

## Factsheet: Properties of Shapes

### 2 Dimensional Shapes

#### Circle (radius $r$ )

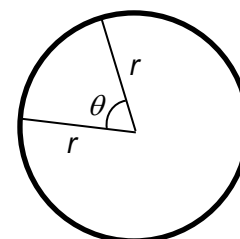
$$\text{Area} = \pi r^2$$

$$\text{Circumference} = 2\pi r$$

$$\text{Diameter} = 2r$$

$$\text{Area of sector shown} = \frac{1}{2} r^2 \theta \quad (\theta \text{ in radians})$$

$$\text{Length of arc shown} = r \theta \quad (\theta \text{ in radians})$$

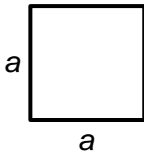
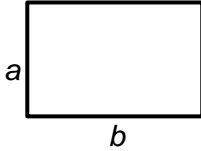
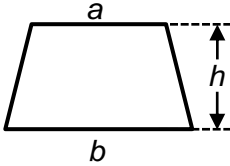
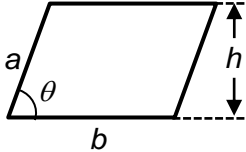
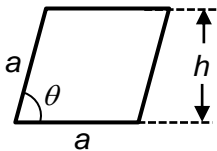


$$\text{Equation of a circle with centre } (a, b): \quad (x - a)^2 + (y - b)^2 = r^2$$

#### Triangles

See factsheet: [Trigonometric Identities](#) for facts about triangles.

#### Quadrilaterals

Name	Area	Perimeter	Picture
<b>Square</b>	$a^2$	$4a$	
<b>Rectangle</b>	$ab$	$2(a + b)$	
<b>Trapezium</b>	$\frac{1}{2}(a + b)h$	not useful	
<b>Parallelogram</b>	$bh = ab \sin \theta$	$2(a + b)$	
<b>Rhombus</b>	$ah = a^2 \sin \theta$	$4a$	

### 3 Dimensional Shapes

#### Cube (side length $a$ )

$$\text{Volume} = a^3$$

$$\text{Surface Area} = 6a^2$$

#### Sphere (radius $r$ )

$$\text{Volume} = \frac{4}{3} \pi r^3$$

$$\text{Surface Area} = 4\pi r^2$$

$$\text{Equation of a sphere with centre } (a, b, c): (x-a)^2 + (y-b)^2 + (z-c)^2 = r^2$$

#### Cylinder (height $h$ , cross-sectional radius $r$ )

$$\text{Volume} = \pi r^2 h$$

$$\text{Surface Area} = 2\pi r(h+r)$$

#### Cone (height $h$ , base radius $r$ )

$$\text{Volume} = \frac{1}{3} \pi r^2 h$$

$$\text{Surface Area (not including base)} = \pi r \sqrt{r^2 + h^2}$$

$$\text{Surface Area (including base)} = \pi r \left( r + \sqrt{r^2 + h^2} \right)$$

### Want to know more?

If you have any further questions about this topic you can make an appointment to see a **Learning Enhancement Tutor** in the **Student Support Service**, as well as speaking to your lecturer or adviser.

- 📞 Call: 01603 592761
- 💻 Ask: [ask.let@uea.ac.uk](mailto:ask.let@uea.ac.uk)
- 🖱️ Click: <https://portal.uea.ac.uk/student-support-service/learning-enhancement>

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