Planner

Trigonometry

- Identifying the opposite and adjacent sides in a right-angled triangle
- Using trigonometry to find a side in a right-angled triangle
- Using trigonometry to find an angle in a right-angled triangle

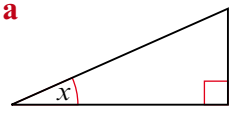
Keywords

You should know

explanation 1

1 Sketch each triangle. Label the hypotenuse (hyp), opposite (opp) and adjacent (adj) sides in relation to the marked angle x.

a



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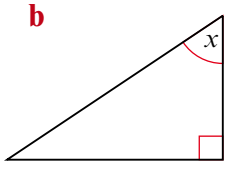

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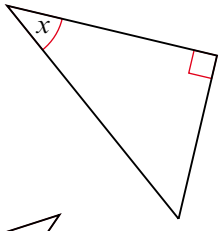

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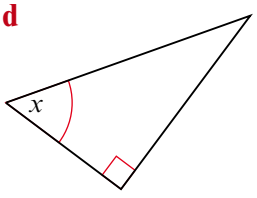

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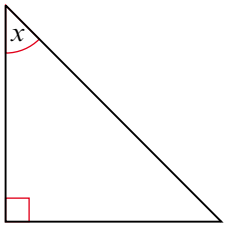

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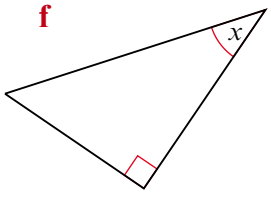
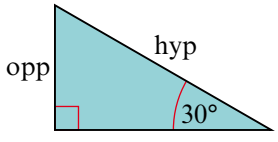


2 This question is about right-angled triangles.

a Draw accurately five different right-angled triangles that each have a 30° angle.

Label the opposite and hypotenuse of each triangle.



b Copy and complete this table by measuring the opposite and hypotenuse on each triangle correct to the nearest millimetre.

c What do you notice about all the values in the final column? Compare your results with your neighbour.

Triangle	Opp (cm)	Hyp (cm)	Opp ÷ Hyp
1			
2			
3			
4			
5			

explanation 2a explanation 2b

3 Use your calculator to find these. Give your answers correct to three significant figures where necessary.

a sin 40° **b** cos 60° **c** tan 45° **d** cos 63° **e** tan 59°

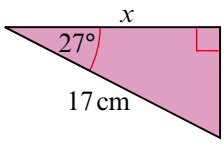
f sin 82° **g** tan 12.5° **h** cos 35.1° **i** sin 9.76° **j** cos 78.4°

explanation 3

4 Look at each triangle.

Decide which two sides have been labelled. Write whether sin, cos or tan should be used.

a



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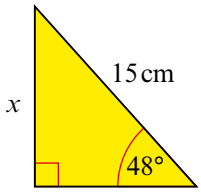

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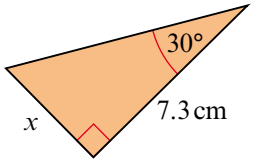

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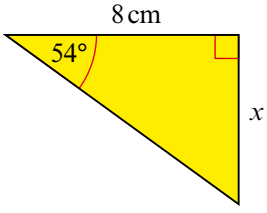

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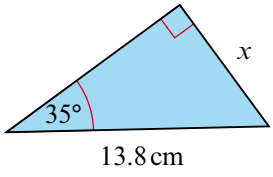

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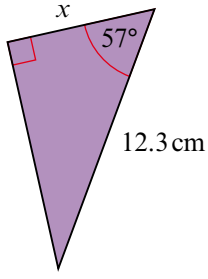
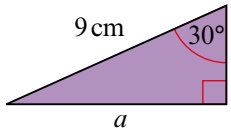


explanation 4a explanation 4b explanation 4c

5 For all the triangles in question **4**, work out the length of each side marked x. Give your answers correct to one decimal place.

6 Work out the length of each marked side. Give your answers correct to three significant figures.

a



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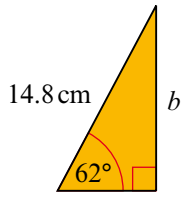

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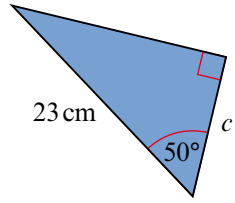

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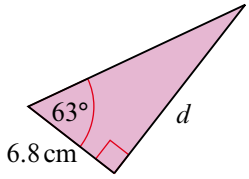

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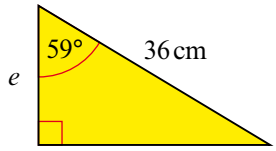

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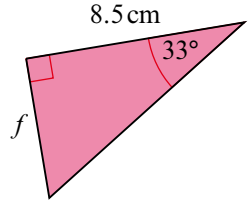

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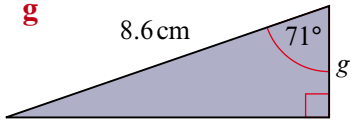

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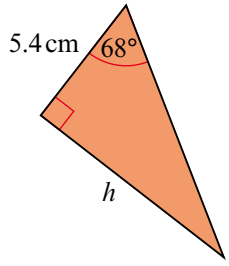

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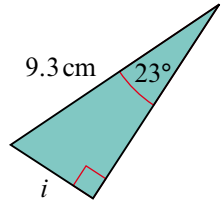
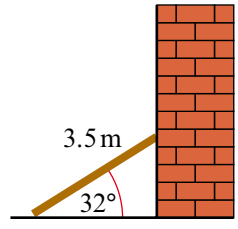
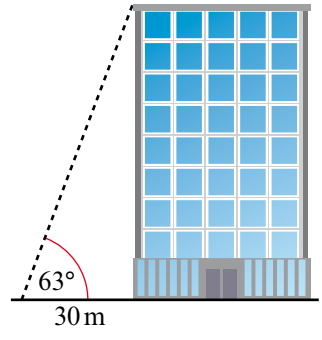


7 A ladder stands on horizontal ground and leans against a vertical wall. The ladder is 3.5 m long and makes an angle of 32° with the wall. How far up the wall does the ladder reach? Give your answer correct to the nearest centimetre.



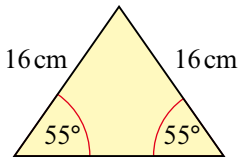
8 From a point 30 m from the foot of a building, the angle of elevation to the top of the building is 63°. Work out the height of the building. Give your answer correct to the nearest metre.



9 A ski run is 1750 m long and slopes at an angle of 23° to the horizontal. A skier skis down the complete ski run. How far will the skier descend vertically in height? Give your answer correct to the nearest metre.

10 Work out the height of the isosceles triangle.

Give your answer correct to one decimal place.



explanation 5

11 In each of the questions, find the value of x.
Give your answers correct to three significant figures.

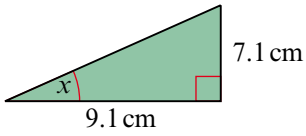
a $\cos x = 0.5$ **b** $\tan x = 1$ **c** $\sin x = 0.866$ **d** $\tan x = 1.5$

e $\sin x = 0.32$ **f** $\cos x = 0.768$ **g** $\cos x = 0.128$ **h** $\tan x = 6.31$

explanation 6

12 In each triangle, work out the size of the angle marked x.
Give your answers correct to one decimal place.

a



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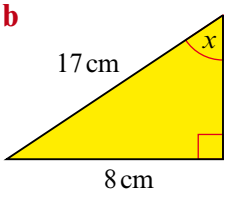

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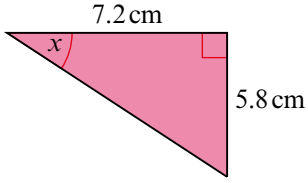

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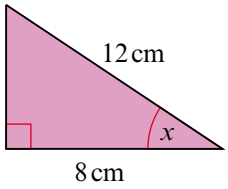

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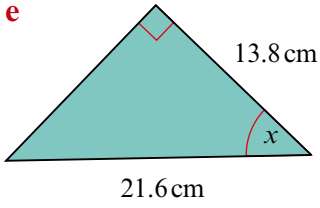

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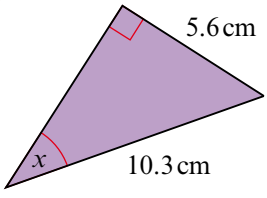


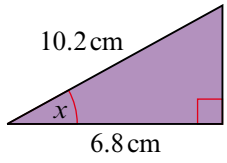
13 A ladder of length 3.5 m rests against a vertical wall so that the base of the ladder is on horizontal ground 2 m away from the wall. Calculate the angle between the ladder and the wall. Give your answer correct to one decimal place.

14 A rectangle has length 15 cm and width 9 cm. Work out the angle between any diagonal and the longest side of the rectangle.
Give your answer correct to one decimal place.

15 A boy lies on the top of a 67 m vertical cliff.
He sees a boat that is 120 m away from the base of the cliff.
Work out the angle of elevation of the boy from the boat.
Give your answer correct to one decimal place.

16 In each triangle, work out the size of the angle or the side marked x.
Give your answers correct to three significant figures.

a



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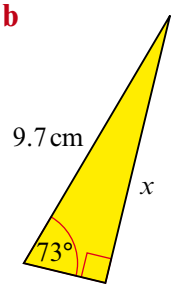

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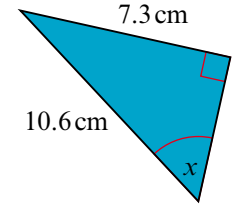

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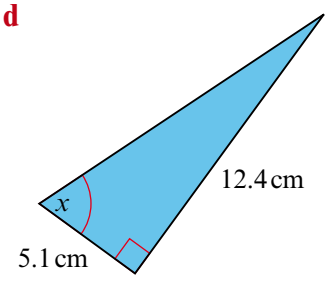

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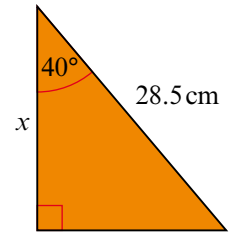

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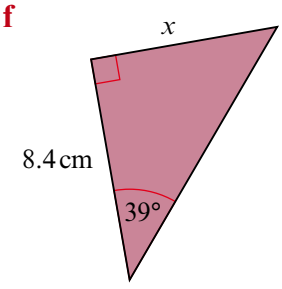

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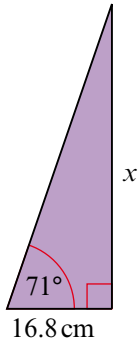

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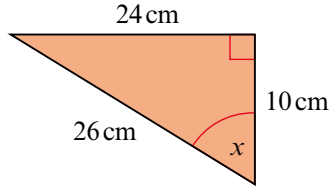

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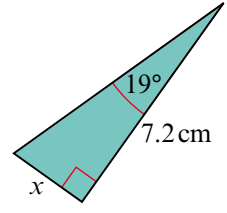
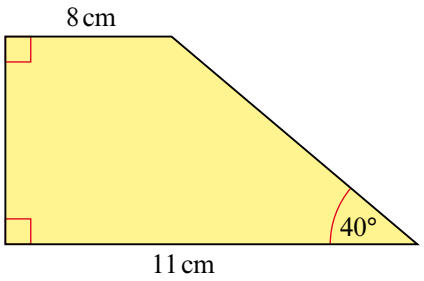


17 Work out the area of the trapezium.

Give your answer correct to three significant figures.



18 An isosceles triangle has sides of 8 cm, 8 cm and 10 cm.

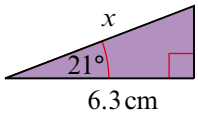
a Work out the sizes of all the angles in the triangle.

b Work out the height of the triangle.

explanation 7

19 Work out the length of each marked side. Give your answers correct to one decimal place.

a



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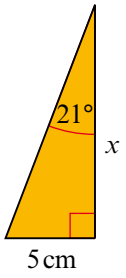

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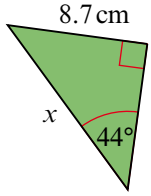

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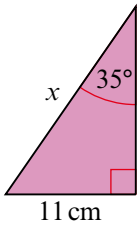

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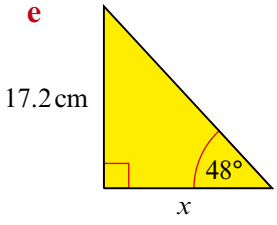
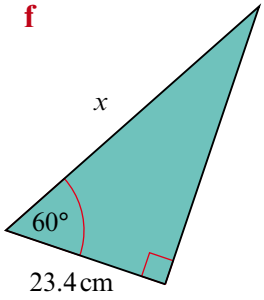
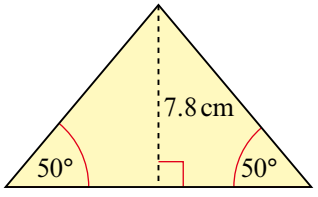


f

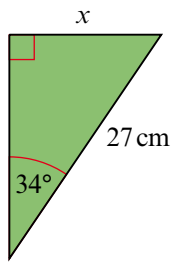


20 An isosceles triangle has two equal angles of 50° and a height of 7.8 cm. Work out the length of all the sides of the isosceles triangle. Give your answers correct to one decimal place.

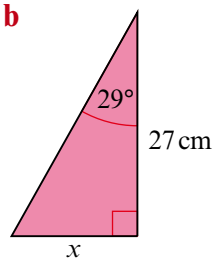


21 Work out the length of each marked side. Give your answers correct to one decimal place.

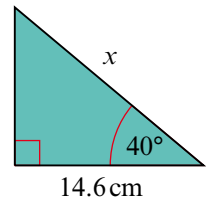
a



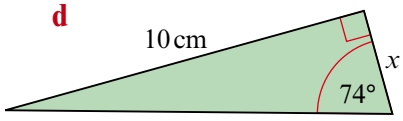
b



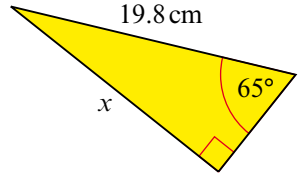
c



d



e



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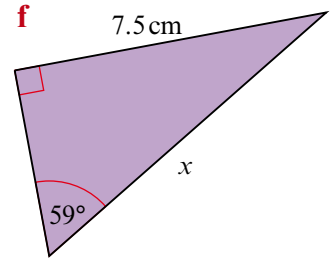


22 An escalator is inclined at an angle of 23° to the horizontal.
The vertical distance that the escalator travels through is 8.5 metres.
How long is the escalator? Give your answer correct to the nearest 10 cm.

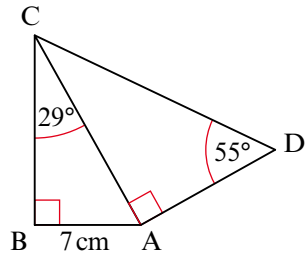
23 The diagram shows a quadrilateral.

a Work out the length of AC.

Give your answer correct to 1 d.p.

b Work out the length of AD.

Give your answer correct to 1 d.p.



24 Work out the size of the angle marked x.

Give your answer correct to one decimal place.