



|  |  | How well do I understand? |
|--|--|---------------------------|
| <b>Straight Line</b>   |  |                           |
| Calculate the distance between 2 points using the distance formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$              |  | 1 2 3 4 5 6 7 8 9 10      |
| Calculate a mid-point $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$  |  | 1 2 3 4 5 6 7 8 9 10      |
| Calculate a gradient between 2 given points $m = \frac{y_2-y_1}{x_2-x_1}$  |  | 1 2 3 4 5 6 7 8 9 10      |
| Calculate the gradient when given the angle that the line makes with the positive direction of the x-axis $m = \tan\theta$ |  | 1 2 3 4 5 6 7 8 9 10      |
| Gradient of a parallel lines $m_1 = m_2$   |  | 1 2 3 4 5 6 7 8 9 10      |
| Gradient of perpendicular lines $m_1 \times m_2 = -1$  |  | 1 2 3 4 5 6 7 8 9 10      |
| Calculate the equation of a line when given the gradient and y-intercept $y = mx + c$                                      |  | 1 2 3 4 5 6 7 8 9 10      |
| Calculate the equation of a line when given the gradient and a point on the line $y - b = m(x - a)$                        |  | 1 2 3 4 5 6 7 8 9 10      |
| Find the point of intersection between lines   |  | 1 2 3 4 5 6 7 8 9 10      |
| Calculating the equation of a median   |  | 1 2 3 4 5 6 7 8 9 10      |
| Calculating the equation of an altitude  |  | 1 2 3 4 5 6 7 8 9 10      |
| Calculating the equation of a perpendicular bisector   |  | 1 2 3 4 5 6 7 8 9 10      |
| State if points are collinear  |  | 1 2 3 4 5 6 7 8 9 10      |



How well do I understand?

## Functions and Graphs

Understand function terminology and notation

1 2 3 4 5 6 7 8 9 10

Find a composite function e.g.  $f(g(x))$

1 2 3 4 5 6 7 8 9 10

Find the equation of an inverse function,  $f^{-1}(x)$

1 2 3 4 5 6 7 8 9 10

Sketch / assess functions and their transformations e.g.  $f(x) + a$ ,  $f(x + a)$ ,  $f(-x)$ ,  $-f(x)$ ,  $kf(x)$ ,  $f(kx)$

1 2 3 4 5 6 7 8 9 10

Sketch / assess logarithmic and exponential functions

1 2 3 4 5 6 7 8 9 10

Sketch / assess trigonometric functions in degrees and radians

1 2 3 4 5 6 7 8 9 10

How well do I understand?

## Recurrence Relations

Construct a recurrence relation when given relevant information

1 2 3 4 5 6 7 8 9 10

Calculate a and b when given three consecutive terms in a sequence

1 2 3 4 5 6 7 8 9 10

Find the limit, where it exists, for a recurrence relation

1 2 3 4 5 6 7 8 9 10



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### Differentiation

Differentiate a function of the form  $f(x) = ax^n$

1 2 3 4 5 6 7 8 9 10

Know how to prepare to differentiate e.g. functions with negative and fractional powers

1 2 3 4 5 6 7 8 9 10

Calculate the gradient of a tangent to a function

1 2 3 4 5 6 7 8 9 10

Calculate the equation of a tangent to a function

1 2 3 4 5 6 7 8 9 10

Find an expression for velocity ( $v = \frac{dx}{dt}$ ) when given the displacement,  $x$

1 2 3 4 5 6 7 8 9 10

Find an expression for acceleration ( $s = \frac{dv}{dt}$ ) when given the velocity,  $v$

1 2 3 4 5 6 7 8 9 10

Sketch the graph of a derived function

1 2 3 4 5 6 7 8 9 10

Find stationary points and their nature

1 2 3 4 5 6 7 8 9 10

Identify when a function is increasing/decreasing

1 2 3 4 5 6 7 8 9 10

Use the stationary points and points to intersection of the axes to sketch the graph of a curve

1 2 3 4 5 6 7 8 9 10

Find the maximum/minimum values in a closed interval

1 2 3 4 5 6 7 8 9 10

Solve optimization problems

1 2 3 4 5 6 7 8 9 10



How well do I understand?

**Quadratics and Polynomials**

Complete the square for a quadratic expression

1 2 3 4 5 6 7 8 9 10

State the max/min value of a function completed square form

1 2 3 4 5 6 7 8 9 10

Sketch the graph of a quadratic function

1 2 3 4 5 6 7 8 9 10

Solve a quadratic equation through factorising or quadratic formula

1 2 3 4 5 6 7 8 9 10

Use the discriminant to determine the nature of the roots

1 2 3 4 5 6 7 8 9 10

Use the discriminant to prove tangency

1 2 3 4 5 6 7 8 9 10

Solve quadratic inequalities

1 2 3 4 5 6 7 8 9 10

Use synthetic division to factorise a polynomial

1 2 3 4 5 6 7 8 9 10

Use the remainder and factor theorems

1 2 3 4 5 6 7 8 9 10

Find the roots of polynomials

1 2 3 4 5 6 7 8 9 10

State the equation of a polynomial given the graph of the function

1 2 3 4 5 6 7 8 9 10

Use iteration to find approximate roots of polynomials

1 2 3 4 5 6 7 8 9 10



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**Integration**

Integrate a function of the form  $f(x) = ax^n$ .

1 2 3 4 5 6 7 8 9 10

Know how to prepare to integrate e.g. functions with negative and fractional powers

1 2 3 4 5 6 7 8 9 10

Solve differential equations to find a general or particular solution

1 2 3 4 5 6 7 8 9 10

Evaluate a definite integral

1 2 3 4 5 6 7 8 9 10

Find the area between a curve and the x-axis

1 2 3 4 5 6 7 8 9 10

Find the area between a line and a curve or 2 curves

1 2 3 4 5 6 7 8 9 10



How well do I understand?

**Circle**

Find the equation of a circle with centre O and radius  $r$   $x^2 + y^2 = r^2$

1 2 3 4 5 6 7 8 9 10

Find the equation of a circle with centre  $(a,b)$  and radius  $r$   $(x - a)^2 + (y - b)^2 = r^2$

1 2 3 4 5 6 7 8 9 10

Find the equation of a circle in general form  $x^2 + y^2 + 2gx + 2fy + c = 0$

1 2 3 4 5 6 7 8 9 10

Find the centre and radius of a circle in any form

1 2 3 4 5 6 7 8 9 10

Find the equation of a tangent to a circle

1 2 3 4 5 6 7 8 9 10

Use the discriminant to determine the number of points of contact between a line and circle

1 2 3 4 5 6 7 8 9 10

Find the point/points of intersection between a line and a circle

1 2 3 4 5 6 7 8 9 10

Know if two circles never touch, touch once internally / externally or touch twice

1 2 3 4 5 6 7 8 9 10



|   | How well do I understand? |
|---|---------------------------|
| <b>Trigonometry</b>   |                           |
| State the exact values of sin/cos/tan for angles: $0^\circ$ , $30^\circ$ , $45^\circ$ , $60^\circ$ & $90^\circ$ | 1 2 3 4 5 6 7 8 9 10      |
| Convert between degrees and radians   | 1 2 3 4 5 6 7 8 9 10      |
| Solve simple linear trigonometric equations   | 1 2 3 4 5 6 7 8 9 10      |
| Solve trigonometric equations with multiple angles  | 1 2 3 4 5 6 7 8 9 10      |
| Solve trigonometric equations involving squared functions   | 1 2 3 4 5 6 7 8 9 10      |
| Solve quadratic trigonometric equations   | 1 2 3 4 5 6 7 8 9 10      |
| Solve trigonometric equations with phase angles   | 1 2 3 4 5 6 7 8 9 10      |
| Use trigonometric identities to simplify and solve trigonometric equations                                      | 1 2 3 4 5 6 7 8 9 10      |
| Use the addition formulae to solve problems   | 1 2 3 4 5 6 7 8 9 10      |
| Use the additional formulae to find the related angle formulae  | 1 2 3 4 5 6 7 8 9 10      |
| Use the double angle formulae to solve problems   | 1 2 3 4 5 6 7 8 9 10      |
| Use the addition & double angle formulae to simplify and solve trigonometric equations                          | 1 2 3 4 5 6 7 8 9 10      |



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### Vectors

Use vectors to prove collinearity of points

1 2 3 4 5 6 7 8 9 10

Write column vectors in terms of the unit vectors  $\underline{i}$ ,  $\underline{j}$  and  $\underline{k}$

1 2 3 4 5 6 7 8 9 10

Use vectors to divide a line in a given ratio

1 2 3 4 5 6 7 8 9 10

Use the scalar product to show that vectors are perpendicular

1 2 3 4 5 6 7 8 9 10

Use the scalar product to find the angle between vectors

1 2 3 4 5 6 7 8 9 10

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### Further Calculus

Differentiate  $\sin x$  and  $\cos x$

1 2 3 4 5 6 7 8 9 10

Integrate  $\sin x$  and  $\cos x$

1 2 3 4 5 6 7 8 9 10

Use the Chain Rule to differentiate a function of the form  $f(x) = (ax + b)^n$

1 2 3 4 5 6 7 8 9 10

Integrate a function of the form  $f(x) = (ax + b)^n$

1 2 3 4 5 6 7 8 9 10





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## Logarithms and Exponentials

Convert between logarithmic and exponential forms  $y = a^x \leftrightarrow x = \log_a y$

1 2 3 4 5 6 7 8 9 10

Use the rules of logs

$$\log_a 1 = 0, \quad \log_a a = 1, \quad \log_a x + \log_a y = \log_a xy, \quad \log_a x - \log_a y = \log_a \frac{x}{y}, \quad \log_a x^n = n \log_a x$$

1 2 3 4 5 6 7 8 9 10

Solve logarithmic equations

1 2 3 4 5 6 7 8 9 10

Solve exponential problems

1 2 3 4 5 6 7 8 9 10

Use the graph of  $\log_a y$  against  $x$  to find the equation connecting  $x$  and  $y$  in the form  $y = ab^x$

1 2 3 4 5 6 7 8 9 10

Use the graph of  $\log_a y$  against  $\log_a x$  to find the equation connecting  $x$  and  $y$  in the form  $y = ax^n$

1 2 3 4 5 6 7 8 9 10