GCSE Maths: Pythagoras' theorem: finding the hypotenuse and a shorter side (Higher): answers

GCSE Maths - Pythagoras and Trigonometry - Higher - Lesson 20.1

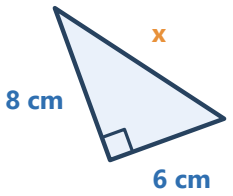
Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at **websink.site/gcse/maths/ch20-pythagoras-trigonometry/higher/pythagoras-theorem-finding-the-hypotenuse-and-a-shorter-side/**

Exercise 20A Pythagoras with whole-number answers

Non-calculator

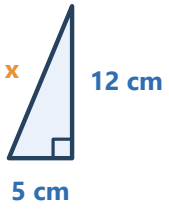
1 Work out the length of the hypotenuse, *x*, in each triangle. All the lengths are in centimetres.

(a)



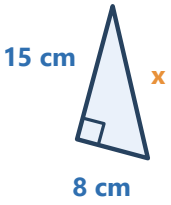
Answer: 10 cm

(b)



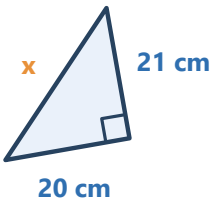
Answer: 13 cm

(c)



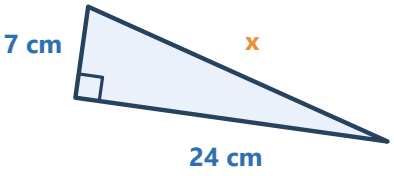
Answer: 17 cm

(d)



Answer: 29 cm

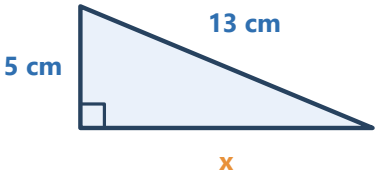
2 Work out the length of the hypotenuse, *x*.



Answer: 25 cm

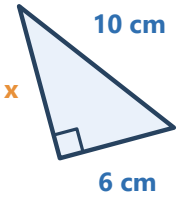
3 Work out the length of the shorter side, *x*, in each triangle. All the lengths are in centimetres.

(a)



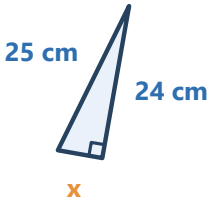
Answer: 12 cm

(b)



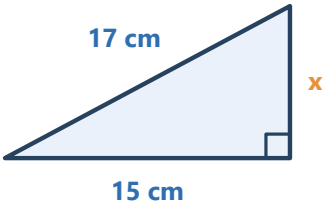
Answer: 8 cm

(c)



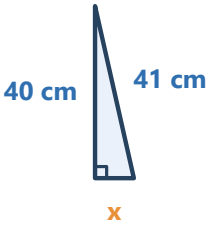
Answer: 7 cm

(d)



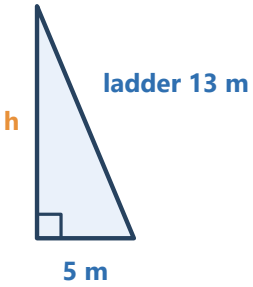
Answer: 8 cm

4 Work out the length of the shorter side, *x*.



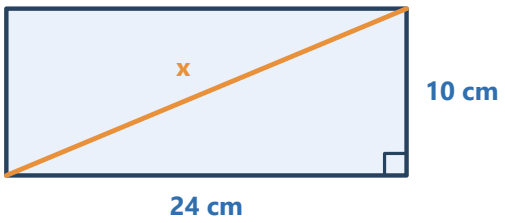
Answer: 9 cm

5 A ladder 13 m long leans against a vertical wall. The foot of the ladder is 5 m from the wall on level ground. How high up the wall does the ladder reach?



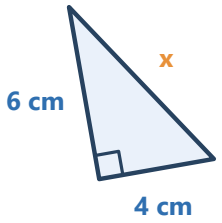
Answer: 12 m

6 The diagram shows a rectangle that is 24 cm long and 10 cm wide. Work out the length of the diagonal, *x*.



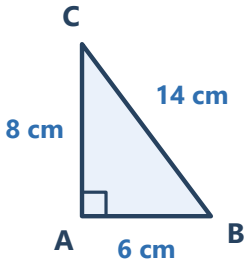
Answer: 26 cm

7 Work out the length of the hypotenuse, *x*. Give your answer as a simplified surd.



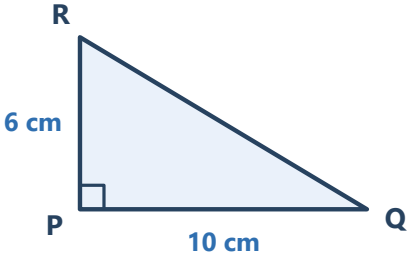
Answer: $2\sqrt{13}$ cm

8 Aisha says: "The shorter sides are 6 cm and 8 cm, so the hypotenuse is 6 + 8 = 14 cm." Explain why Aisha is wrong, and work out the correct length.



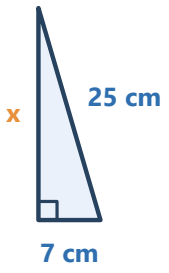
Answer: 10 cm (she added the lengths instead of the squares)

9 Kim says that the hypotenuse of this triangle is 9 cm. Without using Pythagoras' theorem, explain why Kim must be wrong. Then work out the correct length, to 1 decimal place.



Answer: The hypotenuse must be longer than 10 cm. It is 11.7 cm.

10 A right-angled triangle has a hypotenuse of 25 cm and one shorter side of 7 cm. **Show that** its perimeter is 56 cm.



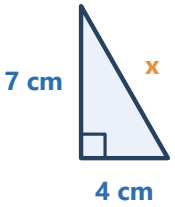
Answer: 7 + 24 + 25 = 56 cm

Exercise 20B Pythagoras with a calculator

Calculator allowed

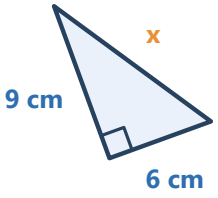
1 Work out the length of the hypotenuse, *x*, in each triangle. Give your answers correct to 1 decimal place. All lengths are in centimetres.

(a)



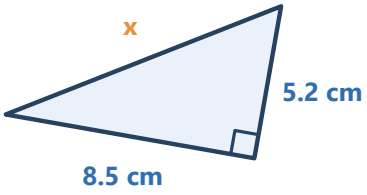
Answer: 8.1 cm

(b)



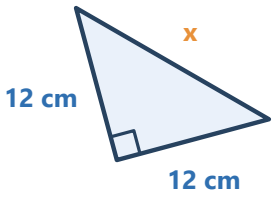
Answer: 10.8 cm

(c)



Answer: 10.0 cm

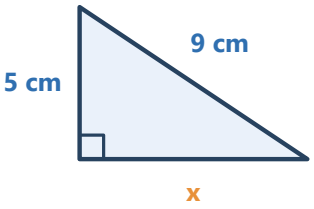
(d)



Answer: 17.0 cm

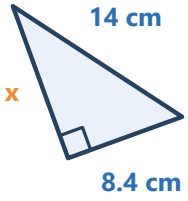
2 Work out the length of the shorter side, *x*, in each triangle. Give your answers correct to 1 decimal place. All lengths are in centimetres.

(a)



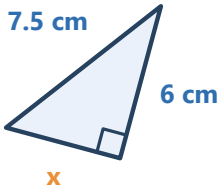
Answer: 7.5 cm

(b)



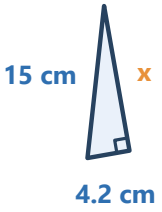
Answer: 11.2 cm

(c)



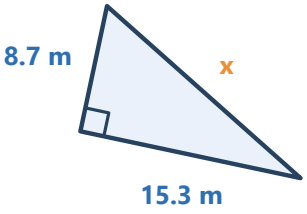
Answer: 4.5 cm

(d)



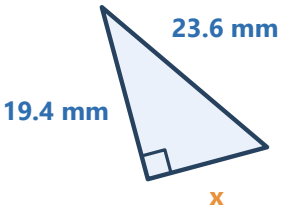
Answer: 14.4 cm

3 Work out the length of the hypotenuse, *x*. Give your answer correct to 2 decimal places.



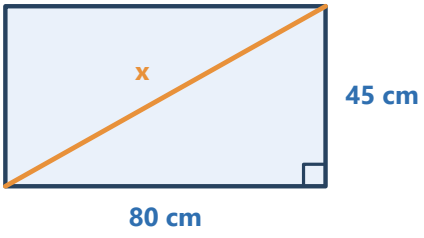
Answer: 17.60 m

4 Work out the length of the shorter side, *x*. Give your answer correct to 3 significant figures.



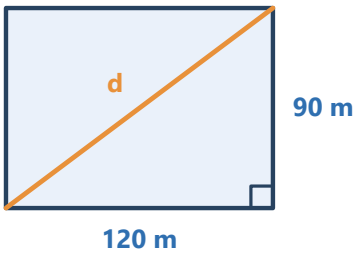
Answer: 13.4 mm

5 A television screen is a rectangle 80 cm wide and 45 cm high. Work out the length of the diagonal of the screen. Give your answer to the nearest centimetre, then say how many inches this is to the nearest inch (1 inch = 2.54 cm).



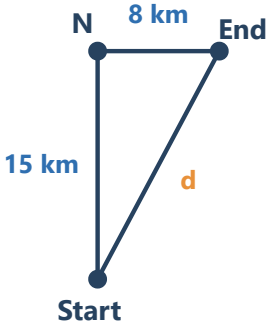
Answer: 92 cm, which is 36 inches

6 Sam walks from one corner of a rectangular field to the opposite corner. The field is 120 m long and 90 m wide. He can walk along the two edges, or straight across the field along the diagonal. How many metres shorter is the diagonal route?



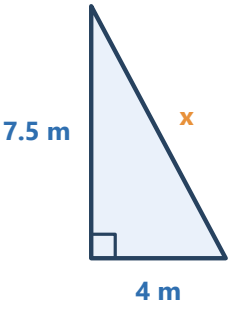
Answer: 60 m

7 A ship sails 15 km due north and then 8 km due east. How far is the ship from where it started?



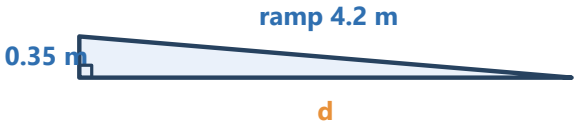
Answer: 17 km

8 A vertical flagpole is 7.5 m tall. A wire runs from the top of the pole to a point on the ground 4 m from the foot of the pole. Work out the length of the wire.



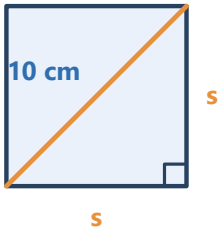
Answer: 8.5 m

9 A wheelchair ramp is 4.2 m long and rises 0.35 m. Work out the horizontal distance the ramp covers. Give your answer correct to 2 decimal places.



Answer: 4.19 m

10 **Challenge.** A square has diagonals of length 10 cm. Use Pythagoras' theorem to work out the length of one side of the square, correct to 1 decimal place. (Hint: the diagonal splits the square into two right-angled triangles whose two shorter sides are equal.)



Answer: 7.1 cm

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