Higher Tier: Content for Paper 1H, 2H and 3H

All links are to www.mathsgenie.co.uk except for those shaded which are from www.corbetmaths.com
Answers to the questions can be found on the same websites.

Number

Topic & Skill		Paper 1	Paper 2	Paper 3	Videos	Questions
Arithmetic	Negative number			Y	negative numbers	Grade 1 negative numbers
Fractions	Fraction of an amount	Y			fraction of amount	Grade 2 fractions of an amount
	Fraction arithmetic	Y			fractions	Grade 3 fractions
	Recurring decimal to fraction	Y			recurring decimals	Grade 6 recurring decimals
Properties	Product of prime factors	Y			HCF & LCM	Grade 4 HCF and LCM
	Laws of Indices			Y	indices	Grade 4 indices
	Negative and fractional indices	Y			indices2	Grade 6 fractional and negative indices
Powers and Roots	Simplification of surds	Y			surds	Grade 7 surds
Standard Form	Conversion	Y			standard-form	Grade 5 standard form
	Calculation	Y				
Approximation and Estimation	Error interval		Y		error-intervals	Grade 3 error intervals
	Bounds			Y	bounds	Grade 7 bounds
Other	Calculator use		Y		use of calculator	Grade 2 using a calculator
	Product rule for counting			Y	product-rule-for-counting	Grade 6 product rule

Algebra

Topic & Skill		Paper 1	Paper 2	Paper 3	Videos	Questions
Manipulation	Simplification	Y	Y	Y	simplifying algebra	Grade 2 simplifying algebra
	Expansion of bracket		Y	Y	expanding-and-factorising	Grade 4 expanding and factorising
	Factorisation		Y			
	Substitute values			Y	substitution	Grade 3 substitution
	Change subject of a formula			Y	changing-the-subject 1 changing-the-subject2	Grade 5 changing the subject Grade 7 rearranging harder formula
	Forming an expression			Y	writing-an-expression	Grade 2 writing an expression
	Laws of indices		Y		indices	Grade 4 indices
	Expansion of brackets	Y		Y	expanding-and-factorising-quadratics	Grade 5 expanding and factorising quadratics
	Difference of two squares			Y		
	Algebraic fractions	Y		Y	algebraic-fractions	Grade 7 algebraic fractions
Equations and inequalities	Linear equation		Y		solving-equations	Grade 3 solving equations
	Form an equation	Y	Y		forming-and-solving-equations	Grade 4 forming and solving equations
	Set up and solve equation			Y		
	Linear inequality	Y			inequalities	Grade 4 inequalities
	Quadratic equation	Y			Factorising Quadratics: expanding-and-factorising-quadratics factorising-harder-quadratics Solving Quadratic Equations: solving-quadratics	Grade 5 solving quadratics by factorising Grade 7 factorising harder quadratics
	Quadratic Inequality		Y		quadratic-inequalities	Grade 8/9 quadratic inequalities
	Equations of parallel lines		Y		parallel-and-perpendicular-lines	Grade 6 parallel and perpendicular lines
	Equation of a tangent to a circle	Y			equation-of-tangent	Grade 8/9 equation of tangent
	Simultaneous equations linear/quadratic			Y	simultaneous-quadratic	Grade 9 quadratic simultaneous equations

Algebra (cont)

Topic & Skill		Paper 1	Paper 2	Paper 3	Videos	Questions
Graphs	Coordinates		Y		coordinates	Grade 1 coordinates
	Quadratic graph	Y			quadratic-graphs	Grade 5 quadratic graphs
	Gradient of a straight line graph			Y	gradient-of-a-line	Grade 5 gradient of a line
	Gradients of parallel and perpendicular lines				parallel-and-perpendicular-lines	Grade 6 parallel and perpendicular lines
	Speed-time graph	Y			real-graphs	Grade 4 real life graphs
	Gradient of a curve	Y			corbettmaths instantaneous-rates-of-change	corbettmaths rates-of-change
	Transformations of functions		Y		transforming-graphs	Grade 8/9 transforming graphs
	Graphs of trigonometric functions		Y		harder-graphs	Grade 7 trig and exponential graphs
Functions	Inverse and composite functions		Y		functions	Grade 7 functions

Ratio, proportion and rates of change

Topic & Skill		Paper 1	Paper 2	Paper 3	Videos	Questions
Conversions	Time			Y	time	Grade 1 time
	Area		Y		conversions-and-units	Grade 3 conversions and units
Percentages	Percentage of an amount	Y			percentages	Grade 3 percentages
	Percentage decrease			Y		
	Depreciation		Y	Y	compound-interest	Grade 4 compound interest
	Reverse percentage			Y	reverse-percentages	Grade 5 reverse percentages
Ratio	Write as a ratio	Y		Y	writing-simplifying-ratio.	Grade 3 writing and simplifying ratio
	1 : n form			Y		
	Use of ratio	Y	Y			
	Share in a ratio	Y		Y	ratio	Grade 3 sharing ratio
	Ratio to fraction	Y			ratio to fraction or linear function	Grade 5 ratio fraction problems
Proportion	Direct proportion		Y	Y	Proportion: Recipes proportion	Grade 3 proportion: ingredients Grade 5 direct and inverse proportion
	Inverse proportion		Y		proportion	Grade 5 direct and inverse proportion
	Currency conversion		Y		exchange-rates	Grade 3 exchange rates
	Equations of proportion	Y			direct-and-inverse-proportion	Grade 7 direct and inverse proportion
Compound Measures	Average speed			Y	speed-and-density	Grade 5 compound measures
	Density	Y				
	Pressure		Y		corbettmaths pressure	corbettmaths pressure
Growth and Decay	General iterative processes			Y	iteration	Grade 7 iteration

Geometry and Measures

Topic & Skill		Paper 1	Paper 2	Paper 3	Videos	Questions
Shape	Transformations		Y		transformations	Grade 3 rotations Grade 3 reflections Grade 3 enlargements Grade 3 translations
Angles	Angles in a polygon	Y			angles-polygons	Grade 4 angles in polygons
	Circle theorems		Y	Y	circle-theorems	Grade 6 circle theorems
Area and Volume	Area of a rectangle		Y		area-perimeter compound-shapes	Grade 2 area and perimeter Grade 3 area of compound shapes
	Area of a triangle	Y				
	Area of a trapezium			Y		
	Area of a sector	Y			sectors-and-arcs	Grade 5 sector area and arc length
	Surface area of a cuboid	Y			surface area	Grade 4 surface area
	Volume of a cuboid	Y			volume	Grade 4 volume of a prism
	Volume of composite solid		Y		cylinders spheres and cones	Grade 4 cylinders Grade 5 spheres and cones
Similarity	Similar triangles			Y	similar shapes length	Grade 5 similar shapes
Pythagoras's Theorem and Trigonometry	Pythagoras's Theorem	Y		Y	pythagoras	Grade 4 pythagoras
	Trigonometry			Y	sohcahtoa	Grade 5 SOHCAHTOA
	Exact trigonometric values	Y			exact-trig-values	Grade 5 exact trig values
	Sine rule		Y		sine-rule	Grade 7 sine rule
	Cosine rule		Y		cosine-rule	Grade 7 cosine rule
	Trigonometry in 3-D			Y	3d-pythagoras	Grade 7 3d pythagoras and trigonometry
Vectors	Column vectors			Y	column-vectors	Grade 5 vectors
	Vector geometry	Y			vectors	Grade 8/9 vectors

Probability

Topic & Skill		Paper 1	Paper 2	Paper 3	Videos	Questions
Probability	Probability	Y			probability	Grade 2 writing probability and the probability scale
	Tree diagram				probability-trees	Grade 5 probability trees
	Independent combined events	Y				
	Dependent combined events			Y	conditional probability-equation-questions	Grade 7 conditional probability Grade 9 probability equation
	Venn diagram		Y		venn-diagrams	Grade 5 venn diagrams
	Probability from a Venn diagram		Y			

Statistics

Topic & Skill		Paper 1	Paper 2	Paper 3	Videos	Questions
Diagrams	Frequency polygon			Y	frequency-polygons	grade 2 frequency polygons
	Cumulative frequency diagram	Y			cumulative frequency	Grade 6 cumulative frequency
	Box plot		Y		box-plots	Grade 6 box plots
	Histogram			Y	histograms	Grade 7 histograms
Measures	Mean	Y			averages mean-tables	Grade 2 averages Grade 4 averages from frequency tables
	Lower and upper quartiles & Inter-quartile range	Y	Y		box-plots	Grade 6 box plots
Population	Comparison of distributions		Y		box-plots	Grade 6 box plots
	Capture-recapture method		Y		corbettmaths capture-recapture	corbettmaths Capture Recapture

Higher Tier Formulae Sheet

Perimeter, area and volume

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

Area of a trapezium = $\frac{1}{2}(a + b)h$

Volume of a prism = area of cross section × length

Where r is the radius and d is the diameter:

Circumference of a circle = $2\pi r = \pi d$

Area of a circle = πr^2

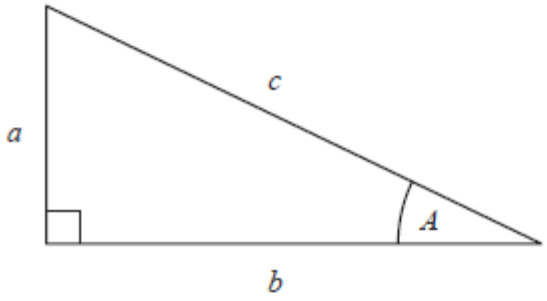
Quadratic formula

The solution of $ax^2 + bx + c = 0$

where $a \neq 0$

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

Pythagoras' Theorem and Trigonometry

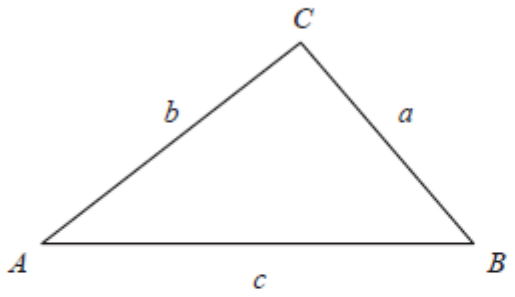


In any right-angled triangle where a, b and c are the length of the sides and c is the hypotenuse:

$a^2 + b^2 = c^2$

In any right-angled triangle ABC where a, b and c are the length of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$



In any triangle ABC where a, b and c are the length of the sides:

sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} a b \sin C$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is number of times that the interest is compounded:

Total accrued = $P\left(1 + \frac{r}{100}\right)^n$

Probability

Where P (A) is the probability of outcome A and P (B) is the probability of outcome B:

P (A or B) = P (A) + P (B) – P (A and B)

P (A and B) = P (A given B) P(B)