

A Level Further Mathematics

Plymstock School



About the Course:

- Specification: OCR MEI (B) A Level Further Mathematics
- Includes – Pure Mathematics, Mechanics and Statistics
- Problem Solving
- 100% Exam
- $1 \times 2\frac{1}{4}$, 1×2 hr 40 mins and $1 \times 1\frac{1}{4}$ hour exams (taken at the end of Year 13)



Pure Mathematics

When studying pure mathematics at A level Further maths you will be extending your knowledge of topics such as algebra and trigonometry as well as learning some brand new ideas such as complex numbers, matrices & calculus.

While many of the ideas that you will meet in pure mathematics are interesting in their own right, they also serve as an important foundation for other branches of mathematics, especially mechanics and statistics.



Mechanics

Mechanics deals with the action of forces on objects. It is therefore concerned with many everyday situations, e.g. objects colliding, work, energy & power, momentum & impulse.

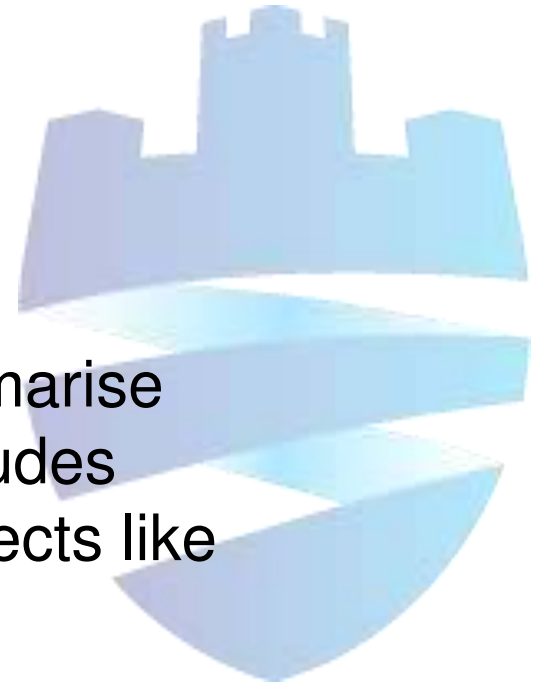
Such problems have to be simplified or modelled to make them capable of solution using relatively simple mathematics.



Statistics

When you study statistics you will learn how to analyse and summarise numerical data in order to arrive at conclusions about it. This includes sampling, and other statistical methods used in other A level subjects like Psychology.

You will extend the range of probability problems that you looked at in GCSE and use new techniques learned on the A level course.



Lessons: Similar to A level Maths

- Year 12 and 13 in one class
- Two Teachers – Split elements of the course
- 5 hours of lessons each week
- Regular topic based assessments throughout the course
- Independent study is the key to success
- A Level Further Maths is both interesting & challenging – you must ask for help!



Preparation:

- Be confident with the GCSE content
- Complete the bridging work
- Practice, Practice, Practice
- [Calculator](#)
- [Head start to A Level Maths](#)



GCSE Maths topics you need to be confident with for A Level Maths:

ALGEBRA

- Solving linear equations
MathsWatch: Clip 135a
- Simultaneous equations
MathsWatch: Clip 140, 162, 211
- Expanding brackets
MathsWatch: Clip 93, 134a, 134b, 178
- Factorising
MathsWatch: Clip 94, 157, 192
- Inequalities
MathsWatch: Clip 139, 212
- Solving Quadratic equations by factorising, quadratic formula, and completing the square
MathsWatch: Clip 157, 191
- Recognise the difference of two squares
MathsWatch: Clip 158
- Rearranging formulae
MathsWatch: Clip 136, 190
- Algebraic fractions
MathsWatch: Clip 210a, 210b
- Transforming graphs
MathsWatch: Clip 196a, 196b
- Straight line graphs
MathsWatch: Clip 96, 159a, 159b, 208

NUMBER

- Indices
MathsWatch: Clip 82, 154, 188
- Surds
MathsWatch: Clip 207a, 207b, 207c

SHAPE AND SPACE

- Pythagoras' Theorem
MathsWatch: Clip 150a, 150b, 150c
- Trigonometry in right angled triangles (SOHCAHTOA)
MathsWatch: Clip 168
- Sine and cosine rule
MathsWatch: Clip 201, 202
- Area of a non-right angled triangle
MathsWatch: Clip 203



Complex Numbers



To start:

$$\text{Solve the equation } x^2 + 6x + 25 = 0$$

What happens?



• $\sqrt{-1} = i$

So $\sqrt{-25} = \sqrt{25} \times \sqrt{-1} = 5i$

What will $\sqrt{-16}$ be?

What about $\sqrt{-28}$?

Write in the form bi , where $b \in \mathbb{R}$.

21 $\sqrt{-9}$

23 $\sqrt{-121}$

25 $\sqrt{-225}$

27 $\sqrt{-12}$

29 $\sqrt{-200}$

22 $\sqrt{-49}$

24 $\sqrt{-10000}$

26 $\sqrt{-5}$

28 $\sqrt{-45}$

30 $\sqrt{-147}$



- A complex number is written in the form $a + bi$
- You can add and subtract complex numbers.

Example

Simplify, giving your answer in the form $a + bi$, where $a \in \mathbb{R}$ and $b \in \mathbb{R}$.

a $(2 + 5i) + (7 + 3i)$

b $(3 - 4i) + (-5 + 6i)$

c $2(5 - 8i)$

d $(1 + 8i) - (6 + i)$

e $(2 - 5i) - (5 - 11i)$

f $(2 + 3i) - (2 - 3i)$

Simplify, giving your answer in the form $a + bi$, where $a \in \mathbb{R}$ and $b \in \mathbb{R}$.

1 $(5 + 2i) + (8 + 9i)$

2 $(4 + 10i) + (1 - 8i)$

3 $(7 + 6i) + (-3 - 5i)$

4 $(2 - i) + (11 + 2i)$

5 $(3 - 7i) + (-6 + 7i)$

6 $(20 + 12i) - (11 + 3i)$

7 $(9 + 6i) - (8 + 10i)$

8 $(2 - i) - (-5 + 3i)$

9 $(-4 - 6i) - (-8 - 8i)$

10 $(-1 + 5i) - (-1 + i)$



- You can multiply complex numbers using the same technique as you use for multiplying brackets in algebra, and you can simplify powers of i .
- Since $i = \sqrt{-1}$, $i^2 = -1$

You can multiply complex numbers

E.g. Multiply $(2+3i)$ by $(4+5i)$

