

## SUMMER WORK 2019 - Maths

All students who have not achieved a grade D or above in the end of year exams will need to complete a work plan over the Summer. The second year of the course builds on the first year, so you will need to go back through the work covered this year before you come back in September.

You have been given a set of AS practice papers to complete. You will need to do some background work before you do these to ensure that you understand the topics.

You can do this from the electronic text book **OR** on the Integral website **OR** on the Aquinas powerpoints on the AquinasMaths website.

You can use any of these sources to help you. They all have examples and explanations which you should work through carefully and make sure you understand.

The TOPIC LIST in this booklet will help you to identify what topics we have covered this year and where to find them.

The information in the table is

The 1st column	The number and name for each topic
The 2nd column	The name of the <b><u>Aquinas PowerPoint</u></b> and the section headings
The 3rd column	The <b><u>electronic textbook</u></b> and chapter with the section headings
The 4th column	The heading name of the topic in <b><u>Integral</u></b> and the Integral tests
The 5th column	Page references to the Pearson revision guide which you may have purchased

## **Schedule:**

To help you plan your time a weekly schedule is on the next page. You will need to allocate at least 5 weeks to catch up on your maths and give you a reasonable chance of being able to pass the A level. You are likely to need to spend at least two hours each day on the work.

The weekly schedule tells you which questions in the AS practice papers link to which topics. (C3 means AS practice paper C, question 3). Once you have gone back through the basic methods you should attempt the questions in the AS practice papers. Remember you should work through the **Aquinas PowerPoint** OR the **electronic textbook** OR **Integral** before attempting the AS papers

The topic numbers refer to the **TOPIC LIST** on the following pages.

The topics we cover in the first weeks of the Upper Sixth are based on Week 4 and Week 5. It is essential that you understand these topics before you start back in September.

The Mechanics topics are grouped together and you should also aim to do these if you have 6 available weeks in the Summer.

Your teacher will expect to see your work on these in the first lesson back. Non-completion of the work will result in you being placed in referral until it is all complete.

You should also make sure that you have **learned** the key information and standard methods for each topic. There are flash cards available to help you with this on the Aquinas Maths website. (Key information and standard method flashcards)

	Topic Number on TOPIC LIST	AS Paper/Qu		Topic Number on TOPIC LIST	AS Paper/Qu		Topic Number on TOPIC LIST	AS Paper/Qu	
WEEK 1 PURE	0	B3	WEEK 3 STATS	17	E1	WEEK 5 PURE	19	A9	
	0	B9		17	F1		19	B7	
	0	C9		17	G1		19	C6	
	1	A1		17	H1		24	C1	
	1	D7		17	I1		24	D11	
	2	A2		17	J1		25	A11	
	2	C8		18	G4		25	B11	
	3	A7		18	G3		25	C12	
	3	B13		18	E2		25	D5	
	3	D8		18	F2		26	A12	
	4	B4		18	H3		26	B12	
	6	C5		18	J4		26	C11	
WEEK 2 PURE	6	D12	18	J5	26	D2	Optional Week Mechanics	26	D6
	7	A level	20	E4	5	E5			
	8	A13	20	F4	5	E6			
	8	B5	20	F5	5	F7			
	8	C4	20	H4	5	I5			
	9	A4	21	I4	5	J6			
	9	D3	13	A10	5	G5			
	10	A6	13	C10	5	G6			
	10	B8	14	A level	5	I7			
	10	C13	15	A3	23	E7			
	10	D9	15	B1	23	J7			
	11	C2	15	B6	23	G7			
11	D1	15	D4						
			15	D10					
			16	A level					

<p><b>TOPIC</b> <b>0</b> Surds/ Indices/ Quadratics</p>	<p><b>Surds and Indices Powerpoint</b> Basic index laws Fractional/negative powers Rationalising denominator <b>Quadratics 1 Powerpoint</b> Expand brackets Factorising Solving equations Completing the square Quadratic functions Quadratic graphs</p>	<p>TEXTBOOK Pure Year 1 Chapter 1 and 2 <b>Algebraic Expressions:</b> 1.1 Index Laws 1.2 Expanding Brackets 1.3 Factorising 1.4 Negative and Fractional Indices 1.5 Surds 1.6 Rationalising Denominators <b>Quadratics</b> 2.1 Solving Quadratic Equations 2.2 Completing the Square 2.3 Functions 2.4 Quadratic Graphs</p>	<p>INTEGRAL <u>Year 1 Pure</u> <b>Surds and Indices</b> Test S1 Test S2 Surds &amp; Indices Topic Assessment  <b>Quadratic Functions</b> Test Q1</p>	<p>REVISION GUIDE Pages 1-6</p>
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<p><b>TOPIC</b> <b>1</b> Quadratics / Simultaneous equations / Inequalities</p>	<p><b>Quadratics 2 Powerpoint</b> The Discriminant Modelling  <b>Simultaneous Equations and Inequalities Powerpoint</b> Solving algebraically Solving graphically Solving inequalities Sketching inequalities Inequalities on graphs</p>	<p>TEXTBOOK Pure Year 1 Chapter 2 and 3 <b>Quadratics</b> 2.5 The Discriminant 2.6 Modelling with Quadratics <b>Equations &amp; Inequalities</b> 3.1 Linear Simultaneous Equations 3.2 Quadratic Simultaneous Equations 3.3 Simultaneous Equations on Graphs 3.4 Linear Inequalities 3.5 Quadratic Inequalities 3.6 Inequalities on Graphs 3.7 Regions</p>	<p>INTEGRAL <u>Year 1 Pure</u>  <b>Quadratic Functions</b> Test Q2 Quadratic Functions Topic Assessment  <b>Equations and Inequalities</b> Test E1 Test E2 Equations and Inequalities Topic Assessment</p>	<p>REVISION GUIDE Pages 7-11</p>
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<p><b>TOPIC</b> <b>2</b> Straight Lines</p>	<p><b>Straight Lines Powerpoint</b> <math>y = mx + c</math> <math>y - y_1 = m(x - x_1)</math> Parallel/Perpendicular lines Lengths and areas Modelling</p>	<p>TEXTBOOK Pure Year 1 Chapter 5 <b>Straight Lines</b> 5.1 <math>y=mx+c</math> 5.2 Equations of Straight Lines 5.3 Parallel and Perpendicular Lines 5.4 Length and Area 5.5 Modelling with Straight Lines</p>	<p>INTEGRAL <u>Year 1 Pure</u> <b>Coordinate Geometry</b> <b>1 Points and Straight lines</b> Test C1</p>	<p>REVISION GUIDE Pages 17-19</p>
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<b>TOPIC 3</b> Circles	<b>Circles Powerpoint</b> Equations of circles Intersecting lines and circles Chords, tangents and perpendicular bisectors Circumscribing Triangles	TEXTBOOK Pure Year 1 Chapter 6 <b><u>Circles - text book</u></b> 6.1 Midpoints and Perpendicular Bisectors 6.2 Equation of a Circle 6.3 Intersections of Straight Lines and Circles 6.4 Use Tangents and Chord Properties 6.5 Circles and Triangles	INTEGRAL <u>Year 1 Pure</u> <b>Coordinate Geometry</b> <b>2 Circles</b> Test C2 Coordinate Geometry Topic Assessment	REVISION GUIDE Pages 20-22
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<b>TOPIC 4</b> Proof	<b>Proof Powerpoint</b> Proof by deduction Proof by exhaustion Proof by counter-example Proof by contradiction	TEXTBOOK Pure Year 1 Chapter 7 <b><u>Factor Theorem and Proof</u></b> 7.4 Mathematical Proof 7.5 Methods of Proof  TEXTBOOK Pure Year 2 Chapter 1 <b><u>Partial Fractions and Proof</u></b> 1.1 Proof by Contradiction	INTEGRAL <u>Year 1 Pure</u> <b>Problem Solving 2: Notation and Proof</b> Test PS2 <u>Year 2 Pure</u> <b>Proof 1: Methods of Proof</b>	REVISION GUIDE Pages 26, 56
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<b>TOPIC 5</b> suvat	<b>Suvat Powerpoint</b> Modelling Scalars and vectors Time graphs Suvat equations Horizontal motion Vertical motion	TEXTBOOK Stats Year 1 Chapter 9 <b><u>Constant Acceleration</u></b> 9.1 Displacement-Time Graphs 9.2 Velocity-Time Graphs 9.3 and 9.4 Constant Acceleration Formulae 9.5 Vertical Motion Under Gravity	INTEGRAL <u>Year 1 Mechanics</u> <b>Kinematics</b> Test K1 Test K2 Test K3 Kinematics Topic Assessment	REVISION GUIDE Pages 149-152
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<b>TOPIC 6</b> Factor Theorem	<b>Factor Theorem Powerpoint</b> Algebraic Fractions Dividing Polynomials Factor Theorem	TEXTBOOK Pure Year 1 Chapter 7 <b><u>Factor Theorem and Proof</u></b> 7.1 Algebraic Fractions 7.2 Dividing Polynomials 7.3 The Factor Theorem Proof	INTEGRAL <u>Year 1 Pure</u> <b>Polynomials 2: Dividing and Factorising Polynomials</b> Test P2	REVISION GUIDE Pages 23, 57
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<b>TOPIC 7</b> Partial Fractions	<b>Partial Fractions Powerpoint</b> Writing algebraic fractions as a single fraction Partial fractions Dividing algebraic expressions Improper algebraic fractions	TEXTBOOK Pure Year 2 Chapter 1 <b>Partial Fractions and Proof</b> 1.2 Algebraic Fractions 1.3 Partial Fractions 1.4 Repeated Factors 1.5 Algebraic Division	INTEGRAL <u>Year 2 Pure</u> <b>Algebra 2: Rational Expressions</b> Test A2 <b>Algebra 3: Partial Fractions</b> Test A3	REVISION GUIDE Pages 57-59
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<b>TOPIC 8</b> Graphs	<b>Graphs Powerpoint</b> Sketching cubic graphs Sketching quartic graphs Sketching reciprocal graphs Intersection of graphs	TEXTBOOK Pure Year 1 Chapter 4 <b>Graphs</b> 4.1 Cubic Graphs 4.2 Quartic Graphs 4.3 Reciprocal Graphs 4.4 Points of Intersection	INTEGRAL <u>Year 1 Pure</u> <b>Polynomials 1: Polynomial Functions and Graphs</b> Test P1 Polynomials Topic Assessment	REVISION GUIDE Pages 12, 15, 16
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<b>TOPIC 9</b> Exponential and Logs (Part 1)	<b>Exponential and Logs (Part 1) Powerpoint</b> Understanding log function and using log laws	TEXTBOOK Pure Year 1 Chapter 14 <b>Exponentials &amp; Logs</b> 14.1 Exponential Functions 14.4 Logs 14.5 Laws of Log 14.6 Solving Equations using Logs	INTEGRAL <u>Year 1 Pure</u> <b>Exponentials &amp; Logarithms 1: Exponential functions &amp; logarithms</b> Test L1	REVISION GUIDE Pages 47-50
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<b>TOPIC 10</b> Exponential and Logs (Part 2)	<b>Exponential and Logs (Part 2) Powerpoint</b> Sketching exponential graphs Natural logarithms Estimating constants in non-linear models	TEXTBOOK Pure Year 1 Chapter 14 <b>Exponentials &amp; Logs</b> 14.2 $y=e^x$ (ignore any part which mentions "differentiation") 14.3 Exponential modelling 14.7 Working with Natural Logs 14.8 Logs and Non-Linear Data	INTEGRAL <u>Year 1 Pure</u> <b>Exponentials &amp; Logarithms 2: Natural logarithms &amp; exponentials</b> Test L2 <b>Exponentials &amp; Logarithms 3: Modelling Curves</b> Test L3 Exponentials & Logarithms Topic Assessment	REVISION GUIDE Pages 51-53
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<p><b>TOPIC 11</b> Functions</p>	<p><b>Functions (Part 1) Powerpoint</b> Transformations of graphs Functions and Mappings Domain and Range Modulus Function</p> <p><b>Functions (Part 2) Powerpoint</b> Composite Functions Inverse Functions Sketching modulus functions Combining transformations</p>	<p>TEXTBOOK Pure Year 1 Chapter 4 <b>Graphs</b> 4.5 Translating Graphs 4.6 Stretching Graphs 4.7 Transforming Functions</p> <p>TEXTBOOK Pure Year 2 Chapter 2 <b>Functions and Graphs</b> 2.1 Modulus Function 2.2 Functions and Mappings 2.3 Composite Functions 2.4 Inverse Functions 2.5 Modulus Graphs 2.6 Combining Transformations 2.7 Solving Modulus Problems</p>	<p>INTEGRAL <u>Year 1 Pure</u> <b>Graphs and Transformations 2: Transformations of graphs</b> Test G2 Graphs and Transformations: Topic Assessment</p> <p><u>Year 2 Pure</u> <b>Functions</b> Test F1, Test F2, Test F3 Functions: Topic Assessment</p>	<p>REVISION GUIDE Pages 13-14, 60-66</p>
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<p><b>TOPIC 13</b> Trigonometry (Part 1)</p>	<p><b>Trigonometry (Part 1) Powerpoint</b> Sine/Cosine Graphs (including transformations) Sine/Cosine Rule Areas of Triangle</p>	<p>TEXTBOOK Pure Year 1 Chapter 9 <b>Trigonometry Part 1</b> 9.1 The Cosine Rule 9.2 The Sine Rule 9.3 Areas of Triangles 9.4 Solving Triangle Problems 9.5 Graphs of Sine, Cosine and Tangent 9.6 Transforming Trigonometric Graphs</p>	<p>INTEGRAL <u>Year 1 Pure</u> <b>Trigonometry 3: The sine and cosine rules</b> Test T3</p>	<p>REVISION GUIDE Pages 27-29</p>
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<p><b>TOPIC 14</b> Trigonometry (Part 2)</p>	<p><b>Trigonometry (Part 2) Powerpoint</b> Exact trig values Radians Arc Length, Sector Area Small angle approximation</p>	<p>TEXTBOOK Pure Year 1 Chapter 10 <b>Trig Identities and Equations</b> 10.1 Angles in All 4 quadrants 10.2 Exact Values of Trig Ratios</p> <p>TEXTBOOK Pure Year 2 Chapter 5 <b>Radians</b> 5.1 Radian Measure 5.2 Arc Length 5.3 Areas of Sectors and Segments 5.4 Solving Trigonometric Equations 5.5 Small Angle Approximations</p>	<p>INTEGRAL <u>Year 2 Pure</u> <b>Trigonometry 2: Circular Measure and Small Angle Approximations</b> Test T2</p>	<p>REVISION GUIDE Pages 76-77, 87 (small angle approximation box only)</p>
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<p><b>TOPIC</b> <b>15</b> Trigonometry (Part 3)</p>	<p><b>Trigonometry (Part 3) Powerpoint</b> Simple Trig Identities Simple Trig equations Quadratic Trig equations</p>	<p>TEXTBOOK Pure Year 1 Chapter 10 <b>Trig Identities and Equations</b> 10.3 Trig Identities 10.4 Simple Trig Equations 10.5 Harder Trig Equations 10.6 Equations and Identities</p>	<p>INTEGRAL <u>Year 2 Pure</u> <b>Trigonometry 1: Working with radians</b> Test T1 Trigonometry Topic Assessment</p> <p><u>Year 1 Pure</u> <b>Trigonometry 1: Trigonometric Functions and Identities</b> Test T1 <b>Trigonometry 2: Trigonometric Equations</b> Test T2 Trigonometry Topic Assessment</p>	<p>REVISION GUIDE Pages 30-32</p>
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<p><b>TOPIC</b> <b>16</b> Trigonometry (Part 4)</p>	<p><b>Trigonometry (Part 4) Powerpoint</b> Sec, Cosec, Cot functions and graphs Trig equations involving Sec, Cosec, Cot Further trig proof Inverse trig functions and their graphs</p>	<p>TEXTBOOK Pure Year 2 Chapter 6 <b>Trigonometric Functions</b> 6.1 Secant, Cosecant and Cotangent 6.2 Graphs Of sec x, cosec x and cot x 6.3 Using sec x, cosec x and cot x 6.4 Trigonometric Identities 6.5 Inverse Trigonometric Identities</p>	<p>INTEGRAL <u>Year 2 Pure</u> <b>Trigonometric Functions</b> Test TF1 Trigonometric Functions Topic Assessment</p>	<p>REVISION GUIDE Pages 78-81</p>
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<p><b>TOPIC</b> <b>17</b> Data Collection</p>	<p><b>Data Collection Powerpoint</b> Populations/Samples Random and Non-random samples Types of data Large data set</p>	<p>TEXTBOOK Stat and Mech Year 1 Chapter 1 <b>Data Collection</b> 1.1 Population and Samples 1.2 Sampling 1.3 Non-Random Sampling 1.4 Types of Data 1.5 The Large Data Set</p>	<p>INTEGRAL <u>Year 1 Stats</u> <b>Collecting and Interpreting Data 1: Collecting Data</b> Test D1</p>	<p>REVISION GUIDE Pages 112</p>
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<p><b>TOPIC 18</b> Probability</p>	<p><b>Probability Powerpoint</b> Basic Probability Venn Diagrams Mutually Exclusive Independent Tree Diagrams Set Notation Conditional Probability - Venn Diagrams / Tree Diagrams /Formulae</p>	<p>TEXTBOOK Stat and Mech Year 1 Chapter 5 <b>Probability 1</b> 5.1 Calculating Probabilities 5.2 Venn Diagrams 5.3 Mutually Exclusive &amp; Independent Events 5.4 Tree Diagrams</p> <p>TEXTBOOK Stat and Mech Year 2 Chapter 2 <b>Conditional Probability</b> 2.1 Set Notation 2.2 Conditional Probability 2.3 Conditional Probabilities in Venn Diagrams 2.4 Probability Formulae 2.5 Tree Diagrams</p>	<p>INTEGRAL <u>Year 1 Stats</u> <b>Probability 1: Working with probability</b> Test P1</p> <p><u>Year 2 Stats</u> <b>Probability</b> Test P1 Probability Topic Assessment</p>	<p>REVISION GUIDE Pages 126-129, 138-139</p>
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<p><b>TOPIC 19</b> Binomial Expansion</p>	<p><b>Binomial Expansion Powerpoint</b> Factorial notation Binomial expansion Estimation Negative/fractional powers Constant not 1 Partial Fractions in Binomial</p>	<p>TEXTBOOK Pure Year 1 Chapter 8 <b>Binomial Expansion</b> 8.1 Pascal's Triangle 8.2 Factorial Notation 8.3 The Binomial Expansion 8.4 Solving Binomial Problems 8.5 Binomial Estimation</p> <p>TEXTBOOK Pure Year 1 Chapter 4 <b>Binomial Expansion 2</b> 4.1 and 4.2 binomial expansion 4.3 Partial Fractions</p>	<p>INTEGRAL <u>Year 1 Pure</u> <b>The binomial expansion</b> Test B1 Binomial Topic Assessment</p> <p><u>Year 2 Pure</u> <b>Algebra 1: the general binomial expansion</b> Test A1 Algebra Topic Assessment</p>	<p>REVISION GUIDE Pages 24, 25, 75</p>
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<p><b>TOPIC 20</b> Binomial Distribution</p>	<p><b>Binomial Distribution Powerpoint</b> General Probability Distributions - Tables, Graphs, Formulae Binomial Distribution Cumulative Binomial Probabilities</p>	<p>TEXTBOOK Stats and Mech Year 1 Chapter 6 <b>Statistical Distributions</b> 6.1 Probability Distributions 6.2 The Binomial Distribution 6.3 Cumulative Probabilities</p>	<p>INTEGRAL <u>Year 1 Statistics</u> <b>Probability 2: Probability Distributions</b> Test P2 Probability Topic Assessment</p> <p><b>The Binomial Distribution</b> Test B1 Binomial distribution Topic Assessment</p>	<p>REVISION GUIDE Pages 130-131</p>
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<p><b>TOPIC 21</b> Hypothesis Testing</p>	<p><b>Binomial Hypothesis Testing Powerpoint</b> Critical Regions and Values One tailed tests Two tailed tests</p>	<p>TEXTBOOK Stats and Mech Year 1 Chapter 7 <b><u>Hypothesis Testing</u></b> 7.1 Hypothesis Testing 7.2 Finding Critical Values 7.3 One-Tailed Tests 7.4 Two-Tailed Tests</p>	<p>INTEGRAL <u>Year 1 Pure</u> <b>Statistical Hypothesis Testing</b> Test H1 Test H2 Statistical Hypothesis Testing Topic Assessment</p>	<p>REVISION GUIDE Pages 132-133</p>
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<p><b>TOPIC 23</b> Forces</p>	<p><b>Forces (Part 1) Powerpoint</b> <b>Forces (Part 2) Powerpoint</b> Forces Resolving components Inclined Planes <math>F = \mu R</math> Connected particles Pulleys</p>	<p>TEXTBOOK Stats and Mech Year 1 Chapter 10 <b><u>Forces Part 1</u></b> 10.1 Force Diagrams 10.2 Forces as Vectors 10.3 Forces and Acceleration 10.4 Motion in 2 Dimensions (leave out 10.5 and 10.6)  TEXTBOOK Stats and Mech Year 2 Chapter 5 and 7 <b><u>Forces and Friction</u></b> 5.1 Resolving Forces 5.2 Inclined Planes 5.3 Friction <b><u>Application of Forces</u></b> 7.1 Static Particles 7.2 Modelling with Statics 7.3 Friction and Static Particles 7.4 Static Rigid Bodies 7.5 Dynamics and Inclined Planes (leave out 7.6)</p>	<p>INTEGRAL <u>Year 1 Mechanics</u> <b>Forces and Newton's Laws</b> Test F1 Test F2 Test F3 Forces and Newton's Laws Topic Assessment <u>Year 2 Mechanics</u> <b>Forces and Motion</b> Test F1 Test F2 Forces and Motion Topic Assessment <b>A model for friction</b> Test FR1 A model for friction Topic Assessment</p>	<p>REVISION GUIDE Pages 153, 155, 156-158, 167-169, 172-173, 175</p>
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<p><b>TOPIC 24</b> Differentiation (Part 1)</p>	<p><b>Differentiation (Part 1)</b> <b>Powerpoint</b> First Principles Derivatives of polynomials Equations of tangents and normals</p>	<p>TEXTBOOK Pure Year 1 Chapter 12 <b>Differentiation</b> 12.1 Gradients of Curves 12.2 Finding the Derivative 12.3 Differentiating <math>x</math> to the <math>n</math> 12.4 Differentiating Quadratics 12.5 Differentiating 2 or More Terms 12.6 Gradients, Tangents &amp; Normals</p>	<p>INTEGRAL <u>Year 1 Pure</u> <b>Differentiation 1: Introduction to differentiation</b> Test D1 <b>Differentiation 3: Extending the rule</b> Test D3</p>	<p>REVISION GUIDE Pages 35-38, 92</p>
<p><b>TOPIC 25</b> Differentiation (Part 2)</p>	<p><b>Differentiation (Part 2)</b> <b>Powerpoint</b> Increasing and decreasing functions Second derivatives Stationary points Sketching gradient functions Optimisation</p>	<p>TEXTBOOK Pure Year 1 Chapter 12 <b>Differentiation</b> 12.7 Increasing &amp; Decreasing Functions 12.8 Second Order Derivatives 12.9 Stationary Points 12.10 Sketching Gradient Functions 12.11 Modelling with Differentiation</p>	<p>INTEGRAL <u>Year 1 Pure</u> <b>Differentiation 2: Maximum and minimum points</b> Test D2 <b>Differentiation 4: More differentiation</b> Test D4 Differentiation Topic Assessment</p>	<p>REVISION GUIDE Pages 39-41</p>
<p><b>TOPIC 26</b> Integration (Part 1)</p>	<p><b>Integration (Part 1)</b> <b>Powerpoint</b> Finding <math>y</math> given <math>dy/dx</math> Definite Integrals and area between the curve and <math>x</math> axis Area bounded by 2 different lines</p>	<p>TEXTBOOK Pure Year 1 Chapter 13 <b>Integration</b> 13.1 Integrating <math>x</math> to the <math>n</math> 13.2 Indefinite Integrals 13.3 Finding Functions 13.4 Definite Integrals 13.5 Areas Under Curves 13.6 Areas Under the <math>x</math> axis 13.7 Areas Between Curves and Lines</p>	<p>INTEGRAL <u>Year 1 Pure</u> <b>Integration</b> Test I1 Test I2 Test I3 Integration Topic Assessment</p>	<p>REVISION GUIDE Pages 42-45</p>