

Higher Maths Key Knowledge

Exact Values

f(x)	0	30	45	60	90	180
Sin(x)	0	1/2	1/√2	√3/2	1	0
Cos(x)	1	√3/2	1/√2	1/2	0	-1
Tan(x)	0	1/√3	1	√3	und	und

Radian to Degrees: Complete the table

Radians	Degrees
π	180°
$\pi/2$	90°
$\pi/4$	45°
$\pi/3$	60°
$\pi/6$	30°

Straight Line

Gradient between two points: $m = \frac{y_2 - y_1}{x_2 - x_1}$ A(x₁, y₁)
B(x₂, y₂)

General Formula for straight line: $y - b = m(x - a)$

Formula links gradient and angle with the x axis: $m = \tan \theta$

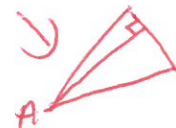
If M₁ is Perpendicular to M₂ then M₁ x M₂ = -1

How can find distance between two points A (x₁, y₁) and B(x₂, y₂)

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

What the two properties of a

- Perpendicular Bisector: 1) Midpoint 2) Perpendicular to line
- Median: 1) Through Vertix 2) Midpoint of opposite side
- Altitude: 1) Through Vertix 2) Perpendicular to opposite side



Circle

If two circles are congruent: Same Radius

If two circles are concentric: Same Centre

To find the gradient of tangent to a circle: $m_{rad} \times m_{tangent} = -1$

How do you show two circles do not intersect?

Distance between centres $>$ (Radius 1 + Radius 2)

How do you show two circles touch at one point?

Distance between centres = Radius 1 + Radius 2

State the quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

State the discriminant formula? $b^2 - 4ac$

Functions

How has the graph $y = f(x) + k$ been transformed? Moved up k units
 $-k$ down

How has the graph $y = f(x+k)$ been transformed? Moved left k units
 $-k$ right

How has the graph $y = kf(x)$ been transformed? Stretched Vertically Scale Factor k

How has the graph $y = f(kx)$ been transformed? Compressed horizontally Scale Factor k

How has the graph $y = -f(x)$ been transformed? Reflected in x axis

How has the graph $y = f(-x)$ been transformed? Reflected in y axis

If $f(g(x)) = x$ then the functions are inverse

Calculus:

To find the gradient of tangent at values x: Find $\frac{dy}{dx}$ sub x in

Turning points occur when: $\frac{dy}{dx} = 0$

An increasing function is when? $\frac{dy}{dx} > 0$

An decreasing function is when? $\frac{dy}{dx} < 0$

How find the area between two curves? \int top - bottom dx

Wave Function:

In the wave function what is the formula for k? $k = \sqrt{a^2 + b^2}$

In the wave function what is the formula for a? $\tan a = \frac{k \sin a}{k \cos a}$

Logs

What is the value of $\log 1 = 0$

What two coordinates will an exponential graph of base a pass through? $(0, 1)$ $(1, a)$

What two coordinates will a logarithmic graph of base a pass through? $(1, 0)$ $(a, 1)$

Examples

$$\log a + \log b = \log ab$$

$$\log a - \log b = \log \frac{a}{b}$$

$$2 \log a = \log a^2$$

What is the inverse function of \ln (natural log)? e^x

