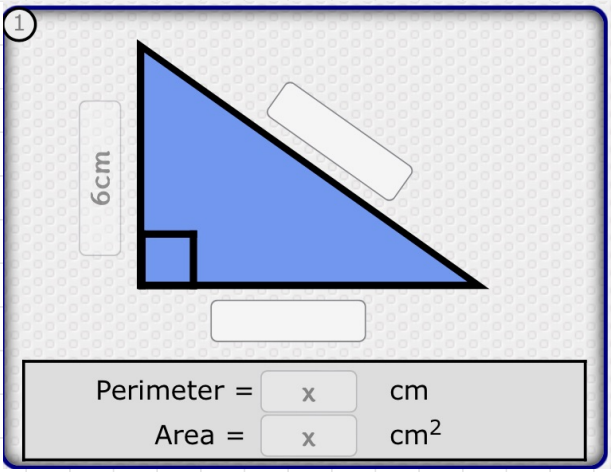
Pythagorean Probe

Level 6



Let the base be **b**

$\text{Area} = \frac{1}{2} \times 6 \times b = 3b = x$

$\therefore b = x/3$

$\text{Hypotenuse} = \sqrt{6^2 + (\frac{x}{3})^2}$

$\text{Perimeter} = 6 + \frac{x}{3} + \sqrt{6^2 + (\frac{x}{3})^2} = x$

Using GDC either numerical solve or graphing: $x = 24$

$\therefore \text{Hypotenuse} = \sqrt{36+64} = 10 \text{ cm}$

$\text{Base} = \frac{24}{3} = 8 \text{ cm}$

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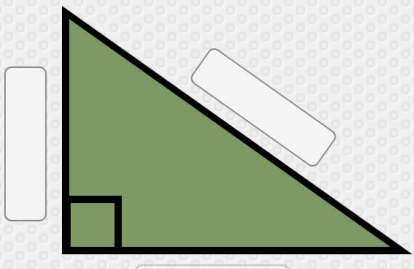


Perimeter = 2x cm

Area = x cm^2

Let the height be h

Area $= \frac{1}{2} h \times 4 = x$

$h = x/2$

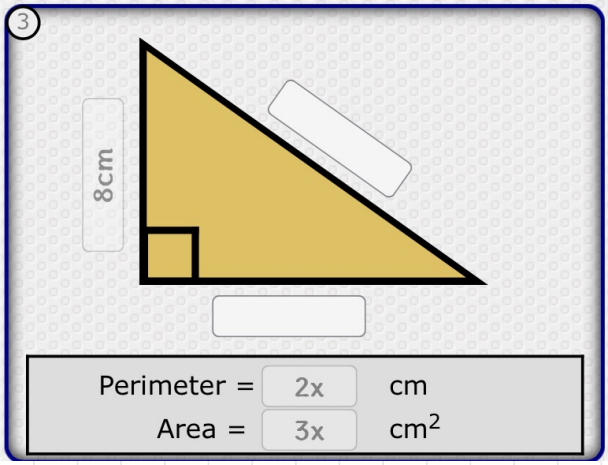
Hypotenuse $= \sqrt{4^2 + (\frac{x}{2})^2}$

Perimeter $= 4 + \frac{x}{2} + \sqrt{16 + \frac{x^2}{4}} = 2x$

Using GDC: $x = 6$

$\therefore$ Height $= \underline{\underline{3 \text{ cm}}}$

$\therefore$ Hypotenuse $= \sqrt{16 + \frac{36}{4}} = \underline{\underline{5 \text{ cm}}}$



Let the base be **b**

$\text{Area} = \frac{1}{2} \times 8 \times b = 3x$

$b = \frac{3x}{4}$

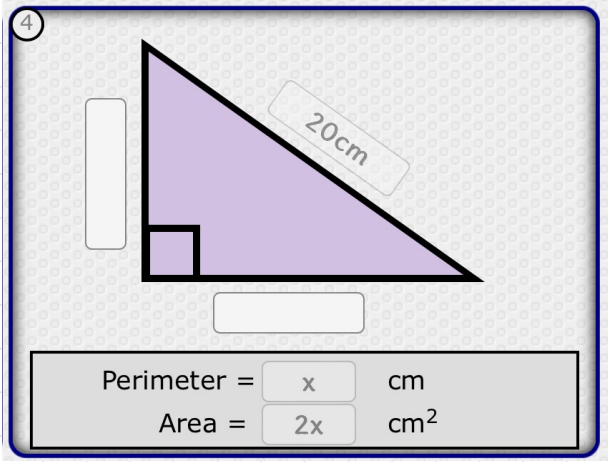
$\text{Hypotenuse} = \sqrt{8^2 + \left(\frac{3x}{4}\right)^2}$

$\text{Perimeter} = 8 + \frac{3x}{4} + \sqrt{8^2 + \left(\frac{3x}{4}\right)^2} = 2x$

Using GDC $x = 20$

$\text{Hypotenuse} = \sqrt{8^2 + \left(\frac{3 \times 20}{4}\right)^2} = 17 \text{ cm}$

$\text{Base} = \frac{3 \times 20}{4} = 15 \text{ cm}$



Let the height be **h** and the base be **b**

Pythagoras: $h^2 + b^2 = 20^2 \Rightarrow b = \sqrt{20^2 - h^2}$

Perimeter: $h + b + 20 = x$

$$h + \sqrt{20^2 - h^2} + 20 = x \quad -①$$

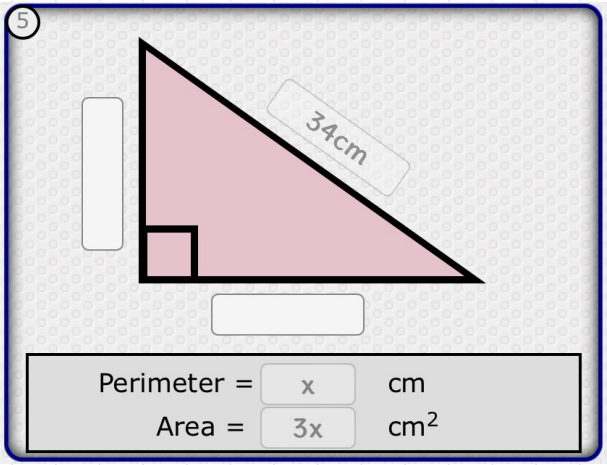
Area: $\frac{1}{2}hb = 2x$

$$\frac{1}{2}h\sqrt{20^2 - h^2} = 2x \quad -②$$

Substituting value for x from ① into ②

$$2h + 2\sqrt{20^2 - h^2} + 40 = \frac{1}{2}h\sqrt{20^2 - h^2}$$

Using GDC Height = h = 12cm, Base = 16cm



Let the height be **h** and the base be **b**

Pythagoras: $h^2 + b^2 = 34^2 \Rightarrow b = \sqrt{34^2 - h^2}$

Perimeter: $h + b + 34 = x$

$$h + \sqrt{34^2 - h^2} + 34 = x \quad -①$$

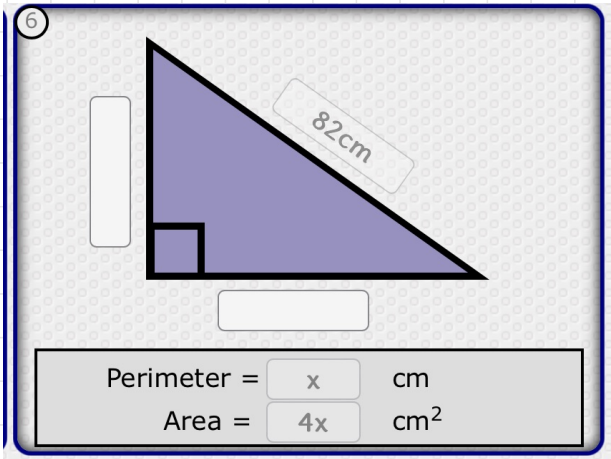
Area: $\frac{1}{2}hb = 3x$

$$\frac{1}{2}h\sqrt{34^2 - h^2} = 3x \quad -②$$

Substituting value for x from ① into ②

$$3h + 3\sqrt{34^2 - h^2} + 102 = \frac{1}{2}h\sqrt{34^2 - h^2}$$

Using GDC Height = h = 16 cm, Base = 30 cm



Let the height be **h** and the base be **b**

Pythagoras: $h^2 + b^2 = 82^2 \Rightarrow b = \sqrt{82^2 - h^2}$

Perimeter: $h + b + 82 = x$

$$h + \sqrt{82^2 - h^2} + 82 = x \quad -①$$

Area: $\frac{1}{2}hb = 4x$

$$\frac{1}{2}h\sqrt{82^2 - h^2} = 4x \quad -②$$

Substituting value for x from ① into ②

$$4h + 4\sqrt{82^2 - h^2} + 328 = \frac{1}{2}h\sqrt{82^2 - h^2}$$

Using GDC Height = h = 18cm, Base = 80cm