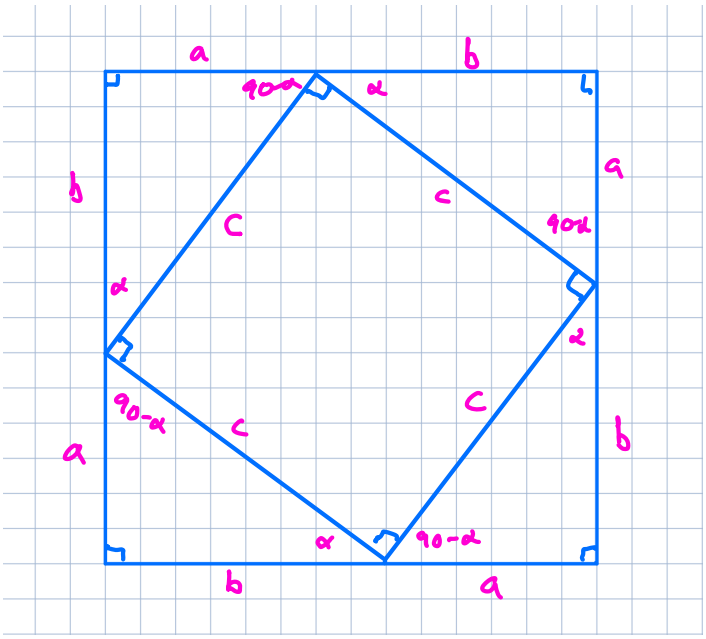
Pythagoras Theorem



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

Proof Consider area of figure above

It is a square of side length $a+b$

$$\therefore \quad \text{Area} = (a+b)(a+b)$$
$$= a^2 + ab + ab + b^2$$
$$= a^2 + b^2 + 2ab$$

The figure above can also be considered as the sum of 4 triangles plus the smaller square in the middle.

$$\text{Area} = 4 \times \tfrac{1}{2}ab + c^2$$
$$= 2ab + c^2$$

The figure can only have one area so

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

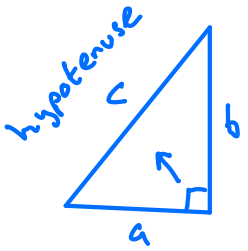
Subtracting 2ab from both sides gives

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

Pythagorean Triples (where all sides are integers)

3, 4, 5 5, 12, 13 7, 24, 25 8, 15, 17

Pythagoras Theorem



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

Given any two sides of a right-angled triangle we can use Pythagoras Theorem to find the third side

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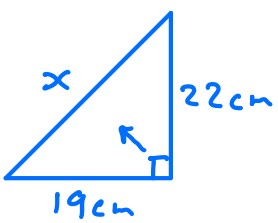
Ex 1



By Pythagoras

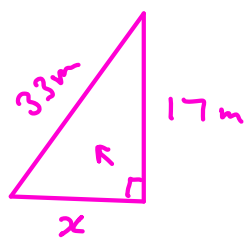
$$19^2 + 22^2 = x^2$$

$$845 = x^2$$

$$\sqrt{845} = x$$

$$x = 29.1\text{cm}$$

Ex 2



By Pythagoras

$$x^2 + 17^2 = 33^2$$

$$x^2 = 33^2 - 17^2$$

$$x^2 = 800$$

$$x = \sqrt{800}$$

$$x = 28.3\text{m}$$

Classwork - Exercise from TheMathsTeacher.com