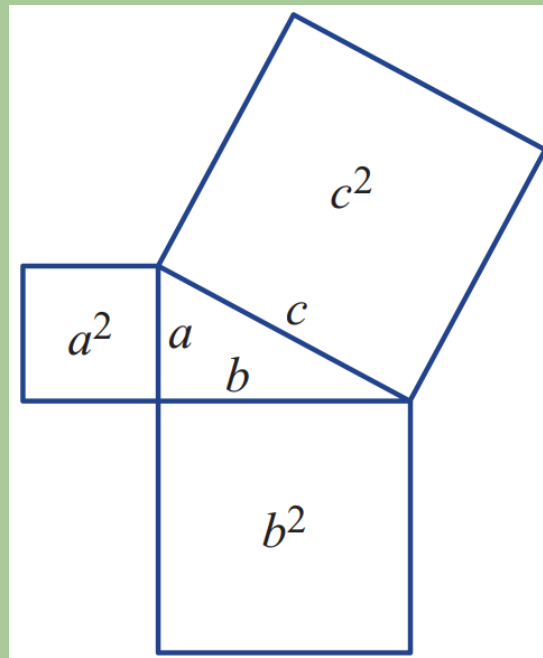


Pythagoras' Theorem

Introducing Pythagoras' theorem



The area of the larger square (c^2) is equal to the sum of the two smaller squares ($a^2 + b^2$).

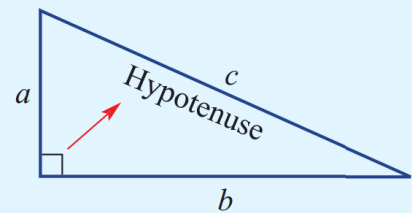
■ The **hypotenuse**

- It is the longest side of a right-angled triangle.
- It is opposite the right angle.

■ **Pythagoras' theorem**

- The square of the hypotenuse is the sum of the squares of the other two shorter sides.
- $a^2 + b^2 = c^2$ or $c^2 = a^2 + b^2$

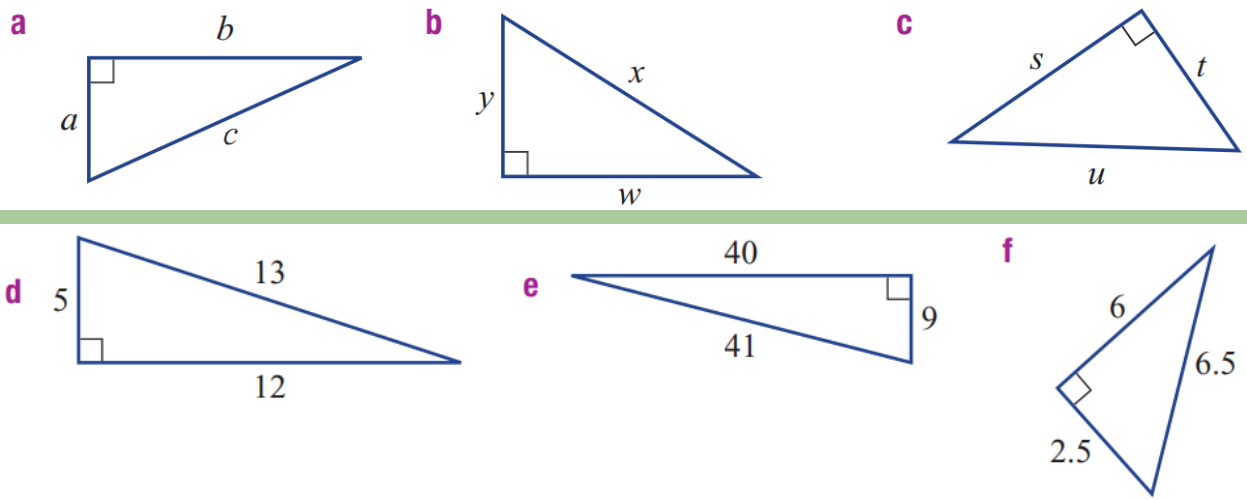
- A Pythagorean triad is a set of three integers which satisfy Pythagoras' theorem.



1. Write the missing words in this sentence

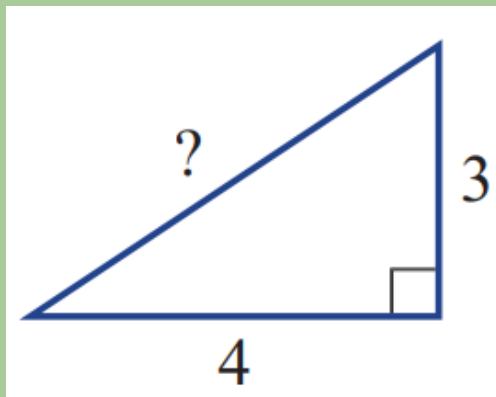
The _____ is the longest side of a right-angled _____.

2. Which letter marks the length of the hypotenuse in these triangles?



Example - Identify and find the missing side to the nearest whole numbers.

a.



$$c^2 = a^2 + b^2$$

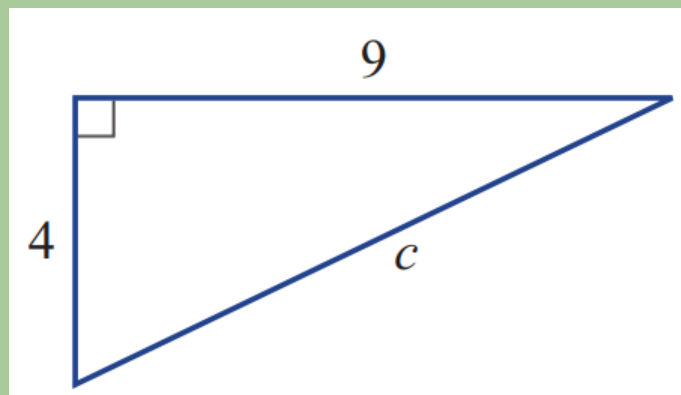
$$c^2 =$$

$$=$$

$$=$$

$$=$$

b.



$$c^2 = a^2 + b^2$$

$$c^2 =$$

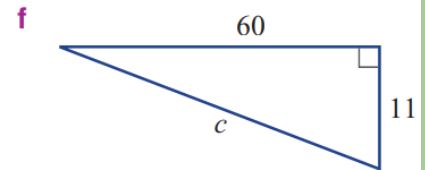
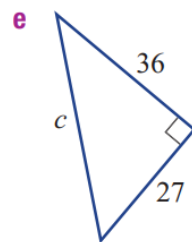
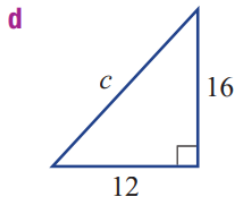
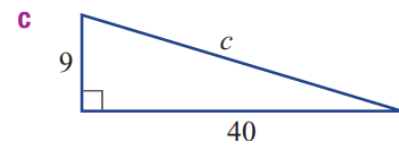
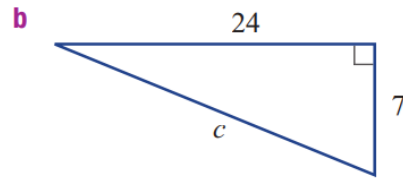
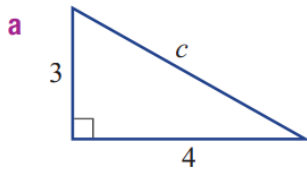
$$=$$

$$=$$

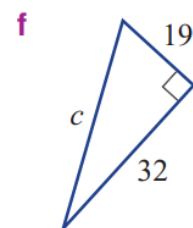
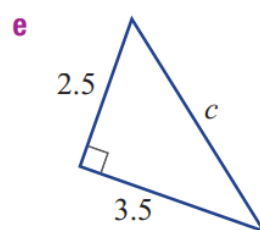
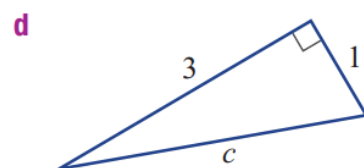
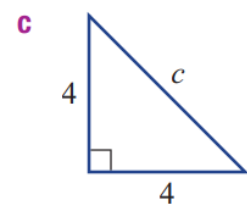
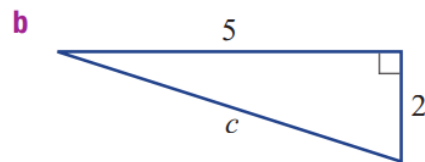
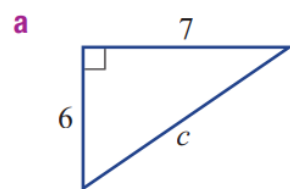
$$=$$

Question

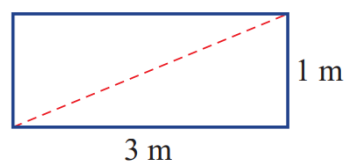
4 Find the length of the hypotenuse (c) of these right-angled triangles.



5 Find the length of the hypotenuse (c) of these right-angled triangles correct to 2 decimal places



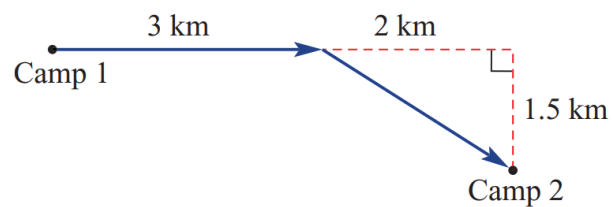
6 A rectangular board is to be cut along one of its diagonals. The board is 1 m wide and 3 m high. What will be the length of the cut, correct to the nearest cm?



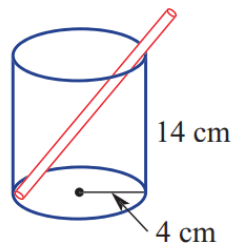
- 7 The size of a television screen is determined by its diagonal length. Find the size of a television screen that is 1.2 m wide and 70 cm high. Round the answer to the nearest cm.



- 8 Here is a diagram showing the path of a bushwalker from camp 1 to camp 2. Find the total distance calculated to 1 decimal place.



- 9 A 20 cm straw sits in a cylindrical glass as shown. What length of straw sticks above the top of the glass? Round the answer to 2 decimal places.



Answer

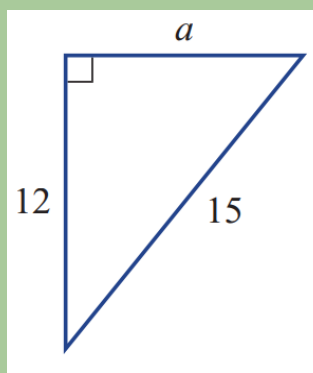
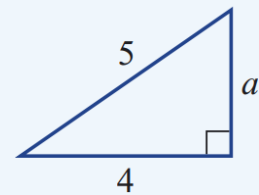
- 4** a 5 b 25 c 41 d 20
e 45 f 61
- 5** a 9.22 b 5.39 c 5.66 d 3.16
e 4.30 f 37.22
- 6** 3.16 m or 316 cm
- 7** 139 cm
- 8** 5.5 km
- 9** 3.88 cm

Calculating the length of a shorter side

- Pythagoras' theorem can be used to find the length of the shorter sides of a right-angled triangle if the hypotenuse and another side are known.
- Use subtraction to make the unknown the subject of the equation.

Example

Find the value of a in this right-angled triangle.



$$c^2 = a^2 + b^2$$

=

=

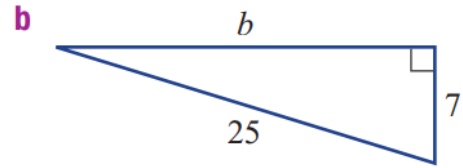
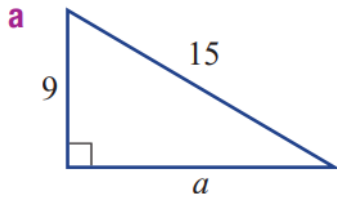
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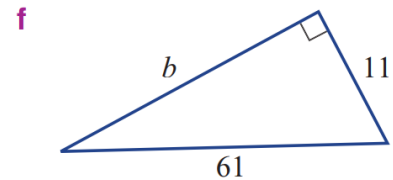
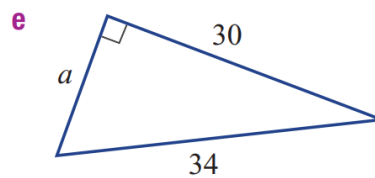
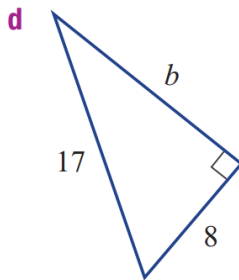
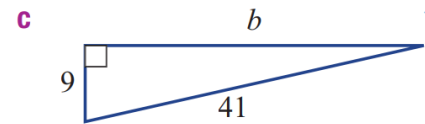
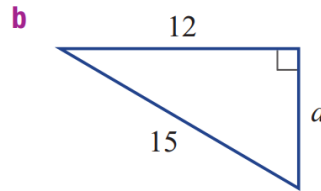
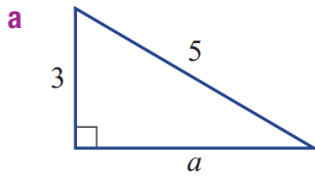
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Question

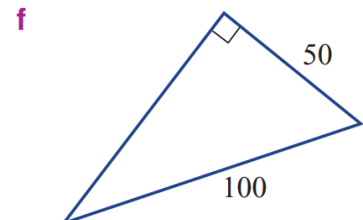
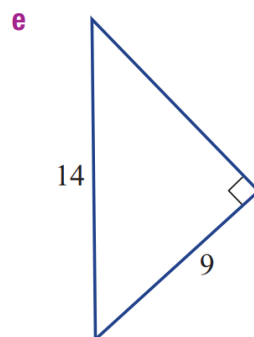
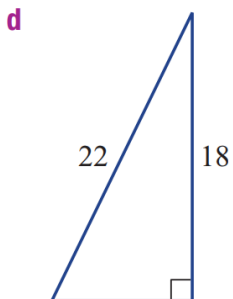
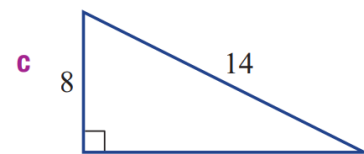
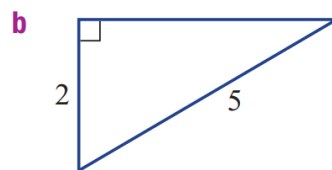
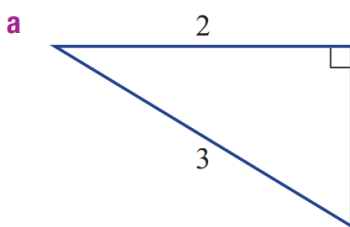
2. Find the unknown side using Pythagoras' Theorem



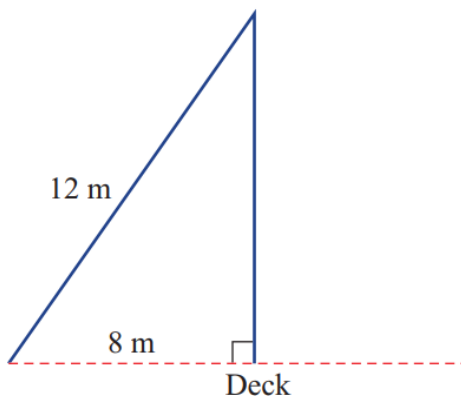
3 Find the length of the unknown side in these right-angled triangles.



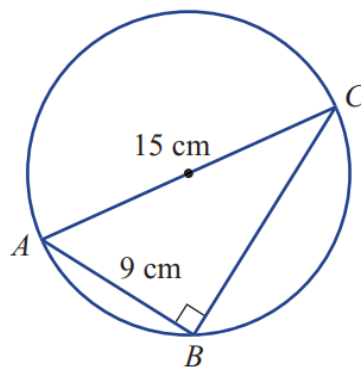
4 Find the length of the unknown side in these right-angled triangles, giving the answer correct to 2 decimal places.



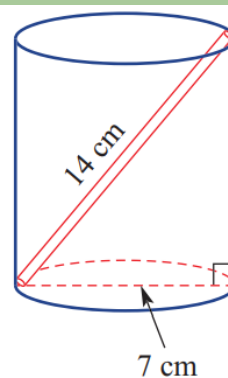
- 5 A yacht's mast is supported by a 12 m cable attached to its top. On the deck of the yacht, the cable is 8 m from the base of the mast. How tall is the mast? Round the answer to two decimal places.



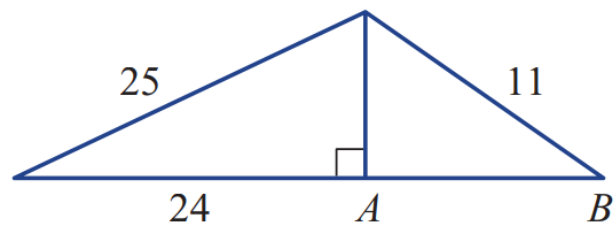
- 6 A circle's diameter AC is 15 cm and the chord AB is 9 cm. Angle ABC is 90° . Find the length of the chord BC .



- 7 A 14 cm drinking straw just fits into a can as shown. The diameter of the can is 7 cm. Find the height of the can correct to 2 decimal places.

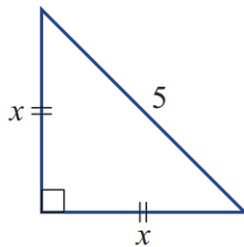


- 8** Find the length AB in this diagram. Round to 2 decimal places.



- 11** Show how Pythagoras' theorem can be used to find the unknown length in these isosceles triangles. Complete the solution for part **a** and then try the others. Round to 2 decimal places.

a



$$a^2 + b^2 = c^2$$

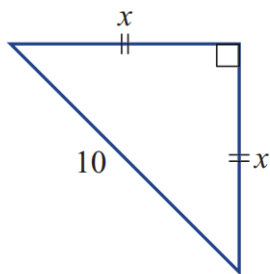
$$x^2 + x^2 = 5^2$$

$$2x^2 = 25$$

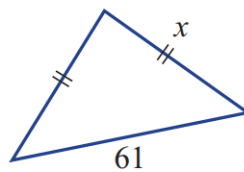
$$x^2 = \underline{\hspace{2cm}}$$

$$\therefore x = \sqrt{\underline{\hspace{2cm}}}$$

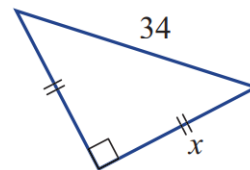
b



c



d



Answer

2 a $a = 12$ **b** $b = 24$

3 a 4 **b** 9 **c** 40

d 15 **e** 16 **f** 60

4 a 2.24 **b** 4.58 **c** 11.49

d 12.65 **e** 10.72 **f** 86.60

5 8.94 m

6 12 cm

7 12.12 cm

8 8.49

11 a 3.54 **b** 7.07 **c** 43.13 **d** 24.04