

Area and Volume

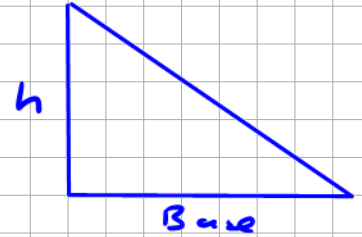
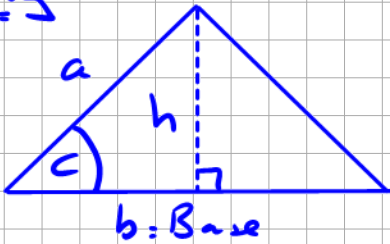
Basic Shapes.



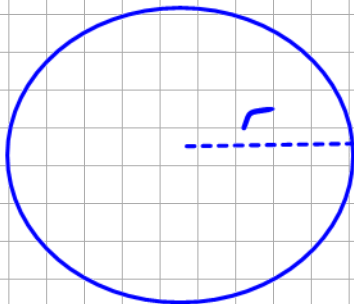
$$A = l \times b$$

$$P = 2l + 2b$$

Triangle.



$$\text{Area} = \frac{1}{2} Bh = \frac{1}{2} ab \sin C$$



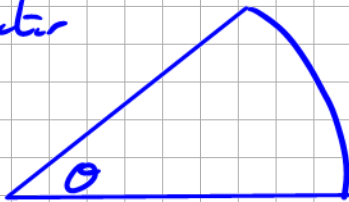
Table

$$A = \pi r^2$$

$$l = 2\pi r$$

$l = \text{length} = \text{circumference} = \text{perimeter}.$

Sector



$$A = \pi r^2 \left(\frac{\theta}{360} \right)$$

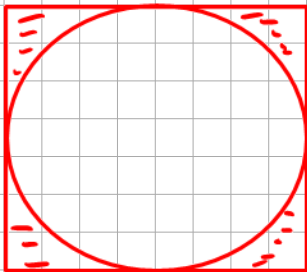
$$A = \frac{1}{2} r^2 \theta$$

$$l = 2\pi r \left(\frac{\theta}{360} \right)$$

Degrees

$$l = r\theta$$

Radius.



Radius is 7m find shaded area when $\pi = \frac{22}{7}$

Square - Circle.

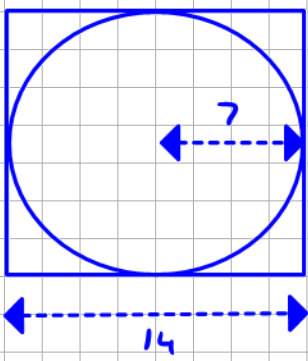
Circle

$$r = 7 \quad \pi = \frac{22}{7}$$

$$A = \pi r^2$$

$$= \frac{22}{7} (7)^2 = 154$$

Square



Square $l = 14$ $b = 14$

$$A = l \times b$$

$$= 14^2 = 196$$

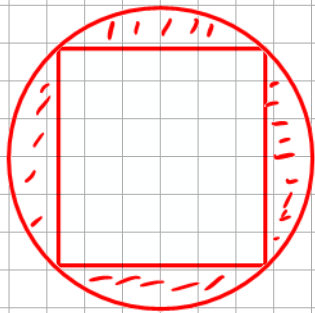
Ans $196 - 154 = 42 \text{ m}^2$

Method :

- (i) Write down the plan.
- (ii) What shape first
- (iii) Information I have.
- (iv) Formulae
- (v) Put figures in work out.

NB

Put in units.



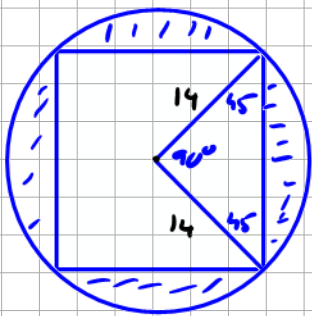
Radius is 14m find shaded area to 1 decimal place.

Plan = Circle - Square

Circle $\pi = \text{cal}$ $r = 14$

$$A = \pi r^2$$

$$= \pi (14)^2 = 615.75$$



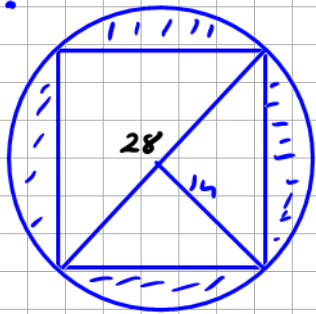
Square $l =$ $b =$

Triangle $= \frac{1}{2} bh$

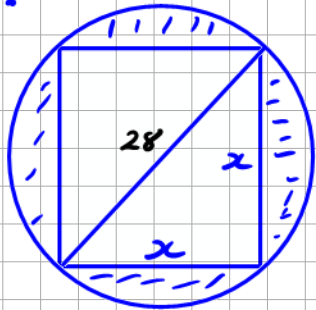
$$= \frac{1}{2} (14)(14) = 98$$

Square = 4 triangle = 392

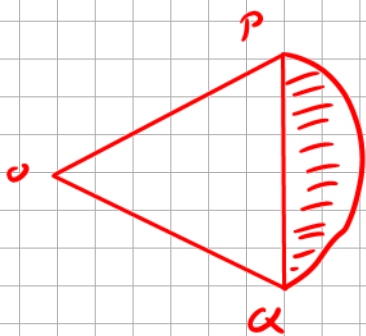
$$615.75 - 392 = 223.75$$



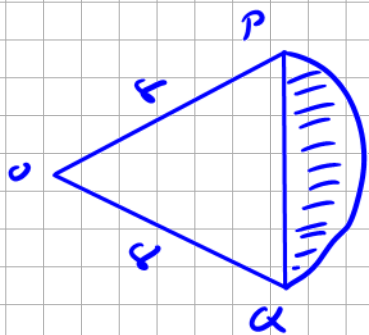
Triangle = $\frac{1}{2} (28)(14) = 196$
 Square = 2 triangles = 392



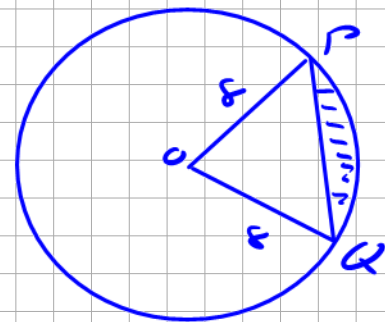
$x^2 + x^2 = 28^2$
 $2x^2 = 784$
 $x^2 = 392$



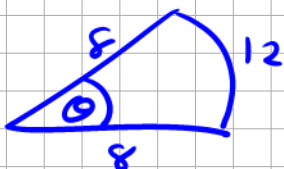
Given $|OP| = 8 \text{ cm}$ and arc length PQ is 12 cm find shaded area to 1 decimal place
 O is centre of circle where OPQ is a sector.



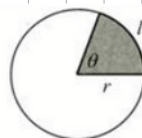
Big picture
 $12 = \text{Arc length}$



Answer = Sector - Triangle
 Cannot do because no angle
 Read the question = answer in question.



Stua / Teascóg



Arc / Sector

nuair is ina raidiain atá θ

$l = r\theta$

$A = \frac{1}{2} r^2 \theta$

when θ is in radians

nuair is ina chéimeanna atá θ

$l = 2\pi r \left(\frac{\theta}{360^\circ} \right)$

$A = \pi r^2 \left(\frac{\theta}{360^\circ} \right)$

when θ is in degrees

Keep question in radians

Change calculator to radians.
Shift mode setup 2 then 2.

$$l = r\theta$$

$$12 = 8\theta$$

$$\frac{12}{8} = \theta \quad \theta = 1.5 \text{ rads.}$$

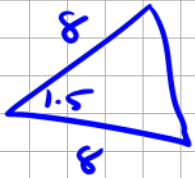
Sector - Triangle



Sector

$$r = 8 \quad \theta = 1.5$$

$$A = \frac{1}{2} r^2 \theta = \frac{1}{2} (8)^2 (1.5) \\ = 48$$



$$A = \frac{1}{2} ab \sin C \\ = \frac{1}{2} (8)^2 \sin 1.5 = 31.91$$

$$Ans. \quad 48 - 31.9 = 16.1 \text{ m}^2$$

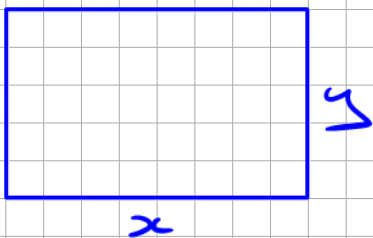
Degrees

$$12 = 2\pi(8) \frac{\theta}{360}$$

$$\frac{12(360)}{16\pi} = \theta$$

$$\theta = 85.5^\circ$$

A rectangle has a perimeter of 20m and maximum area.



$$P = 2x + 2y = 20$$

$$x + y = 10$$

$$y = 10 - x$$

$$A = xy$$

$$A = x(10 - x)$$

$$A = 10x - x^2$$

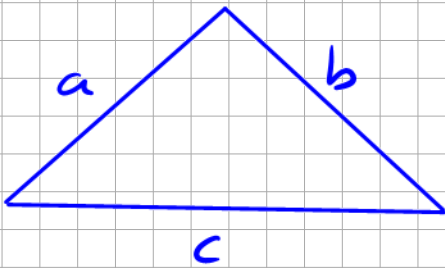
$$\frac{dA}{dx} = 10 - 2x = 0$$

$$2x = 10$$

$$x = 5$$

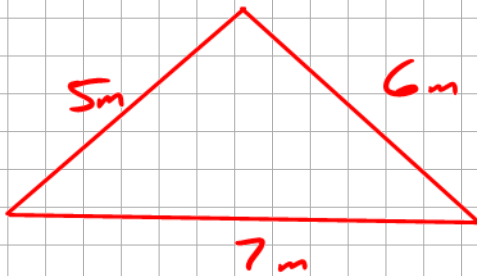
$$y = 5$$

$$A = 25 \text{ m}^2$$



$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$s = \frac{a+b+c}{2}$$



Find area.

$$s = \frac{a+b+c}{2} = \frac{5+6+7}{2} = 9$$

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{9(9-5)(9-6)(9-7)} = 6\sqrt{6} \text{ m}^2$$