



## Archbishop Beck Catholic College

### KS5 Scheme of Work

#### Year 13 Maths Pure



Lesson Sequencing	The High 5 Lesson : to be used throughout year	Further Challenge Opportunities
<p><b>Unit 3: Functions and modelling</b></p> <ul style="list-style-type: none"><li>• 3b. Composite and inverse functions</li><li>• 3c. Transformations</li><li>• 3d. Modelling with functions (trigonometric, exponential, reciprocal etc.)</li></ul> <p><b>Unit 4: Series and sequences</b></p> <ul style="list-style-type: none"><li>• 4a. Arithmetic and geometric progressions (proofs of 'sum formulae')</li><li>• 4b. Sigma notation</li><li>• 4c. Recurrence and iterations</li></ul> <p><b>Unit 5: The binomial theorem</b></p> <ul style="list-style-type: none"><li>• 5a. Expanding <math>(a + bx)^n</math> for rational <math>n</math> knowledge of range of validity</li><li>• 5b. Expansion of functions by first using partial fractions</li></ul>	<p><b>Consolidation:</b> Tasks to support prior learning including past exam questions.</p> <p><b>Modelling:</b> Model examples for each topic when taught. Also exam questions to recap.</p> <p><b>Response and Feedback:</b> Q &amp; A, oral feedback to whole class and individuals, improvement tasks, extension tasks, peer assessment tasks, marking of homework and assessments in depth.</p> <p><b>Challenge:</b> use of exam questions and problem solving questions from text book. Mixed exercises also provide challenge questions.</p> <p><b>Independence:</b> Pupils to work through mixed exercises and review exercises in text book.</p>	<p><b>Extension</b> Exam and problem solving questions provided. Mixed exercises and review exercises provided to challenge HAP.</p> <p>Use of Advanced Maths Support Programme for problem solving days, STEP and AEA test preparation days.</p>

### Unit 6: Trigonometry

- 6a. Radians (exact values), arcs and sectors
- 6b. Small angles
- 6c. Secant, cosecant and cotangent (definitions, identities and graphs); Inverse trigonometrical functions
- 6d. Compound and double (and half) angle formulae; geometric proof of compound angle formula
- 6e.  $R \cos(x \pm a)$  or  $R \sin(x \pm a)$
- 6f. Proving trigonometric identities
- 6g. Solving problems in context (e.g. mechanics)

### Unit 7: Parametric equations

- 7a. Definition and converting between parametric and Cartesian forms
- 7b. Curve sketching and modelling

### Unit 8: Differentiation

- 8a. Differentiating  $\sin x$  and  $\cos x$  from first principles
- 8b. Differentiating exponentials and logarithms
- 8c. Differentiating products, quotients, implicit and parametric functions.
- 8d. Second derivatives (rates of change of gradient, inflections)
- 8e. Rates of change problems (including growth and kinematics) - see Integration (part 2) - Differential equations

**Consolidation:** Tasks to support prior learning including past exam questions.

**Modelling:** Model examples for each topic when taught. Also exam questions to recap.

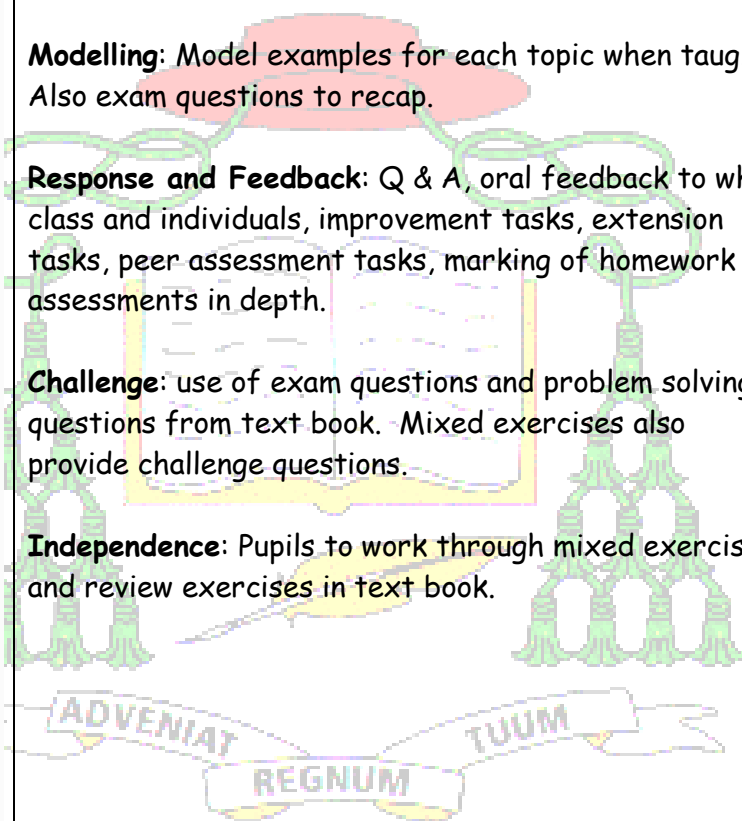
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**Unit 9: Numerical methods - see Integration (part 2) for the trapezium rule**

- 9a. Location of roots
- 9b. Solving by iterative methods (knowledge of 'staircase and cobweb' diagrams)
- 9c. Newton-Raphson method
- 9d. Problem solving

**Unit 10: Integration (part 1)** 10a.

Integrating  $x^n$  (including when  $n = -1$ ), exponentials and trigonometric functions

- 10b. Using the reverse of differentiation, and using trigonometric identities to manipulate integrals

**Unit 11: Integration (part 2)**

- 11a. Integration by substitution
- 11b. Integration by parts
- 11c. Use of partial fractions
- 11d. Areas under graphs or between two curves, including understanding the area is the limit of a sum (using sigma notation)
- 11e. The trapezium rule
- 11f. Differential equations (including knowledge of the family of solution curves)

**Unit 12: Vectors (3D)**

- 12a. Use of vectors in three dimensions; knowledge of column vectors and  $i$ ,  $j$  and  $k$  unit vectors

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