











# Year 12 Mathematics Cycle 1

Week	Content Taught (Chapter Subsections – all from Year 1 book)		Independent Work Scan here to find videos:  Scan here for SolutionBank:	Further Reading
1	Quadratics: 2.1-2.6	Algebra Recap: 1.1-1.6	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Life-changing quadratic formula: The quadratic formula no one taught you: 
2	Trigonometry: 9.1-9.5	Algebraic Methods: 7.1-7.3	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Why we rationalise the denominator: Visual proof of the sine rule: 
3	Trigonometry: 10.1-10.3	Algebraic Methods: 7.4-7.5	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	A proof that $3 = 0$ : Last digits of fifth powers: 
4	Trigonometry: 10.4-10.6	Vectors: 11.1-11.2	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Beautiful Trigonometry: What is wrong with this sine memorisation pattern? 
5	Equations & Inequalities: 3.1-3.4	Vectors: 11.3-11.4	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	When mathematicians get bored: Why $\pi^{\pi^{\pi^{\pi}}}$ could be an integer (for all we know!) 

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6	Equations & Inequalities: 3.5-3.7	Vectors: 11.5-11.6	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Things you'll find in higher dimensions: Why solving a rational inequality is tricky!
7	Graphs & Transformations: 4.1-4.5	Exponentials & Logarithms: 14.1	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	The Number "e":  What's so special about "e"?
8	Graphs & Transformations: 4.6-4.7 & 9.6	Exponentials & Logarithms: 14.4-14.5	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Logarithms explained Bob Ross style:  The most useful curve in mathematics:
9	Straight Line Graphs: 5.1-5.5	Exponentials & Logarithms: 14.6-14.7	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	What are "e" and "ln(x)"? Perpendicular lines negative reciprocal gradients rule proof:
10	Circle Geometry: 6.1-6.5	Exponentials & Logarithms: 14.8	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	"Which logarithm is bigger?" problem:  A classic Japanese circle problem:





## Year 12 Mathematics Cycle 2

Week	Content Taught (Chapter Subsections)		Independent Work Scan here to find videos:  Scan here for SolutionBank:	Further Reading
1	Binomial Expansions: Year 1 book: <b>8.1-8.5</b>	Differentiation: Year 1 book: <b>12.1-12.3</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	The Essence of Calculus: Pascal's Triangle: 
2	Algebraic Fractions: Year 2 book: <b>1.2-1.3</b>	Differentiation: Year 1 book: <b>12.4-12.5</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	3 Paradoxes That Gave Us Calculus: The Paradox of the Derivative: 
3	Algebraic Fractions: Year 2 book: <b>1.4-1.5</b>	Differentiation: Year 1 book: <b>12.6-12.7</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Differentiation Formulae Through Geometry: The Remainder Theorem: 
4	More Binomial Expansions: Year 2 book: <b>4.1-4.3</b>	Differentiation: Year 1 book: <b>12.8-12.9</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Pascal's Triangle Puzzles: The Method No One Taught You - Finding the Tangent to a Curve: 
5	Trigonometry: Year 2 book: <b>5.1-5.3</b>	Differentiation: Year 1 book: <b>12.10-12.11</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Aristotle's Wheel Paradox: How Many 3D Nets Does a 4D Hypercube Have? 















# Year 12 Mathematics Cycle 2

Week	Content Taught (Chapter Subsections)		Independent Work Scan here to find videos:  Scan here for SolutionBank:	Further Reading
6	Trigonometry: Year 2 book: <b>5.4-5.5 &amp; 6.1</b>	Differentiation: Year 1 book: <b>14.2-14.3</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	What is a Fourier Series? Fourier Series & Fourier Transform:
7	Trigonometry: Year 2 book: <b>6.2-6.4</b>	Integration: Year 1 book: <b>13.1-13.2</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Integration & the Fundamental Theorem of Calculus: Trig Functions Visualised (sec, cosec, & cot):
8	Trigonometry: Year 2 book: <b>7.1-7.3</b>	Integration: Year 1 book: <b>13.3-13.4</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	What does area have to do with gradient? Angle Sum Formula Proof using Complex Numbers:
9	Trigonometry: Year 2 book: <b>7.4-7.5</b>	Integration: Year 1 book: <b>13.5-13.6</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	Paradox of the Möbius Strip and Klein Bottle: Things You'll Find in Higher Dimensions:
10	Trigonometry: Year 2 book: <b>7.6-7.7</b>	Integration: Year 1 book: <b>13.7</b>	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	My New Favourite Trig Function: $\text{cas}(x)$ The Riddle That Seems Impossible Even If You Know The Answer:















# Year 12 Further Mathematics Cycle 1

Week	Content Taught (Chapter Subsections)		Independent Work	Further Reading
	Decision:  	Core Pure: 	Scan here to find model solutions to the textbook questions: 	
1	Algorithms: 1.1 Using and understanding algorithms 1.2 Flow charts 1.3 Bubble sort 1.4 Quick sort	Series: 3.1 Sums of natural numbers 3.2 Sums of squares and cubes	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Bubble sort with Hungarian folk dance -Sums of squares and sums of cubes
2	Algorithms: 1.5 Bin-packing algorithms 1.6 Order of an algorithm Mixed exercise 1	Series: Mixed exercise 3  Roots of polynomials: 4.1 Roots of a quadratic equation 4.2 Roots of a cubic equation	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-The bin-packing problem  -P Vs NP problem
3	Graphs and networks: 2.1 Modelling with graphs 2.2 Graph Theory 2.3 Special types of graph 2.4 Representing graphs and networks using matrices	Roots of polynomials: 4.3 Roots of a quartic equation 4.4 Expressions relating to the roots of a polynomial	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Graph theory applications article  Vieta's formula
4	Graphs and networks: 2.5 The planarity algorithm Mixed exercise 2	Roots of polynomials: 4.5 Linear transformations of roots Mixed exercise 4	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Interactive planarity game -Transforming roots of polynomials
5	Algorithms on graphs: 3.1 Kruskal's algorithm 3.2 Prim's algorithm 3.3 Applying Prim's algorithms to a distance matrix	Matrices: 6.1 Introduction to matrices 6.2 Matrix multiplications 6.3 Determinants	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Programming minimum spanning tree algorithms -Matrix puzzles





# Year 12 Further Mathematics Cycle 1

Week	Content Taught (Chapter Subsections)		Independent Work	Further Reading
	Decision:  	Core Pure: 	Scan here to find model solutions to the textbook questions: 	
6	Algorithms on graphs: 3.4 Using Dijkstra's algorithm to find the shortest path 3.5 Floyd's	Matrices: 6.4 Inverting a 2 x 2 matrix 6.5 Inverting a 3 x 3 matrix	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Directed networks and invasive plants  -Interactive Dijkstra's 
7	Algorithms on graphs: Mixed exercise 3	Matrices: 6.6 Solving systems of equations using matrices Mixed exercise 6	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Really great Wikipedia article on matrices  -Applications of the 20 most popular graph algorithms 
8	Route inspection: 4.1 Eulerian graphs	Linear transformations: 7.1 Linear transformations in two dimensions 7.2 Reflections and rotations	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-The Seven bridges of Konigsberg video  -Puzzle on linear transformations 
9	Route inspection: 4.2 Using the route inspection algorithm	Linear transformations: 7.3 Enlargements and stretches 7.4 Successive transformations	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Use Python to code a route inspection problem  -Linear transformations video 
10	Route inspection: 4.3 Networks with more than 4 odd nodes Mixed exercise 4	Linear transformations: 7.5 Linear transformations in three dimensions 7.6 The inverse of a linear transformation Mixed exercise 7	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Linear transformations task  -Interactive route inspection website 

# Year 12 Further Mathematics Cycle 2












Week	Content Taught (Chapter Subsections)		Independent Work	Further Reading
	Decision:  	Core Pure: 	Scan here to find model solutions to the textbook questions: 	
1	The travelling salesman problem: 5.1 The classical and practical travelling salesman problem 5.2 Using a minimum spanning tree to find an upper bound 5.3 Using a minimum spanning tree to find a lower bound	Proof by induction: 8.1 Proof by mathematical induction 8.2 Proving divisibility results	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Travelling salesman article   -Proof by induction article 
2	The travelling salesman problem: 5.4 Using the nearest neighbour algorithm to find an upper bound Mixed exercise	Proof by induction: 8.2 Proving statements involving matrices Mixed exercise 8	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-AI applications of the nearest neighbour algorithm (article)   -Proof by induction video 
3	Linear programming: 6.1 Linear programming problems 6.2 Graphical methods	Vectors: 9.1 Equation of a line in three dimensions 9.2 Equation of a plane in three dimensions	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Linear programming article   -Online 3d graphing calculator 
4	Linear programming: 6.3 Locating the optimal point 6.4 Solution with integer values Mixed exercise	Vectors: 9.3 Scalar product 9.4 Calculating angles between lines and planes	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Scalar product insight interactive tool   -Angles between lines and planes in geogebra 
5	The simplex algorithm: 7.1 Formulating linear programming problems 7.2 The simplex algorithm	Vectors: 9.5 Points of intersection	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Exploring intersections of planes in geogebra   -Interactive simplex algorithm 

# Year 12 Further Mathematics Cycle 2











Week	Content Taught (Chapter Subsections)		Independent Work	Further Reading
	Decision:  	Core Pure: 	Scan here to find model solutions to the textbook questions: 	
6	The simplex algorithm: 7.3 Problems requiring integer solutions 7.4 Two-stage simplex method	Vectors: 9.6 Finding perpendiculars	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Why simplex? 16-minute-long lecture on the why -Simplex for non-linear functions
7	The simplex algorithm: 7.5 The Big-M method Mixed exercise	Vectors: Mixed exercise 9	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Big M method online calculator -Vectors in higher dimensions
8	Critical path analysis: 8.1 Modelling a project 8.2 Dummy activities	Complex numbers: 1.1 Imaginary and complex numbers 1.2 Multiplying complex numbers	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-A brief introduction to complex numbers. -Complex numbers are awesome video
9	Critical path analysis: 8.3 Early and late 8.4 Critical activities 8.5 The float of an activity 8.6 Gantt charts	Complex numbers: 1.3 Complex conjugation 1.4 Roots of quadratic equations	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Gantt charts templates for your next project! -The useless number video
10	Critical path analysis: 8.7 Resource histograms 8.8 Scheduling diagrams Mixed exercise	Complex numbers: 1.5 Solving cubic and quartic equations Mixed exercise 1	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-A video on the cubic formula -Critical path analysis in project management



# Year 12 Further Mathematics Cycle 3

Week	Content Taught (Chapter Subsections) Core Pure: 		Independent Work Scan here to find model solutions to the textbook questions: 	Further Reading
1	Volumes of revolution: 5.1 Volumes of revolution around the x-axis 5.2 Volumes of revolution around the y-axis	Argand diagrams: 2.1 Argand diagrams 2.2 Modulus and argument	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Volumes of revolution visualisation -Argand diagrams Interactive tool  
2	Volumes of revolution: 5.3 Adding and subtracting volumes 5.4 Modelling with volumes of revolution	Argand diagrams: 2.3 Modulus-argument form of complex numbers	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-The disc method vs the shell method for volumes of Revolution -Volumes of revolution in Higher dimensions?  
3	Volumes of revolution: Mixed exercise 5  Hyperbolic trigonometric functions (Y2): 6.1 Introduction to hyperbolic functions	Argand diagrams: 2.4 Loci in the Argand diagram	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Complex squares task  -Loci in the Argand diagram in Geogebra  
4	Hyperbolic trigonometric functions (Y2): 6.2 Inverse hyperbolic functions 6.3 Identities and equations	Argand diagrams: 2.5 Regions in the Argand diagram Mixed exercise 2	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Hyperbolic functions article. -Regions in the Argand diagram puzzle  
5	Hyperbolic trigonometric functions (Y2): 6.4 Differentiating hyperbolic functions Mixed exercise 6	Complex numbers (Y2): 1.1 Exponential form of a complex number 1.2 Multiplying and dividing complex numbers	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Hyperbolic functions occur in the calculations of angles and distances in hyperbolic geometry. Watch this video on hyperbolic space. 

# Year 12 Further Mathematics Cycle 3

Week	Content Taught (Chapter Subsections) Core Pure: 		Independent Work Scan here to find model solutions to the textbook questions: 	Further Reading
6	Polar coordinates (Y2): 5.1 Polar coordinates and equations 5.2 Sketching curves	Complex numbers (Y2): 1.3 De Moivre's theorem	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Polar flower  -Graphs and symmetry of polar curves  
7	Polar coordinates (Y2): 5.4 Tangents to polar curves Mixed exercise 5	Complex numbers (Y2): 1.4 Trigonometric identities	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Polar graphing on Desmos  -Using De Moivre's for Trigonometric identities  
8	Series (Y2): 2.1 The method of differences	Complex numbers (Y2): 1.5 Sums of series	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Understanding series of complex numbers  -Did you know there are 3 different methods of difference?  
9	Series (Y2): 2.2 Higher derivatives 2.3 Maclaurin series	Complex numbers (Y2): 1.6 nth roots of a complex number	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Towards Maclaurin rich task  -Taylor and Maclaurin series interactive applet  
10	Series (Y2): 2.4 Series expansion of compound functions Mixed exercise 2	Complex numbers (Y2): 1.7 Solving geometric problems Mixed exercise 1	<input type="checkbox"/> Videos (as needed) <input type="checkbox"/> Textbook questions <input type="checkbox"/> Marking & correcting <input type="checkbox"/> Weekly assessment	-Roots of unity articles 