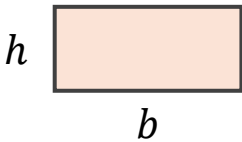




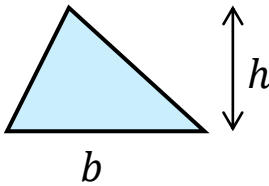
basics...

Rectangle



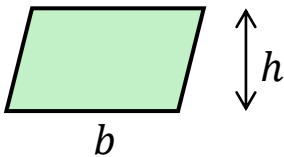
$$\text{Area} = b \times h$$

Triangle



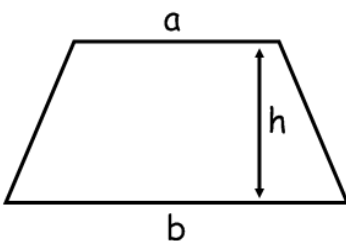
$$\text{Area} = \frac{b \times h}{2}$$

Parallelogram



$$\text{Area} = b \times h$$

Trapezium

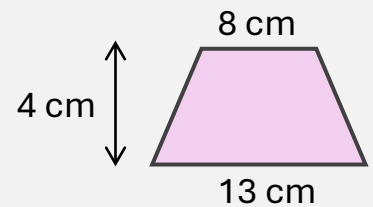


$$\text{Area} = \frac{1}{2}(a + b)h$$

area of trapezium...

EXAMPLE:

Calculate the area of the trapezium.



Start with the formula

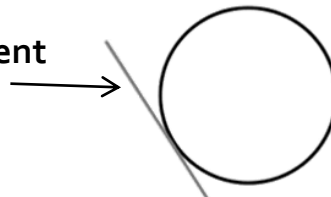
Substitute the lengths from the diagram

Remember to include the units

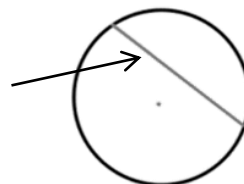
$$\begin{aligned} A &= \frac{1}{2}(a + b)h \\ &= \frac{1}{2}(8 + 13) \times 4 \\ &= \frac{1}{2} \times 21 \times 4 \\ &= \frac{1}{2} \times 84 = 42 \text{ cm}^2 \end{aligned}$$

circle parts...

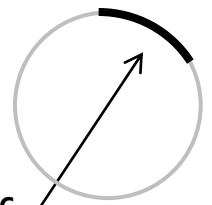
tangent



chord



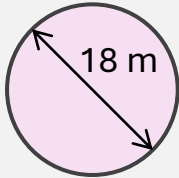
arc
(part of circumference)



circles...

EXAMPLE:

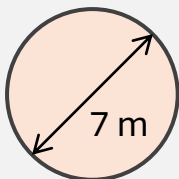
Calculate the **area** of the circle. Give your answer correct to 2 decimal places.



$$\begin{aligned}
 A &= \pi \times r^2 \\
 &= \pi \times 9^2 \\
 &= 254.4690049 \\
 &= 254.47 \text{ m}^2 \text{ (2dp)}
 \end{aligned}$$

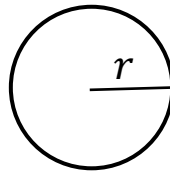
EXAMPLE:

Calculate the **circumference** of the circle. Give your answer in terms of π .



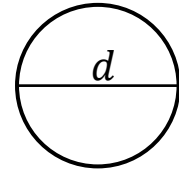
$$\begin{aligned}
 C &= d \times \pi \\
 &= 7 \times \pi \\
 &= 7\pi \text{ metres}
 \end{aligned}$$

Leave the answer 'in terms of π '



Area of a circle:

$$A = \pi \times r^2$$



Circumference of a circle:

$$C = d \times \pi$$

Check whether we need area, or circumference

Start with the correct formula

The radius is $18 \div 2 = 9$

Divide the shape into two rectangles

Calculate the missing height of rectangle A

Find the area of each rectangle

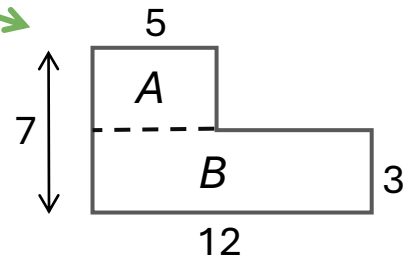
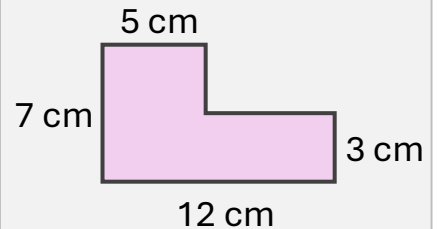
Start with the correct formula

Add to get the total area

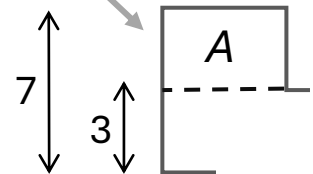
compound area...

EXAMPLE:

Calculate the area.



$$7 - 3 = 4$$



$$\text{Area A: } 5 \times 4 = 20$$

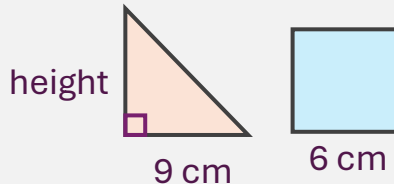
$$\text{Area B: } 12 \times 3 = 36$$

$$\begin{aligned}
 \text{Total area,} \\
 20 + 36 &= 56 \text{ cm}^2
 \end{aligned}$$

two shapes...

EXAMPLE: The triangle and the square have the same **area**.

Calculate the height of the triangle.



Square area,

$$6 \times 6 = 36$$

Triangle area,

$$\frac{9 \times h}{2} = 36$$

$$9 \times h = 72$$

$$h = 8 \text{ (cm)}$$

EXAMPLE:

Find, correct to 1dp, the area of a circle whose circumference is double the perimeter of a square of side 13cm.

$$13 \times 4 = 52$$

$$52 \times 2 = 104$$

$$104 \div \pi = 33.10422316$$

$$33.10422816 \div 2 = 16.55211408$$

$$\begin{aligned} \pi \times 6.55211408^2 \\ = 860.7099322 \\ = 860.7 \text{ cm}^2 \text{ (1dp)} \end{aligned}$$

Read carefully whether it's area, or perimeter

Decide what we can work out immediately

Use the fact that the triangle has the same area

Find the perimeter of the square

Write an expression for the perimeter of the rectangle

Perimeter of the square

Circumference of the circle

diameter

Use the 76 to form an equation and solve it

radius

Finally, calculate the area

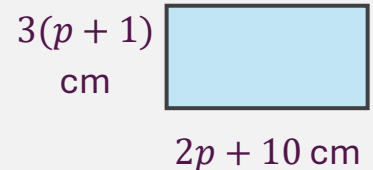
Now find the side lengths and area

form and solve...

EXAMPLE:

The perimeter of the rectangle is equal to the perimeter of the square. The area of the square is 361 cm^2 .

Find the area of the rectangle.



Square,

$$\sqrt{361} = 19$$

$$19 \times 4 = 76$$

Rectangle,

$$3(p + 1) + 3(p + 1) + 2p + 10 + 2p + 10$$

$$= 3p + 3 + 3p + 3$$

$$+ 2p + 10 + 2p + 10$$

$$= 10p + 26$$

$$10p + 26 = 76$$

$$10p = 50$$

$$p = 5$$

$$3 \times (5 + 1) = 18$$

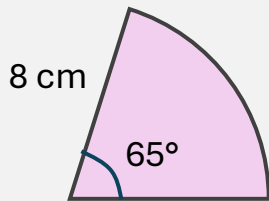
$$2 \times 5 + 10 = 20$$

$$18 \times 20 = 360 \text{ cm}^2$$

arcs and sectors...

EXAMPLE:

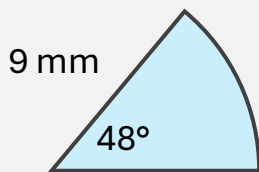
Calculate the area of the sector, correct to 1 decimal place.



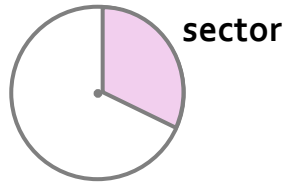
$$\begin{aligned} \frac{65}{360} \times \pi \times 8^2 \\ = 36.30284844 \\ = 36.3 \text{ cm}^2 \text{ (1dp)} \end{aligned}$$

EXAMPLE:

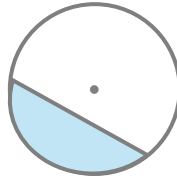
Calculate the arc length of the sector, correct to 3 significant figures



$$\begin{aligned} \frac{48}{360} \times \pi \times 18 \\ = 7.539822369 \\ = 7.54 \text{ mm (3sf)} \end{aligned}$$



sector



segment

The angle gives us the proportion of the whole circle

πr^2 for the area

Write down all the digits before rounding

Simplify the fraction

Combine the $\div 8$ and $\times 16$ to give 2

The angle gives us the proportion of the whole circle

πd for the circumference

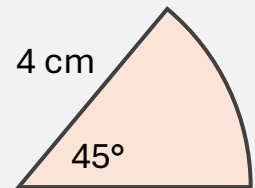
$$\frac{1}{9} \times 12 = \frac{12}{9} = \frac{4}{3}$$

For the whole perimeter, we need to include two 6cm radii

An **exact** answer will have π or a surd in it. This is more accurate than a rounded decimal.

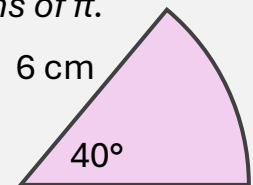
exact answers...

EXAMPLE: Calculate the exact area of the sector, in terms of π .



$$\begin{aligned} \frac{45}{360} \times \pi \times 4^2 \\ = \frac{1}{8} \times \pi \times 16 \\ = 2\pi \text{ cm}^2 \end{aligned}$$

EXAMPLE: Calculate the exact perimeter, in terms of π .

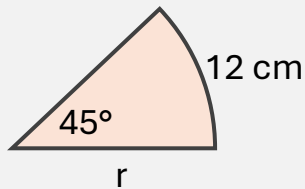


$$\begin{aligned} \frac{40}{360} \times \pi \times 12 \\ = \frac{1}{9} \times \pi \times 12 \\ = \frac{4}{3}\pi \\ P = \frac{4}{3}\pi + 12 \end{aligned}$$

in reverse...

EXAMPLE:

Calculate the radius, correct to 3 sf.



$$\frac{45}{360} \times \pi \times 2r = 12$$

$$\frac{1}{8} \times \pi \times 2r = 12$$

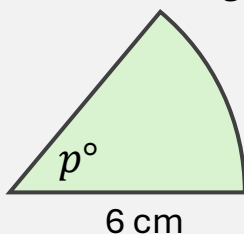
$$\pi \times 2r = 96$$

$$\pi \times r = 48$$

$$r = 15.27887454 \\ = 15.3 \text{ cm (3sf)}$$

EXAMPLE:

The area is $3\pi \text{ cm}^2$. Find the size of angle p .



$$\frac{p}{360} \times \pi \times 6^2 = 3\pi$$

$$\frac{p}{10} \times \pi = 3\pi$$

$$\frac{p}{10} = 3$$

$$p = 30^\circ$$

Use circumference, as the arc length is given

Remove everything except r from the left of the equation

Form an equation for the area

Solve to find the missing radius

Use the radius to calculate the arc length

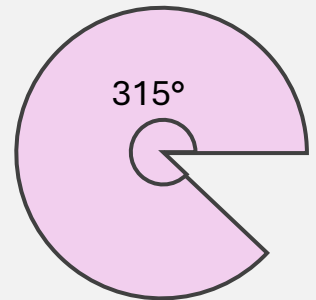
Form equation for the area

$$\frac{36}{360} = \frac{1}{10}$$

combining skills...

EXAMPLE:

The area of the sector is 14π . Calculate the exact perimeter.



$$\frac{315}{360} \times \pi \times r^2 = 14\pi$$

$$\frac{7}{8} \times \pi \times r^2 = 14\pi$$

$$7 \times \pi \times r^2 = 112\pi$$

$$\pi \times r^2 = 16\pi$$

$$r^2 = 16$$

$$r = 4$$

$$\frac{315}{360} \times \pi \times 8$$

$$= \frac{7}{8} \times \pi \times 8$$

$$= 7\pi$$

$$P = 7\pi + 8$$

Finally, remember to add two 4cm radii for the whole perimeter