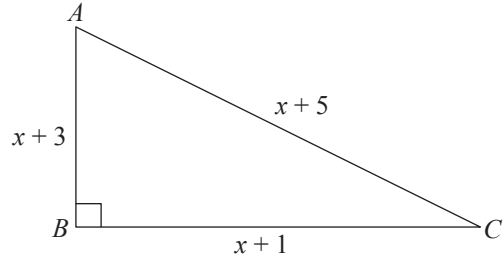
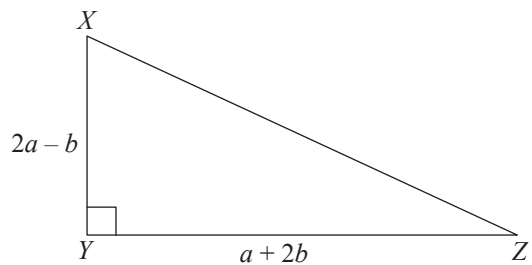


Pythagoras' Theorem

1. In the figure, $\triangle ABC$ is a right-angled triangle such that $AB = (x + 3)$ cm, $BC = (x + 1)$ cm, $AC = (x + 5)$ cm and $\angle ABC = 90^\circ$. Find the value of x .



2. $\triangle XYZ$ is a right-angled triangle such that $XY = (2a - b)$ cm, $YZ = (a + 2b)$ cm and $\angle XYZ = 90^\circ$.
- (a) Show that $XZ^2 = 5(a^2 + b^2)$.
- (b) Hence, given that $(a + b)^2 = 141$ and $ab = 8$, find the length XZ .



Adapted:

Secondary 2 Mathematics Tutorial 2B

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Pythagoras' Theorem

1. Since $\triangle ABC$ is right-angled, by the Pythagoras' Theorem,

$$AC^2 = AB^2 + BC^2$$

$$(x + 5)^2 = (x + 3)^2 + (x + 1)^2$$

$$x^2 + 10x + 25 = x^2 + 6x + 9 + x^2 + 2x + 1$$

$$x^2 + 10x + 25 = 2x^2 + 8x + 10$$

$$x^2 - 2x - 15 = 0$$

$$(x - 5)(x + 3) = 0$$

$$x - 5 = 0 \quad \text{or} \quad x + 3 = 0$$

$$x = 5 \quad \text{or} \quad x = -3 \text{ (rej.)}$$

$$\therefore x = 5$$

Note: $x = -3$ is rejected because $BC = -3 + 1 = -2$ cm, which is impossible.

2. (a) Since $\triangle XYZ$ is a right-angled triangle, by the Pythagoras' Theorem,

$$XZ^2 = (2a - b)^2 + (a + 2b)^2$$

$$= (2a^2) - 2(2a)(b) + b^2 + a^2 + 2(a)(2b) + (2b)^2$$

$$= 4a^2 - 4ab + b^2 + a^2 + 4ab + 4b^2$$

$$= 5a^2 - 4ab + 5b^2 + 4ab$$

$$= 5a^2 + 5b^2$$

$$= 5(a^2 + b^2) \quad \text{(shown)}$$

(b) $(a + b)^2 = 141$

$$a^2 + b^2 + 2ab = 141$$

$$a^2 + b^2 + 2(8) = 141$$

$$a^2 + b^2 = 125$$

$$\therefore XZ^2 = 5(a^2 + b^2)$$

$$= 5(125)$$

$$= 625$$

$$XZ = \sqrt{625} \text{ or } -\sqrt{625} \text{ (rej.)}$$

$$= 25 \text{ cm}$$