Planner

Pythagoras' theorem

- Identifying the hypotenuse in a right-angled triangle
- Using Pythagoras' theorem
- Finding the length of a line joining two coordinate points

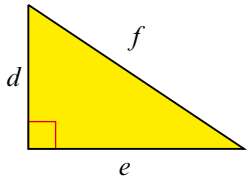
Keywords

You should know

explanation 1a | explanation 1b | explanation 1c

1 Write Pythagoras' theorem for each triangle.

a



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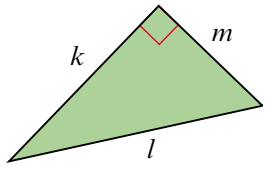

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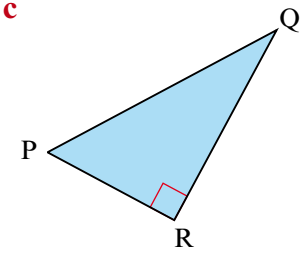


2 These diagrams can be used to demonstrate Pythagoras' theorem.

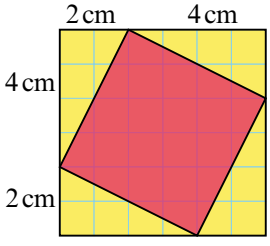


Diagram 1

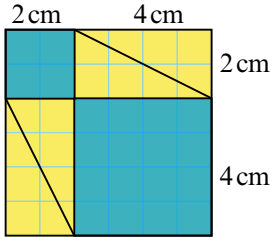


Diagram 2

a Compare the area of the yellow triangles in Diagram 1 with the area of the yellow triangles in Diagram 2. What do you notice?

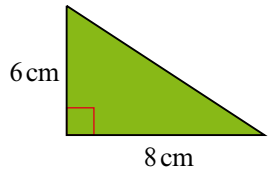
b Now use the diagrams to explain why the area of the red square is equal to the areas of the two blue squares added together.

c Explain how this shows that Pythagoras' theorem is true for each yellow triangle.

explanation 2 online

3 For each triangle, use Pythagoras' theorem to work out the length of the unmarked side.

a



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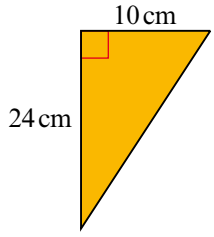

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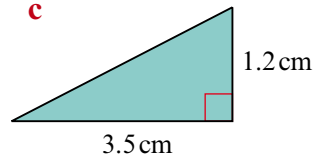

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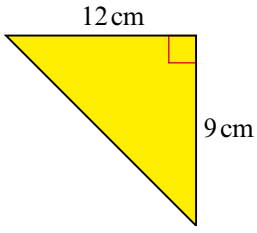

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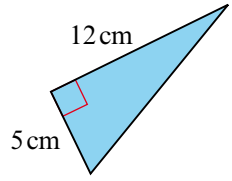

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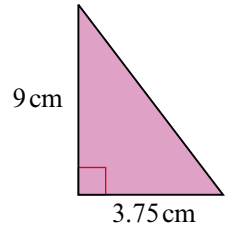
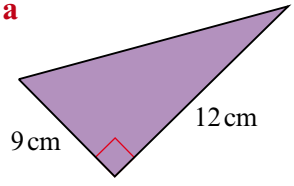


4 Work out the length of each unmarked side. Give your answers correct to one decimal place.

a



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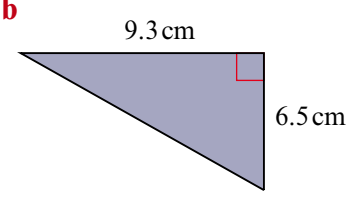

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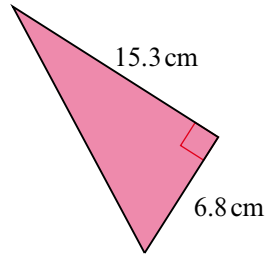

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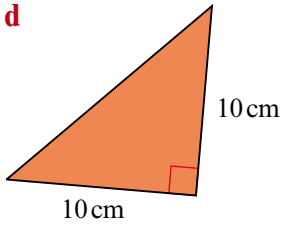

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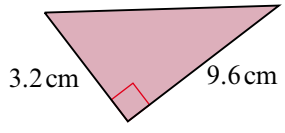

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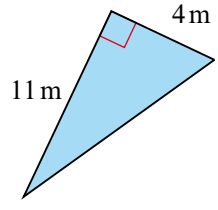
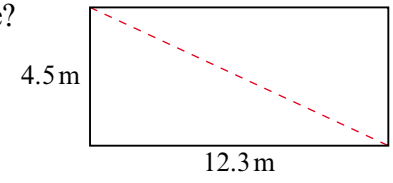


5 What is the length of the diagonal of this rectangle?

Give your answer correct to two decimal places.

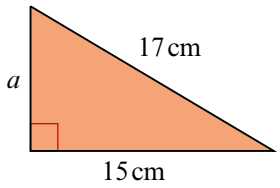


6 Work out the length of a diagonal of a square of side length 6 cm.
Give your answer correct to one decimal place.

explanation 3 — online

7 Work out the length of each side marked by a letter. Give your answers correct to one decimal place where necessary.

a



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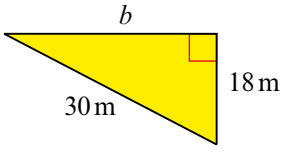

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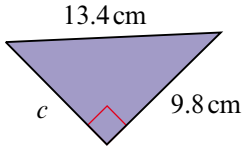
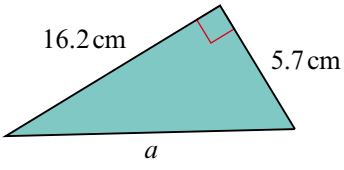


8 Work out the length of each side marked by a letter. Give your answers correct to one decimal place where necessary.

a



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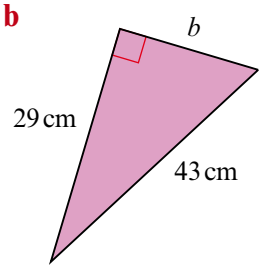

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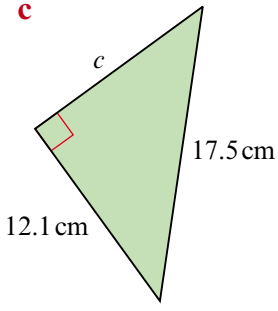

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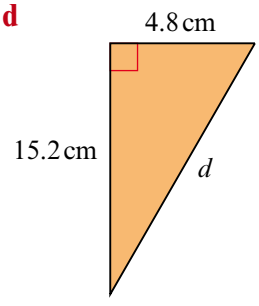

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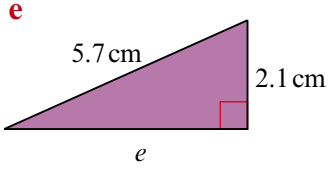

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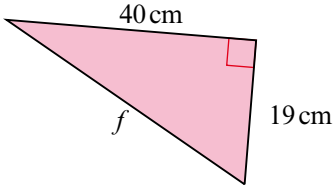
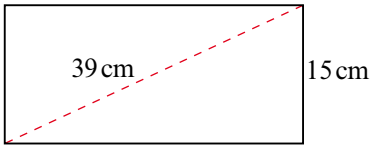
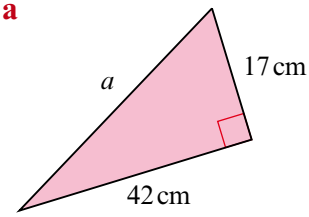


9 The diagonal of a rectangle is 39 cm and the short side measures 15 cm.
Work out the length of the long side of the rectangle.



10 Work out the length of each side marked by a letter. Give your answers correct to three significant figures.

a



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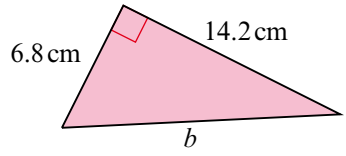

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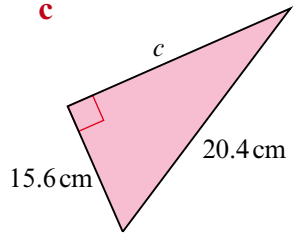
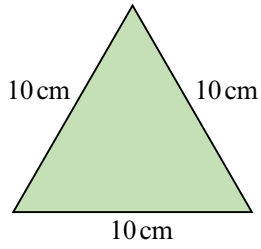


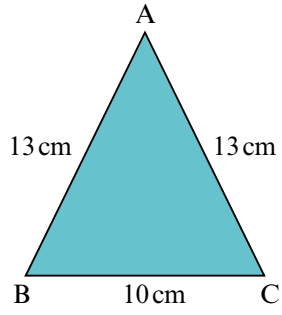
explanation 4a explanation 4b

11 Find the height of an equilateral triangle of side length 10 cm.



12 ABC is an isosceles triangle. AB = AC = 13 cm. BC = 10 cm.

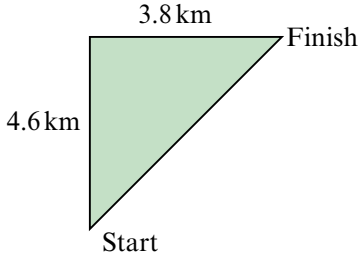
Work out the area of triangle ABC.

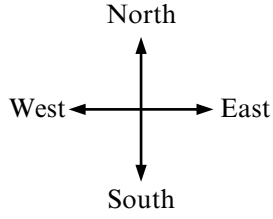


13 Sumire walks due North for 4.6 km.

She then turns and walks 3.8 km due East.

Work out the distance between Sumire's starting point and finishing point.



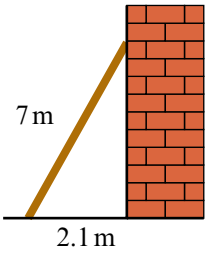


14 A ship sails 50 km due South and then a further 75 km due West.

At the end of its journey, how far is the ship from its starting point?

15 A 7 m ladder is standing on horizontal ground 2.1 m away from a vertical wall.

How far up the wall will the ladder reach?

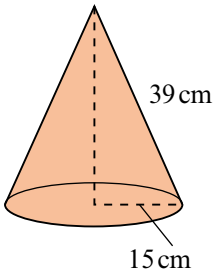


16 A snooker table is in the shape of a rectangle. The snooker table measures 12 feet by 6 feet. What is the length of a diagonal of the snooker table?

17 The slant height of a cone is 39 cm.

The radius of the base of the cone is 15 cm.

Work out the height of the cone.

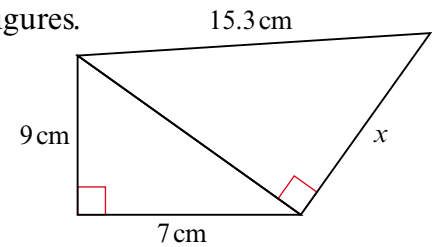


18 The diagonal of a rugby pitch is 140 m and the short side is 70 m.

What is the length of the long side of the pitch? Give your answer correct to the nearest metre.

19 Work out the length of the side marked x.

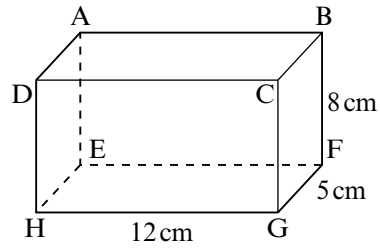
Give your answer correct to three significant figures.



20 The diagonals of a square are each of length 14.1 cm.

Work out the perimeter of the square.

21 This glass tank is a cuboid. It has length 12 cm, width 5 cm and height 8 cm.

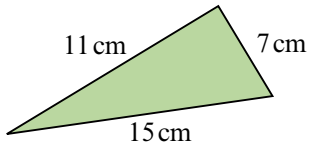


a Work out the length of the diagonal HF.

b Hence work out the length of the diagonal BH.

22 Use Pythagoras' theorem to decide whether or not these triangles have a right angle.

a



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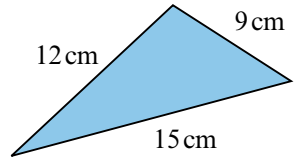
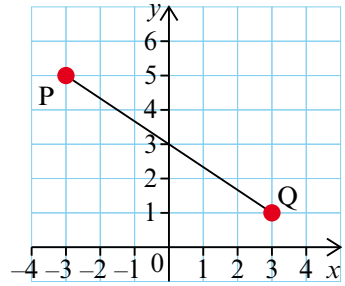


explanation 5

23 The points P (−3, 5) and Q (3, 1) are plotted on the diagram.

Find the length of the line PQ.



24 Find the distance between the points in each pair.

a (0, 1) and (5, 3)

b (−2, 1) and (4, −3)

c (−3, −2) and (5, 0)

d (−5, 8) and (0, −2)

e (−3, −6) and (2, 3)

f (5, −1) and (−4, 5)

25 Point A has the coordinates (1, 2). The length of the line AB is 5 units. The x-coordinate of B is 4.

a Draw a sketch to show why there are *two* possible positions for point B.

b Use Pythagoras' theorem to work out the two possible y-coordinates of B.