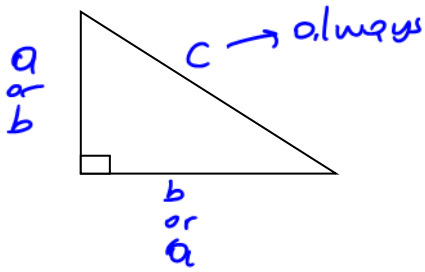


**PYTHAGOREAN THEOREM REVIEW**

'RIGHT - ANGLE TRIANGLE' - A right triangle is a triangle with one  $90^\circ$  angle. For example:



$$a^2 + b^2 = c^2$$

*you can label it a or b but not c*

**Solving for the Hypotenuse**

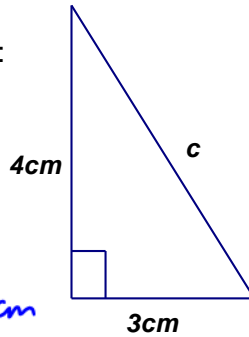
Find the value of the missing side:

$$4^2 + 3^2 = c^2$$

$$16 + 9 = c^2$$

$$\sqrt{25} = \sqrt{c^2}$$

$$5 = c \quad \therefore c \text{ is } 5\text{cm}$$



**Solving for a side**

Find the value of the missing side:

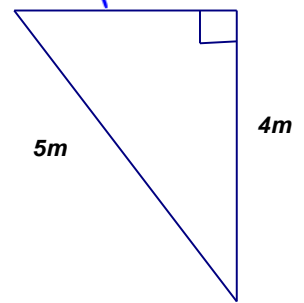
$$5^2 = a^2 + 4^2$$

$$25 = a^2 + 16$$

$$9 = a^2$$

$$\sqrt{9} = \sqrt{a^2}$$

$$a = 3$$



**PRACTICE:**

1. Find the value of the missing sides (round to one decimal place where necessary)

a.

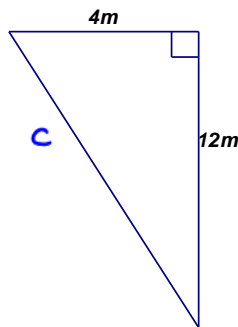
$$4^2 + 12^2 = c^2$$

$$16 + 144 = c^2$$

$$180 = c^2$$

$$\sqrt{180} = \sqrt{c^2}$$

$$c \approx 13.4\text{m}$$



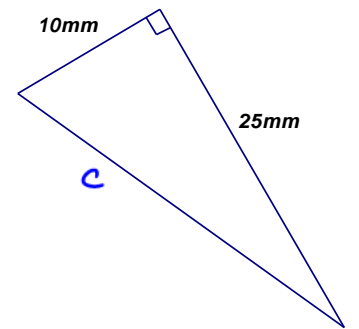
b.

$$10^2 + 25^2 = c^2$$

$$725 = c^2$$

$$\sqrt{725} = \sqrt{c^2}$$

$$c \approx 26.9$$



c.

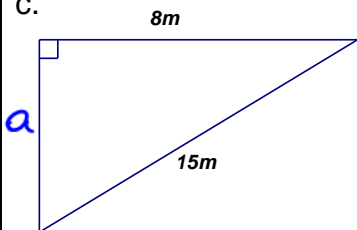
$$a^2 + 8^2 = 15^2$$

$$a^2 + 64 = 225$$

$$a^2 = 161$$

$$a^2 = \sqrt{161}$$

$$a \approx 12.7$$



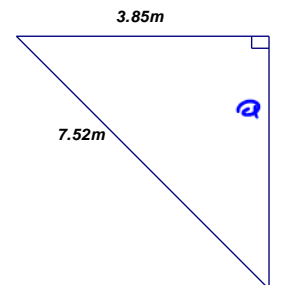
d.

$$a^2 + (3.85)^2 = (7.52)^2$$

$$a^2 + 14.8225 = 56.5504$$

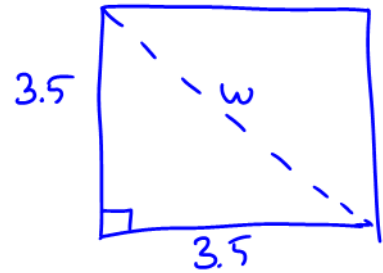
$$a^2 = 41.7279$$

$$a \approx 6.5$$



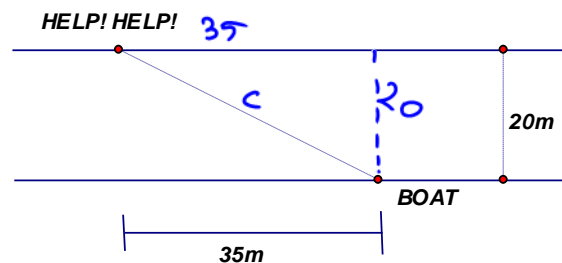
2. My neighbour has a square vegetable garden which is 3.5m by 3.5m. He wants to put a walkway diagonally through the garden to make it easier to get the veggies in the middle. How long will his walkway be?

$$\begin{aligned}(3.5)^2 + (3.5)^2 &= w^2 \\ 12.25 + 12.25 &= w^2 \\ 24.5 &= w^2 \\ \boxed{w \approx 4.9}\end{aligned}$$



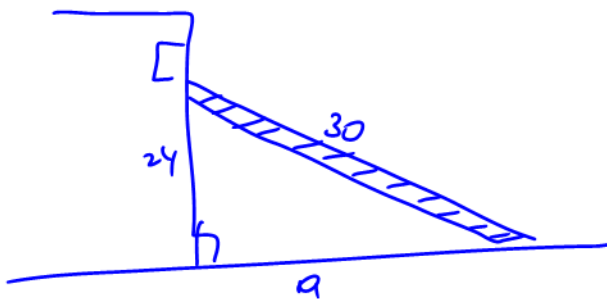
3. An emergency boat is on one side of a waterway and there are cries of help on the other side. The waterway is 20m wide and the boat is about 35 m down the water way from the people in need. What is the distance the boat must travel if they go directly (diagonally) to help?

$$\begin{aligned}35^2 + 20^2 &= c^2 \\ 1225 + 400 &= c^2 \\ 1625 &= c^2 \\ \boxed{c = 40.3}\end{aligned}$$



$\therefore$  It must travel 40.3m.

3. The window of a burning building is 24 metres above the ground. A ladder that is 30m is angled to reach the window and the base is out from the wall. How far out from the wall is the ladder?



$$a^2 + 24^2 = 30^2$$

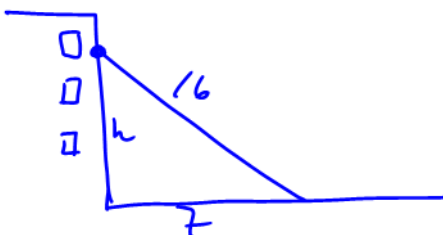
$$a^2 + 576 = 900$$

$$a^2 = 324$$

$$a = 18$$

$\therefore$  It's 18m out.

4. A 16 m long ladder leans against a house. The foot of the ladder is 7m from the house. Find the height of the ladder from the ground, correct to the nearest tenth of a meter.



$$h^2 + 7^2 = 16^2$$

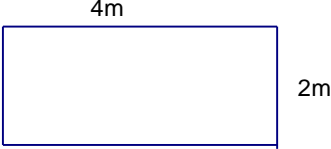
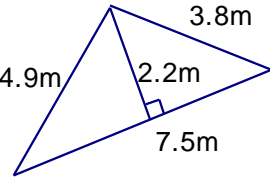
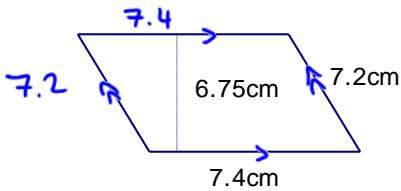
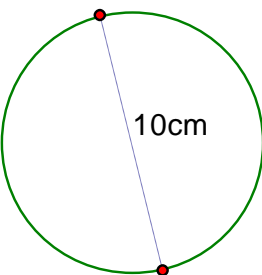
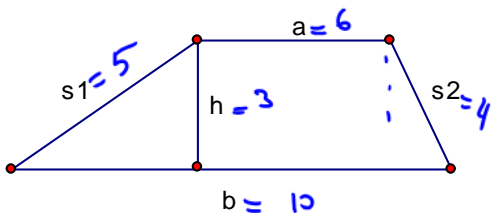
$$h^2 + 49 = 256$$

$$h^2 = 207$$

$$\boxed{h \approx 14.4\text{m}}$$

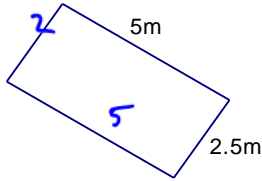
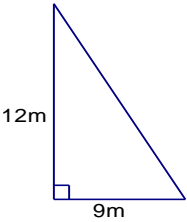
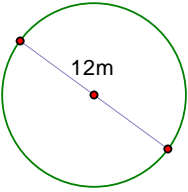
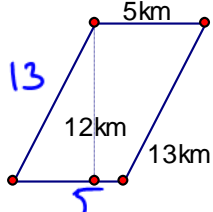
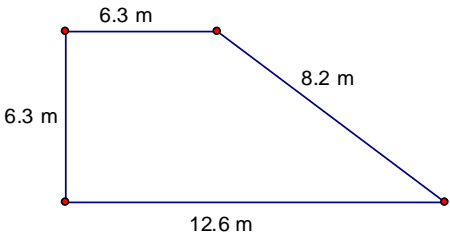
$\therefore$  Its height is 14.4m.

Review: Perimeter & Area of Basic Shapes

SHAPE	PERIMETER	AREA
Rectangle/Square 	$P = 2l + 2w$ $P = 2 \cdot 4 + 2 \cdot 2$ $P = 8 + 4$ $P = 12m$	$A = l \times w$ $A = 4 \times 2$ $A = 8m^2$
Triangle 	$P = s_1 + s_2 + s_3$ $P = 4.9 + 3.8 + 7.5$ $P = 16.2m$	$A = \frac{b \times h}{2}$ $A = \frac{7.5(2.2)}{2}$ $A = 8.25m^2$
Parallelogram 	$P = s_1 + s_2 + s_3 + s_4$ $P = 7.2 + 7.4 + 7.2 + 7.4$ $P = 29.2$	$A = b \times h$ $A = 7.4(6.75)$ $A = 49.95cm^2$
Circle 	$C = 2\pi r$ or $C = \pi d$ $C = \pi \cdot 10$ $C = 31.4cm$	$A = \pi \times r^2$ $A = \pi \cdot 5^2$ $A = 78.5cm^2$
Trapeziod 	$P = a + b + s_1 + s_2$ $P = 10 + 6 + 5 + 4$ $P = 25$	$A = \frac{1}{2}(a + b)h$ $A = \frac{1}{2}(10 + 6) \cdot 3$ $A = \frac{1}{2} \cdot 16 \cdot 3$ $A = 24cm^2$

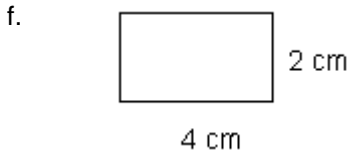
Practice: Area and Perimeter

Find the area and perimeter (circumference) of each figure:

<p>a. Rectangle</p>  $P = 2(5) + 2(2.5)$ $= 10 + 5$ $= 15m$ $A = l \cdot w$ $= 5(2.5)$ $= 12.5m^2$	<p>b. Triangle</p>  $P = 12 + 9 + 20$ $= 41m$ $A = \frac{1}{2} \cdot b \cdot h$ $= \frac{1}{2} \cdot 12 \cdot 9$ $= 54m^2$	<p>c. Circle</p>  $C = \pi d$ $= 12\pi$ $= 37.70m$ $A = \pi r^2 \quad r = 6m$ $= \pi 6^2$ $= 36\pi$ $= 113.09m^2$
<p>d. Parallelogram</p>  $P = 13 + 5 + 13 + 5$ $= 36km$ $A = b \times h$ $= 5 \cdot 12$ $= 60 km^2$	<p>e. Trapezoid</p>  $P = 6.3 + 6.3 + 8.2 + 12.6$ $= 33.4m$ $A = \frac{1}{2} (6.3 + 12.6) \times 6.3$ $= \frac{1}{2} (18.9)(6.3)$ $= 59.5m^2$	
<p>ANSWERS: a. <math>A=12.5m^2</math>, <math>P=15m</math>, b. <math>A=54m^2</math>, <math>P=41m</math>, c. <math>A=226.08m^2</math>, <math>C=37.68m</math>, d. <math>A=60km^2</math>, <math>P=36km</math>, e. <math>A=59.5m^2</math>, <math>P=33.4m</math></p>		

**More Area & Perimeter Practice**

Find the area and perimeter of the following shapes:



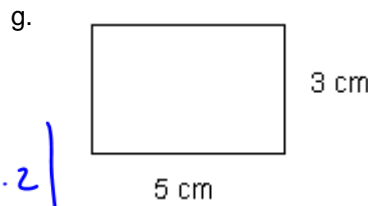
$$A = L \cdot W \quad ; \quad P = 2 \cdot L + 2 \cdot W$$

$$= 4 \cdot 2 \quad ; \quad = 2 \cdot 4 + 2 \cdot 2$$

$$= 8 \text{ cm}^2 \quad ; \quad = 8 + 4$$

$$\quad \quad \quad = 12 \text{ cm}$$

A = 8 cm<sup>2</sup> P = 12 cm



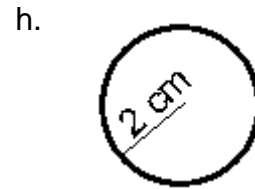
$$A = L \cdot W \quad ; \quad P = 2 \cdot L + 2 \cdot W$$

$$= 5 \cdot 3 \quad ; \quad = 2 \cdot 5 + 2 \cdot 3$$

$$= 15 \text{ cm}^2 \quad ; \quad = 10 + 6$$

$$\quad \quad \quad = 16 \text{ cm}$$

A = 15 cm<sup>2</sup> P = 16 cm



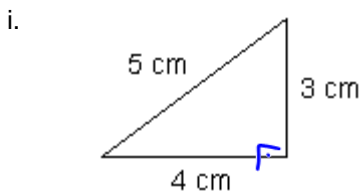
$$C = 2\pi r \quad ; \quad A = \pi r^2$$

$$= 2 \cdot \pi \cdot 1 \quad ; \quad = \pi \cdot 1^2$$

$$= 4\pi \quad ; \quad = 4\pi$$

$$= 12.57 \quad ; \quad = 12.57$$

A = 12.57 cm<sup>2</sup> P = 12.57 cm

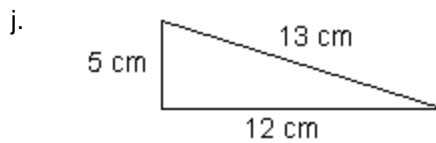


$$A = \frac{1}{2} \cdot b \cdot h \quad ; \quad P = b + h + c$$

$$= \frac{1}{2} \cdot 3 \cdot 4 \quad ; \quad = 3 + 4 + 5$$

$$= 6 \text{ cm}^2 \quad ; \quad = 12 \text{ cm}$$

A = 6 cm<sup>2</sup> P = 12 cm

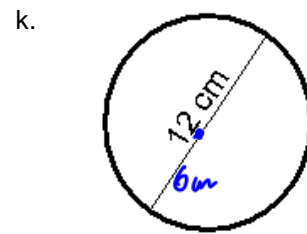


$$A = \frac{1}{2} \cdot b \cdot h \quad ; \quad P = b + h + c$$

$$= \frac{1}{2} \cdot 5 \cdot 12 \quad ; \quad = 5 + 12 + 13$$

$$= 30 \text{ cm}^2 \quad ; \quad = 30 \text{ cm}$$

A = 30 cm<sup>2</sup> P = 30 cm

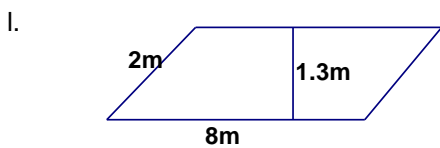


$$A = \pi r^2 \quad ; \quad C = \pi d$$

$$= 113.10 \text{ cm}^2 \quad ; \quad = 12\pi$$

$$\quad \quad \quad = 37.70 \text{ cm}$$

A = 113.10 cm<sup>2</sup> P = 37.70 cm



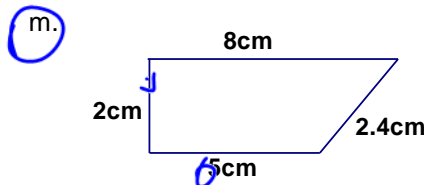
$$A = \frac{b \cdot h}{2} \quad ; \quad P = b \cdot 2 + 2 \cdot h$$

$$= \frac{8 \cdot (1.3)}{2} \quad ; \quad = 8 \cdot 2 + 2 \cdot 2$$

$$= 52 \text{ m}^2 \quad ; \quad = 16 + 4$$

$$\quad \quad \quad = 20 \text{ m}$$

A = 52 m<sup>2</sup> P = 20 m

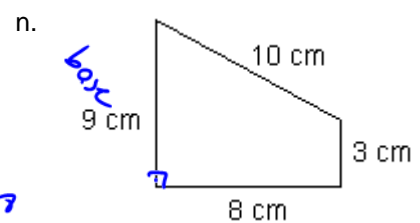


$$A = \frac{1}{2} (b_1 + b_2) \cdot h \quad ; \quad P = b_1 + b_2 + 2 \cdot h$$

$$= \frac{1}{2} (6 + 8) \cdot 2 \quad ; \quad = 6 + 2 + 2 \cdot 4 + 2$$

$$= 14 \text{ cm}^2 \quad ; \quad = 18.4$$

A = 14 cm<sup>2</sup> P = 18.4 cm



$$A = \frac{1}{2} (b_1 + b_2) \cdot h \quad ; \quad P = b_1 + b_2 + 2 \cdot h$$

$$= \frac{1}{2} (9 + 3) \cdot 8 \quad ; \quad = 9 + 10 + 3 + 3$$

$$= 48 \text{ cm}^2 \quad ; \quad = 30$$

A = 48 cm<sup>2</sup> P = 30 cm

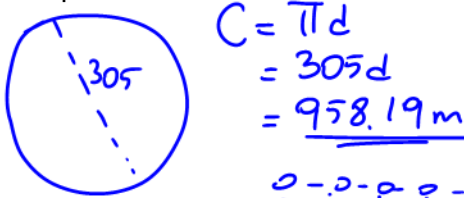
ANSWERS: f. 8 cm<sup>2</sup>, 12 cm, g. 15 cm<sup>2</sup>, 16 cm, h. 12.56 m<sup>2</sup>, 12.56 cm, i. 6 cm<sup>2</sup>, 12 cm, j. 30 cm<sup>2</sup>, 30 cm, k. 113.04 cm<sup>2</sup>, 37.68 cm, l. 10.4 m<sup>2</sup>, 20 m, m. 13 cm<sup>2</sup>, 17.4 cm, n. 48 cm<sup>2</sup>, 30 cm

Area and Perimeter Problems

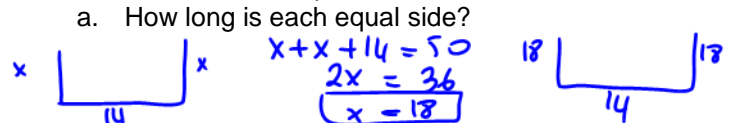
Complete the table for the circles with the following dimensions/measurements:

	Radius	Diameter	Circumference	Area
o.	7 cm	14 cm	$C = 14\pi = 43.98$	$A = \pi(7)^2 = 153.94$
p.	10.5 cm	21 cm	$21\pi = 65.97$	$= \pi(10.5)^2 = 346.36$
q.	2.99	5.98 km	$\frac{C}{\pi} = 18.84$ cm	$\pi(2.99)^2 = 28.25$
r.	12	24	$24\pi = 75.40$ cm	$\frac{A}{\pi} = 452.39$ m <sup>2</sup> $r^2 = 144$ $r = 12$

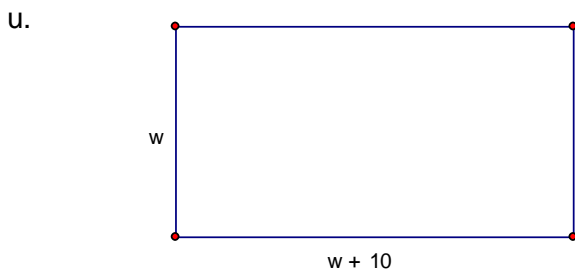
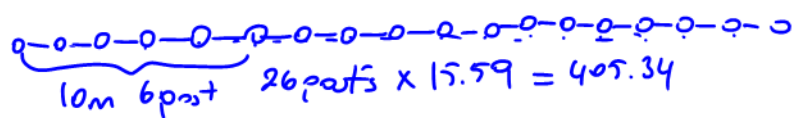
s. The world's largest dish radio telescope has a diameter of 305 m. What is the circumference of the telescope?



t. A pool has a 50-m fence around 3 sides. One side is 14 m and the other sides are equal.



b. Fence posts costing \$15.59 each is placed every 2 m. how much do the posts cost?



Determine the simplified expression for the perimeter of this rectangle

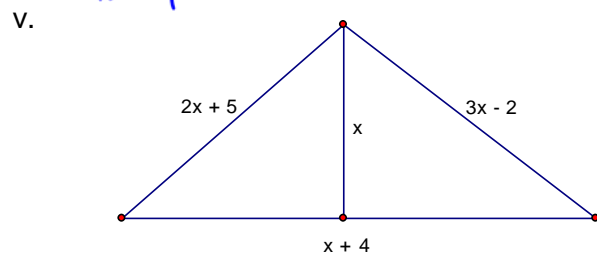
$P = 2 \cdot w + 2(w + 10)$   
 $= 2w + 2w + 20$   
 $= 4w + 20$

Determine the simplified expression for the area of this rectangle

$A = w(w + 10)$   
 $= w^2 + 10w$

Calculate the value of w if the perimeter is 76 units

$4w + 20 = 76$   
 $4w = 56$   
 $w = 14$



Determine the simplified expression for the perimeter of this triangle

$P = 2x + 5 + 3x - 2 + x + 4$   
 $= 6x + 7$

Determine the simplified expression for the area of this triangle

$A = \frac{1}{2} \cdot x \cdot (x + 4) = \frac{x(x + 4)}{2} = \frac{x^2 + 4x}{2}$

Calculate the area if x=11

$A = \frac{x(x + 4)}{2} = \frac{11(15)}{2} = 82.5$

ANSWERS: o. 14, 43.96, 493.14, p. 10.5, 65.94, 346.785, q. 3, 6, 28.26, r. 12, 24, 75.36, s. 957.7m, t. 18m, \$389.75, u.  $P=4w+20$ ,  $A=w^2+10w$ ,  $w=14$ , v.  $P=6x+7$ ,  $A=(x^2+4x)/2$ , 82.5units<sup>2</sup>