## Maths IGCSE Topics

	Торіс	Example Question	R	Α	G
Number	Fraction of a number	Find $\frac{4}{7}$ of 42			
	Fractions – adding, subtracting	Show that $2\frac{1}{4} - \frac{6}{7} = 1\frac{11}{28}$			
	Fractions – multiplying, dividing	Show that $2\frac{1}{4} \div \frac{6}{7} = 2\frac{5}{8}$			
	Percentage of a number	Find 13% of £350			
	Percentage increase/decrease	Decrease £75 by 17%			
		I bought an item for £240 and sold it for £270. What was my percentage profit?			
		A washing machine is £204 in a sale with 15% off. What was the full price of the washing machine?			
	Repeated percentage change eg. Compound interest	I invest £400 in an account paying 3% compound interest per year. How much will be in the account after 5 years?			
	Decimals – calculations involving a calculator	Calculate $\frac{3.7^2 - 1.55}{0.56}$			
	Recurring decimals	Show algebraically that $0.1\dot{9}\dot{6} = \frac{13}{66}$			
	Equivalent fractions, decimals, percentages Eg. Ordering	Put the following in ascending order: $37\%  \frac{3}{8}  0.38  \frac{7}{20}$			

Properties of number (factors, primes, squares, cubes)	Which of these is a square number?           2, 3, 5, 7, 11, 15, 16, 20
HCF and LCM	Find the HCF and LCM of 72 and 90.
Prime factors and HCF and LCM	M has prime factors $2^5 \times 3^2 \times 5^3 \times 7$ N has prime factors $2^3 \times 3^3 \times 5 \times 11^2$ Find the HCF of $3M$ and $7N$
Ratio – simplifying	I have 18 red beads and 45 blue beads. Write the ratio of red to blue beads in its simplest form.
Ratio – sharing in a given ratio	Share £64 in the ratio 3: 5.
Ratio – real-life problems Eg. Currency conversion or recipes	A recipe requires 120 <i>g</i> of flour for 12 people. How much flour would I need for 30 people?
Speed, distance, time	I travel 99 <i>km</i> in 2 hours 45 minutes. What was my average speed?



	Indices – simplifying	Find <i>n</i> when $\frac{y^3 \times y^n}{y^4} = y^2$ .
	Indices – fractional and negative	Simplify $\left(\frac{27}{8x^6}\right)^{-\frac{2}{3}}$
	Surds – simplifying	Show that $\sqrt{27} + \sqrt{48} = 7\sqrt{3}$
	Surds – rationalising the denominator	Show that $\frac{4}{2-\sqrt{3}} = a + b\sqrt{3}$ where <i>a</i> and <i>b</i> are integers.
	Surds – expanding and simplifying	Expand and simplify fully $(5 - \sqrt{2})(3 + \sqrt{2})$
	Rounding and approximation	Estimate $\frac{18.67+23.52}{0.46}$
	Error in measurement – upper and lower bounds	Find the upper and lower bounds of 23.6 <i>m</i> rounded to 3 <i>sf</i> .
	Error in measurement – calculations	A runner ran a $100m$ (rounded to the nearest $10m$ ) race in 11 seconds (rounded to $2sf$ ). What is the upper bound of the runner's speed?
	Standard form – converting to and from	Write 7 billion in standard form.
	Standard form – calculations	Mercury has a mass of $3.3 \times 10^{23}$ kilograms.Jupiter has a mass of $1.898 \times 10^{27}$ kilograms.How many times bigger is Jupiter than Mercury?
Algebra	Simplifying expressions	Simplify $3x + 2y - 7x + 4y$
	Substitution into formulae	If $T = 5n^2 - 3n$ , find T when $n = -2$ .

Expanding a single bracket	Expand $5(7-2x)$
Factorising into a single bracket	Factorise fully $5a^2 - 20a$
Expanding two brackets	Expand and simplify $(t + 7)(t - 3)$
Expanding three bracket	Expand and simplify $(x - 3)(x + 2)(x + 5)$
Factorising quadratics	Factorise $y^2 + 2y - 15$
Solving equations with the unknown on one s	ide Solve $3(2x - 1) = 21$
Solving equations with unknown on both side	Solve $5x + 7 = x - 3$
Forming and solving equations	The sides of a rectangle have the lengths $(x + 3)cm$ and $(3x - 5)cm$ . The perimeter of the rectangle is $32cm$ . Form an equation to find $x$ and hence find the area of the rectangle.
Changing the subject of a formula	Make x the subject: $\frac{4x+5y}{x} = y$
Solving quadratics by factorising	Solve $2y^2 - 7y + 3 = 0$
Solving quadratics using the quadratic formul	a Solve $3n^2 + 7n - 1 = 0$ giving your answer to $3sf$ .
Simplifying algebraic fractions	Simplify $\frac{x^2-9}{x^2+8x+15}$
Adding and subtracting algebraic fractions	Simplify $\frac{3}{x-2} + \frac{5}{x+3}$

Inequalities – number line and integers that satisfy them	Show $-4 \le 2n < 8$ on the number line below:
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
	List all the integers that satisfy the inequality.
Solving inequalities	Solve 3 <i>n</i> + 5 > 12
Solving simultaneous equations by elimination	Solve:
	3x - 4y = 13
	5x - 3y = 18
Solving simultaneous equations by substitution	Solve:
including a non-linear graph and a linear.	$x^2 + y^2 = 16$
	y = 3x - 1
	Give answers to 2 <i>dp</i> .
Equations of lines	Plot the graph of $y = 3x - 2$
Shading regions using inequalities	Shade the region satisfied by the inequalities:
	$y \ge 2x - 1$
	$x \ge -1$
	$y \le 4$

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	Parallel and perpendicular lines	I have the line $y = 3 - 2x$ .
		Give an equation of a parallel line to $y = 3 - 2x$ .
		What is the swedient of a line newsendie deute
		what is the gradient of a line perpendicular to
		y = 3 - 2x?
		$\mathbf{D}$ be the sum by a first $\mathbf{u}^3 + 2\mathbf{u} = 1$
	Equations of curves	Plot the graph of $y = x^3 + 3x - 1$
	Solving simultaneous equations graphically	Plot the graph of $y = x^2 - x - 6$ .
		Use your graph to solve:
		$x^2 - x - 6 = 0$
		$\begin{vmatrix} u & x & x & 0 = 0 \\ b & u^2 & u & 0 = 2 \end{vmatrix}$
		b. x - x - b = 2

Finding and using the nth term of a sequence	I have the sequence 5, 9, 13, 17 Find the 100th term of this sequence.	
Summing an arithmetic sequence	The first 4 terms of an arithmetic sequence are 2, 5, 8, 11 Find the sum of the first 100 terms of this sequence.	
Problems involving sequences	The 4th term of an arithmetic sequence is 17.The 10th term of the same arithmetic sequence is 35.Find the sum of the first 50 terms of the sequence.	
Calculus - differentiation	I have the curve $y = x^2 - 8x - 5$ . Find the co-ordinates of the minimum point of the curve.	
Displacement, velocity, acceleration	A particle is moving along a straight line that passes through a fixed point <i>O</i> . The displacement, <i>s</i> metres, of <i>P</i> from <i>O</i> at time <i>t</i> seconds is given by: $s = t^3 - 6t^2 + 5t - 4$ Find the value of <i>t</i> for which the acceleration of <i>P</i> is $3m/s^2$ .	

Function notation – substitution	If $f(x) = \frac{x}{2x+1}$ find $f(3)$ .
Function notation – composite functions.	If $g(x) = 2x - 3$ and $h(x) = \frac{1}{3x'}$ , find $hg(x)$ .
Function notation – finding inverses	If $f(x) = \frac{x}{2x+1}$ find $f^{-1}(x)$ .
Transforming functions	The function $y = f(x)$ is pictured: The function $y = f(x)$ is pictured:

Describing transformation	Describe fully the single transformation of		
	y = f(x) onto $y = f(x + 3) + 5$		

Geometry	Angles – on a line, around a point, in triangles	Find the size of angle <i>x</i> :
		<u>47°</u> x
	Angles – in polygons	The exterior angle of a regular polygon is 24°. How many sides has the polygon got?
	Angles – parallel lines	Find the size of the angles <i>a</i> , <i>b</i> and <i>c</i> , giving reason for your answer:



	Not drawn accurately         Find the sizes of the angles x and y, giving reasons for your answer in each case.		
Measures – conversion	I make a fruit cocktail involving the following ingredients: 1.4 <i>l</i> of apple juice 40 <i>cl</i> of pineapple juice 250 <i>ml</i> of cranberry juice. How much fruit cocktail have I made?		
Construction - shapes	Construct a triangle with sides of length 6 <i>cm</i> , 8 <i>cm</i> , 9 <i>cm</i> .		

Construction - bisectors	Construct a bisector of the angle shown:		
Locus	The garden below requires a shed:		

	The shed must be closer to fence AD than fence AB.
Transformations – reflection, rotation, translation	Use the diagram below to describe the following single transformations:

Transformation - enlargement	Use the diagram below:			
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	Describe the single transformations: <ul> <li>a. A to B</li> <li>b. B to A</li> </ul> Perform the following transformations: <ul> <li>c. Enlarge shape A by scale factor 3, centre (4,5)</li> <li>d. Enlarge shape B by scale factor <math>-\frac{1}{2}</math>, centre the origin</li> </ul>		
Perimeter and area of simple shapes Eg. Rectangle, triangle, parallelogram, trapezium, circles	Find the area of the trapezium below: 5cm $7cm$ $11cm$		

Perimeter and area of compound shapes	Find the area of the following shape:
	5 <i>cm</i> 11 <i>cm</i> 9 <i>cm</i>
Volume and surface area of prisms	I have a cube with a surface area of 294 <i>cm</i> <sup>2</sup> . Find the volume of the cube.
Volume and surface area of complex shapes Eg. Cone, sphere, frustum	Find the surface area of a hemisphere which has a radius of $5cm$ . Leave your answer in terms of $\pi$ .

Similar shapes including area and volume	The shapes below are similar:
Pythagoras	Find the length of the side $x$ : 11cm x 8cm
Trigonometry – right-angled triangles	Find the length of the side y: $y$ $32^{\circ}$ $7cm$

Pythagoras and trigonometry in 3D	The shape below is the cuboid ABCDEFGH: H G 5cm A Bcm B Calculate the length AG and the angle AG makes with the face of the cuboid ABCD.
Trigonometry – Sine Rule, Cosine Rule, Area	In the triangle below, calculate the angle ACB: $ \begin{array}{c} C \\ 5cm \\ 4 \\ 8cm \\ B \end{array} $ Hence or otherwise, calculate the area of the triangle.



Handling Data	Averages and range – mean, median, mode	List four numbers that have a mode of 6, a median of 8 and a range of 5.							
	Averages and range – frequency tables	The table below shows how many coins 20 people had in their pocket:							
		Coins	0	1	2	3			
		Freq	4	3	7	6			
		a. Fin pe b. Wł pe	id the me ople's po nat is the rson's po	ean numb cket. median r cket?	er of coir number o	ns in these f coins in	e a		
	Averages and range – grouped frequency	The table below shows how long 20 people took to complete their weekly shop:		ook					
		Time (mins)	0 <i>to</i> 10	10 <i>to</i> 20	20 to 30	30 <i>to</i> 40			
		Freq.	4	3	7	6			
a. Find the modal class. b. Estimate the mean tim complete the weekly s		ime it toc v shop.	ok to						



	Use the graph to estimate a student's height if they are 10 years old.
Cumulative frequency – drawing and reading	Below is a cumulative frequency graph showing the length of plants in a garden centre.
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	Find the median and inter-quartile range using the graph.
Histograms – drawing and reading	Below is a histogram showing the distance people travelled to a venue.

	What percentage of the people travelled more than 10km to the venue?
Probability – independent events (mutually exclusive)	The probability of Chloe winning a game of tennis is 0.54. What is the probability of Chloe not winning a game of tennis?
Probability – independent events (tree diagrams)	There are 15 counters in a tin; 11 are blue, 4 are red. If I take two counters at random, replacing them after each pick, what is the probability that I pick at least one red counter?
Probability – dependent events (tree diagrams)	There are 12 biscuits in a tin; 7 are plain, 5 are chocolate. If I take two biscuits at random and eat them, what is the probability that I eat one of each?
Set notation and Venn diagrams	$\varepsilon = 1 \text{ to } 10 \text{ inclusive}$ Set A: 4,5,6,7,8 $A \cap B = 5,6$ $A \cup B = 2,3,4,5,6,7,8$ List Set B.