EDEXCEL AS Level Mathematics – CORE 1 & 2 Scheme of Work

Exam in May of Year 12 - **Aim to complete all teaching by Easter break.**

The number of lessons given in this Scheme of Work for each unit is approximate. Text – AS Core for EDEXCEL. ***ALL C1 NON calculator***

The Solomen press worksheets are an invaluable resource and should be used for all units.

ALGEBRA 1 – 5-6 lessons

Topic	Content	Resources	C1 / C2
Algebra manipulation	Review of algebraic manipulation of polynomials, including expanding brackets, collecting like terms and factorising quadratic a = 1 and a>1 ***This should be a homework review task for students and not a taught lesson***		C1
Algebraic fractions	Manipulate, simplify and cancel algebraic fractions	Ex2C p26 Q2; Ex2f p38	C1
Surds	Simplify and manipulate surds	Ex 1A p6; Ex 1B Q1, p8; Ex 1F p17 Q2 *Solomen press indices and surds worksheet A*	C1
	Rationalise the denominator, including difference of two squares	Ex 1B, p8-9 (Not Q1); Ex 1F p17 Q3 *Solomen press indices and surds worksheet C*	C1
Indices	***Review*** the basic rules of indices and simplify fractions with integer powers.		C1
	Evaluating and manipulating expressions containing indices (including fractional and negative powers).	Ex 1C p13; 1D p14; 1E Q1, Q5-Q6 p16/17. *Solomen press indices and surds worksheet B & C*	C1
	Solving equations containing indices. (Not ones that reduce to quadratics as this is taught in with the quadratics unit)	Ex 1C p13 Q3; Ex 1F p17 Q4 *Solomen press indices and surds worksheet B & C*	C1
	Solve problems involving indices and surds Exam style questions on indices and surds	Ex 1B, p9; Q6-14 p; Ex 1F p17 Q5-Q10 *Solomen press indices and surds Worksheet D*	C1

ALGEBRA 2 – 4 lessons

Topic	Content	Resources	C1 / C2
Assessment of Algebraic manipulations, algebraic fractions, Surds & Indices.			
Algebra	Be able to find unknowns in an identity	Ex12a p190	C2
Algebraic division and the factor theorem	Carry out algebraic division by a factor of (x – a) or (x + a) Know that of f(x) = 0 when x = a, then (x – a) is a factor of f(x)	Ex12B p195 Ex12C, p199-200 *Solomen press algebra worksheet A*	C2
Factor remainder theorem	Determine the quotient and remainder when the polynomial f(x) is divided by (ax + b)	Ex12D, p200 *Solomen press algebra worksheet B* *Solomen press algebra worksheet C*	C2
Assessment of Algebra 2 - Factor remainder theorem.			

FUNCTIONS AND QUADRATICS (6 lessons)

Topic	Content	Resources	C1 / C2
Algebraic expressions & functions	Introduction to function notation.		C1
	Review of factorising quadratics expressions (including difference of two squares) and solving quadratics by factorising when a = 1 and a >1	Ex3B p55 Q1 & Q2 *Solomen press polynomials worksheet B*	
Quadratics	Solving equations containing indices which reduce to quadratics.	Ex 3B p55/56 Q8	C1
	Solving quadratic equations by using the quadratic formula – answers in surd form; Solving problems involving the discriminant.	Ex 3B p55/56 Q6; Ex 3D p64 *Solomen press polynomials worksheet D*	C1
	Expressing quadratics in completed square form and using this form to solve equations.	Ex3B p55 Q3, Q4, Q5 *Solomen press polynomials worksheet C*	
	Sketch quadratic curves by using the completed square, by factorising and by using the formula – be able to show all points of intersection with the axes. From the completed square, also be able to find the vertex and line of symmetry.	Ex 3C p59 - 60	
	Solving problems involving quadratics	Ex 3B p56 Q9-12 *Solomen press polynomials worksheet E*	
Assessment of Quadratics			

SIMULTANEOUS EQUATIONS, INEQUALITIES AND GRAPHS (4-6 lessons)

Topic	Content	Resources	C1 / C2
Simultaneous equations	Recap of method of solving a pair of linear simultaneous equations by substitution	Ex 5B p78 *Solomen press polynomials worksheet F*	C1
	Solving a pair of simultaneous equations involving one linear and one quadratic equation.	Ex 5C p83 *Solomen press polynomials worksheet F*	C1
	Use of discriminant to solve problems involving the intersection of a straight line and a quadratic graph.	Ex 5D p87	C1
	Exam style questions involving all polynomials, simultaneous equations and inequalities	Ex 5E p87 *Solomen press polynomials worksheet I and J*	C1
Inequalities	Solution of linear inequalities	Ex 4B p67 *Solomen press worksheet G*	C1
	Solution of quadratic inequalities or inequalities that are written as a product of 3 linear factors.	Ex 4C p70; Ex4D p71 *Solomen press worksheet G*	C1
	Solve problems involving inequalities	*Solomen press worksheet H*	C1
Assessment – Simultaneous equations and inequalities.			

Students to complete Exam practice 1 at home – P89 to 91

EXPONENTIALS AND LOGARITHMS (5 LESSONS)

Topic	Content	Resources	C1 / C2
Exponential function	Sketch the graph of $y = a^x$, where $a > 0$, and understand how different values of a affect the shape of the graph.	*Solomen press exponentials and logs worksheet C*	C2
Logarithms	Know the definition og a logarithm & understand $a^b = c \Longleftrightarrow \log_a c = b$	Ex 18A p313	C2
	Use the laws of logarithms to simplify expressions and write expressions as a single logarithm $\text{Log}_c\, ab = \log_c a + \log_c b$; $\log_c a/b = \log_c a \div \log_c b$ $\text{Log}_c\, a^n = n \log_c a$	Ex 18B p316 *Solomen press exponentials and logs worksheet A & B*	C2
	Understand that log functions and exponential functions are inverse of each other. Use $\log_a a^x = x$ and $\log^{\log_a n} = n$ Use change of base log law: $\log_a b = \frac{\log_c b}{\log_c a}$	Ex 18C p319	C2
	Solving equations involving indices and logarithms.	Ex 18D p322 *Solomen press exponentials and logs worksheet C*	C2
	Mixed Exam style questions	Review Ex 18 p323 - 324 *Solomen press exponentials and logs worksheet D*	
Assessment – Exponentials and logarithms			

COORDINATE AND CIRCLE GEOMETRY (7-8 lessons)

Topic	Content	Resources	C1 / C2
Line segments	Calculating the length, gradient and mid-point of a line segment. Deduce if two lines are parallel or perpendicular.	Ex 6A p96; Ex 6B p105 Q1 to Q3 Ex 6B – pick appropriate questions	C1
Line Segments	Solve problems involving length, gradient and mid-point of a line	*Solomen press Straight line Graphs worksheet A*	C1
Straight lines	Calculating the equation of a straight line including parallel and perpendicular lines (when given the gradient and a point OR when given 2 points) using $y - y_1 = m(x - x_1)$	Ex 6B – pick appropriate questions Ex 6C p109 – pick appropriate *Solomen Press Straight line Graphs worksheet C*	C1
	Solving problems in coordinate geometry. Exam practice	Review Ex 6D p111-112 *Solomen press Straight line Graphs Worksheet D*	
Circle geometry	Review circle theorems – tangents, perpendiculars, chords and diameters. **(This should be set as independent home work prior to the start of this topic)**	Properties 1 to 4 on pages 200-202 of chapter 13.	C2
	Equation of a circle radius *r*, centre (*a*, *b*) and Identifying the centre and radius of a circle by completing the square.	Ex 13A p209-201 *Solomen press circles worksheet A*	C2
	Find equations of tangents, normals and straight lines related to circles.	Ex 13B p214-215 *Solomen press circles worksheet B*	C2
	Solve problems involving circles, tangents, normals and straight lines.	Review Ex 13C p216 *Solomen press circles worksheet C*	C2
Assessment of Coordinate & Circle Geometry			

SEQUENCES AND SERIES (10 lessons)

Topic	Content	Resources	C1 / C2
Introduction to sequences and series.	Understand the idea of a sequence of terms, and use nth term formulae and recurrence relations to calculate terms in a sequence.	Ex 8A p133-134 *Solomen press sequences and series worksheet A*	C1
	Understand and use $\sum$ notation	Ex 8B p135-136	
Arithmetic progressions	Recognise an arithmetic progression. Use formulae for the nth term and for the sum of the first n terms to solve problems involving A.P.s including using $\sum$ notation	Ex 8D p143-145 *Solomen press sequences and series worksheet B & C*	C1
	Solve problems involving arithmetic progression sequences Mixed Exam questions	Review Ex8E p146 *Solomen press sequences and series worksheet F & G (Pick Arithmetic sequence questions only)*	C1
Assessment – Series & sequences AP			
Geometric progressions	Recognise a geometric progression. Use formulae for the nth term and for the sum of the first *n* terms to solve problems involving G.P.s.	Ex 20A p356-358	C2
	Use the condition $\|r\| < 1$ for convergence of a geometric series, and the formula for the sum to infinity of a convergent geometric series.	Ex20B p361-362 *Solomen press sequences and series worksheet D & E*	
	Solve problems involving Geometric progression sequences Mixed Exam questions	Ex20A p356-358, pick as appropriate Review Ex 20C p362-363 *Solomen press sequences and series worksheet F & G (Pick Geometric series questions only)*	C2
Assessment – Series and sequences GP			
Binomial expansions	Use the expansion of $(a+b)^n$ where *n* is a positive integer, including the recognition and use of the notations $\binom{n}{r}$ and $n!$ Include using binomial expansion for an approximation	Ex 14C p226-227 Review Ex 14D p227-228 *Solomen press binomial theorem worksheet A, B & C*	C2
Assessment – Binomial expansion			

DIFFERENTIATION (8-10 lessons)

Topic	Content	Resources	C1 / C2
Differentiation	Introduce gradient of a curve as the limit of a suitable sequence of chords. (Introducing differentiation algebraically by 1st principals is ***optional***).	Ex 9A p154 *Solomen press differentiation worksheet A*	C1
	Differentiating polynomials and functions that can be written using powers of *x*. Find the gradient given the x coordinate, find the x coordinate given the gradient	Ex 9B p158-159 *Solomen press differentiation worksheet B*	
	Application of differentiation to tangents and normals.	Ex 9C p161-163 *Solomen press differentiation worksheet C*	
	Solving problems involving gradients, tangents and normals using differentiation.	Review Ex 9D p163 *Solomen press differentiation worksheet C*	
Assessment – Differentiation 1			
Applications of differentiation	Find increasing and decreasing regions of functions	Ex 15A p231	C2
	Find the coordinates of stationary points on a curve using differentiation.	Ex 15B p236-237 *Solomen press differentiation worksheet D*	C2
	Use of second derivative a way of identifying the type of stationary point – minimum or maximum and state whether a function is increasing or decreasing and solve problems involving stationary points, minimum and maximum.	Ex 15B p236-237 *Solomen press differentiation worksheet D*	C2
	Understand and use differentiation and second derivatives as rates of change and solving minima and maxima problems	Ex15C p241-243 *Solomen press differentiation worksheet E, F and G*	C2
	Use differentiation to sketch curves	Ex 15D p248	C2
	Solve a range of problems involving differentiation	Review Ex15E p249 *Solomen press differentiation worksheet E, F and G*	C2
Assessment – Differentiation 2			

INTEGRATION (6-8 lessons)

Topic	Content	Resources	C1 / C2
Indefinite integration	Understand indefinite integration as the reverse process of differentiation, and integrate x^n (for any rational *n* except −1), together with constant multiples, sums and differences. Solve problems involving the evaluation of a constant of integration.	Ex 10A p169-170 *Solomen press integration worksheet A*	C1
	Given f'(x) and a point on the curve, be able to find the equation of the curve	Ex 10B p171-172 Review Ex10C p173	C1
Definite integration	Evaluate definite integrals (including integrals to infinity).	Ex 19A p330 – 331 Q2 to Q4 *Solomen press integration worksheet C & E*	C2
	Use of integration to find the area 'under' a curve.	Ex 19A p330/331 Q5-13	
	Finding the area trapped between a curve and a line OR between two curves.	Ex19B p337-339 *Solomen press integration worksheet C & D*	
Trapezium rule	Use the trapezium rule to estimate the area under a curve, and use sketch graphs, in simple cases, to determine whether the trapezium rule gives an over-estimate or an under-estimate.	Ex 19C p344-347 *Solomen press integration worksheet G*	C2
Assessment – Integration			

TRANSFORMING GRAPHS (3 lessons)

Topic	Content	Resources	C1 / C2
Transforming graphs	Sketch graphs of cubics, reciprocals and square root. Sketch graphs of functions which can be factorised as a product of 2 or 3 linear factors. Predict functions from their graph, find points of intersection of two graphs.	Ex 7C p127-128	C1
	Understand and use the relationships between the graphs of $y = f(x)$, $y = af(x)$, $y = f(x) + a$, $y = f(x+a)$, $y = f(ax)$, where *a* is a constant, and express the transformations involved in terms of translations, reflections and stretches.	Ex7A p118 Ex7B p121-123 *Solomen press graphs and functions worksheet B & C*	C1
Assessment – Transforming graphs			

TRIGONOMETRY (12 lessons)

Topic	Content	Resources	C1 / C2
Trigonometrical graphs, identities and equations.	Relate the periodicity and symmetries of the sine, cosine and tangent functions to the form of their graphs; both in degrees and radians.	*Solomen press trigonometry worksheet D*	C2
	Use the graph of the trigonometric functions to find simple values of θ	Ex 16B p226-227 Q5	
	Use the exact values of the sine, cosine and tangent of 30° , 45° , 60°		
	Transform the graphs of the trigonometric functions	Ex 16B p266-267 Q7, Q8, Q9	
	Use the identities $\tan\theta = \frac{\sin\theta}{\cos\theta}$ and $\sin^2\theta + \cos^2\theta = 1$	Ex 16C p275-277 Q13 Review Ex16D *Solomen press trigonometry worksheet F*	
	Find all the solutions, within a specified interval, of the equations sin(*kx*) = *c*, cos(*kx*) = *c*, tan(*kx*) = *c*	Ex 16C p275-277 Q4 to Q8 Review Ex 16D *Solomen press trigonometry worksheet E*	
	Find all the solutions, within a specified interval, of the equations which reduce to quadratics in(*kx*) = *c*, cos(*kx*) = *c*, tan(*kx*) = *c*	Ex 16C Q9, Q10, Q11	
	Solve a variety of problems involving trigonometrical graphs, identities and equations.	Ex 16C p275-277 *Solomen press trigonometry worksheet G, H & I*	
Assessment – Trigonometry 1			
Radians	Understand the definition of a radian, and use the relationship between degrees and radians. Find Area of a sector and length of an arc using radians	Ex 17A p284-285	
	Solve a variety of problems involving trigonometrical graphs, identities and equations using radians	*Solomen press trigonometry worksheet B & C*	C2
Applications of trigonometry	Use the area formula: Area of a triangle = $ab\sin C$	Ex 17B p289-290	C2
	Use of the sine and cosine rules to solve problems including solving any triangle.	Ex 17F p301-302	
	Solve a variety of problems involving the sine, cosine rules and trigonometry in triangles	Ex17G p303 *Solomen press trigonometry worksheet A*	
Assessment – Trigonometry 2			

MOCK EXAMINATION JANUARY OF YEAR 12

ASSESSMENTS

Students should complete an assessment test at the end of each unit of work. Marks for these assessments should be recorded on G4S as soon as they are complete.

Examination revision – Pupils should practice at least 8 – 10 past papers prior to the examination.
They should also complete the practice exams in the text book.