

Name : _____



Level 3 Core Maths Preparation Work Summer 2023

In September you have chosen Level 3 Core Maths in order to strengthen and extend your mathematical knowledge as well as to support your other A-Levels over the next 2 years.

The course that we follow is the AQA Mathematical Studies course with the optional paper 2A.

Within the course the mathematics that you will study includes:

- financial mathematics,
- statistics and probability,
- critical analysis,
- modelling (using spreadsheets)
- Fermi estimations.

In both Year 12 and 13 you will have one double lesson a week.

Expectations

Each student is expected to become more responsible for his/her own learning as the course progresses. This will include seeking assistance from their teacher outside of normal lessons when the need arises. A degree of extra study will also be expected through the obtaining of additional resources such as extra texts from the recommended book list. Throughout, there should be an increasing emphasis on the students active learning.

Qualities of a **SUCCESSFUL** Core Mathematics student

The following, though not an exhaustive list, are the qualities that must be developed in order to maximise the achievement in Mathematics.

- ✓ You will be expected to bring your own scientific calculator – Casio fx-991EX, this is called a classwiz, paper to write on and basic mathematics equipment
- ✓ Keep organised notes, bring them with you every lesson. Notes for the current chapter are expected to be brought to all lessons. Your folder will be reviewed once per half term by your teacher, so keep it organised and up to date.
- ✓ Do take quality notes in class. Remember that your notes need to be good enough so that you can revise from them in 6 weeks and 6 months' time.
- ✓ Be punctual to lessons
- ✓ Actively participate in lessons - ask questions, answer questions, get involved
- ✓ Have good time management skills
- ✓ Meet ALL homework deadlines, hand in your homework in a clear wallet with your name on. All pages should be numbered and in the correct order. Any homework set from the text book should be marked using the answers in the back of the book. Any questions that you have not been able to complete should be accompanied with a note explaining where the problem or misunderstanding has occurred.
- ✓ Complete all set work
- ✓ Be prepared, read ahead in the textbook provided
- ✓ Prepare for end of topic tests
- ✓ Go over homework, learn from your mistakes
- ✓ Read around the subject
- ✓ Complete all set tasks in the independent study booklet
- ✓ If you miss a lesson then the onus is on you to catch up. Copy another students notes, read them, if you understand them then do the questions set. If you do not follow them, use the MEI website walkthroughs to guide you, then, if you are still unsure come and see one of your teachers.
- ✓ **FINALLY** Do get things sorted out. If you are stuck- get help. **sort it out.** Speak to any teacher the maths department, we can all help.

In preparation for your course in September you are encouraged to complete a few activities to keep your brain ticking over in a mathematical way!

We really want to encourage you to think for yourselves when solving these problems:

- How could you answer these problems?
- How would you illustrate your solution?
- What information do you need to know to solve them?
- Do you know what area of GCSE Mathematics that this links to?

Task One

You need to be confident answering the following questions in order to be able to achieve success in your Core Maths from the beginning!

You need to make sure you show full workings and correct notation for each question.

Please present your work clearly, using a ruler and pencil for all diagrams.

Please complete the questions in the spaces provided

Types of Number and Fractions

1. Which of the following are integers? Circle them

4 -3.5 0.3 $\frac{4}{5}$ 8.99 -10 205 0

2. Express in standard Form

a) 50

f) 0.25

b) 500

g) 0.025

c) 2500

h) 0.0205

d) 250

i) 25×10^2

e) 0.2

j) 50×10^{-3}

3. Evaluate the following without using a calculator, giving your answers in their lowest terms. Give any answers larger than 1 as improper fractions.

a) $\frac{2}{9} \times \frac{3}{5}$	c) $\frac{1}{12} + \frac{5}{6}$
b) $\frac{1}{6} \div \frac{2}{3}$	d) $\frac{8}{5} - \frac{1}{7}$

Solving Equations and Rearranging Formulae

4. Solve the following:

a) $5x - 2 = 8$

b) $3(x - 6) = 2(x - 4)$

c) $2x(x + 1) = 2x + 18$

5. Make x the subject of the following formulae:

a) $y = mx + c$

b) $y = \frac{3x+2}{5}$

c) $y = 2x^2z + 1$

d) $y = \frac{3x+1}{x-2}$

Straight Lines and Quadratic Graphs

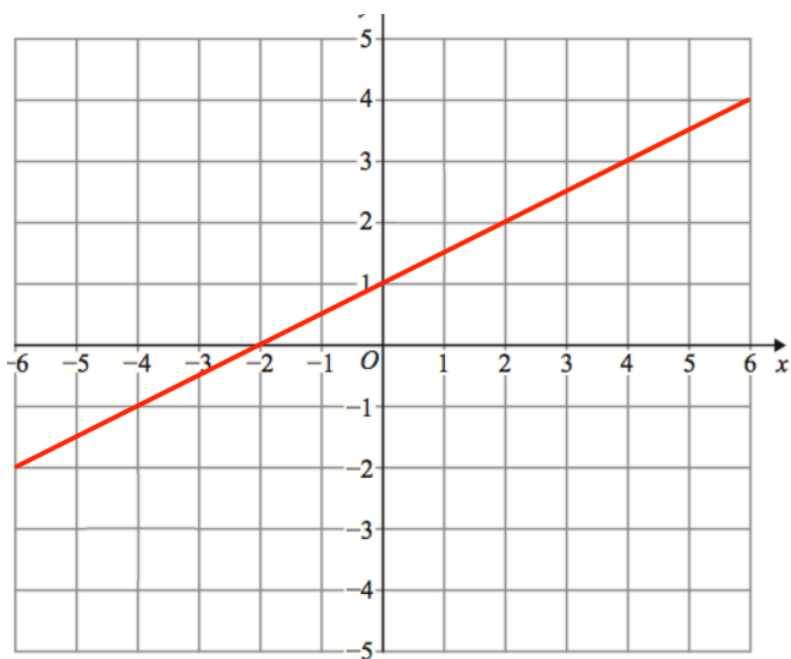
6. Plot $y = 2x + 7$

7. Plot $y = 8 - 3x$

Plot both on the same set of axes below.



8. What is the equation of the line below?



9. Point A has coordinates $(5, 2)$ and point B has coordinates $(2, -4)$.

a) Find the equation of the line passing through points A and B.

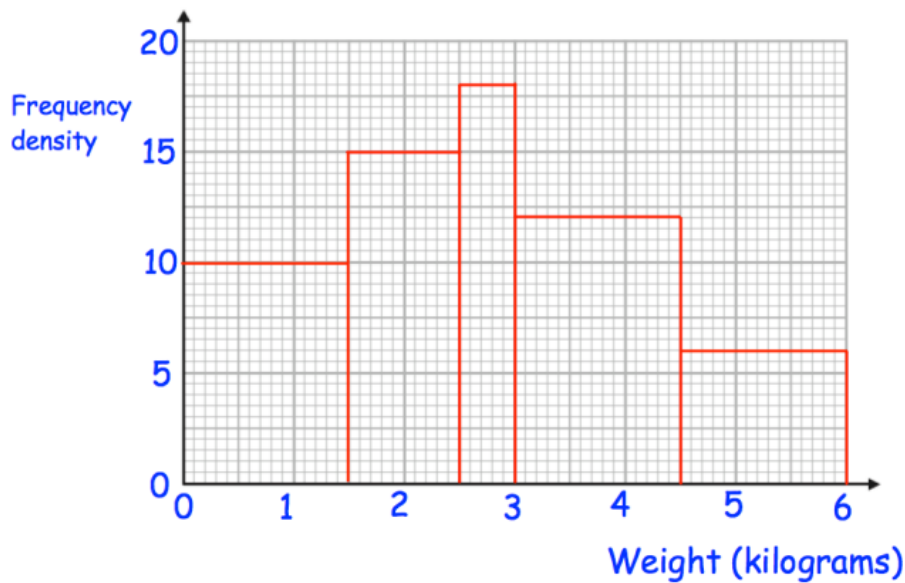
b) Find the exact length of line AB.

Handling Data

10. Calculate an estimate for the mean length of plants and comment on why it is only an estimate.

length, L , cm	Frequency	Midpoint	
$0 < L \leq 10$	21		
$10 < L \leq 20$	11		
$20 < L \leq 30$	31		
$30 < L \leq 40$	12		
$40 < L \leq 50$	25		

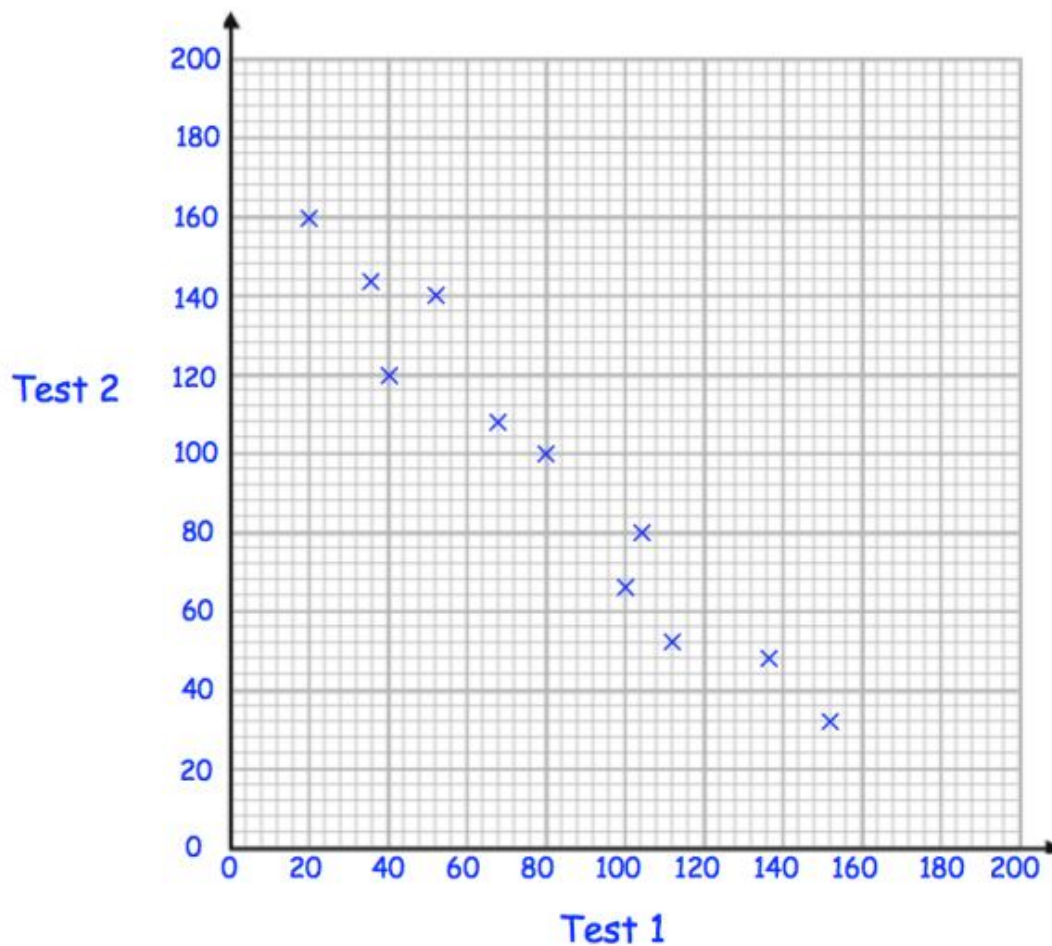
11. Below is a histogram that shows the weights of parcels.



Use the information in the histogram to complete the table below.

Weight, w	Frequency
$0 < w \leq 1.5$	
$1.5 < w \leq 2.5$	
$2.5 < w \leq 3$	
$3 < w \leq 4.5$	
$4.5 < w \leq 6$	

12. Some rugby players take two tests, one measuring speed and the other measuring strength. Each test is marked out of 200.
The scatter graph compares the result



What type of correlation does this scatter graph show?

Draw a line of best fit on the scatter graph and find the equation for the line of the best fit that you have drawn.

Brian scores 40 in Test 2. Estimate his score in Test 1.

Task two

Can you find out what the definition of a 'Fermi estimation' is?

Can you give an example of a Fermi estimation question *and your solution to it?*

Task three – *please select ONE and write your thoughts/solutions below*

<https://nrich.maths.org/6046>

This activity focuses on BIG numbers and how we process them

<https://nrich.maths.org/8318>

This activity is about types of numbers and magnitudes of numbers.

<https://nrich.maths.org/5893>

This activity involves percentages and investments.

<https://nrich.maths.org/7721>

This one gets you to think about probability in some real-life settings.

<https://nrich.maths.org/8061>

This is one to think about, can you use the spreadsheet to help you think about it?

OPTIONAL BUT VERY IMPORTANT

It would also be a good idea to revise some key GCSE topics before the start of September. A good place to revise is [Corbettmaths](https://www.corbettmaths.com). On this website you will find videos to guide you, questions to work through in order to check your understanding and also the worked solutions to check your progress and understanding.

The topics that you should focus on include:

- Percentage increase and decrease and compound interest.
- Equation of a straight line.
- Similarity & Pythagoras' Theorem.
- Area, Volume and Surface area
- Finding a statistical average: mean, mode and median from raw data, a frequency table and a grouped frequency table.
- Be able to plot a cumulative frequency graph and use it to find the median and IQR.
- Histograms.
- Box and whisker plots.

I hope that you enjoy looking at some of the materials suggested and we look forward to welcoming you into our classrooms later this year.