

Chapter 1: Pythagorean Relationships

Section 1.2 - Exploring the Pythagorean Relationship

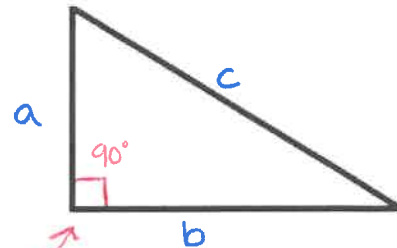
Describe Relationships in Right Triangles

Hypotenuse c

- The **LONGEST** side of a right triangle
- **OPPOSITE** the right angle

Legs a, b

- The two **SHORTER** sides of a right triangle
- Meet at the **90 DEGREE CORNER**

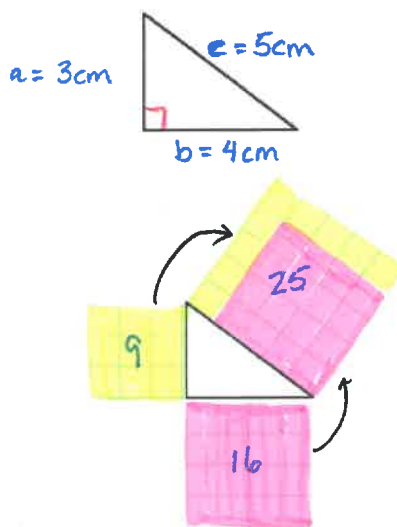


Pythagorean Relationship

- The **SUM** of the **SQUARE** of the **LEGS** of a right triangle equal the square of the **HYPOTENUSE**

Example

Key Points



- **Label the sides of the right triangle**
($a = 3\text{cm}$, $b = 4\text{cm}$, $c = 5\text{cm}$)

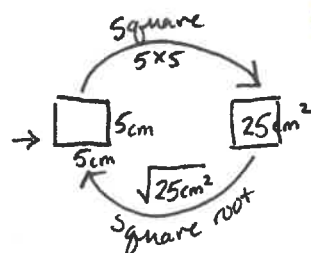
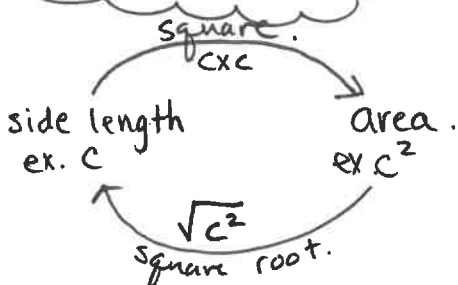
- **Square each side**

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

Pythagorean Relationship

$$\frac{9}{a^2} + \frac{16}{b^2} = \frac{25}{c^2}$$

Important Tip



Identify a Right Triangle

Properties of a right triangle

- Must have a **90** angle in it
- Always has a **PYTHAGOREAN** relationship between its three sides

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

Example

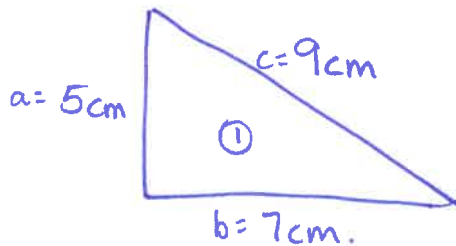
Key Points

A triangle has side lengths of 5cm, 7cm, and 9cm? Is this a right triangle? How do you know?

① • Draw a picture

② • Square the side lengths

③ • Use pythagorean relationship



②

$$a^2 = 5\text{cm} \times 5\text{cm} = 25\text{cm}^2$$

$$b^2 = 7\text{cm} \times 7\text{cm} = 49\text{cm}^2$$

$$c^2 = 9\text{cm} \times 9\text{cm} = 81\text{cm}^2$$

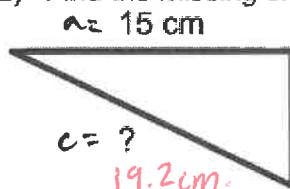
Try it out:

③ If this is a right triangle, then
 $a^2 + b^2 = c^2$

So ...
 $25\text{cm}^2 + 49\text{cm}^2 = 74\text{cm}^2$ (not 81cm^2)
 ... therefore this is not a right triangle.

1) A triangle has side lengths of 6m, 8m and 10m. Does it have a right angle in it?

2) Find the missing side length of the following right triangle.



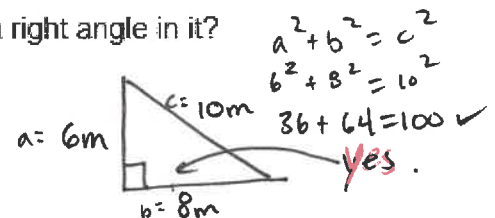
$$a^2 + b^2 = c^2$$

$$(15)^2 + (12)^2 = c^2$$

$$225 + 144 = 369$$

$$c^2 = 369\text{cm}^2$$

$$c = \sqrt{c^2} = \sqrt{369\text{cm}^2} = 19.2\text{cm}$$



Practice assignment - page 17 # 1, 2, 3, 6, 7, choose two apply questions (challenge: # 19 or 21)