



Grade 8

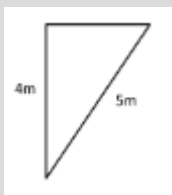
Mathematics

Pythagoras

**Question 1: Use Pythagoras to find the length of the missing side of these right-angled triangles**

(You may use a calculator if you choose)

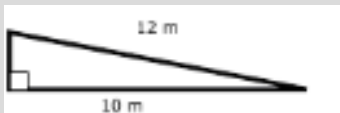
1.



$$\begin{aligned} \textcircled{1} \quad a^2 + b^2 &= c^2 \\ 4^2 + b^2 &= 5^2 \\ 16 + b^2 &= 25 \\ b^2 &= 25 - 16 \\ \sqrt{b^2} &= \sqrt{9} \\ b &= 3 \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad a^2 + b^2 &= c^2 \\ a^2 + 10^2 &= 12^2 \\ a^2 + 100 &= 144 \\ a^2 &= 144 - 100 \\ \sqrt{a^2} &= \sqrt{44} \\ a &= \sqrt{44} \text{ or } 6,6 \end{aligned}$$

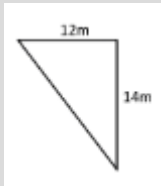
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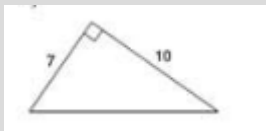
$$\begin{aligned} \textcircled{3} \quad a^2 + b^2 &= c^2 \\ 12^2 + 14^2 &= c^2 \\ 144 + 196 &= c^2 \\ \sqrt{340} &= \sqrt{c^2} \\ c &= \sqrt{340} \text{ or } 18,4 \end{aligned}$$

$$\begin{aligned} \textcircled{4} \quad a^2 + b^2 &= c^2 \\ 7^2 + 10^2 &= c^2 \\ 49 + 100 &= c^2 \\ \sqrt{149} &= \sqrt{c^2} \\ c &= \sqrt{149} \text{ or } 12,2 \end{aligned}$$

3.

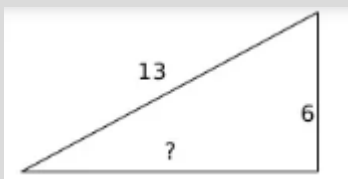


4.



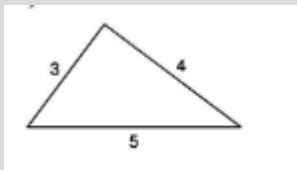
$$\begin{aligned} \textcircled{5} \quad a^2 + b^2 &= c^2 \\ 6^2 + b^2 &= 13^2 \\ 36 + b^2 &= 169 \\ b^2 &= 169 - 36 \\ \sqrt{b^2} &= \sqrt{133} \\ b &= \sqrt{133} \text{ or } 11,5 \end{aligned}$$

5.



**Question 2: Use Pythagoras to prove that these are right-angled triangles (if  $a^2 + b^2 = c^2$  then they are)**

1.



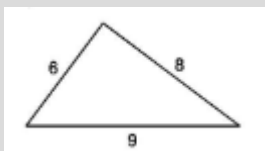
$$\begin{aligned} \textcircled{1} \quad a^2 + b^2 &= c^2 \\ 3^2 + 4^2 &= 5^2 \\ 9 + 16 &= 25 \end{aligned}$$

True, so therefore the triangle is right-angled.

$$\begin{aligned} \textcircled{2} \quad a^2 + b^2 &= c^2 \\ 6^2 + 8^2 &= 9^2 \\ 36 + 64 &= 81 \\ 100 &\neq 81 \end{aligned}$$

False, so therefore the triangle is not right-angled.

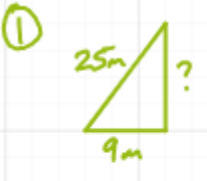
2.



### 3. Words problems – using Pythagoras

1. Mali was flying her kite. She had a 25m line, and the kite was flying 9m in front of her. How high off the ground was her kite?

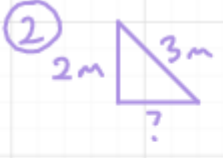
①


$$\begin{aligned} a^2 + b^2 &= c^2 \\ 9^2 + b^2 &= 25^2 \\ 81 + b^2 &= 625 \\ b^2 &= 625 - 81 \\ \sqrt{b^2} &= \sqrt{544} \\ b &= \sqrt{544} \text{ or } 23,3\text{m} \end{aligned}$$

Mali's kite was 23,3m high.

2. Eva wants to get to the top of a 2m wall. She has a 3m ladder. If she wants the ladder to get her to exactly the top of the wall (without sticking up) how far away from the wall should she place it?


②


$$\begin{aligned} a^2 + b^2 &= c^2 \\ 2^2 + b^2 &= 3^2 \\ 4 + b^2 &= 9 \\ b^2 &= 9 - 4 \\ \sqrt{b^2} &= \sqrt{5} \\ b &= \sqrt{5} \text{ or } 2,2\text{m} \end{aligned}$$

Eva should place her ladder 2,2m from the wall.

3. Feroza has walked 4km north and 3km east. How far (in a straight line) is she from where she started?

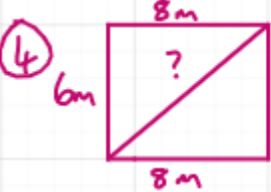
③


$$\begin{aligned} a^2 + b^2 &= c^2 \\ 4^2 + 3^2 &= c^2 \\ 16 + 9 &= c^2 \\ \sqrt{25} &= \sqrt{c^2} \\ c &= 5\text{km} \end{aligned}$$

Feroza is 5km from where she started.

4. Christiano has a rectangular garden that is 6m by 8m. He wants to divide it equally into 2 triangles (corner to opposite corner). How much fencing should he buy?

④


$$\begin{aligned} a^2 + b^2 &= c^2 \\ 6^2 + 8^2 &= c^2 \\ 36 + 64 &= c^2 \\ \sqrt{100} &= \sqrt{c^2} \\ c &= 10 \end{aligned}$$

Christiano must buy 10m of fencing.