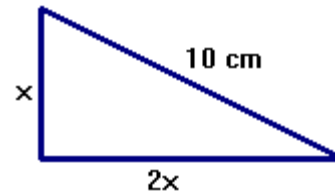


PYTHAGORAS' THEOREM

1. Find out the length of the legs on the following triangle:



2. There is a building with a 12 m high window. You want to use a ladder to go up to the window, and you decide to keep the ladder 5 m away from the building to have a good slant. How long should the ladder be?

3. The perimeter of an isosceles trapezoid is 110 m and the bases are 40 and 30 m in length. Calculate the length of the non-parallel sides of the trapezoid and its area.

4. Determine the side of an equilateral triangle whose perimeter is equal to a square of side 12 cm. Are their areas equal?

5. Determine the length of the diagonal of a square with sides of length 12 m.

6. Find the area of the rectangular rug if the width is 3 metres and the diagonal measures 5 metres.



7. A window frame that seems rectangular has height 408 cm, length 306 cm, and one diagonal with length 525 cm. Is the window frame really rectangular? Explain.

8. Find the area of a right triangle with hypotenuse length 17 cm and one leg length 15 cm.

9. A chord of 48 cm is 7 cm from the centre of a circle. Calculate the area of the circle.

10. Natalie left her house and walked 2 blocks east. She turned and walked 5 blocks north to get to the library. If each block is $\frac{1}{4}$ of a mile, how far is the direct route from Natalie's house to the library?

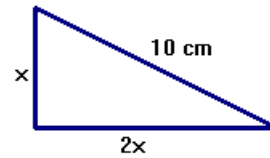
SOLUTION

1.

$$10^2 = x^2 + (2x)^2 \rightarrow 100 = x^2 + 4x^2 = 5x^2$$

$$x^2 = \frac{100}{5} = 20 \rightarrow x = \sqrt{20} = 4.47$$

legs: 4.47 cm and 8.94 cm

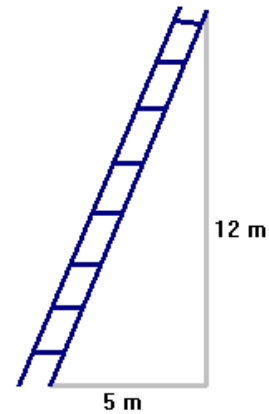


2.

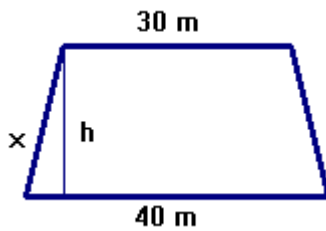
$$x^2 = 12^2 + 5^2 = 144 + 25$$

$$x = \sqrt{169} = 13 \text{ m}$$

The ladder should be 13 m long



3.



$$110 = 40 + 30 + 2x \rightarrow 2x = 110 - 70 = 40$$

$$x = \frac{40}{2} = 20 \text{ m}$$

$$h^2 = 20^2 - 5^2 = 400 - 25 = 375$$

$$h = \sqrt{375} = 19.36 \text{ m}$$

$$A = \frac{(30 + 40)}{2} \cdot 19.36 = 677.6 \text{ m}^2$$

4. $P = 4 \cdot 12 = 48 \text{ cm} \rightarrow 48 : 3 = 16 \text{ cm}$ each side of the triangle

$$h^2 = 16^2 - 8^2 = 192 \rightarrow h = \sqrt{192} = 13.86 \text{ cm}$$

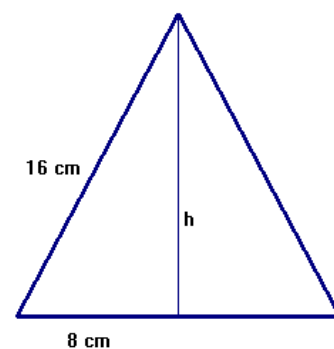
Square:

$$A = 12^2 = 144 \text{ cm}^2$$

Triangle:

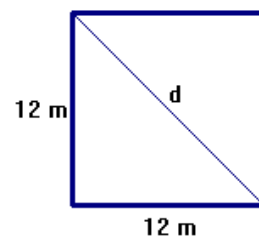
$$A = \frac{16 \cdot 13.86}{2} = 110.85 \text{ cm}^2$$

The areas are not equal

5. $d^2 = 12^2 + 12^2 = 288$

$$d = \sqrt{288} = 16.97 \text{ m}$$

The diagonal is 16.97 m long

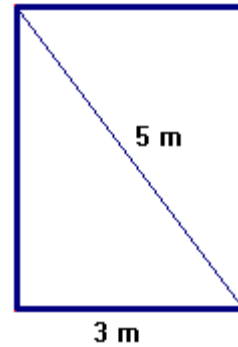


6. Find the area of the rectangular rug if the width is 3 metres and the diagonal measures 5 metres.

$$x^2 = 5^2 - 3^2 = 16$$

$$x = \sqrt{16} = 4$$

$$A = 4 \cdot 3 = 12 \text{ m}^2$$



7. A window frame that seems rectangular has height 408 cm, length 306 cm, and one diagonal with length 525 cm. Is the window frame really rectangular? Explain.

If the frame is rectangular it has to be $525^2 = 408^2 + 306^2$

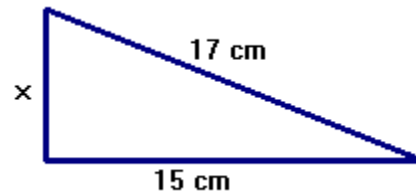
$$275625 \neq 166464 + 93636 = 260100$$

So, the windows frame is not rectangular.

8.

$$x^2 = 17^2 - 15^2 = 64 \rightarrow x = 8 \text{ cm}$$

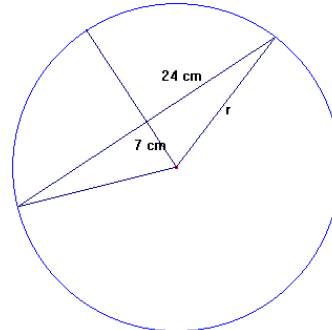
$$A = \frac{15 \cdot 8}{2} = 60 \text{ cm}^2$$



9.

$$r^2 = 24^2 + 7^2 = 625 \rightarrow r = \sqrt{625} = 25$$

$$A = \pi \cdot r^2 = \pi \cdot 25^2 = 1963.5 \text{ cm}^2$$



10. Natalie left her house and walked 2 blocks east. She turned and walked 5 blocks north to get to the library. If each block is $\frac{1}{4}$ of mile, how far is the direct route from Natalie's house to the library?

$$2 \cdot \frac{1}{4} = 0.5 \text{ miles}; 5 \cdot \frac{1}{4} = 1.25 \text{ miles}$$

$$x^2 = 1.25^2 + 0.5^2 = 2.203125$$

$$x = \sqrt{2.203125} = 1.48 \text{ miles}$$

The library is 1.48 miles from Natalie's house

