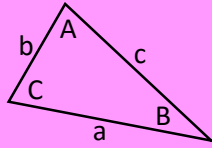


# Core 2 Knowledge Organiser

@pbrucemaths

## sine and cosine rules

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$



$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area of } \Delta = \frac{1}{2} ab \sin C$$

## Logarithms

$$b^x = y \equiv x = \log_b y$$

$$\log(pq) = \log(p) + \log(q)$$

$$\log\left(\frac{p}{q}\right) = \log(p) - \log(q)$$

$$\log(p^x) = x \log(p)$$

## Trig Identities

$$\frac{\sin \theta}{\cos \theta} = \tan \theta$$

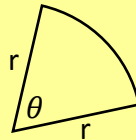
$$\sin^2 \theta + \cos^2 \theta = 1$$

## Radians

$$\pi \text{ rad} = 180^\circ$$

$$\text{arc length} = r\theta$$

$$\text{sector area} = \frac{1}{2} r^2 \theta$$



## Factors and Remainders

If  $p(x)$  is a polynomial and  $p(t) = 0$  then  $(x - t)$  is a factor of  $p(x)$

If  $p(t) \neq 0$  then that is the remainder

## Binomial Theorem

$$(x + y)^n = \binom{n}{0} x^n + \binom{n}{1} x^{n-1} y + \binom{n}{2} x^{n-2} y^2 + \dots + \binom{n}{n} y^n$$

## Arithmetic Sequences

Common difference =  $d$

First term =  $a$

$$u_1 = a, \quad u_{n+1} = u_n + d$$

The  $n$ th term is given by

$$u_n = a + (n - 1)d$$

Last term,  $l = a + (n - 1)d$

Sum:

$$\frac{1}{2} n(a + l) \text{ or } \frac{1}{2} n(2a + (n - 1)d)$$

## Geometric Sequences

Common ratio =  $r$

First term =  $a$

The  $i$ th term is given by  $ar^{i-1}$

Sum:

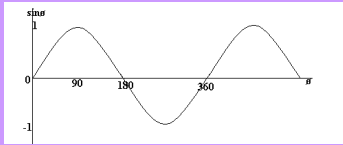
$$\frac{a(1 - r^n)}{1 - r}$$

Converges if  $-1 < r < 1$

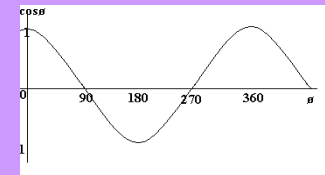
$$S_\infty = \frac{a}{1 - r}$$

## Trig Graphs

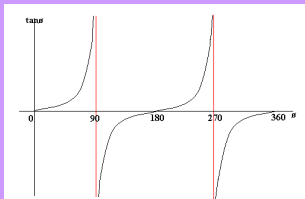
$\sin(x)$



$\cos(x)$



$\tan(x)$



## Trapezium Rule

$$\int_a^b y \, dx \approx \frac{1}{2} h \{(y_0 + y_n) + 2(y_1 + y_2 + \dots + y_{n-1})\}$$

where  $h = \frac{b-a}{n}$

## Integration ( $n \neq -1$ )

$$\int x^n \, dx = \frac{1}{n+1} x^{n+1} + C$$

$$\int_a^b x^n \, dx = \left[ \frac{1}{n+1} x^{n+1} \right]_a^b$$