

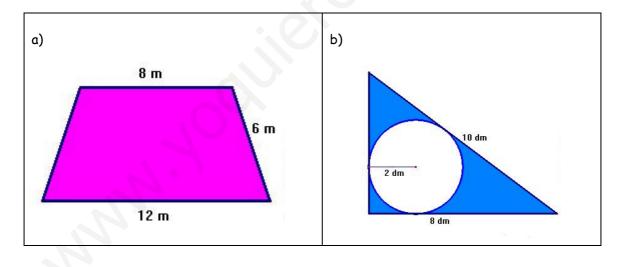
Maths 3rd ESO

EXAM 3_2

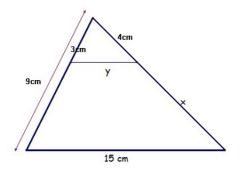
1. Solve:

(2.5 points)

- a) $\frac{(x+1)^2}{16} \frac{1+x}{2} = \frac{(x-1)^2}{16} \frac{2+x}{4}$
- b) $\begin{array}{c} x + y = 10 \\ x^2 + y^2 = 68 \end{array}$
- The area of a rectangle is 65 square centimetres. The length is 8 cm more than the width. Find the length and the width. (1.5 points)
- To wash a window that is 15 m off the ground, Peter leans a 20-metres ladder against the side of the building. To reach the window, how far away from the building should Peter place the base of the ladder? (1.5 points)
- 4. Find the area and perimeter of the shaded part in each diagram: (3 points)



5. In the triangle, work out the length of x and y: (1.5 points)





Maths 3rd ESO

SOLUTION

1. a)
$$\frac{(x+1)^2}{16} - \frac{1+x}{2} = \frac{(x-1)^2}{16} - \frac{2+x}{4} \rightarrow x^2 + 2x + 1 - 8 - 8x = x^2 - 2x + 1 - 8 - 4x$$

 $2x + 1 - 8 - 8x = -2x + 1 - 8 - 4x \rightarrow 2x - 8x + 2x + 4x = 1 - 8 - 1 + 8 \rightarrow 0x = 0$

Solution: all real numbers

b)
$$\begin{array}{c} x + y = 10 \\ x^2 + y^2 = 68 \end{array}$$
 \Rightarrow $y = 10 - x \Rightarrow x^2 + (10 - x)^2 = 68 \Rightarrow 2x^2 - 20x + 100 = 68$

 $2x^{2} - 20x + 32 = 0 \rightarrow x^{2} - 10x + 16 = 0 \rightarrow x = \frac{10 \pm \sqrt{100 - 64}}{2} = \frac{10 \pm 6}{2} = \binom{8}{2}$

When $\begin{cases} x = 8 \rightarrow y = 10 - 8 = 2 \\ x = 2 \rightarrow y = 10 - 2 = 8 \end{cases}$

2. The area of a rectangle is 240 square centimetres. The length is 8 more than the width. Find the length and the width.

Length x+8 , width x Area:
$$A = (x+8)x \rightarrow 65 = x^2 + 8x \rightarrow x^2 + 8x - 65 = 0$$

 $x = \frac{-8 \pm \sqrt{64 + 260}}{2} = \frac{-8 \pm 18}{2} = \begin{pmatrix} 5 \\ -13 \text{ NO} \end{pmatrix}$

Answer: the width is 5 cm and the length 13 cm

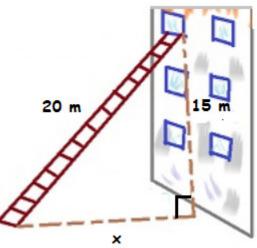
3. To wash a window that is 15 m off the ground, Peter leans a 20-metres ladder against the side of the building. To reach the window, how far away from the building should Peter place the base of the ladder?

Pythagorean Theorem:

$$20^2 = x^2 + 15^2 \rightarrow 400 = x^2 + 225$$

 $x^2 = 400 - 225 = 175$

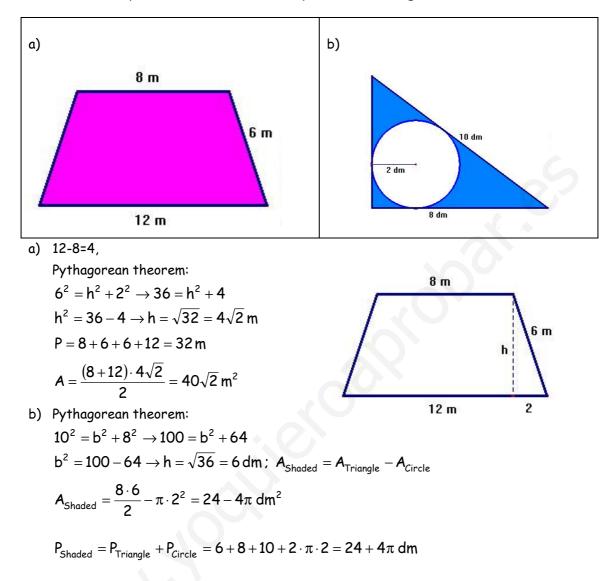
$$x = \sqrt{175} = \sqrt{5^2 \cdot 7} = 5\sqrt{7}$$
 metres





Maths 3rd ESO

Find the area and perimeter of the shaded part in each diagram:



4. In the triangle, work out the length of x and y: They are similar triangles, so

$$\frac{9}{3} = \frac{4+x}{4} \rightarrow 4+x = \frac{4\cdot 9}{3} = 12$$
$$x = 12 - 4 \Rightarrow x = 8 \text{ cm}$$
$$\frac{9}{3} = \frac{15}{y} \rightarrow 9y = 15 \cdot 3 \Rightarrow y = \frac{15 \cdot 3}{9} = 5 \text{ cm}$$

