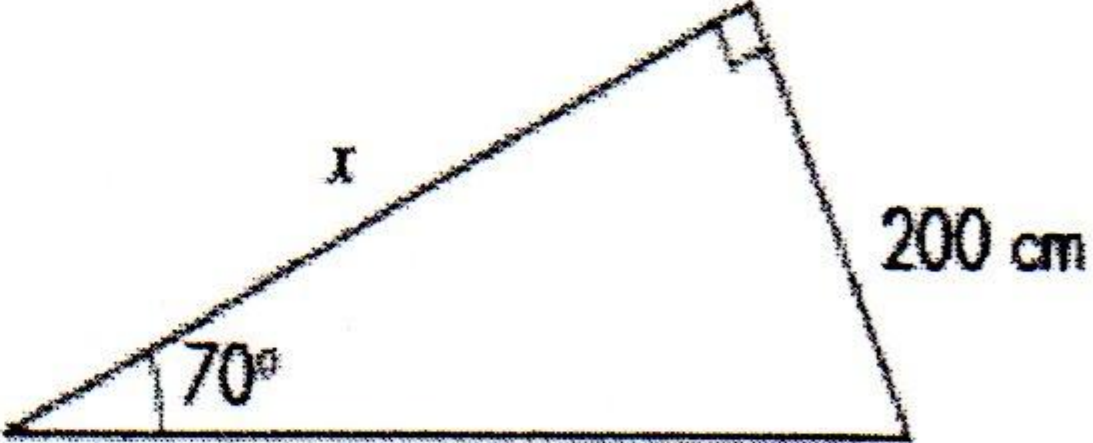
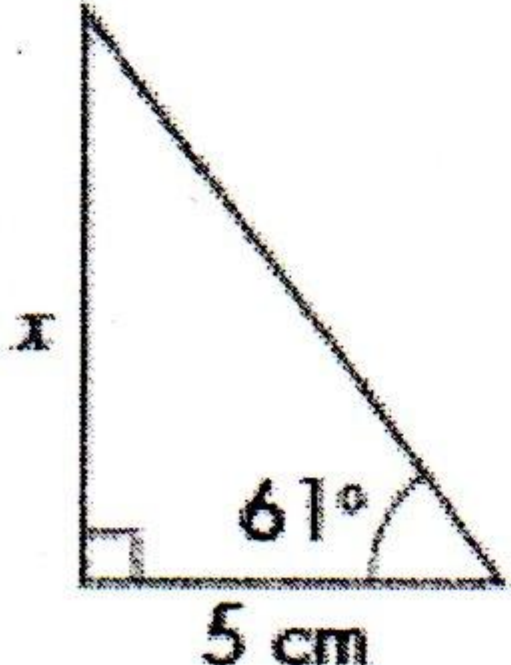
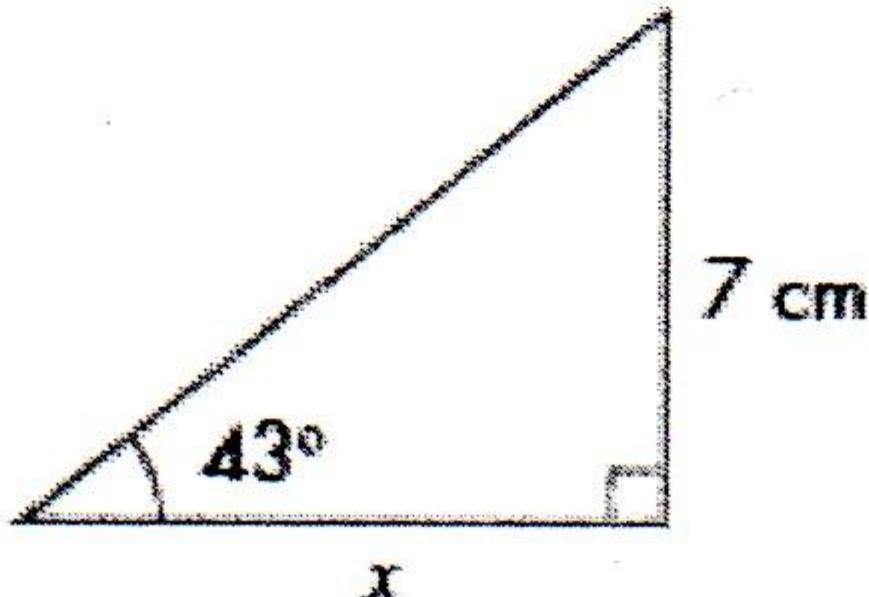
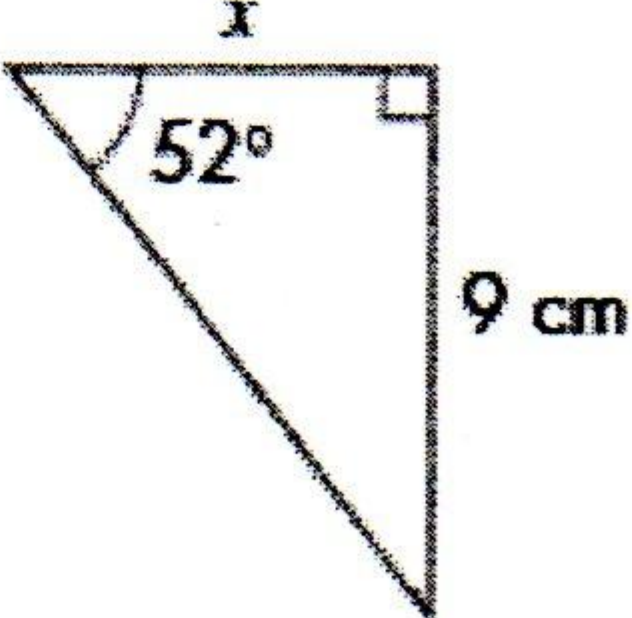
Cosec ratio = H/O Sec ration = H/A Cot ratio = A/O

Generally we use first three ratios i.e. Sin, Cos and Tan ratios.

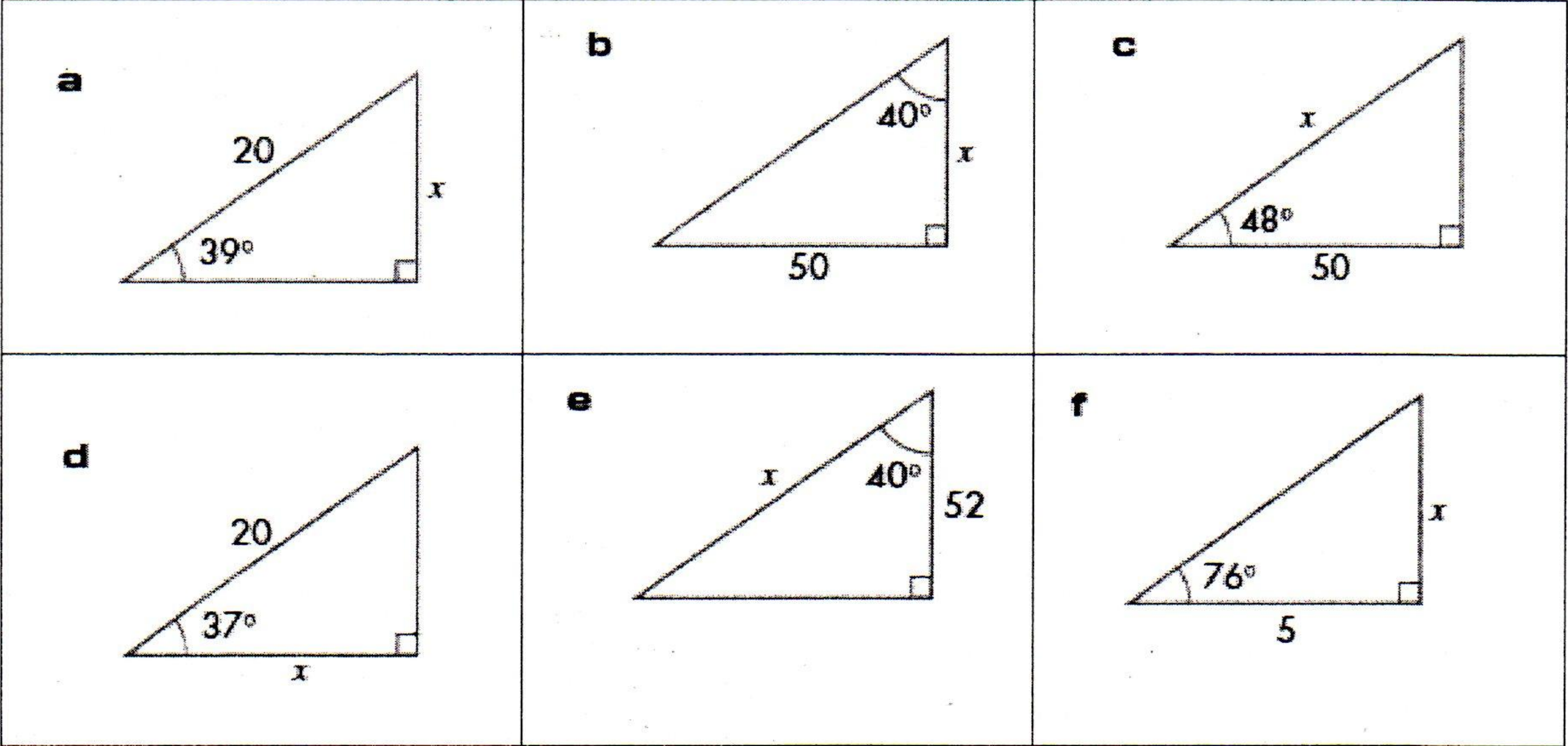
Examples.

<p>1) Find the unknown side from the following figure.</p> 	<p>We have to use the known and the unknown side from the figure Side x (Unknown) is the opposite side, with 12 cm (Known) as the hypotenuse, so the ratio of 'O' and 'H' is given by sine.</p> $\sin 35 = x / 12$ <p>By doing cross multiplication we get</p> $x = 12 \times \sin 35$ <p>So $x = 12 \sin 35^\circ = 6.88 \text{ cm}$ (3 significant figures)</p>
<p>2) Find the angle θ, given that the adjacent side is 5 cm and the hypotenuse is 12 cm.</p> 	<p>Here we have to use 2 known sides.</p> <p>From the information 'A' and 'H' are 2 known sides and the relationship between them is Cos</p> $\cos \theta = A/H$ $\cos \theta = 5 / 12$ <p>Here angle is unknown, so we have to use inverse function.</p> $\theta = \cos^{-1} (5/12)$ $\theta = 65.4^\circ \text{ (1 decimal place)}$
<p>3) Find the unknown side from the following figure.</p> 	<p>We have to use the known and the unknown side from the figure Side x (Unknown) is the hypotenuse, side, with 59 cm (Known) as the opposite, so the ratio of 'O' and 'H' is given by Sin.</p> $\sin 36 = 59 / x$ <p>By doing cross multiplication we get</p> $x \times \sin 36 = 59$ <p>So $x = 59 \div \sin 36^\circ = 9.83 \text{ cm}$ (3 significant figures)</p>

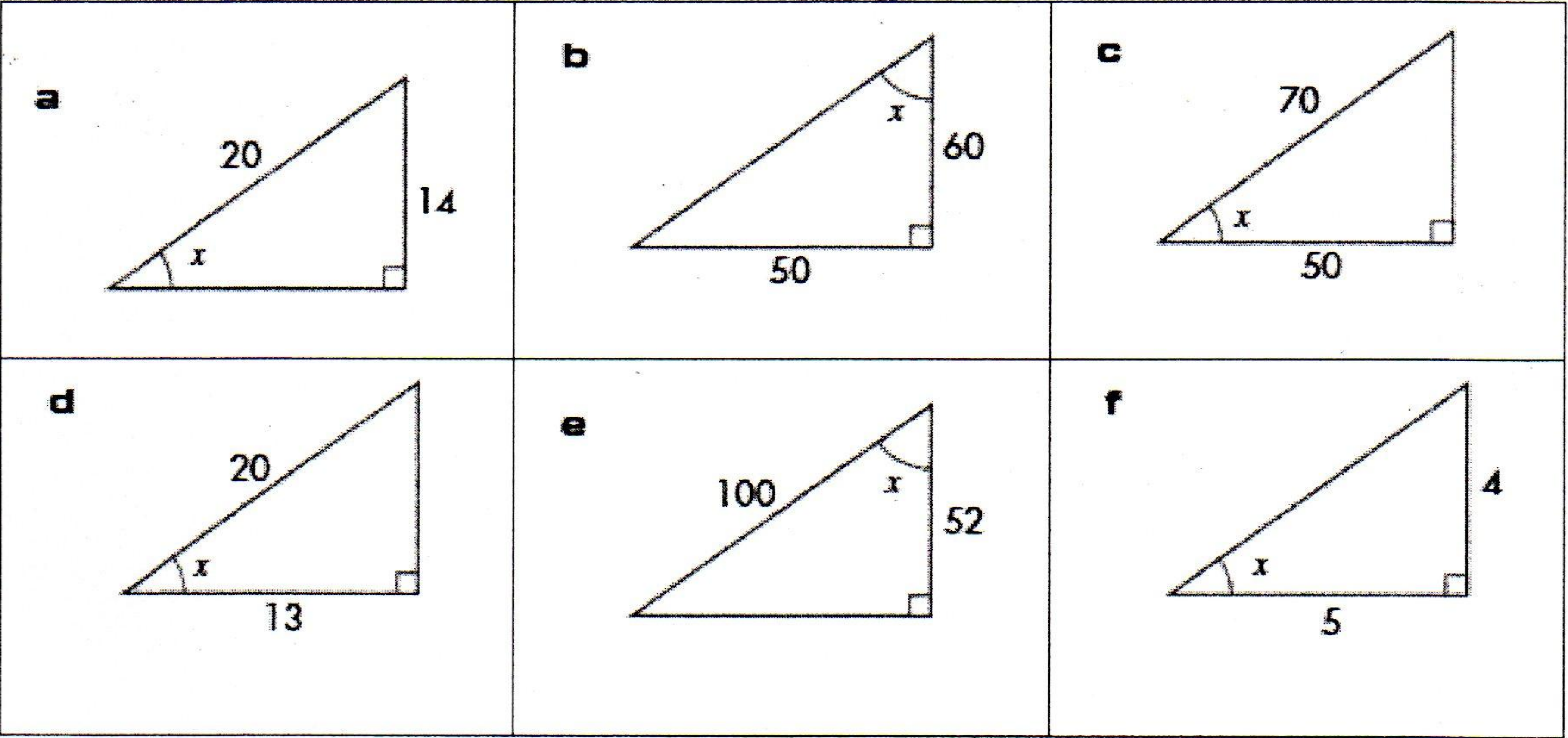
Find the angle or side marked x in each of these triangles.

<p>1)</p> <p>a</p> 	<p>b</p> 	<p>c</p> 
<p>2)</p> <p>a</p> 	<p>b</p> 	<p>c</p> 
<p>3)</p> <p>a</p> 	<p>b</p> 	<p>c</p> 
<p>4)</p> <p>a</p> 	<p>b</p> 	<p>c</p> 
<p>5)</p> <p>a</p> 	<p>b</p> 	<p>c</p> 
<p>6)</p> <p>a</p> 	<p>b</p> 	<p>c</p> 

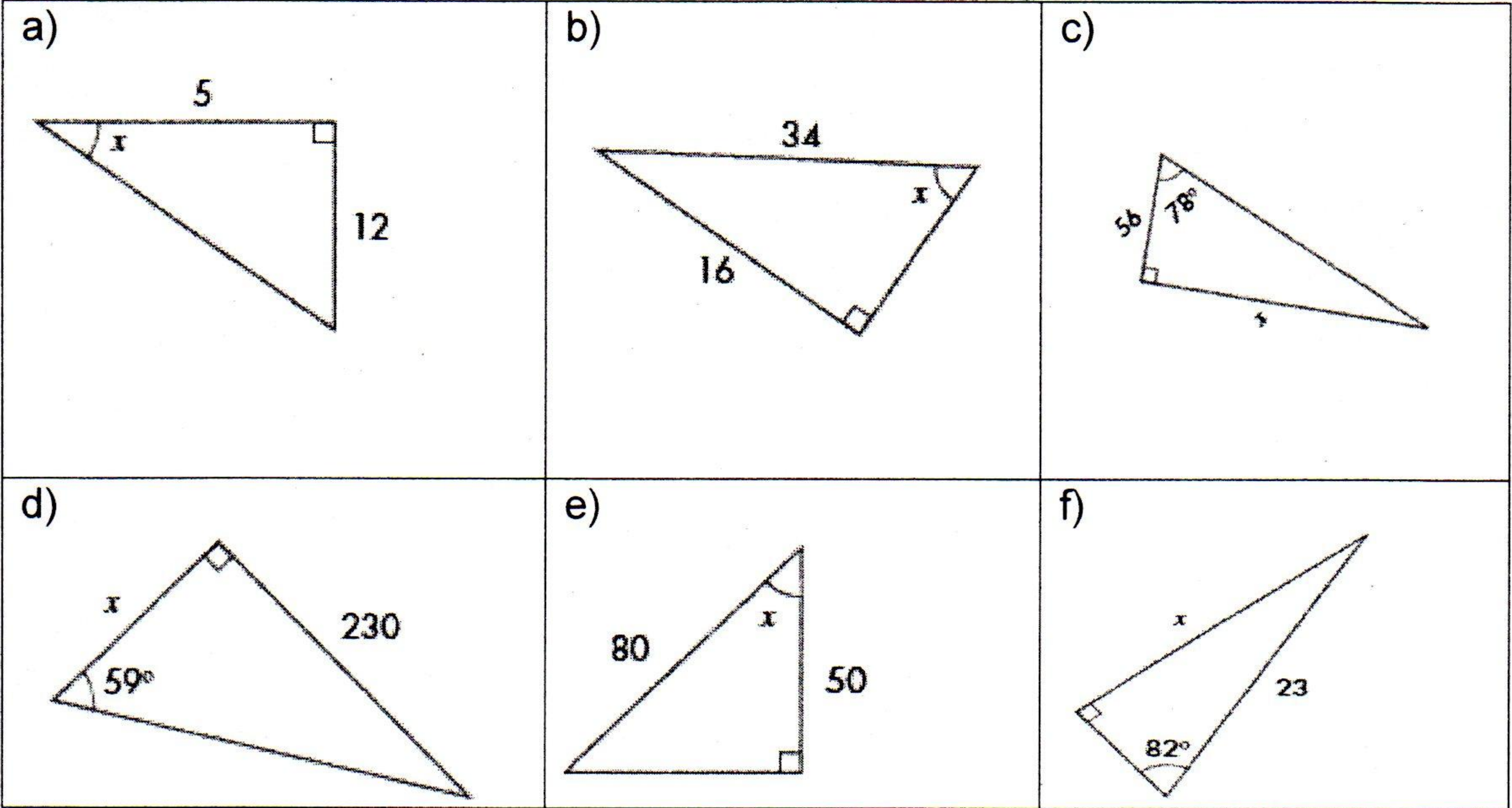
7) Find the length marked x in each of these triangles.



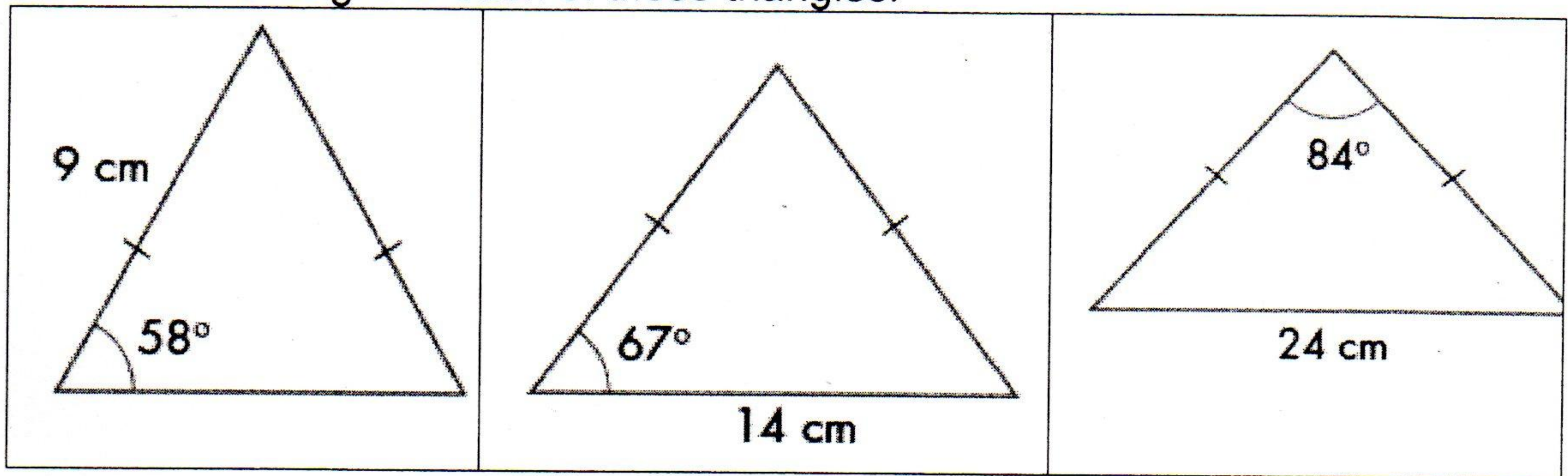
8) Find the angle marked x in each of these triangles.



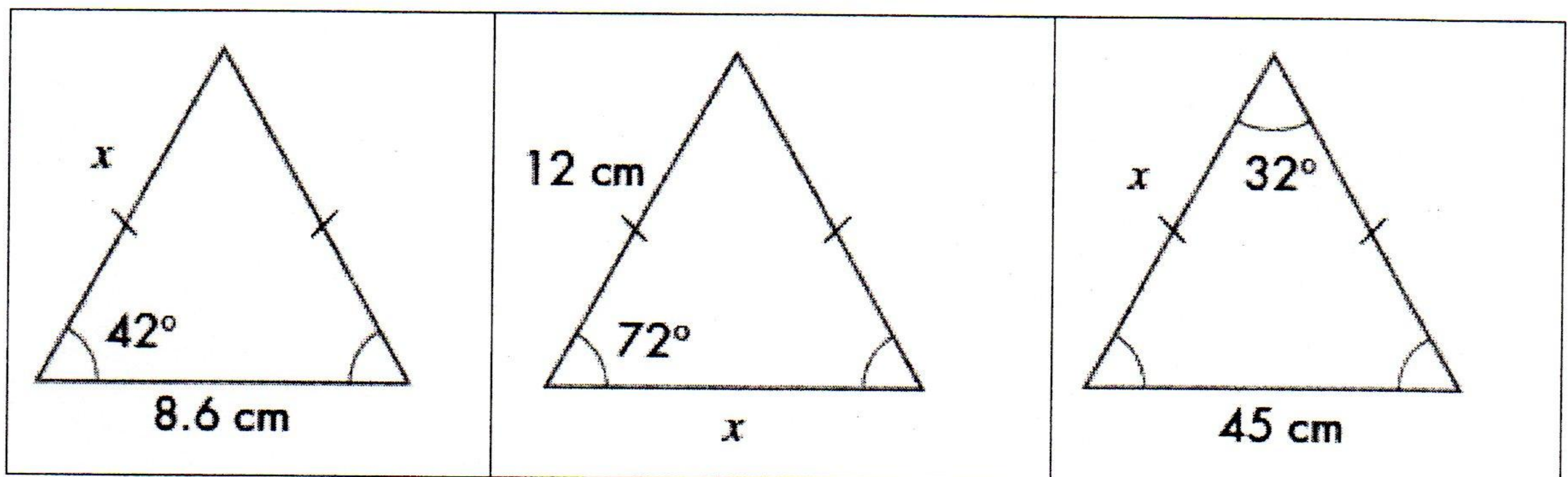
9) Find the angle or length marked x in each of these triangles.



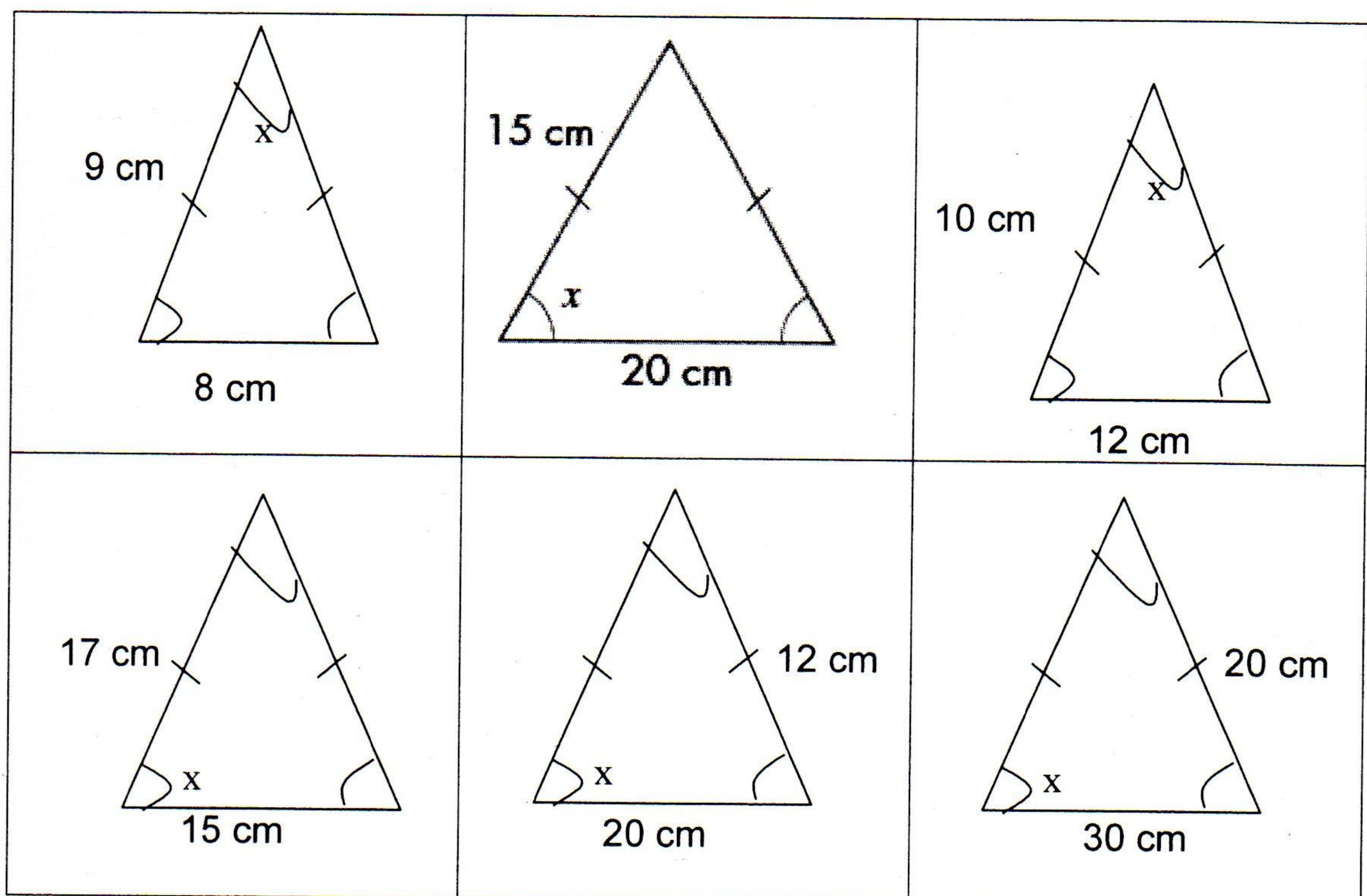
10) Calculate the height of each of these triangles.



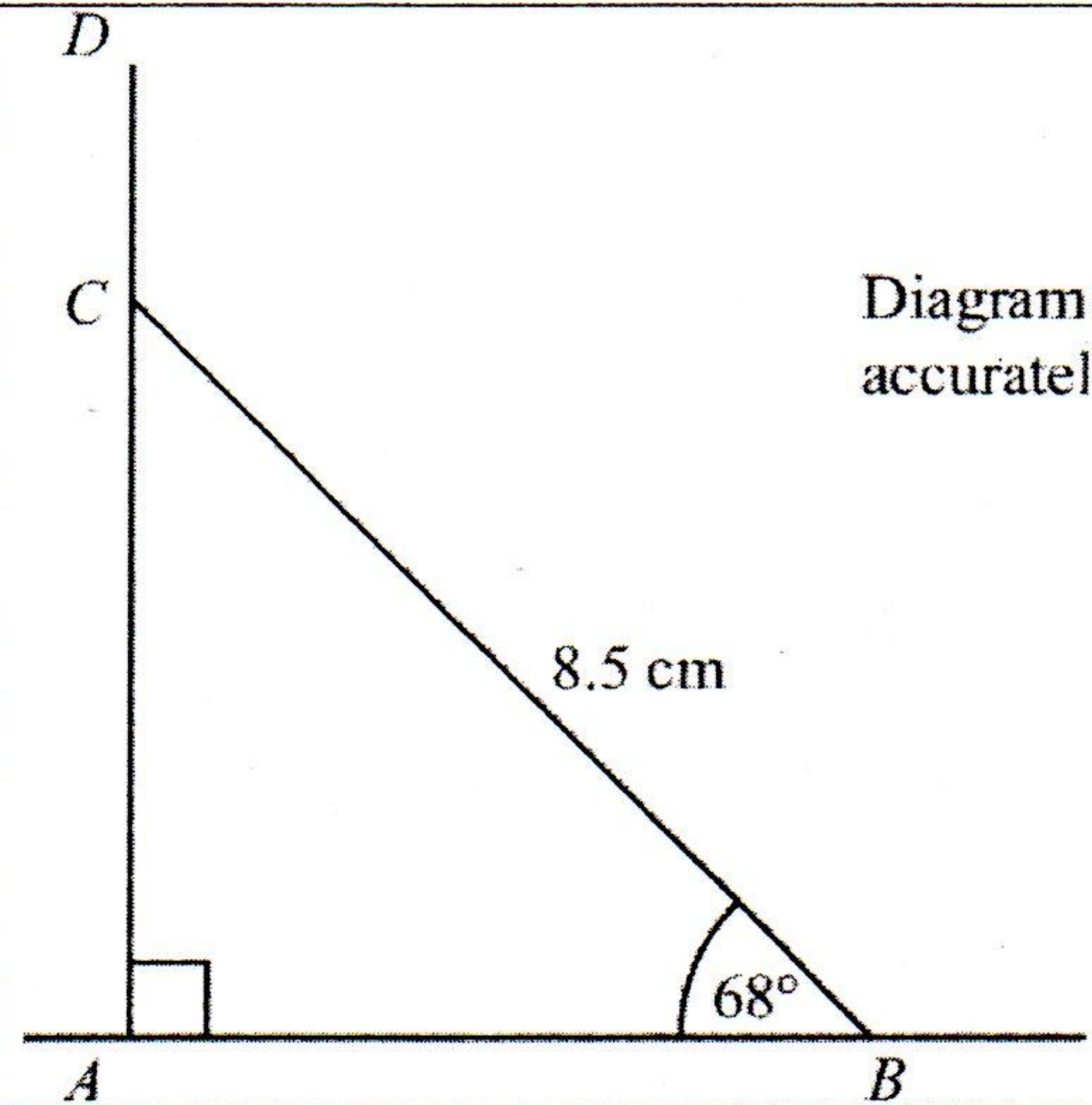
11) Find the side of the following triangles marked x .



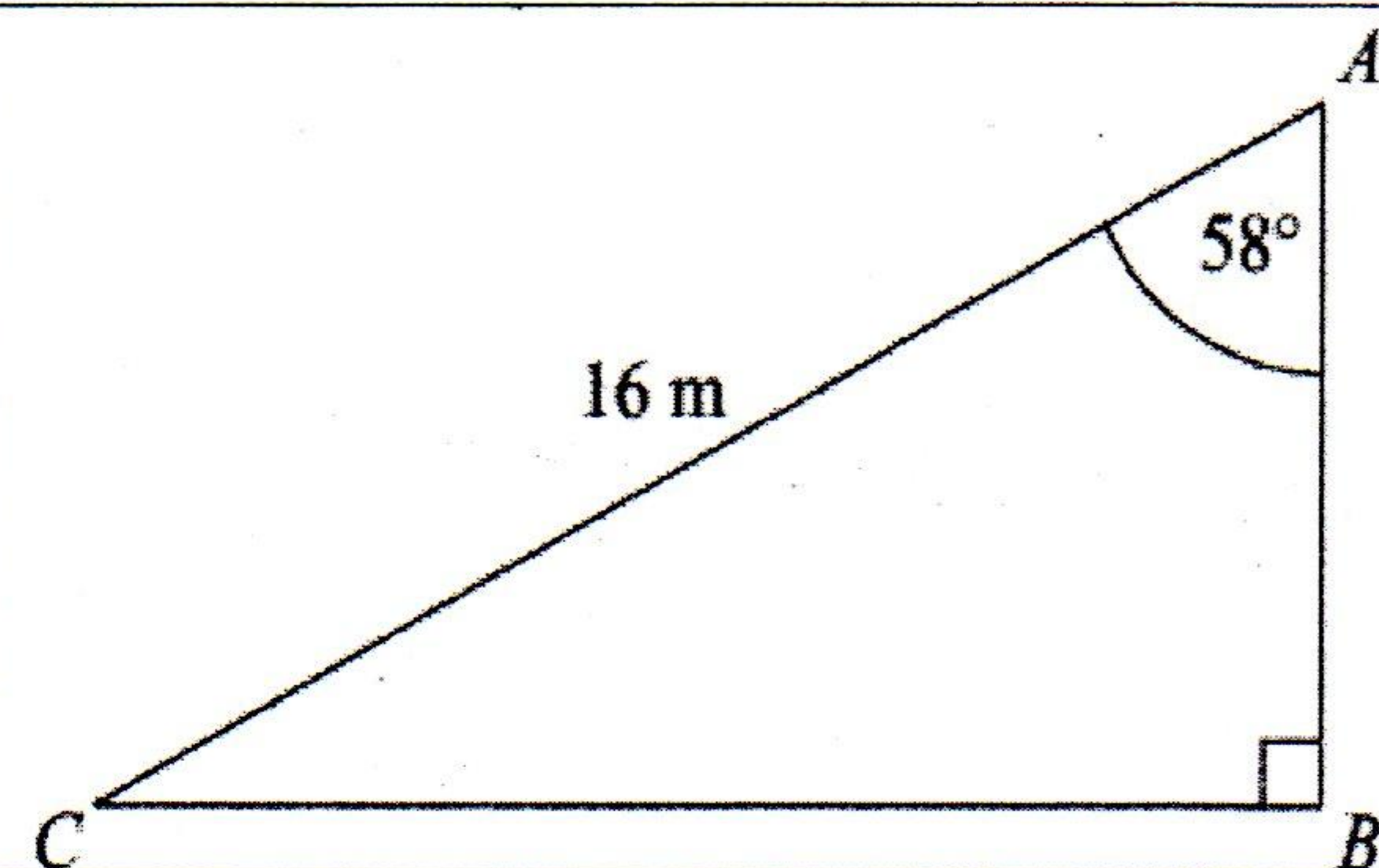
12) Find the angle of the following triangles marked with x .



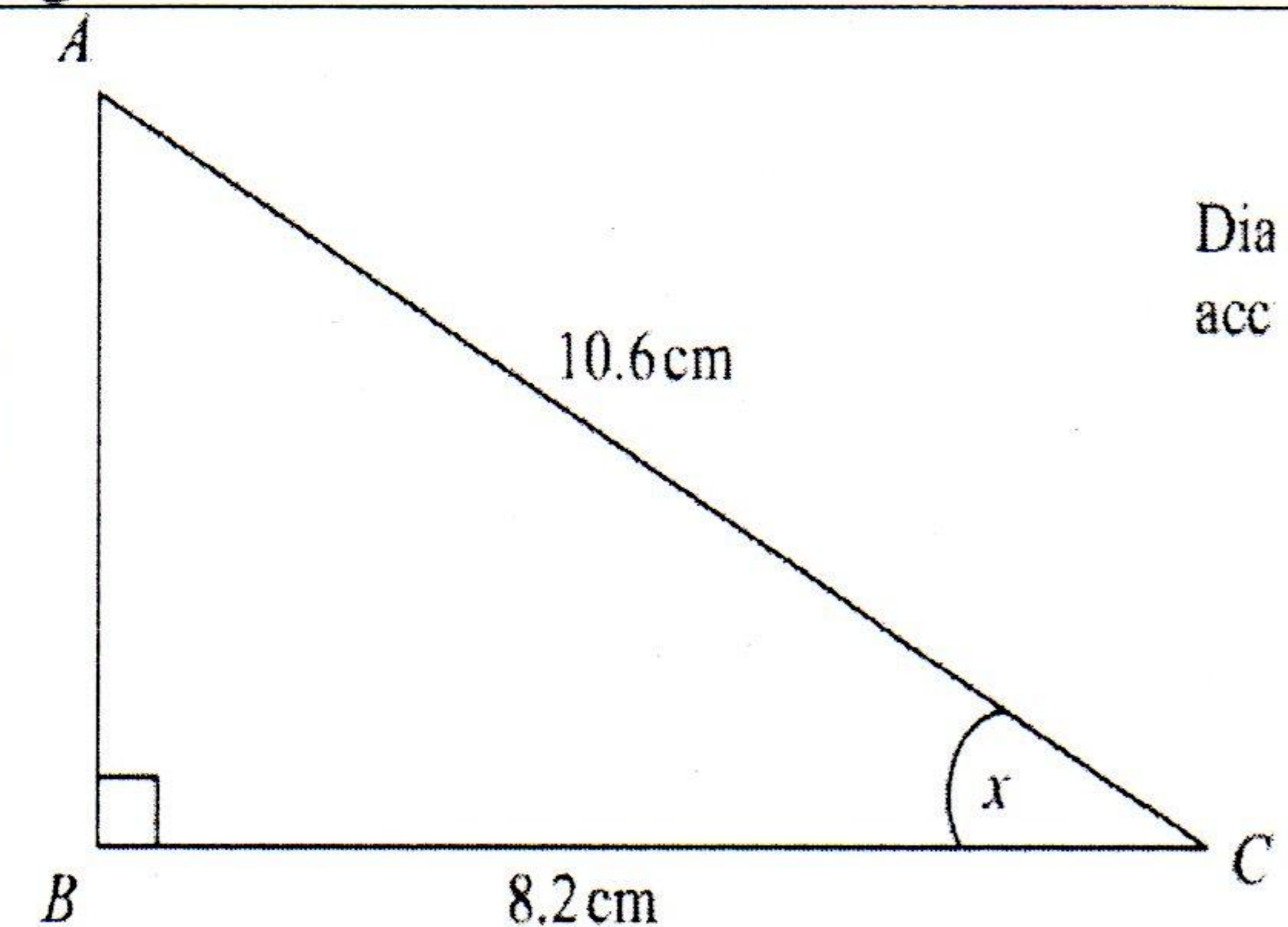
13) The diagram represents a vertical pole ACD .
 AB is horizontal ground.
 BC is a wire of length 8.5 metres.
The height of the pole AD is 9 metres.
For the pole to be correctly installed, the length DC has to be at least 1 metre.
Show that the pole has been correctly installed.



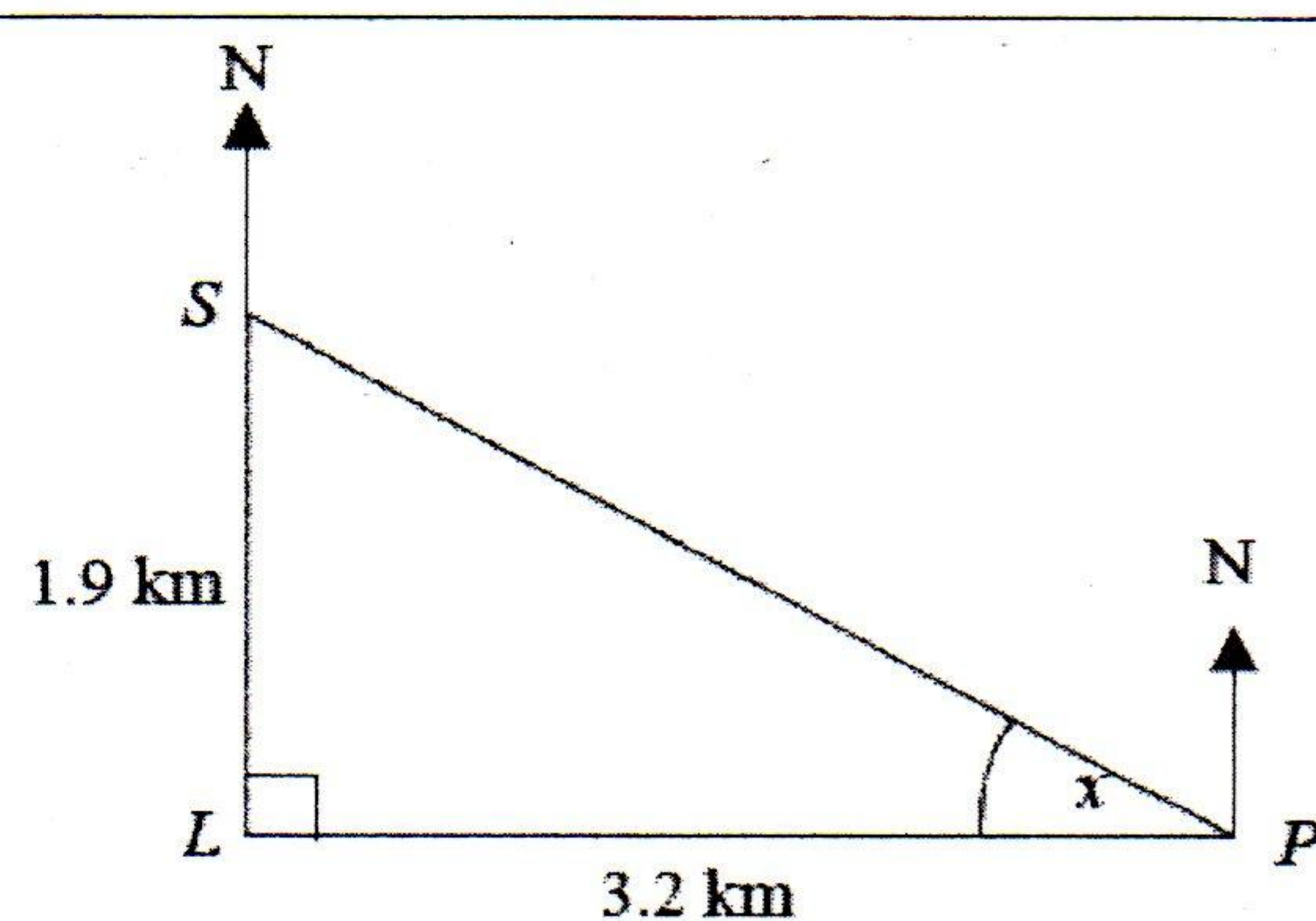
14) ABC is a right-angled triangle.
 $AC = 16$ m.
Angle $CAB = 58^\circ$
Calculate the length of AB .
Give your answer correct to 3 significant figures.
..... m

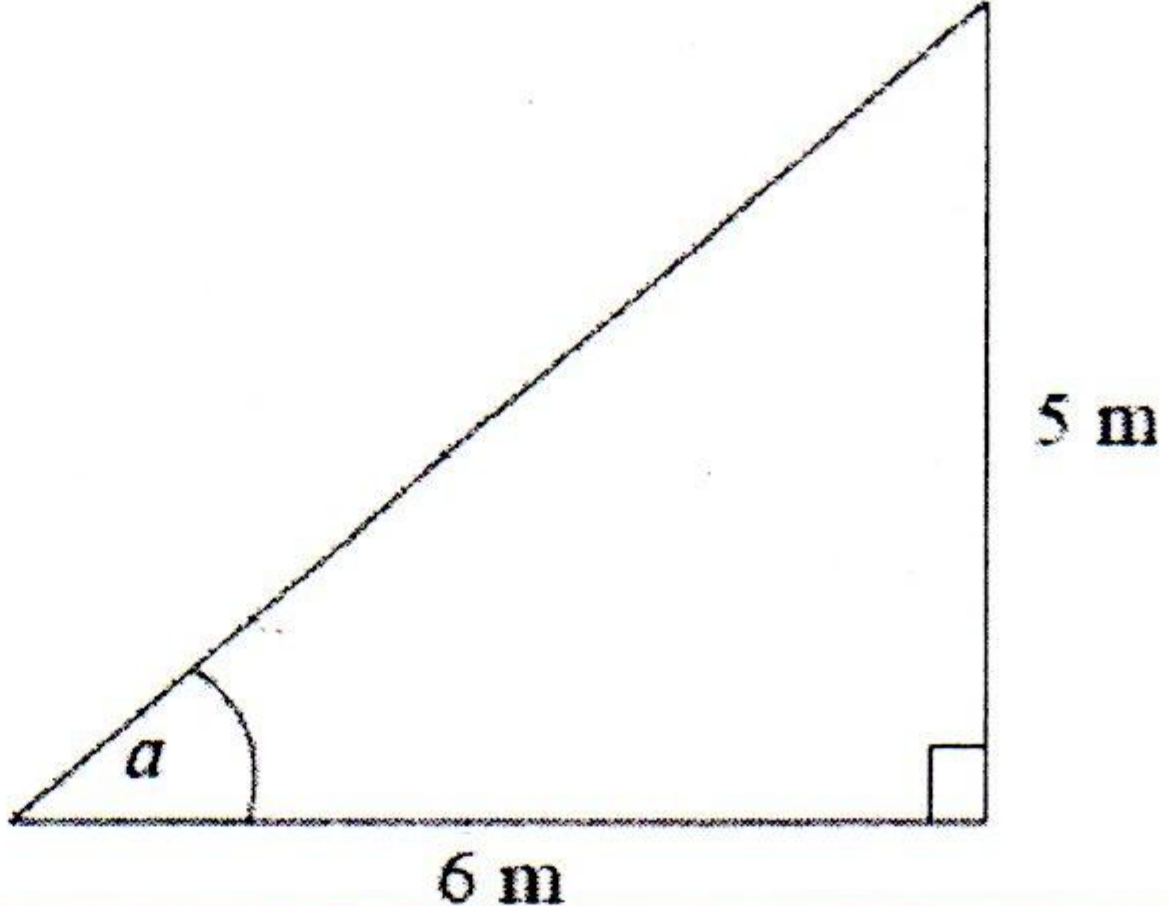
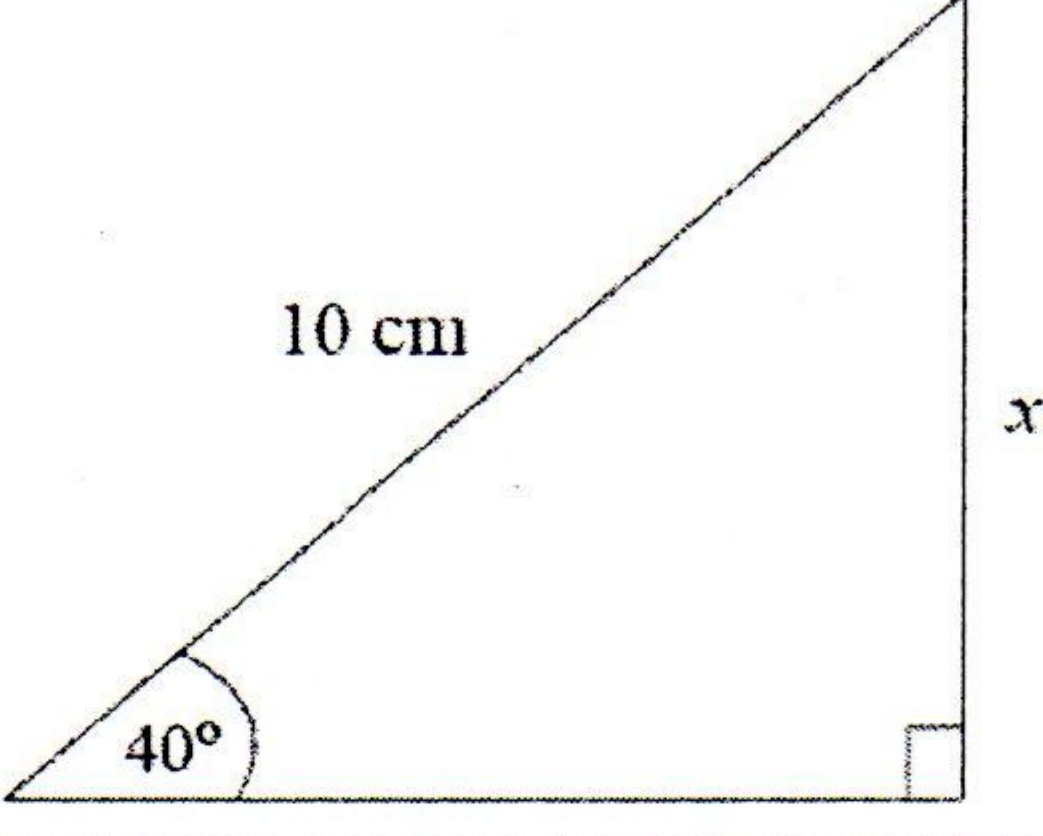
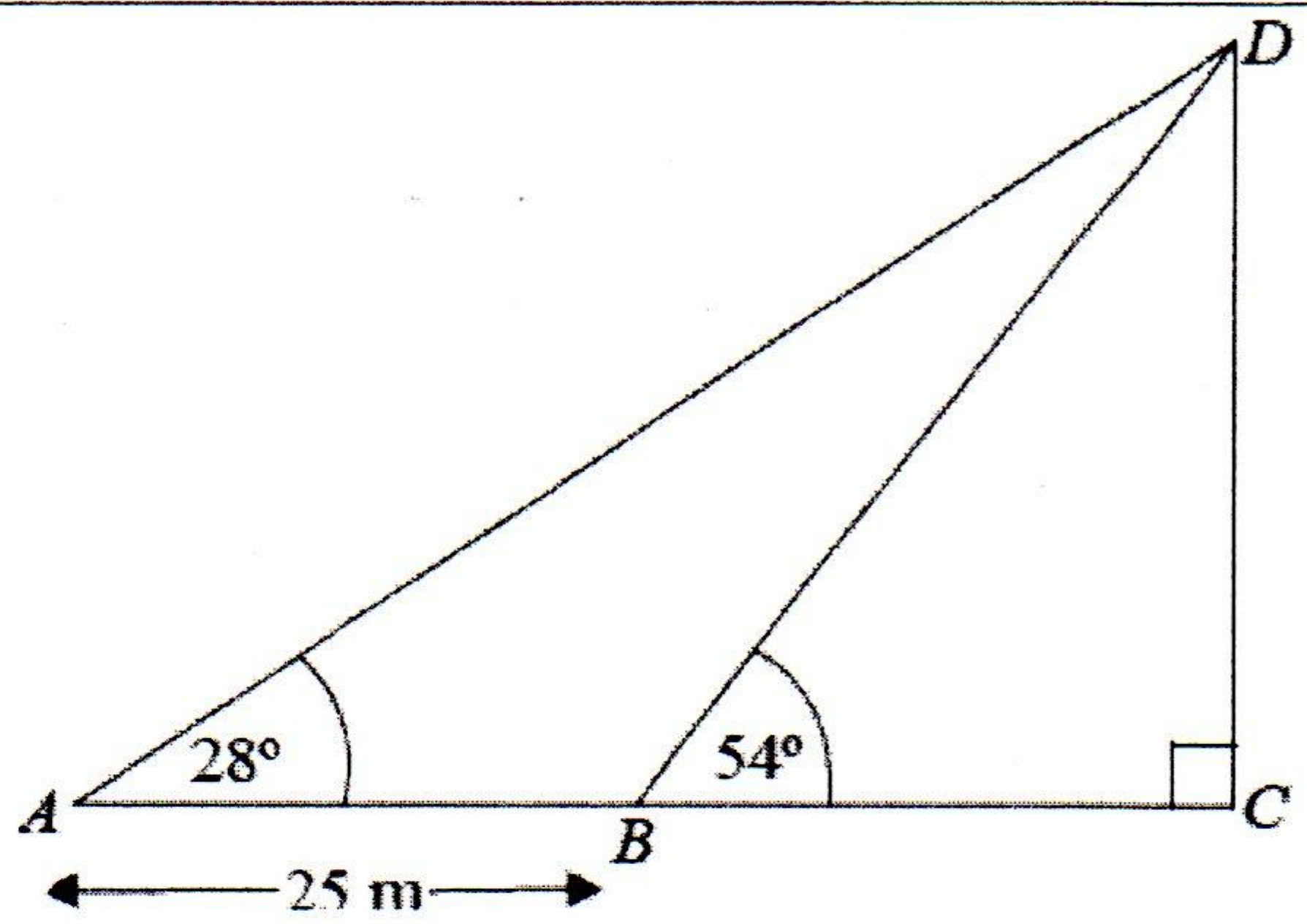
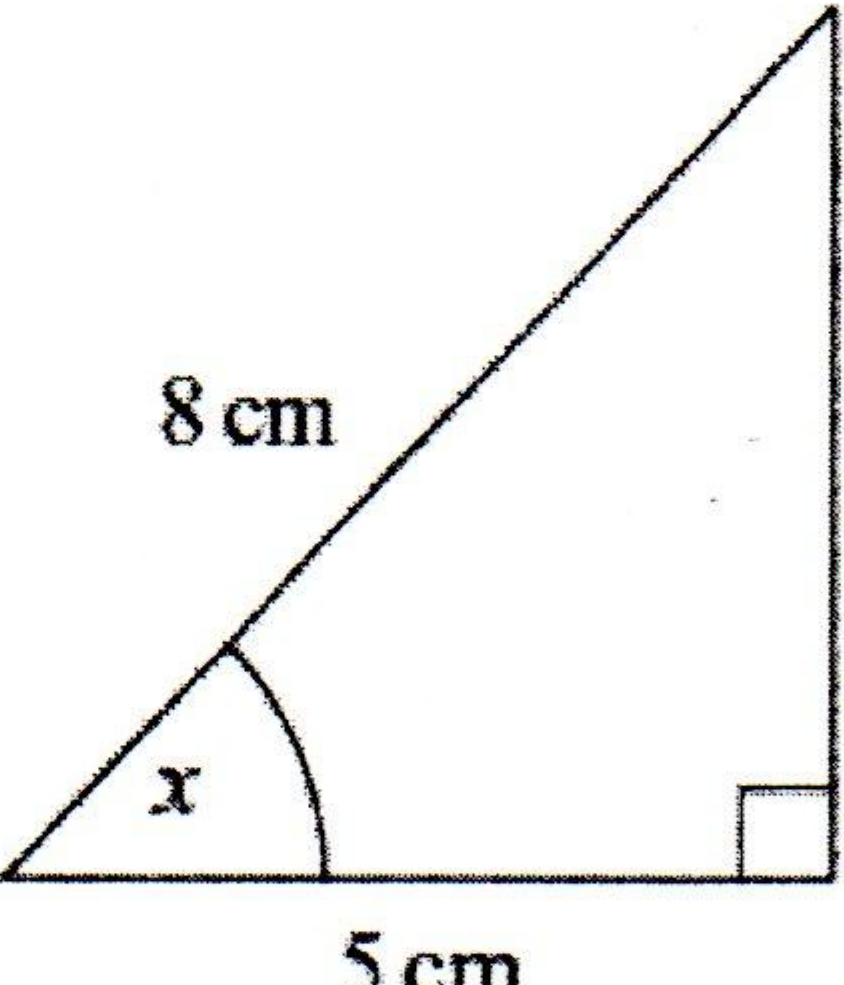
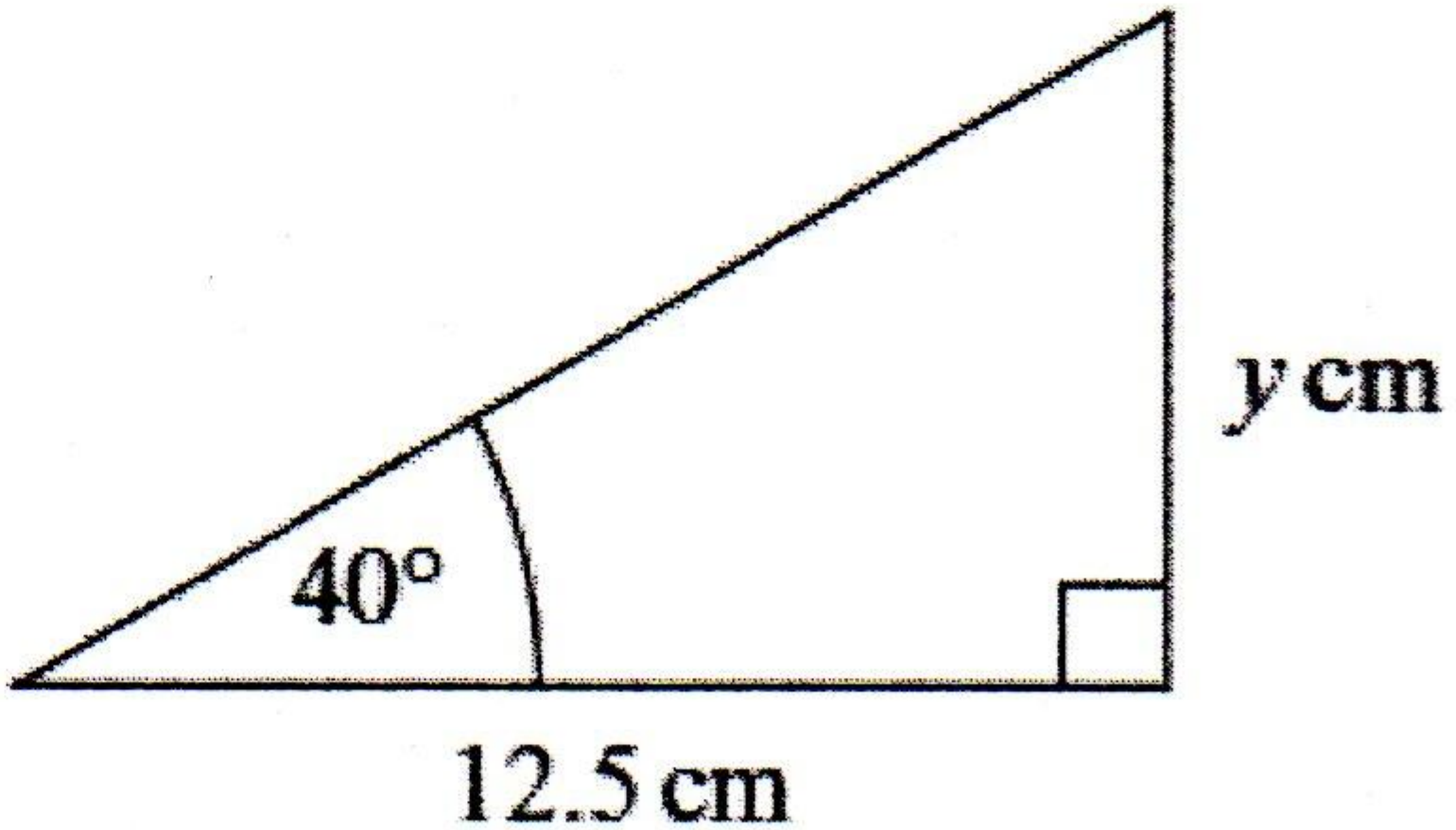


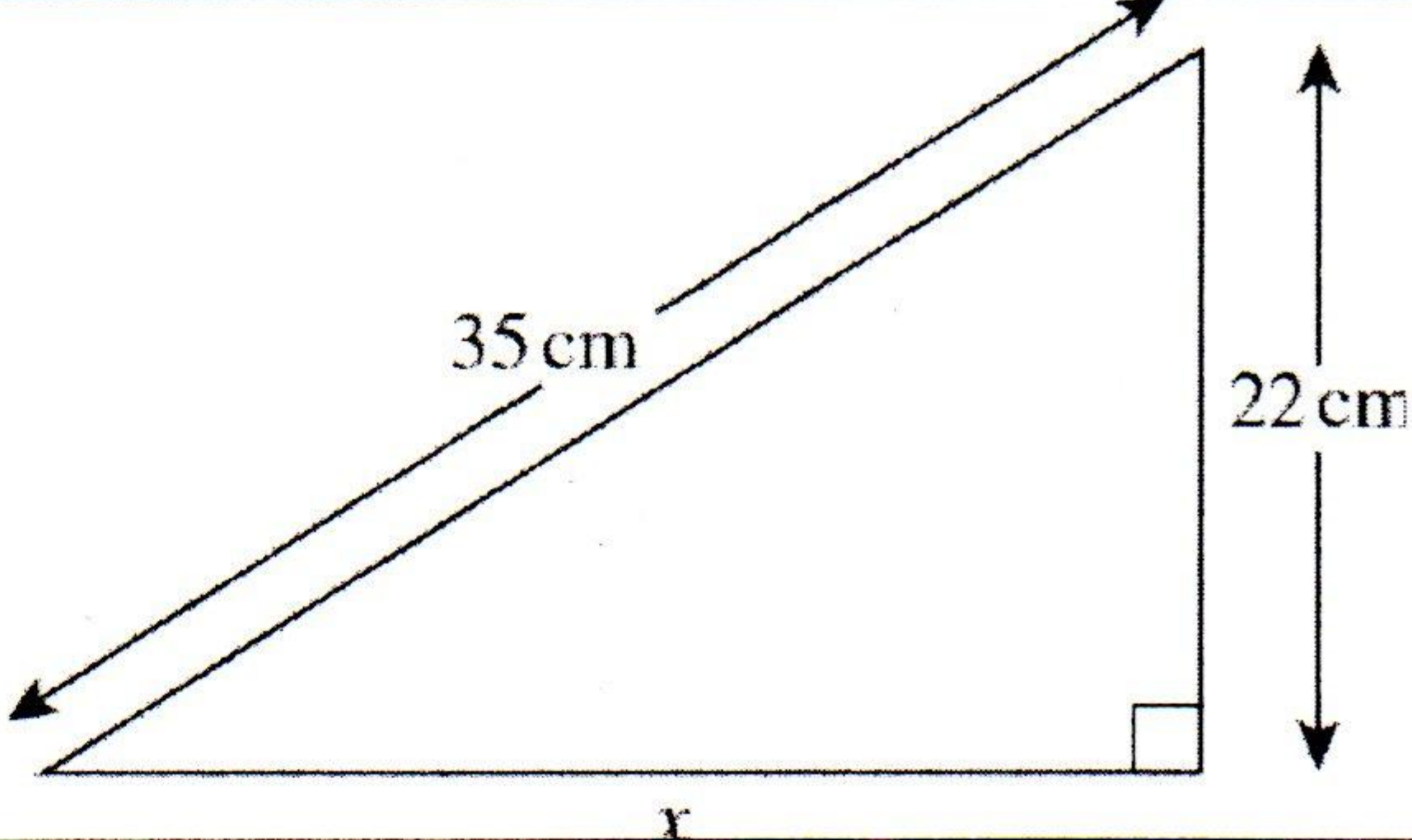
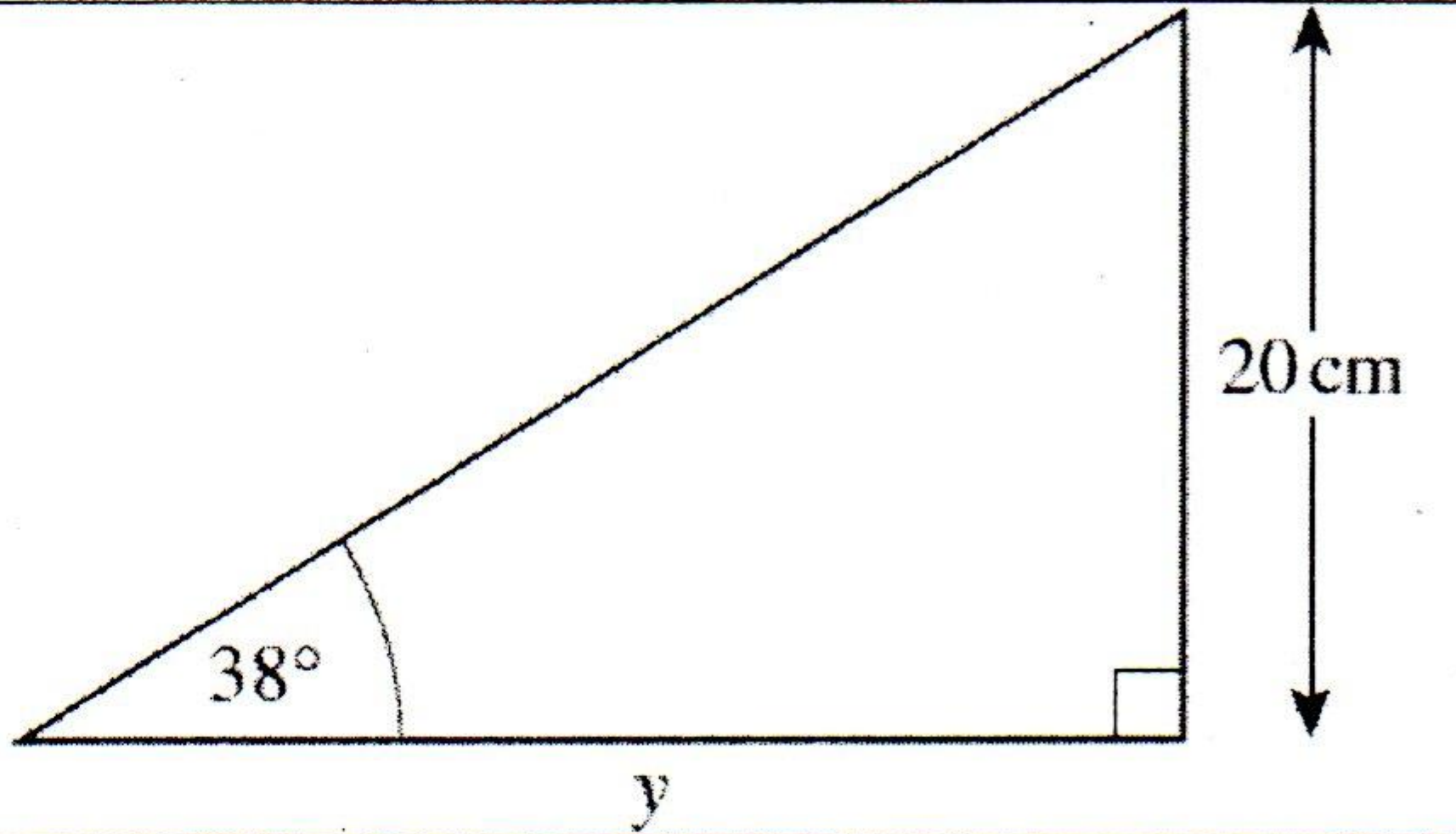
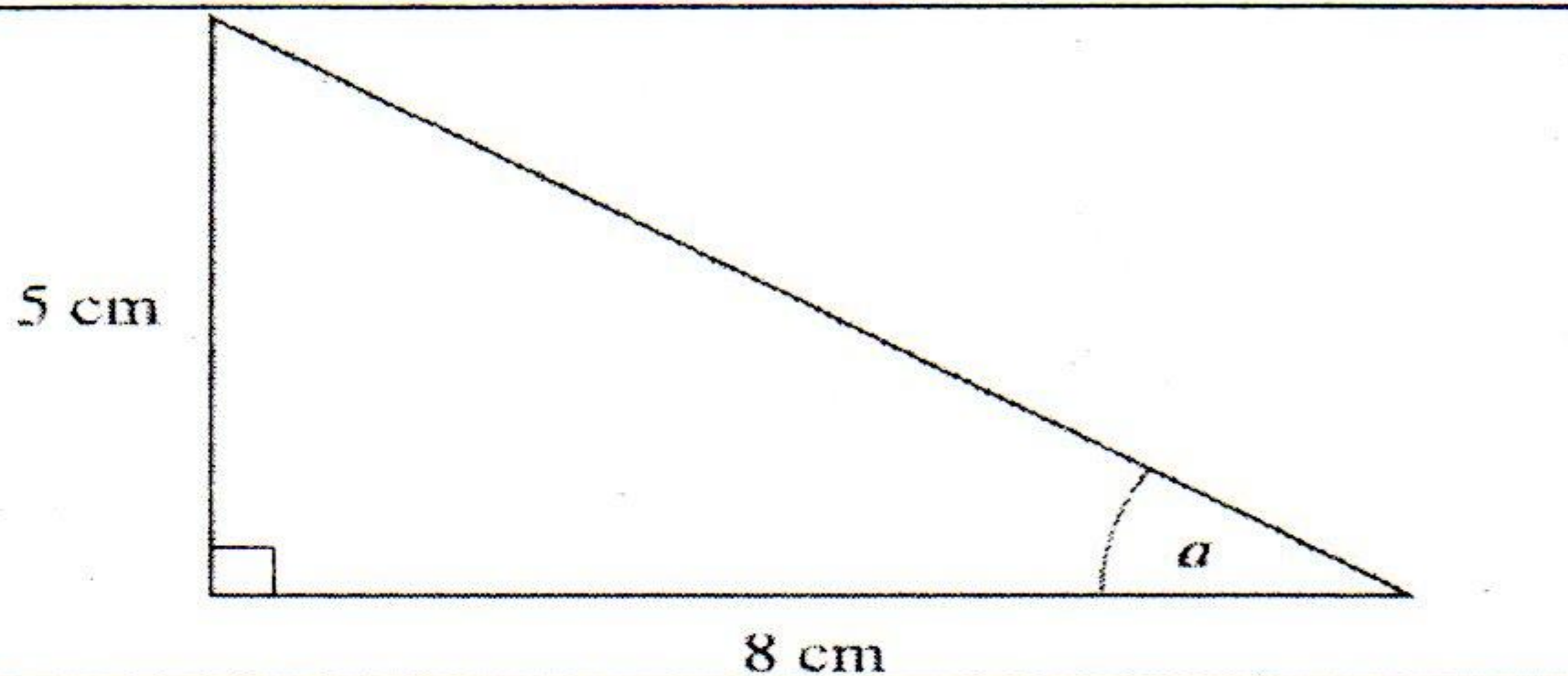
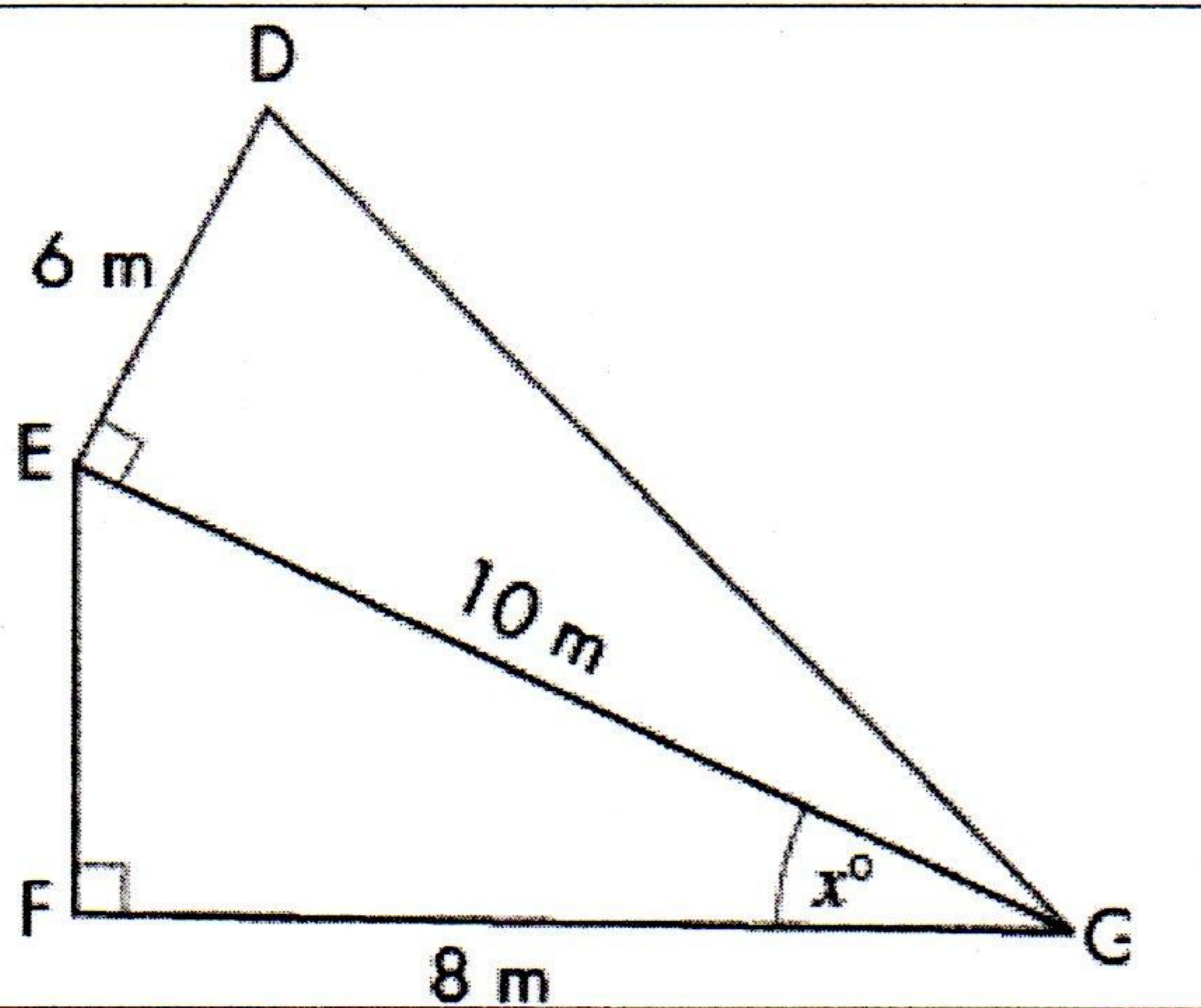
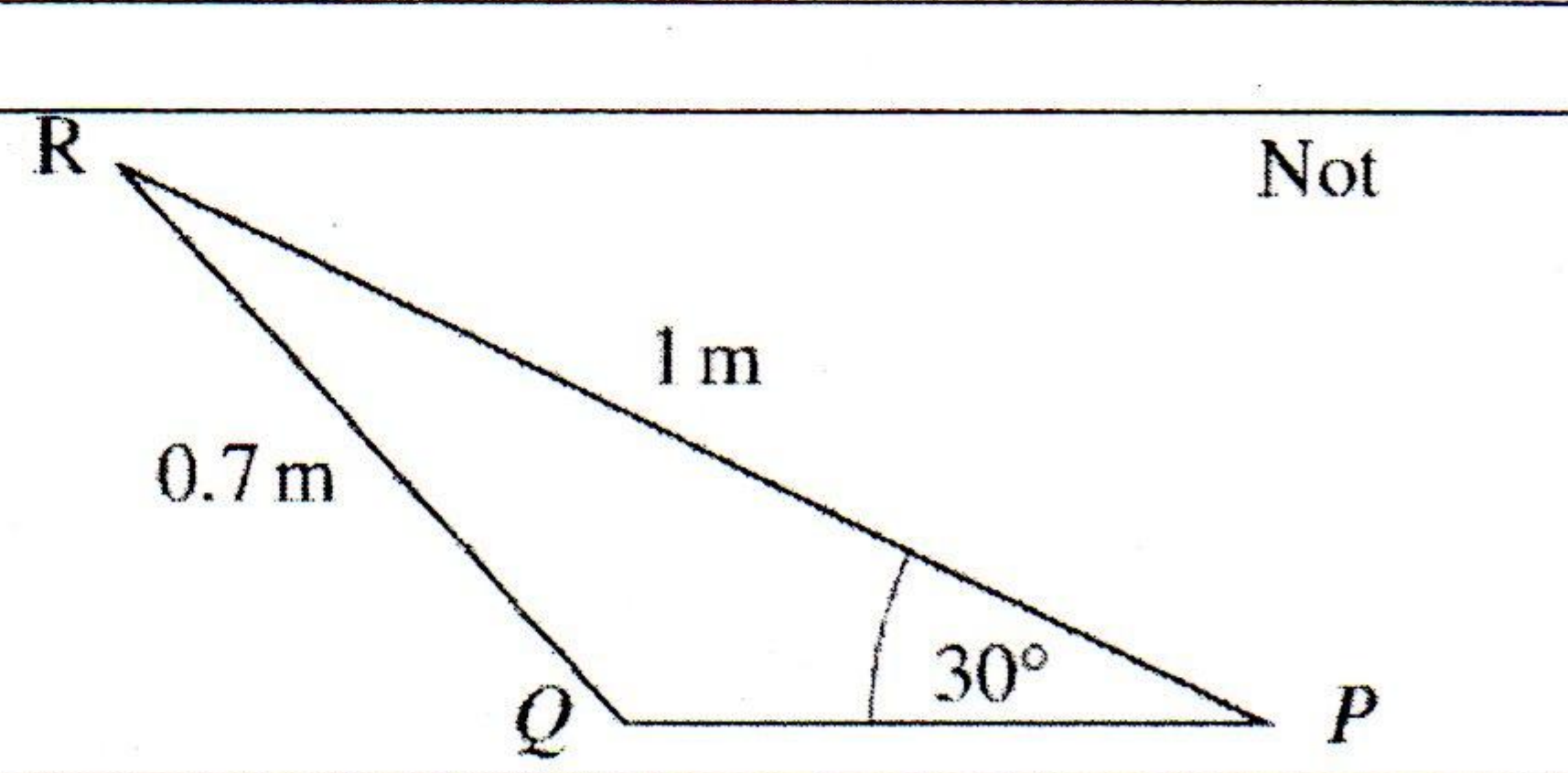
15) ABC is a right-angled triangle.
 $AC = 10.6$ cm.
 $BC = 8.2$ cm.
Calculate the size of the angle marked x .
Give your answer correct to 3 significant figures.
..... $^\circ$



16) A lighthouse, L , is 3.2 km due West of a port, P .
A ship, S , is 1.9 km due North of the lighthouse, L .
(a) Calculate the size of the angle marked x .
Give your answer correct to 3 significant figures.
 $x =$ $^\circ$
(b) Find the bearing of the port, P , from the ship, S .
Give your answer correct to 3 significant figures.
..... $^\circ$



<p>17) (a) Calculate the size of angle a in this right-angled triangle. Give your answer correct to 3 significant figures.</p>	
<p>18) Calculate the length of the side x in this right-angled triangle. Give your answer correct to 3 significant figures.</p>	
<p>19) The diagram shows a vertical tower DC on horizontal ground ABC. ABC is a straight line. The angle of elevation of D from A is 28°. The angle of elevation of D from B is 54°. $AB = 25$ m. Calculate the height of the tower. Give your answer correct to 3 significant figures. m</p>	
<p>20) Here is a right-angled triangle. (a) Calculate the size of the angle marked x. Give your answer correct to 1 decimal place. $x =$</p>	
<p>21) Here is another right-angled triangle. Calculate the value of y. Give your answer correct to 1 decimal place. $y =$</p>	

<p>22) Calculate the length x.</p>	
<p>23) Calculate the length y.</p>	
<p>24) Work out the size of the angle a.</p>	
<p>25) Here $DE = 6$ m. $EG = 10$ m. $FG = 8$ m. Angle $DEG = 90^\circ$. Angle $EFG = 90^\circ$. a Calculate the length of DG. Give your answer correct to 3 significant figures. b Calculate the size of the angle marked x°. Give your answer correct to 1 decimal place.</p>	
<p>26) PQR is a triangle. $PR = 1$ m and $QR = 0.7$ m Angle $RPQ = 30^\circ$ Find the size of the obtuse angle RQP.</p>	
<p>27) Angle $ABC = 47^\circ$ Angle $ACB = 58^\circ$ $BC = 220$ m Calculate the area of triangle ABC. Give your answer correct to 3 significant figures.</p>	