Highclare School
Mathematics Department

Advanced Subsidiary Mathematics
Module: Core Mathematics 2
Scheme of Work

1 Algebra and functions

What students need to learn:

Simple algebraic division; use of the Factor Theorem and the Remainder Theorem.	Only division by $(x + a)$ or $(x - a)$ will be required. Students should know that if $f(x) = 0$ when $x = a$, then $(x - a)$ is a factor of $f(x)$. Students may be required to factorise cubic expressions such as $x^3 + 3x^2 - 4$ and $6x^3 + 11x^2 - x - 6$. Students should be familiar with the terms 'quotient' and 'remainder' and be able to determine the remainder when the polynomial $f(x)$ is divided by $(ax + b)$.

Resources

- Modular Mathematics for Edexcel: AS Pure Mathematics by John Sykes - Chapter 6 Ex 6A – 6D
- Additional exercises from other textbooks as required
- MEI website
- Past examination papers/Solomon practice papers

Time allocated

1-2 weeks (3 hours per week)

2 Coordinate geometry in the (x, y) plane

What students need to learn:

Coordinate geometry of the circle using the equation of a circle in the form $(x-a)^2+(y-b)^2=r^2$ and including use of the following circle properties: (i) the angle in a semicircle is a right angle; (ii) the perpendicular from the centre to a chord bisects the chord; (iii) the perpendicularity of radius and tangent.	Students should be able to find the radius and the coordinates of the centre of the circle given the equation of the circle, and vice versa.

Resources

- Modular Mathematics for Edexcel: AS Pure Mathematics by John Sykes - Chapter 7 Ex 7A – 7C
- Additional exercises from other textbooks as required
- Autograph for investigating how equations of circles relate to their graphs
- MEI website
- Past examination papers/Solomon practice papers

Time allocated

1 week

3 Sequences and series

What students need to learn:

The sum of a finite geometric series; the sum to infinity of a convergent geometric series, including the use of $\|r\| < 1$.	The general term and the sum to n terms are required. The proof of the sum formula should be known.
Binomial expansion of $(1+x)^n$ for positive integer n. The notations $n!$ and $\binom{n}{r}$.	Expansion of $(a+bx)^n$ may be required.

Resources

- Modular Mathematics for Edexcel: AS Pure Mathematics by John Sykes - Chapter 8 Ex 8A – 8F
- Additional exercises from other textbooks as required
- MEI website
- Past examination papers/Solomon practice papers

Time allocated

2 weeks

4 Trigonometry

What students need to learn:

The sine and cosine rules, and the area of a triangle in the form $\frac{1}{2}ab\sin C$.	
Radian measure, including use for arc length and area of sector.	Use of the formulae $s = r\theta$ and $A = \frac{1}{2}r^2\theta$ for a circle.
Sine, cosine and tangent functions. Their graphs, symmetries and periodicity.	Knowledge of graphs of curves with equations such as $y = 3\sin x, y = \sin\left(x + \frac{\pi}{6}\right), y = \sin 2x$ is expected.
Knowledge and use of $\tan\theta = \frac{\sin\theta}{\cos\theta}$, and $\sin^2\theta + \cos^2\theta = 1$.	
Solution of simple trigonometric equations in a given interval.	Students should be able to solve equations such as $\sin\left(x + \frac{\pi}{2}\right) = \frac{3}{4}$ for $0 < x < 2\pi$, $\cos(x + 30°) = \frac{1}{2}$ for $-180° < x < 180°$, $\tan 2x = 1$ for $90° < x < 270°$, $6\cos^2 x + \sin x - 5 = 0, 0° \le x < 360$, $\sin^2\left(x + \frac{\pi}{6}\right) = \frac{1}{2}$ for $-\pi \le x < \pi$.

Resources

- Modular Mathematics for Edexcel: AS Pure Mathematics by John Sykes - Chapter 9 Ex 9A – 9J
- Additional exercises from other textbooks as required
- Autograph for investigating trigonometric graphs
- MEI website
- Powerpoint Maths: Trigonometry (graph collection)
- Past examination papers/Solomon practice papers

Time allocated

3 weeks

5 Exponentials and logarithms

What students need to learn:

$y = a^x$ and its graph.

Laws of logarithms	To include $\log_a xy = \log_a x + \log_a y,$ $\log_a \frac{x}{y} = \log_a x - \log_a y,$ $\log_a x^k = k \log_a x,$ $\log_a \frac{1}{x} = -\log_a x$, $\log_a a = 1$
The solution of equations of the form $a^x = b$.	Students may use the change of base formula.

Resources

- Modular Mathematics for Edexcel: AS Pure Mathematics by John Sykes - Chapter 10 Ex 10A – 10D
- Additional exercises from other textbooks as required
- Autograph for investigating exponential graphs
- MEI website
- Past examination papers/Solomon practice papers

Time allocated

1-2 weeks

6 Differentiation

What students need to learn:

Applications of differentiation to maxima and minima and stationary points, increasing and decreasing functions.	The notation $f''(x)$ may be used for the second order derivative. To include applications to curve sketching. Maxima and minima problems may be set in the context of a practical problem.

Resources

- Modular Mathematics for Edexcel: AS Pure Mathematics by John Sykes - Chapter 11 Ex 11A – 11D
- Additional exercises from other textbooks as required
- Autograph for checking sketch graphs
- MEI website
- Past examination papers/Solomon practice papers

Time allocated

1-2 weeks

7 Integration

What students need to learn:

Evaluation of definite integrals.	
Interpretation of the definite integral as the area under a curve.	Students will be expected to be able to evaluate the area of a region bounded by a curve and given straight lines. Eg find the finite area bounded by the curve $y = 6x - x^2$ and the line $y = 2x$. $\int x \, dy$ will not be required.
Approximation of area under a curve using the trapezium rule.	For example, evaluate $\int_0^1 \sqrt{(2x+1)} \, dx$ using the values of $\sqrt{(2x+1)}$ at $x = 0$, 0.25, 0.5, 0.75 and 1.

Resources

- Modular Mathematics for Edexcel: AS Pure Mathematics by John Sykes - Chapter 12 Ex 12A – 12F
- Additional exercises from other textbooks as required
- MEI website
- Past examination papers/Solomon practice papers

Time allocated

2 weeks