



# Marshalls Park Academy - Curriculum Overview



Subject: Mathematics

Year Group: 11 Higher

In Year 11, Students study the final content of the three year GCSE Mathematics curriculum and prepare for the GCSE.

The aim of the curriculum is to become fluent in the fundamentals of mathematics, reason mathematically and solve problems.

TERM 1	TERM 2	TERM 3
<p style="text-align: center;">CONTENT/SKILLS</p> <p><b>Circle Theorems</b></p> <ul style="list-style-type: none"> <li>Select and apply construction techniques and understanding of loci to draw graphs based on circles and perpendiculars of lines;</li> <li>Find the equation of a tangent to a circle at a given point, by:               <ul style="list-style-type: none"> <li>finding the gradient of the radius that meets the circle at that point (circles all centre the origin);</li> <li>finding the gradient of the tangent perpendicular to it;</li> <li>using the given point;</li> </ul> </li> <li>Recognise and construct the graph of a circle using <math>x^2 + y^2 = r^2</math> for radius <math>r</math> centred at the origin of coordinates.</li> </ul> <p><b>More Algebra</b></p> <ul style="list-style-type: none"> <li>Rationalise the denominator involving surds;</li> </ul>	<p style="text-align: center;">CONTENT/SKILLS</p> <p><b>Proportion and graphs</b></p> <ul style="list-style-type: none"> <li>Recognise, sketch and interpret graphs of the reciprocal function <math>y = \frac{1}{x}</math> with <math>x \neq 0</math></li> <li>State the value of <math>x</math> for which the equation is not defined;</li> <li>Recognise, sketch and interpret graphs of exponential functions <math>y = k^x</math> for positive values of <math>k</math> and integer values of <math>x</math>;</li> <li>Use calculators to explore exponential growth and decay;</li> <li>Set up, solve and interpret the answers in growth and decay problems;</li> <li>Interpret and analyse transformations of graphs of functions and write the functions algebraically, e.g. write the equation of <math>f(x) + a</math>, or <math>f(x - a)</math>:               <ul style="list-style-type: none"> <li>apply to the graph of <math>y = f(x)</math> the transformations <math>y = -f(x)</math>, <math>y = f(x)</math> for linear, quadratic, cubic functions;</li> </ul> </li> </ul>	<p style="text-align: center;">CONTENT/SKILLS</p> <p><b>GCSE Maths revision</b></p>



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- Simplify algebraic fractions;
- Multiply and divide algebraic fractions;
- Solve quadratic equations arising from algebraic fraction equations;
- Change the subject of a formula, including cases where the subject occurs on both sides of the formula, or where a power of the subject appears;
- Change the subject of a formula such as  $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ , where all variables are in the denominators;
- Solve 'Show that' and proof questions using consecutive integers ( $n, n + 1$ ), squares  $a^2, b^2$ , even numbers  $2n$ , odd numbers  $2n + 1$ ;
- Use function notation;
- Find  $f(x) + g(x)$  and  $f(x) - g(x), 2f(x), f(3x)$  etc algebraically;
- Find the inverse of a linear function;
- Know that  $f^{-1}(x)$  refers to the inverse function;
- For two functions  $f(x)$  and  $g(x)$ , find  $gf(x)$ .

## Vectors and geometric proof

- Understand and use vector notation, including column notation, and understand and interpret vectors as displacement in the plane with an associated direction.

- apply to the graph of  $y = f(x)$  the transformations  $y = f(x) + a, y = f(x + a)$  for linear, quadratic, cubic functions;
- Estimate area under a quadratic or other graph by dividing it into trapezia;
- Interpret the gradient of linear or non-linear graphs, and estimate the gradient of a quadratic or non-linear graph at a given point by sketching the tangent and finding its gradient;
- Interpret the gradient of non-linear graph in curved distance-time and velocity-time graphs:
  - for a non-linear distance-time graph, estimate the speed at one point in time, from the tangent, and the average speed over several seconds by finding the gradient of the chord;
  - for a non-linear velocity-time graph, estimate the acceleration at one point in time, from the tangent, and the average acceleration over several seconds by finding the gradient of the chord;
- Interpret the gradient of a linear or non-linear graph in financial contexts;
- Interpret the area under a linear or non-linear graph in real-life contexts;
- Interpret the rate of change of graphs of containers filling and emptying;



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- Understand that  $2\mathbf{a}$  is parallel to  $\mathbf{a}$  and twice its length, and that  $\mathbf{a}$  is parallel to  $-\mathbf{a}$  in the opposite direction.
- Represent vectors, combinations of vectors and scalar multiples in the plane pictorially.
- Calculate the sum of two vectors, the difference of two vectors and a scalar multiple of a vector using column vectors (including algebraic terms).
- Find the length of a vector using Pythagoras' Theorem.
- Calculate the resultant of two vectors.
- Solve geometric problems in 2D where vectors are divided in a given ratio.
- Produce geometrical proofs to prove points are collinear and vectors/lines are parallel.

- Interpret the rate of change of unit price in price graphs.
- Recognise and interpret graphs showing direct and inverse proportion;
- Identify direct proportion from a table of values, by comparing ratios of values, for  $x$  squared and  $x$  cubed relationships;
- Write statements of proportionality for quantities proportional to the square, cube or other power of another quantity;
- Set up and use equations to solve word and other problems involving direct proportion;
- Use  $y = kx$  to solve direct proportion problems, including questions where students find  $k$ , and then use  $k$  to find another value;
- Solve problems involving inverse proportion using graphs by plotting and reading values from graphs;
- Solve problems involving inverse proportionality;
- Set up and use equations to solve word and other problems involving direct proportion or inverse proportion.



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KEY ASSESSMENTS	KEY ASSESSMENTS	KEY ASSESSMENTS
HALF TERM 1	HALF TERM 3	HALF TERM 5 GCSE papers
HALF TERM 2 PPEs	HALF TERM 4 PPEs	HALF TERM 6 GCSE papers

Students have access to Mathswatch revision resources and supporting video clips <https://vle.mathswatch.co.uk/vle/>

Edexcel Maths GCSE Higher revision guides are available to support learning.

Students can obtain further revision resources from [www.mathsgenie.co.uk](http://www.mathsgenie.co.uk) and [www.corbettmaths.com](http://www.corbettmaths.com)