HIGHER MATHEMATICS COURSE DETAILS

Summer Revision	• Indices • Surds • Fractions • Solving equations with fractions (Algebra manipulation) • Factorising • Completing the square (unitary coefficient) Topics advised for further revision: Straight Line https://www.maths180.com/gradient.html https://www.maths180.com/straight-lines1.html Vectors https://www.maths180.com/vectors1.html Simultaneous Equations https://www.maths180.com/simultaneous-equations.html Changing the subject https://www.maths180.com/change-the-subject-of-a-formula.html	Indices: https://www.maths180.com/indices.html Surds: https://www.maths180.com/surds.html Fractions: https://www.maths180.com/fractions.html Equations/Inequalities: https://www.maths180.com/equations-and-inequalities.html Algebraic Fractions https://www.maths180.com/algebraic-fractions.html Factorising Quadratics: https://www.maths180.com/quadratics_2.html Completing the square: https://www.maths180.com/quadratics_4.html
All videos to help revise National 5 material can be found using the following links: https://www.maths180.com/ (National 5 Tab) https://www.larberthigh.com/departments/maths_and_computing/mathematics/flipped_learning.html (N5) https://www.youtube.com/playlist?list=PLX35a4GHKCRfz0h8QQlN0OjUuFkZCzUtg (N5)		

HIGHER MATHEMATICS COURSE DETAILS

June	• Trig Equations (Related angles) • Trig Graphs • Exact Value Triangles • Trig identities	Trig Equations (N5) https://tinyurl.com/trigeqns Trig Graphs https://www.youtube.com/watch?v=JZGKeGdyWrs https://www.youtube.com/watch?v=f3ugUIDRxwA https://www.youtube.com/watch?v=snhuWuvwiI0 https://www.youtube.com/watch?v=YBKOnbeUm-s Exact Value Triangles https://tinyurl.com/exactval Trig Identities https://tinyurl.com/y22szlu4
Trigonometric Equations	• Trig Graphs; identifying period, amplitude, vertical shift, horizontal shift. • Convert to Radians • Exact Value triangles • Solving trig equations, multiple angles. • Solving trig equations with compound angles	Trig Graphs: https://www.maths180.com/functions--graphs.html Radians: https://www.youtube.com/watch?v=VSGJOoxEWl4&t=1s Exact Values: https://www.youtube.com/watch?v=Fj0PdjdiT1I Trig Equations: https://www.maths180.com/trig-equations.html

HIGHER MATHEMATICS COURSE DETAILS

Straight Line	• Gradient of a straight line • Gradient of parallel lines • Collinearity • Gradient of perpendicular lines • m = tanΘ • Distance between two points /midpoint • Equation of horizontal and vertical lines • Equation of a line (Ax + By + C = 0) • Perpendicular Bisectors • Equation of an Altitude • Equation of a Median • Finding the point of intersection (Concurrent lines) • Finding if a point lies on a line	Straight Line: Look for titles. https://www.maths180.com/straight-lines.html Gradient Revision: https://www.youtube.com/watch?v=LkR5KQ0r4cg&t=6s
Functions	• Domain and Range of a function, one to one mapping • Composite functions • Inverse functions (discuss the domain and range connection with original function) --- Introduce at the beginning of the Logs and Exponentials topic. • Exponential functions • Logarithmic functions	Functions: Look for titles https://www.maths180.com/functions--graphs.html Functions: Composite, inverse, domains. https://www.maths180.com/composite--inverse-functions.html

HIGHER MATHEMATICS COURSE DETAILS

Vectors	• Position Vectors • Magnitude/ Unit vectors • Collinearity (parallel vectors) • Section Formula • The Scalar product $\underline{a}.\underline{b} = \|a\|\|b\|cos\vartheta$ (extend/slide vectors, expand brackets) • Component form of dot product ($\underline{a}.\underline{b} = 0$ for perpendicular vectors) • Angle between vectors • Vector pathways/3D vectors	Vectors: Look for titles https://www.maths180.com/vectors.html

Quadratics	• Sketching quadratic functions
	  ○ Determine shape
	  ○ Intersection with x and y axis
	  ○ Axis of symmetry
	  ○ Coordinates of the turning point.
	• Completing the square (non unitary coefficient)
	• Solving quadratic equations
	  ○ Graphically
	  ○ Factorising
	  ○ Completing the square
	  ○ Quadratic Formula.
	• Quadratic inequations (sketching)
	• The discriminant for tangency/repeated root for tangency.
		Quadratics and Completing the square:
		https://www.maths180.com/functions--graphs.html
		
		Discriminant, scroll to end.
		https://www.maths180.com/polynomials.html

Polynomials	• Using synthetic division to find the remainder and quotient. • Factor Theorem (finding a root & intersection of a curve and a line) • Finding missing coefficients using synthetic division • Solving polynomial equations • Find the equation of the function from the graph	Polynomials: Look for titles https://www.maths180.com/polynomials.html

HIGHER MATHEMATICS COURSE DETAILS

Differentiation	• The derivative of ax^n • Rate of change (applications of derivatives) • Derivatives of products and quotients • Gradient from derivative • Equations of tangents • Increasing and decreasing functions • Stationary points (shapes of curves) • Curve Sketching • Closed Intervals • Graphs of derived function • Chain Rule $(ax+b)^n$ • Differentiation of trig functions • Optimisation	Differentiation 1: Intro, rates of change, tangents. https://www.maths180.com/differentiation-1.html Differentiation 2: Trig and Composite functions https://www.maths180.com/differentiation_2.html Differentiation 3: Tangents, increasing/decreasing. https://www.maths180.com/differentiation_3.html Differentiation 4: SP's, curve sketching, optimisation https://www.maths180.com/differentiation_4.html
Circle	• The equation of a circle with centre (0,0) and r. $x^2 + y^2 = r^2$ • Identifying where a point lies inside, outside or on the circumference. • The equation of a circle with centre (a,b) and r. $(x - a)^2 + (y - b)^2 = r^2$ • The distance formula to find the radius • Expanded form $x^2 + y^2 + 2gx + 2fy + c = 0$ centre (-g,-f) r= $\sqrt{g^2 + f^2 - c}$, $g^2 + f^2 - c > 0$ • Determine whether circles touch, do not touch or intersect. • Intersection of lines and circles/tangent to a circle • Equation of tangent to a circle.	Circle : Look for titles. https://www.maths180.com/circles.html
Recurrence Relations	• Forming a linear recurrence relation • The limit of a recurrence relation • Solving recurrence relations to find a and b.	Recurrence Relations: Look for titles. https://www.maths180.com/sequences.html

HIGHER MATHEMATICS COURSE DETAILS

Graphs of Functions	Sketch and annotate related graphs • Change in the y coordinate ○ $y = f(x) \pm a$ ○ $y = -f(x)$ ○ $y = kf(x)$ • Change in the x coordinate ○ $y = f(x \pm a)$ ○ $y = f(-x)$ ○ $y = f(kx)$ Introduce graphs of Logs and Exponentials. • Graphs of related exponential functions • Graphs of Logarithmic functions	Graphs of functions: Look for titles. https://www.maths180.com/functions--graphs.html
Logs and Exponentials	• Exponential growth and decay (graphs) • Logarithms (graphs, inverse of exponential) • Laws of Logarithms • Logarithmic equations • Natural logarithms • Formulae from experimental data $y = kx^n$ • Formulae from experimental data $y = ab^x$ • Graph transformations of exponentials and logs	Logs and Exponentials: Look for titles https://www.maths180.com/logs--exponentials.html
Integration	• The anti-derivative • Indefinite integrals • Definite integrals • Chain Rule • Integrating Trig functions • Finding the intersection points of two curves. • Area between two curves (curve and the x-axis) • Differential equations	Integration 1: Look for titles. https://www.maths180.com/integration-1.html Integration 2: Look for titles. https://www.maths180.com/integration-2.html

HIGHER MATHEMATICS COURSE DETAILS

Addition Formulae	• Double Angle Formula • Trigonometric Equations with double angle • Formulae for cos^2x and sin^2x • Trigonometric Identities • Compound Angles • $\sin(x+\alpha)$ • $\sin(x-\alpha)$ • $\cos(x\pm\alpha)$	Double Angle: https://www.youtube.com/watch?v=cYmenAnUfvI Addition Formulae: https://www.youtube.com/watch?v=eMngvOg5fek Trig Identities: https://www.youtube.com/watch?v=JftKDFqw6Ig
Wave Function	Expressing $acosx+bsinx$ in the forms • $\mathrm{kcos}(x-\alpha)$ • $\mathrm{kcos}(x+\alpha)$ • $\mathrm{ksin}(x\pm\alpha)$ • Wave function multiple angles • Maximum and minimum values • Solving equations using the wave function	Wave functions intro: https://www.youtube.com/watch?v=SKTGI3pjKYc&t=1s All forms: https://www.youtube.com/watch?v=ogt7aCPShsY&t=2s Multiples Angles: https://www.youtube.com/watch?v=OPp4vt2WaZ4&t=54s Max/Min Values: https://www.youtube.com/watch?v=v0izLhkRQEE&t=2s Sketching Graphs: https://www.youtube.com/watch?v=Zop82bLLvZ8 Solving Equations using the Wave: https://www.youtube.com/watch?v=F8L0mVIas9E

Follow this link for videos for topic specific breakdown.

https://www.larberthigh.com/departments/maths_and_computing/mathematics/flipped_learning.html