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MATHEMATICS DEPARTMENT

Learning Checklists

GCSE Mathematics
Units M5 – M8

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Learning Checklist

GCSE Mathematics (Units M5 – M8)

Topic 1: Transformations

You should be able to…

	M5	describe and carryout single transformations
	M6	distinguish properties that are preserved under particular transformations
	M7	describe and carryout combined transformations
	M5	describe and translate 2D shapes
	M6	describe and transform 2D shapes using translations, to include using vector notation
	M5	describe and transform 2D shapes using enlargements by a positive whole number SF
	M7	describe and transform 2D shapes using enlargements by a fractional scale factor
	M8	enlarge 2D shapes using negative scale factors
	M5	describe and transform 2D shapes using reflections about the x and y axes
	M6	describe and transform 2D shapes using reflections in lines parallel to the x or y axes
	M7	describe and transform 2D shapes using reflections in the line y = +/-x
	M5	describe and transform 2D shapes using single rotations about the origin
	M6	describe and transform 2D shapes using rotations about any point

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GCSE Mathematics (Units M5-M8)

Topic 2: Similarity

You should be able to…

	M6	understand the effect of enlargement on perimeter and area of shapes
	M7	understand and use the effect of enlargement on the volume of solids
	M7	use the relationship between the ratios of lengths and areas of similar 2D shapes
	M8	use the relationship between the ratios of lengths, areas and volumes of similar 3D shapes

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GCSE Mathematics (Units M5 – M8)

Topic 3: Number

You should be able to…

	M5	solve problems involving whole numbers, fractions, decimals, and percentages without a calculator
	M6	convert numbers from decimal to binary (base 2) and vice versa
	M7	use surds and pi in exact calculations
	M7	interpret, order and calculate with numbers written in standard index form
	M8	simplify numerical expressions involving surds, including the rationalisation of the denominator of a fraction such as $5/3\sqrt{2}$
	M8	distinguish between rational and irrational numbers
	M8	change a recurring decimal to a fraction

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GCSE Mathematics (Units M5-M8)

Topic 4: Probability

You should be able to…

	M5	list all outcomes for single events, and for two successive events
	M5	apply systematic listing strategies
	M5	work out probabilities expressed as fractions or decimals from simple experiments with equally likely outcomes and simple combined events
	M5	understand and use the vocabulary of probability including notions of uncertainty and risk
	M5	use the terms fair, random, evens, certain, likely, unlikely and impossible
	M5	understand and use the probability scale (0 to 1)
	M5	identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1
	M5	understand the probability of an event not occurring is one minus the probability that it occurs
	M5	use probabilities to calculate expectation
	M6	systematically list all outcomes for single events and for two successive events
	M6	understand and use estimates or measures of probability from theoretical models (including equally likely outcomes) or from relative frequency

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GCSE Mathematics (Units M5 – M8)

Topic 4: Probability (continued)

You should be able to…

	M6	compare experimental data and theoretical probabilities
	M6	understand that increasing sample size generally leads to better estimates of probability
	M7	use the product rule for counting: if there are m ways of doing one task and for each of these there are n ways of doing another task, then the total number of ways the two tasks can be done is m x n
	M7	know when to add or multiply two probabilities : if A and B are mutually exclusive, then the probability of A or B occurring is P(A) + P(B), whereas if A and B are independent events, the probability of A and B occurring is P(A) x P(B)
	M7	use tree diagrams to represent successive events which are independent
	M8	use the most appropriate method when solving complex probability problems
	M8	use tree diagrams to represent successive events that are not independent

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GCSE Mathematics (Units M5-M8)

Topic 5: Indices

You should be able to…

	M6	use index laws in algebra for positive powers
	M7	use index laws in algebra for integer powers
	M7	use index notation and index laws for zero, positive and negative powers
	M8	use index notation and index laws for integer, fractional and negative powers

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GCSE Mathematics (Units M5 – M8)

Topic 6: Working with Estimation

You should be able to…

	M5	estimate answers and check calculations using approximation and estimation

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GCSE Mathematics (Units M5-M8)

Topic 7: Working with Ratio

You should be able to…

	M5	use ratio notation, including reduction to its simplest form and its various links to fraction notation
	M5	divide a quantity in a given ratio
	M5	apply ratio and proportion to real life contexts and problems such as conversion, best buy, comparison, scaling, mixing concentrations and exchange rates

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GCSE Mathematics (Units M5 – M8)

Topic 8: Expressions, Equations and Formulae

You should be able to…

	M6	use systematic trial and improvement to find approximate solutions of equations where there is no simple analytic method for solving them
	M6	change the subject of a simple formula
	M7	set up and solve two linear simultaneous equations algebraically
	M7	set up equations and solve problems involving direct proportion, including graphical and algebraic representations
	M7	change the subject of a formula, including cases where a power or root of the subject appears and including cases where the subject appears in more than one term
	M8	set up equations and solve problems involving indirect proportion, including graphical and algebraic representations
	M8	set up and solve two simultaneous equations, one linear and one non linear

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GCSE Mathematics (Units M5-M8)

Topic 9: Inequalities

You should be able to…

	M6	solve linear inequalities in one variable, and represent the solution set on a number line
	M7	solve linear inequalities in two variables, representing the solution set on a graph

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GCSE Mathematics (Units M5 – M8)

Topic 10: Sequences

You should be able to…

	M5	recognise and use sequences of, for example triangular, square and cube numbers
	M5	generate terms of a sequence using term-to-term or a position-to-term rule
	M6	find the nth term of a sequence where the rule is linear
	M7	find the nth term of non-linear sequences

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GCSE Mathematics (Units M5-M8)

Topic 11: Working with and using graphs

You should be able to…

	M5	plot and interpret graphs modelling real situations, for example conversion graphs, distance/time graphs and travel graphs
	M6	solve two linear simultaneous equations graphically
	M6	generate points and plot graphs of simple quadratic functions and use these to find approximate solutions for points of intersection with lines of the form y = +/- a only
	M7	recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions and the reciprocal function $y=a/x$ with $x \neq 0$
	M7	generate points and plot graphs of simple quadratic functions and use these to find approximate solutions for points of intersection with lines of the form y = mx + c
	M8	recognise, sketch and interpret graphs of exponential functions $y = k^x$ for positive values of k, for example growth and decay rates

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GCSE Mathematics (Units M5 – M8)

Topic 11: Working with using Graphs (Continued)

You should be able to…

	M8	find the intersection points of the graphs of a linear and quadratic function, knowing that these are the approximate solutions of the corresponding simultaneous equations representing the linear and quadratic functions, which may require algebraic manipulation
	M8	interpret the gradient at a point on a curve as the instantaneous rate of change
	M5	use the sum of angles in a triangle, for example to deduce the angle sum in any polygon
	M6	calculate and use the sums of interior and exterior angles of polygons

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Learning Checklist

GCSE Mathematics (Units M5-M8)

Topic 12: Angle Properties

You should be able to…

	M5	use the sum of angles in a triangle, for example to deduce the angle sum in any polygon
	M6	calculate and use the sums of interior and exterior angles of polygons

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Learning Checklist

GCSE Mathematics (Units M5 – M8)

Topic 13: Congruence and Constructions

You should be able to…

	M5	draw triangles and other 2D shapes using a ruler and a protractor
	M6	understand the term congruent
	M6	use the standard ruler and compass constructions
	M6	identify the loci of points, including real life problems

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GCSE Mathematics (Units M5-M8)

Topic 14: Working with measures and scale drawings

You should be able to…

	M5	interpret scales on a range of measuring instruments and recognise the continuous nature of measurement and the approximate nature of measurement
	M5	know and use imperial measures still in use and their approximate metric equivalents
	M5	use and interpret maps, scale factors and scale drawings
	M6	use and understand bearings

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GCSE Mathematics (Units M5 – M8)

Topic 15: Trigonometry

You should be able to…

	M8	understand and use the sine and cosine rules
	M8	calculate the area of a triangle using A=1/2.absinC
	M8	use Pythagoras' theorem and trigonometry to solve 2D and 3D problems

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Topic 16: Co-ordinate Geometry

You should be able to…

	M8	recognise and use the equation of a circle, centre the origin and radius r
	M8	find the equation of a tangent to a circle at a given point on the circle

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Topic 17: Growth and Decay

You should be able to…

	M8	set up, solve and interpret the answers in growth and decay problems, for example use the formula for compound interest