Pythagoras' Theorem - Lesson 6

Converse of Pythagoras' Theorem

<u>LI</u>

- Know the Converse of Pythagoras' Theorem.

- Use the Converse of Pythagoras to decide whether or not a triangle is right-angled.

<u>SC</u>

- Squaring and adding numbers.

Aug 16-13:14

Statement : If Jo behaves, Mo does not give Jo a detention.

Converse Statement : If Mo does not give Jo a detention,
then Jo behaves.

Pythagoras : If a triangle is right-angled, then the longest side
squared equals the sum of the shorter sides squared.

Converse of Pythagoras : If the longest side squared equals the
sum of the shorter sides squared, then the triangle is right-angled.

Aug 16-16:02

Short Version of Converse of Pythagoras

c is longest side

Triangle is RA $\longrightarrow$ $c^2 = a^2 + b^2$

Triangle is RA $\longleftarrow$ $c^2 = a^2 + b^2$

Triangle is not RA $\longrightarrow$ $c^2 \neq a^2 + b^2$

Triangle is not RA $\longleftarrow$ $c^2 \neq a^2 + b^2$

Feb 9-15:31

The Converse of Pythagoras is used
to decide if a triangle is
right-angled or not.

Example 1

Decide whether or not the triangle with sides
$6, 8$ and 10 is right-angled.

Shorter Sides

Longest Side

$6^2 = 36$

$8^2 = 64$

$36 + 64 = 100$

$10^2 = 100$

As the sum of the shorter sides squared equals the longest
side squared, by the Converse of Pythagoras' Theorem, the
triangle is right-angled.

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Example 2

Is the triangle with sides 14 cm, 20 cm and 24 cm right-angled ?

Justify your answer.

Shorter Sides   **Longest Side**

$14^2 = 196$ $24^2 = 576$

$196 + 400 = 596$

$20^2 = 400$

As the sum of the shorter sides squared does not equal the longest side squared, by the Converse of Pythagoras, the triangle is not right-angled.

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Questions

Decide if these triangles are right-angled or not.
Justify your answer.

1) 3, 4, 5.

2) 41, 11, 39.

3) 8, 10, 6.

4) 26, 24, 10.

5) 41, 9, 42.

6) 5, 13, 12.

7) 1 . 5, 2 . 5, 2 . 1.
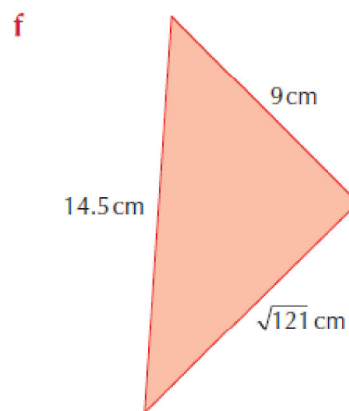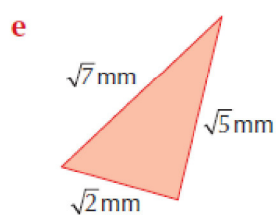
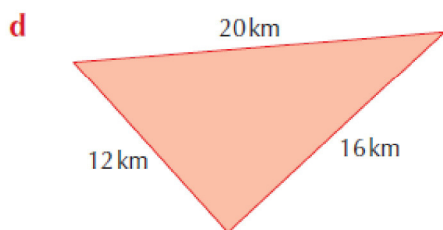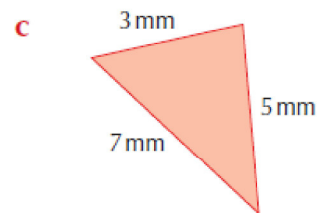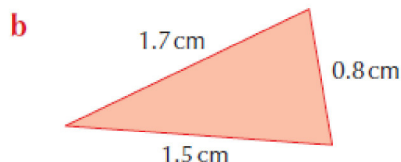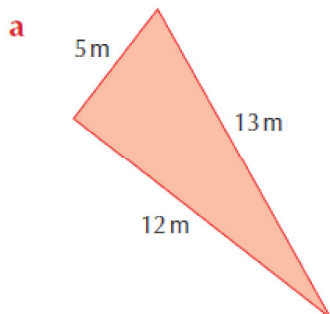8) 12, 15, 8.

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Answers

Decide if these triangles are right-angled or not.
Justify your answer.

1) 3, 4, 5.   YES

2) 41, 11, 39.   NO

3) 8, 10, 6.   YES

4) 26, 24, 10.   YES

5) 41, 9, 42.   NO

6) 5, 13, 12.   YES

7) 1.5, 2.5, 2.1. NO

8) 12, 15, 8.   NO

Aug 16-16:25

Questions

1 Use the converse of Pythagoras' theorem to determine if these triangles are right-angled or not.

a
5m
13m
12m

b
1.7cm
0.8cm
1.5cm

c
3mm
5mm
7mm

d
20km
12km
16km

e
$\sqrt{7}$mm
$\sqrt{5}$mm
$\sqrt{2}$mm

f
9cm
14.5cm
$\sqrt{121}$cm

2 These shapes look rectangular but are they? Use the converse of Pythagoras' theorem to check.

a
3500mm
6400mm
5500mm

b
1.6m
2.6m
2.4m

c
75cm
60cm
45cm
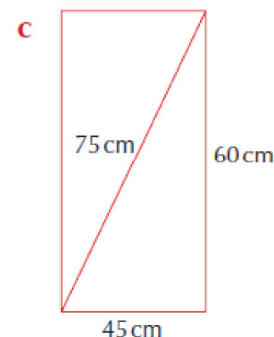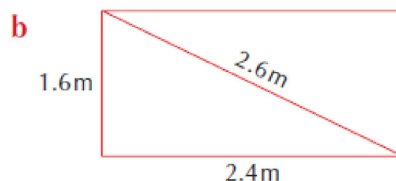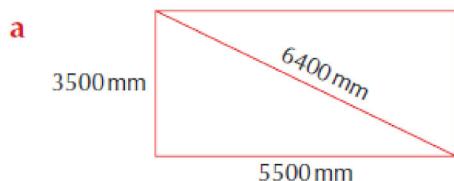
3 Fergus has spent his afternoon putting up a shelf, but his brother James says it looks wrong against the wall. Use the dimensions in the picture to decide if the shelf has been put up square to the wall.

18.5cm
23.8cm
15cm
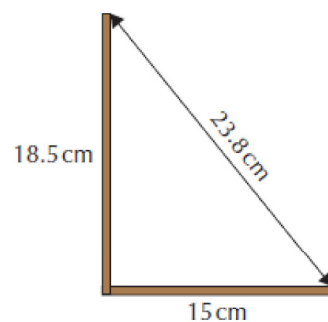
Answers

1 **a**, **b**, **d**, and e are right-angled; **c** and **f** are not right-angled

2 **a** and **b** are not rectangular;

   c is rectangular

3 Shelf is not at right angles to the wall.