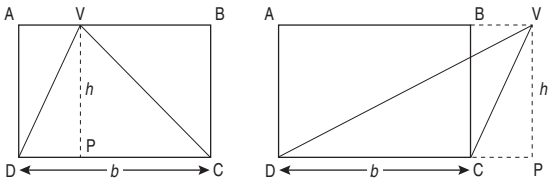
As outcomes, Year 8 pupils should, for example:

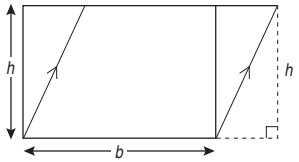
Use vocabulary from previous year and extend to: volume, space, displacement…
and use the units: hectare (ha), cubic centimetre (cm^3), cubic metre (m^3), cubic millimetre (mm^3)…

Deduce formulae for the area of a parallelogram, triangle and trapezium. For example, explain why:

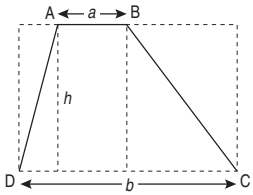
- The area of a triangle is given by A = ½bh, where b is the base and h is the height of the triangle.



- A rectangle and parallelogram on the same base and between the same parallels have the same area, A = bh, where b is the base and h is the perpendicular distance between the parallels.

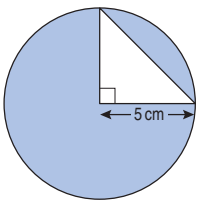


- The area of a trapezium, where h is the perpendicular distance between the parallel sides, is ½ (sum of parallel sides) × h.

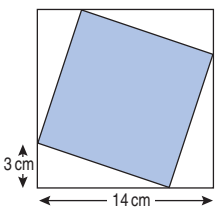


Calculate areas of triangles, parallelograms and trapezia, and of shapes made from rectangles and triangles. For example:

- A right-angled triangle lies inside a circle.
  The circle has a radius of 5 cm.
  Calculate the area of the triangle.



- The diagram shows a shaded square inside a larger square.
  Calculate the area of the shaded square.



As outcomes, Year 9 pupils should, for example:

Use vocabulary from previous years and extend to: circumference, π…
and names of the parts of a circle.
Link to circles (pages 194–7).

Know and use the formula for the circumference of a circle. For example:

Know that the formula for the circumference of a circle is C = πd, or C = 2πr, and that different approximations to π are 3, 22/7, or 3.14 correct to 2 d.p.

Use the π key on a **calculator**.

Calculate the circumference of circles and arcs of circles. For example:

- A circle has a circumference of 120 cm.
  What is the radius of the circle?

- The diameter of King Arthur's Round Table is 5.5 m.
  A book claims that 50 people sat round the table.
  Assume each person needs 45 cm round the circumference of the table.
  Is it possible for 50 people to sit around it?

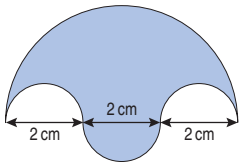
- The large wheel on Wyn's wheelchair has a diameter of 60 cm.
  Wyn pushes the wheel round exactly once.
  Calculate how far Wyn has moved.

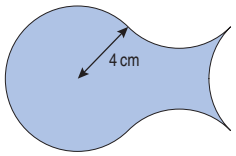
  The large wheel on Jay's wheelchair has a diameter of 52 cm.
  Jay moves her wheelchair forward 950cm.
  How many times does the large wheel go round?

- A Ferris wheel has a diameter of 40 metres. How far do you travel in one revolution of the wheel?

- A touring cycle has wheels of diameter 70cm. How many rotations does each wheel make for every 10km travelled?

- All curves in the left-hand figure are semicircles.
  All curves in the right-hand figure are quarter circles or three-quarter circles.
  Calculate the perimeter of each shape.





Know that the length of an arc is directly proportional to the size of the angle θ between the two bounding radii, or arc length = 2πr × θ/360, where θ is in degrees and r is the length of the radius.