

Core 1 Knowledge Organiser

Coordinate Geometry

Midpoint: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Distance: $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Gradient: $\frac{(y_2 - y_1)}{(x_2 - x_1)}$

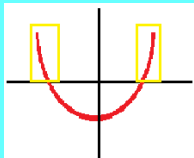
Equation of a line: $y - y_1 = m(x - x_1)$

Gradient = m, perpendicular gradient = $-\frac{1}{m}$

Inequalities

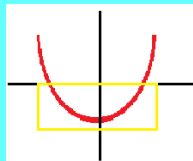
If quadratic draw, factorise and sketch!
Which part do you want...

> 0 you need the sections above the x-axis



$x > ??$ or $x < ??$

< 0 you need the section below the x-axis



$?? < x < ??$

Quadratics

D.O.T.S: $p^2 - q^2 = (p - q)(p + q)$

Discriminant: $b^2 - 4ac$

+ve = 2 roots

0 = repeated roots

-ve = 0 roots

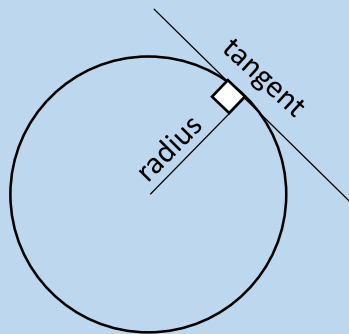
Circles

Equation of a circle:

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

Centre = (a,b)

Radius = r



Graph Transformations

NB: inside the brackets is opposite to what you think!

$f(x) + c$ = translation in y direction

$f(x + c)$ = translation in x direction

$cf(x)$ = stretch in y direction

$f(cx)$ = stretch in the x direction

$-f(x)$ = reflection in the x-axis

$f(-x)$ = reflection in the y-axis

Surds

$$\sqrt{xy} = \sqrt{x} \times \sqrt{y}$$

$$\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}}$$

Rationalise the denominator:

$$\frac{1}{\sqrt{x}} \times \frac{\sqrt{x}}{\sqrt{x}} = \frac{\sqrt{x}}{x}$$

If the denominator is $a + \sqrt{b}$ you multiply by $a - \sqrt{b}$ (think D.O.T.S.)

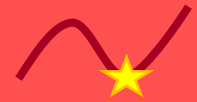
Differentiation

$$y = x^n$$

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

Use $\frac{d^2y}{dx^2}$ to find max or min

If positive = minimum



If negative = maximum



Index Notation

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

$$a^{-m} = \frac{1}{a^m}$$

$$a^{\frac{m}{n}} = (\sqrt[n]{a})^m$$

$$a^0 = 1$$

@pbrucemaths

Graphs

$$y = x^n \quad (n \neq 1)$$

Even powers:
(2,4,6,...)

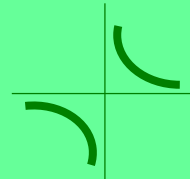


Odd Powers:
(3,5,7,...)



$$y = \frac{1}{x^n}$$

n odd



n even

