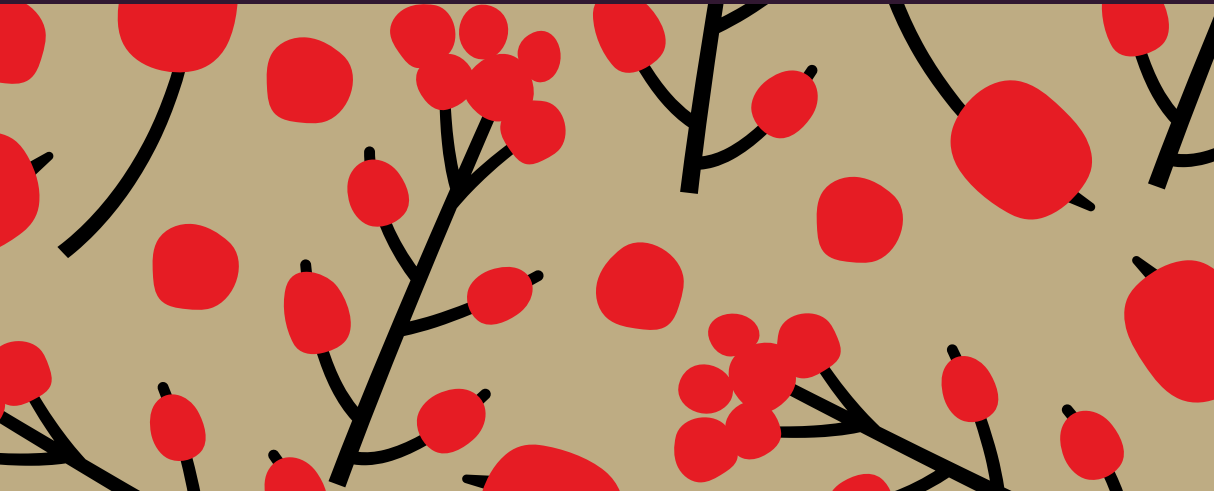
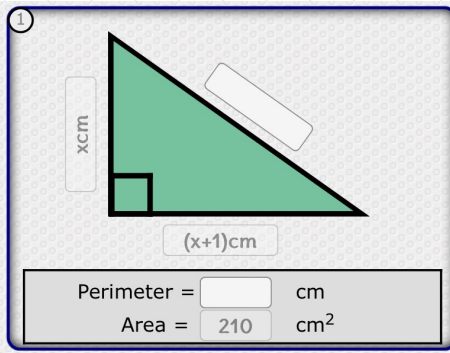




PYTHAGOREAN PROBE

LEVEL 5





$$\text{Area} = \frac{1}{2} x (x+1) = 210$$

$$x^2 + x - 420 = 0$$

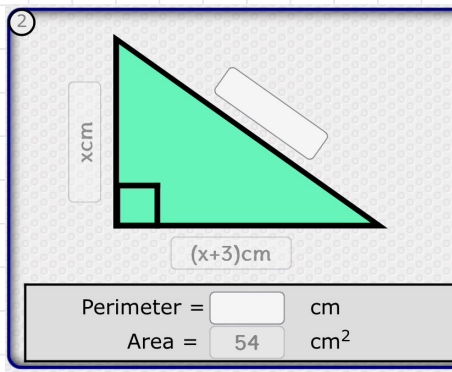
$$(x+21)(x-20) = 0$$

$\therefore x = 20$ as a length is positive

height = 20 cm, base = 21 cm

$$\text{Hypotenuse} = \sqrt{20^2 + 21^2} = \underline{\underline{29 \text{ cm}}}$$

$$\therefore \text{Perimeter} = 20 + 21 + 29 = \underline{\underline{70 \text{ cm}}}$$



$$\text{Area} = \frac{1}{2} x (x+3) = 54$$

$$x^2 + 3x - 108 = 0$$

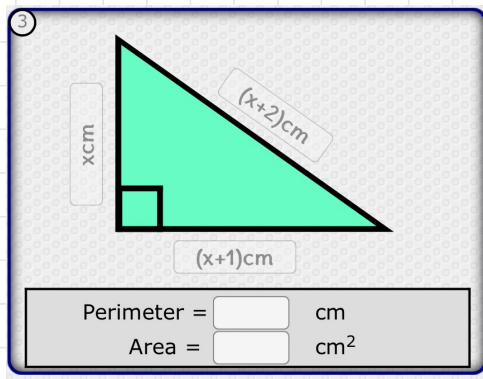
$$(x+12)(x-9) = 0$$

$\therefore x = 9$ as a length is positive

Height = 9 cm, base = 12 cm

$$\text{Hypotenuse} = \sqrt{9^2 + 12^2} = \underline{\underline{15 \text{ cm}}}$$

$$\therefore \text{perimeter} = 9 + 12 + 15 = \underline{\underline{36 \text{ cm}}}$$



Pythagoras: $x^2 + (x+1)^2 = (x+2)^2$

$$x^2 + x^2 + 2x + 1 = x^2 + 4x + 4$$

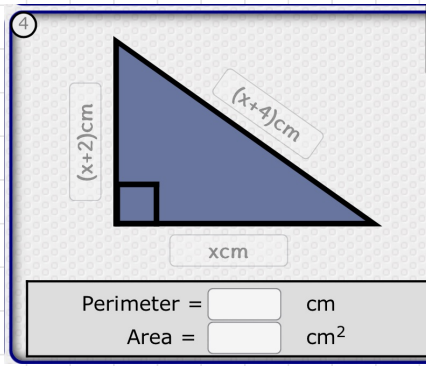
$$x^2 - 2x - 3 = 0$$

$$(x-3)(x+1) = 0$$

$\therefore x = 3$ as a length is positive

$$\therefore \text{Perimeter} = 3 + 4 + 5 = \underline{\underline{12 \text{ cm}}}$$

$$\text{Area} = \frac{1}{2} 3 \times 4 = \underline{\underline{6 \text{ cm}^2}}$$



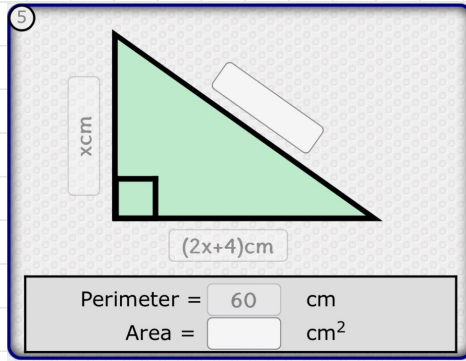
Pythagoras! $(x+2)^2 + x^2 = (x+4)^2$

$$x^2 + 4x + 4 + x^2 = x^2 + 8x + 16$$
$$x^2 - 4x - 12 = 0$$
$$(x+2)(x-6) = 0$$

$\therefore x = 6$ as a length is positive

\therefore Perimeter = $6 + 8 + 10 = \underline{\underline{24 \text{ cm}}}$

Area = $\frac{1}{2} 6 \times 8 = \underline{\underline{24 \text{ cm}^2}}$



$$\begin{aligned} \text{Hypotenuse} &= \sqrt{x^2 + (2x+4)^2} \\ &= \sqrt{5x^2 + 16x + 16} \end{aligned}$$

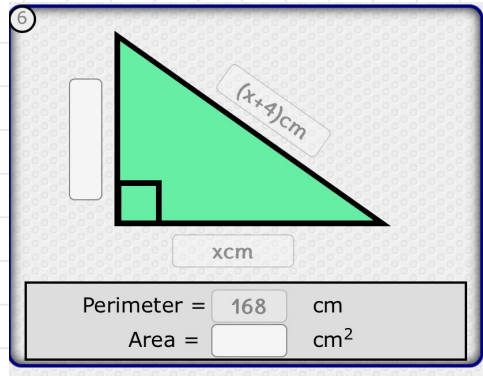
$$\text{Perimeter} = x + (2x+4) + \sqrt{5x^2 + 16x + 16} = 60$$

Using the GDC's numerical solve or by plotting a graph(s) the solution is:

$$x = 10$$

$$\therefore \text{Hypotenuse} = \underline{\underline{26 \text{ cm}}}$$

$$\text{Area} = \frac{1}{2} 10 \times 24 = \underline{\underline{120 \text{ cm}^2}}$$



$$\begin{aligned} \text{Height} &= \sqrt{(x+4)^2 - x^2} \\ &= \sqrt{8x + 16} \end{aligned}$$

$$\text{Perimeter} = (x+4) + x + \sqrt{8x+16} = 168$$

Using GDC, $x = 70$

$$\therefore \text{Height is } \sqrt{8 \times 70 + 16}$$

$$\underline{\underline{24 \text{ cm}}}$$

$$\text{Area} = \frac{1}{2} \times 24 \times 70 = \underline{\underline{840 \text{ cm}^2}}$$