

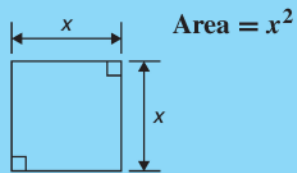
# FORMULAE/REVISION HINTS FOR SECTION C

## AREAS AND VOLUMES

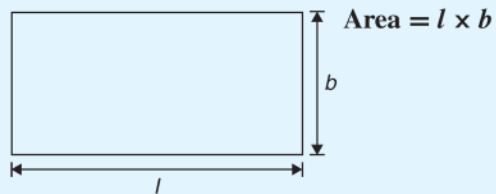
### Formulae for the areas of common shapes

#### Area of plane figures

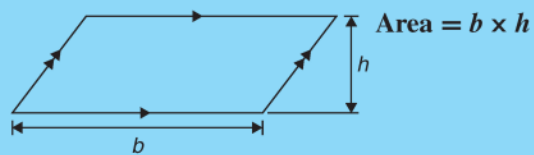
Square



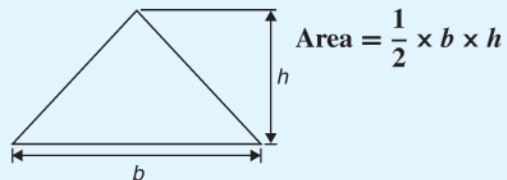
Rectangle



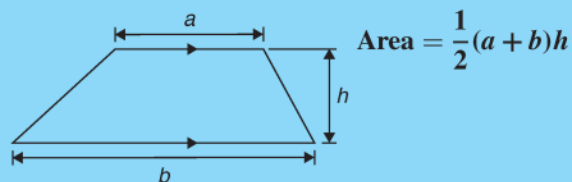
Parallelogram



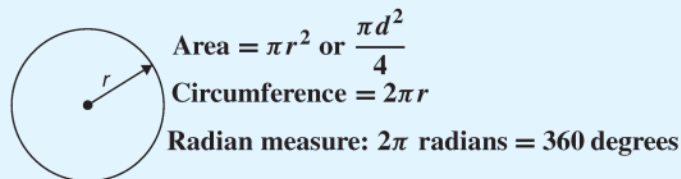
Triangle



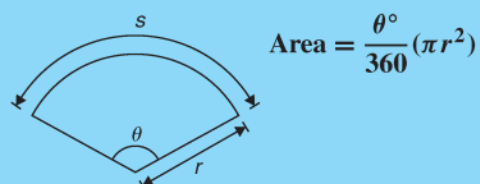
Trapezium

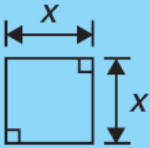
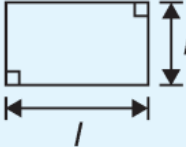
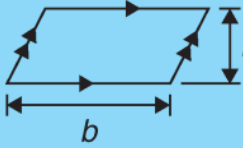
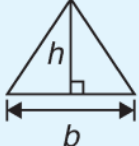
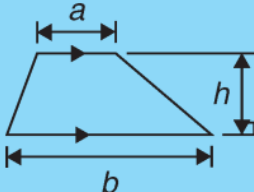
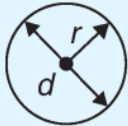
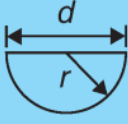

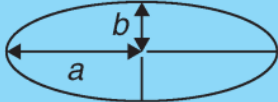


Circle

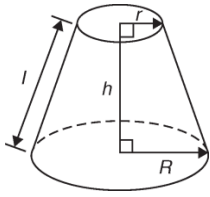


Sector of circle



(i) Square		Area = $x^2$
(ii) Rectangle		Area = $l \times b$
(iii) Parallelogram		Area = $b \times h$
(iv) Triangle		Area = $\frac{1}{2} \times b \times h$
(v) Trapezium		Area = $\frac{1}{2}(a + b)h$
(vi) Circle		Area = $\pi r^2$ or $\frac{\pi d^2}{4}$
(vii) Semicircle		Area = $\frac{1}{2}\pi r^2$ or $\frac{\pi d^2}{8}$
(viii) Sector of a circle		Area = $\frac{\theta^\circ}{360^\circ}(\pi r^2)$ or $\frac{1}{2}r^2\theta$ ( $\theta$ in rads)
(ix) Ellipse		Area = $\pi ab$ Perimeter $\approx \pi(a + b)$

### Frustum of a cone



$$\text{Volume} = \frac{1}{3}\pi h(R^2 + Rr + r^2)$$

$$\text{Curved surface area} = \pi l(R + r)$$

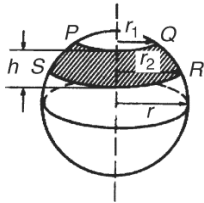
$$\text{Total surface area} = \pi l(R + r) + \pi r^2 + \pi R^2$$

### Frustum of a sphere

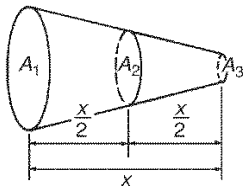
$$\text{Surface area of a zone of a sphere} = 2\pi rh$$

$$\text{Volume of frustum of a sphere} =$$

$$\frac{\pi h}{6} (h^2 + 3r_1^2 + 3r_2^2)$$

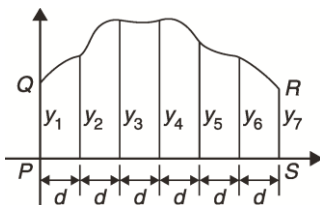


### Prismoidal rule



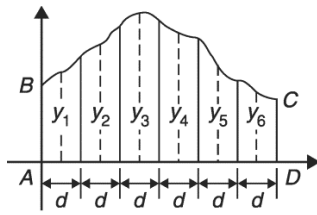
$$\text{Volume, } V = \frac{x}{6}[A_1 + 4A_2 + A_3]$$

### Trapezoidal rule



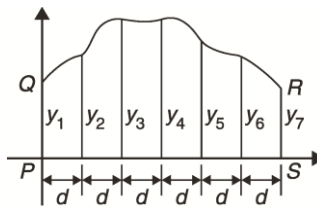
$$\text{Area} = \left( \text{width of interval} \right) \left[ \frac{1}{2} \left( \text{first + last ordinate} \right) + \left( \text{sum of remaining ordinates} \right) \right]$$

### Mid-ordinate rule



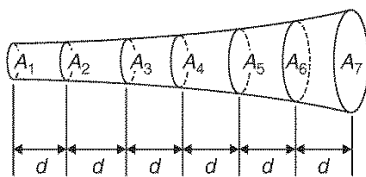
Area = (width of interval)(sum of mid-ordinates)

### Simpson's rule



$$\text{Area} = \frac{1}{3} \left( \text{width of interval} \right) \left[ \left( \text{first + last ordinate} \right) + 4 \left( \text{sum of even ordinates} \right) + 2 \left( \text{sum of remaining odd ordinates} \right) \right]$$

### Volume of irregular solids

$$\text{Volume, } V = \frac{d}{3} [(A_1 + A_7) + 4(A_2 + A_4 + A_6) + 2(A_3 + A_5)]$$


For a sine wave:

over half a cycle, mean value =  $\frac{2}{\pi} \times \text{maximum value}$

of a full-wave rectified waveform, mean value =  $\frac{2}{\pi} \times \text{maximum value}$

of a half-wave rectified waveform, mean value =  $\frac{1}{\pi} \times \text{maximum value}$