

C1 Essentials: Summary of AQA Core 1 content not provided in the formula book

Inequalities:

$$x < y \Rightarrow -x > -y$$

Quadratic inequalities:

Find critical values by solving $= 0$.

Sketch the curve to identify the required region.

Rationalising the denominator:

$$\frac{1}{a + \sqrt{b}} = \frac{a - \sqrt{b}}{(a + \sqrt{b})(a - \sqrt{b})} = \frac{a - \sqrt{b}}{a^2 - b}$$

Straight lines:

$$y - y_1 = m(x - x_1) \quad \text{Gradient} = \frac{y\text{-step}}{x\text{-step}}$$

Perpendicular lines have $m_1 m_2 = -1$

Quadratic formula:

$$ax^2 + bx + c = 0$$

$$\Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Completing the square:

$$x^2 + bx + c = \left(x + \frac{b}{2}\right)^2 - \frac{b^2}{4} + c$$

Roots of quadratics:

No roots: $b^2 - 4ac < 0$

One root: $b^2 - 4ac = 0$

Two roots: $b^2 - 4ac > 0$

Circle equation:

Centre (a, b) , radius r :

$$(x - a)^2 + (y - b)^2 = r^2$$

Factor theorem:

$$(x - a) \text{ is a factor} \Leftrightarrow a \text{ is a root}$$

Remainder theorem:

$$P(x) \div (x - a) \text{ has remainder } R \Leftrightarrow P(a) = R$$

Differentiation:

$$y = x^n \Rightarrow \frac{dy}{dx} = nx^{n-1}$$

$\frac{dy}{dx}$ is the rate of change of y with respect to x .

$\frac{dy}{dx}$ gives the gradient of the curve y .

$\frac{dy}{dx} > 0 \Rightarrow$ Function is increasing.

$\frac{dy}{dx} < 0 \Rightarrow$ Function is decreasing.

Stationary points (eg max/min) occur when $\frac{dy}{dx} = 0$.

$$\frac{dy}{dx} = 0 \text{ and } \frac{d^2y}{dx^2} > 0 \Rightarrow \text{min}$$

$$\frac{dy}{dx} = 0 \text{ and } \frac{d^2y}{dx^2} < 0 \Rightarrow \text{max}$$

Integration:

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

$\int y dx$ is the area under the curve y .

$\int_a^b y dx$ gives the area bounded by the curve, the x -axis and the lines $x = a$ and $x = b$. If below the axis, integral will be < 0 .