

# YEAR 8 — DEVELOPING GEOMETRY...

## Area of trapezia and Circles

### What do I need to be able to do?

By the end of this unit you should be able to:

- Recall area of basic 2D shapes
- Find the area of a trapezium
- Find the area of a circle
- Find the area of compound shapes
- Find the perimeter of compound shapes

### Keywords

**Congruent:** The same

**Area:** Space inside a 2D object

**Perimeter:** Length around the outside of a 2D object

**Pi ( $\pi$ ):** The ratio of a circle's circumference to its diameter.

**Perpendicular:** At an angle of  $90^\circ$  to a given surface

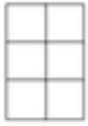
**Formula:** A mathematical relationship/ rule given in symbols. Eg  $b \times h =$  area of rectangle/ square

**Infinity ( $\infty$ ):** A number without a given ending (too great to count to the end of the number) — never ends

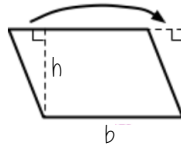
**Sector:** A part of the circle enclosed by two radii and an arc.

### Area — rectangles, triangles, parallelograms

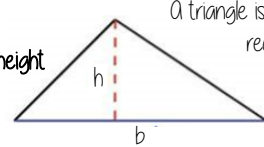
Rectangle  
Base x Height



Parallelogram/ Rhombus  
Base x Perpendicular height



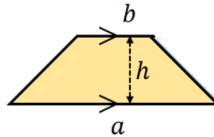
Triangle  
 $\frac{1}{2} \times$  Base x Perpendicular height



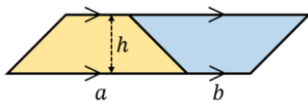
A triangle is half the size of the rectangle it would fit in

### Area of a trapezium

Area of a trapezium  
 $\frac{(a+b) \times h}{2}$



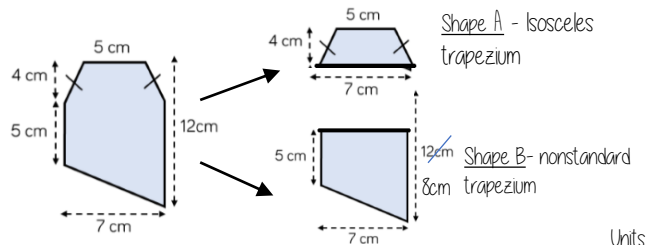
Why?



- Two congruent trapeziums make a parallelogram
- New length  $(a + b) \times$  height
- Divide by 2 to find area of one

### Compound shapes

To find the area compound shapes often need splitting into more manageable shapes first. Identify the shapes and missing sides etc. first.



Shape A + Shape B = total area

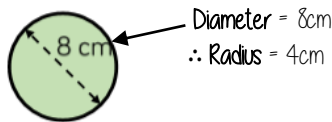
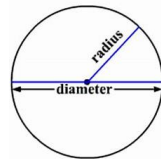
$$\frac{(5+7) \times 4}{2} + \frac{(5+7) \times 8}{2} = 24 + 45.5 = 69.5 \text{ cm}^2$$

Units

### Area of a circle (Non-Calculator)

Read the question — leave in terms of  $\pi$  or if  $\pi \approx 3$  (provides an estimate for answers)

Area of a circle  
 $\pi \times \text{radius}^2$



$$\begin{aligned} \pi \times \text{radius}^2 \\ &= \pi \times 4^2 \\ &= \pi \times 16 \\ &= 16\pi \text{ cm}^2 \end{aligned}$$

Find the area of one quarter of the circle



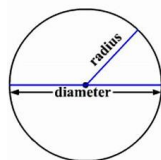
Circle Area =  $16\pi \text{ cm}^2$   
Quarter =  $4\pi \text{ cm}^2$

### Area of a circle (Calculator)



SHIFT  $\times 10^x$

Area of a circle  
 $\pi \times \text{radius}^2$



How to get  $\pi$  symbol on the calculator

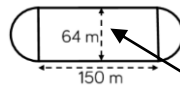
It is important to round your answer suitably — to significant figures or decimal places. This will give you a decimal solution that will go on forever!

### Compound shapes including circles

Circumference  
 $\pi \times \text{diameter}$

Compound shapes are not always area questions. For Perimeter you will need to use the circumference

Spotting diameters and radii



This dimension is also the diameter of the semi circles

$$\begin{aligned} \text{Arc lengths} &= \pi \times 64 \\ &= 64\pi \end{aligned}$$

Don't need to halve this because there are 2 ends which make the whole circle

Arc lengths + Straight lengths = total perimeter

$$\begin{aligned} &= 64\pi + 150 + 150 \\ &= (300 + 64\pi) \text{ m} \\ \text{OR} &= 501.1 \text{ m} \end{aligned}$$

Still remember to split up the compound shape into smaller more manageable individual shapes first