Key Maths phrases, explanations and Formula

Algebra (C1 and C2)

SHOW THAT: starting with the information you are given, show all the steps of working until you get to the answer

Find equation of a line write in form \( y = mx + c \), with \( m \) gradient and \( c \) intercept

or use \( y - y_1 = m(x - x_1) \) with \( (x_1, y_1) \) a point on the line

Perpendicular line gradient is \( -\frac{1}{m} \)

Intersects the \( x \)-axis: make \( y = 0 \)

Intersects the \( y \)-axis: make \( x = 0 \)

Coordinates of intersection of lines: solve the equations simultaneously

Give exact solutions: leave as a surd and/or fraction (or in term of \( \pi \) or a log)

**No decimal answers for exact solutions**

If \( x = 2 \) is a root, find the other roots: divide the polynomial by \( (x - 2) \)

Prove no real roots: Prove that the discriminant is negative \( (b^2 - 4ac < 0) \)

Prove it is a tangent: Make the equations of the line and curve equal to form a new quadratic and show there is only 1 solution

Or show discriminant is zero \( (b^2 - 4ac = 0) \)

Distance between 2 points Make a right angled triangle and use Pythagoras

Prove 2 lines don’t intersect Must be parallel – same gradient

Prove line and curve don’t intersect Solve simultaneously E.g. Make the equations of the line and curve equal to form a new quadratic and show there is no solution Or show discriminant is negative

Turning point/Stationary point Solve \( \frac{dy}{dx} = 0 \) for \( x \)-values either side of turning point

Determine Nature of turning point Decide whether a maximum, minimum or inflection point by using \( \frac{d^2y}{dx^2} \)

If \( < 0 \) \( \rightarrow \) Max, \( > 0 \) \( \rightarrow \) Min, if \( = 0 \) then need to compare \( \frac{dy}{dx} \) for \( x \)-values either side of turning point

Increasing function When \( \frac{dy}{dx} > 0 \)

Area of a Triangle Either \( \frac{1}{2} \times \text{base} \times \text{height} \) OR \( \frac{1}{2} \times a \times b \times \sin C \)

Area of a Sector \( \frac{1}{2} r^2 \theta \) (where \( \theta \) is in radians)

Arc Length \( S = r\theta \) (where \( \theta \) is in radians)

Calculate gradient at a point Substitute \( x \) into \( \frac{dy}{dx} \)

Calculate the area under a curve Use integration between two limits