Sir Roger Manwood's School

A Level Mathematics Preparation 2025

Successful study of A Level Mathematics requires a good level of skill and confidence in GCSE and in particular in Algebra. Is is therefore important that you do some preparation in advance so that you are ready and looking forward to your next challenge.

We have listed the topics on the next pages that we think are essentials. You need to know these topics thoroughly and to be able to apply your knowledge in these areas.

We have arranged for you to have access to the AMSP (Advanced Maths Support Programme) Transition to A Level Maths material. This is hosted on the Integral website (https://my.integralmaths.org/login). You should have been given your individual login details, but if you haven't got them, please contact us. We should like you to work through <u>at least</u> the Algebraic Manipulation section of the course, together with the Algebraic Manipulation assessment, and to print the certificate to show to us in September. If you do this work towards the end of the holiday, you will remember it better when you need it in September. The more you expolore these resources the more confident you will be in September.

There are some suggestions of other textbooks and resources that you might like to look at here. Use them if necessary so that you are confident that you can do all the necessary topics as listed on the next pages.

1) The rest of the AMSP Transition to A Level Maths material

2) AMSP Transition to A level Mathematics: Essential Skills resources
https://amsp.org.uk/resource/gcse-alevel-transition-resources.

3) On Kerboodle: Edexcel A Level Maths Year 1 + Year 2 Bridging Edition

4) MyMaths: A-level Bridging from GCSE.   Use this link after you have logged into MyMaths or select the A Level (England) Curriculum and the Bridging from GCSE sections of Pure, Statistics and Mechanics   https://app.mymaths.co.uk/myportal/library/30/370/4490

5) Your GCSE notes and revision guides

6) Books specifically written to bridge the gap between GCSE and A Level mathematics

e.g.   Bridging GCSE and A Level maths Student Book (Collins) ISBN: 9780008205010
Head Start to AS Maths (CGP) ISBN: 9781782947929

You will need a calculator and text books for your A Level Mathematics course. You can either buy these for yourself in advance, or buy them through school in September.

1) You need a calculator with the ability to access probabilities from standard statistical distributions.
The Casio *fx*-991CW is the calculator which we recommend and can order for you in September. The Casio *fx*-991EX is an older model; it has all the same functions and you might be able to find one at a reduced price.
The Casio *fx*-CG50, a graphical calculator, is also acceptable for use in the examinations, but is more expensive.

2) The two text books required for year 12 are:

i) Edexcel AS & A-Level Mathematics Student Textbook - Pure Mathematics Year 1/AS + Online Edition ISBN: 9781789088397 Publisher: **CGP**

ii) Edexcel AS and A Level Mathematics Student textbook -Statistics & Mechanics Year 1/AS + online   ISBN: 9781789088403 Publisher: **CGP**

Pre-requisites for studying A Level Mathematics

1) Know and be able to use the laws of indices

$$x^a \times x^b = x^{a+b} \qquad \frac{x^a}{x^b} = x^{a-b} \qquad \left(x^a\right)^b = x^{ab}$$

$$x^0 = 1 \qquad x^{-a} = \frac{1}{x^a} \qquad x^{\frac{1}{a}} = \sqrt[a]{x} \qquad x^{\frac{b}{a}} = \sqrt[a]{x^b}$$

2) Expand brackets and factorise quadratic expressions

e.g.
$$(x+3)(2x-5) \equiv 2x^2 + x - 15 \qquad (x+2)(x+2) \equiv x^2 - 4$$
$$x^2 + 7x + 12 \equiv (x+3)(x+4) \qquad x^2 - 9 \equiv (x-3)(x+3) \qquad 2x^2 - 9x - 18 \equiv (2x+3)(x-6)$$

3) Use surd form and rationalise the denominator of a fraction

$$\sqrt{8} = 2\sqrt{2}$$

$$\frac{1}{3-\sqrt{2}} = \frac{1}{3-\sqrt{2}} \times \frac{3+\sqrt{2}}{3+\sqrt{2}}$$
$$= \frac{3+\sqrt{2}}{9-2}$$
$$= \frac{(3+\sqrt{2})}{7}$$

e.g

4) Solve simultaneous equations

  a) both equations linear
  b) one equation linear and one quadratic

$$4x + 6y = -4$$
e.g. solve: $4x^2 - 2y^2 = -1$

5) Find an equation of the line passing through two given points

e.g.   Find the equation of the line through $(3,4)$ and $(6,-7)$

6) Be able to transform graphs

Given a sketch of the graph of $y = f(x)$, sketch $y = f(x) + c$, $y = f(x+c)$, $y = cf(x)$ $y = f(cx)$, $y = -f(x)$ and $y = f(-x)$ for a constant, c.

7) Completing the square

e.g.

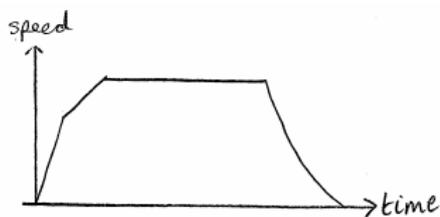$$x^2 + 8x - 12 \equiv (x+4)^2 - 16 - 12$$
$$\equiv (x+4)^2 - 28$$

8) <u>Add algebraic fractions</u>
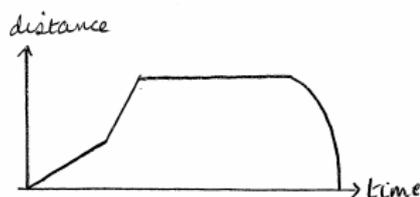
e.g.

$$\frac{2}{x-3} - \frac{1}{2x+3} \equiv \frac{2(2x+3)}{(x-3)(2x+3)} - \frac{(x-3)}{(x-3)(2x+3)}$$

$$\equiv \frac{(4x+6)-(x-3)}{(x-3)(2x+3)}$$

$$\equiv \frac{4x+6-x+3}{(x-3)(2x+3)}$$

$$\equiv \frac{3x+9}{(x-3)(2x+3)}$$

9) <u>Know the properties of simple velocity/time, speed/time and distance/time graphs</u>
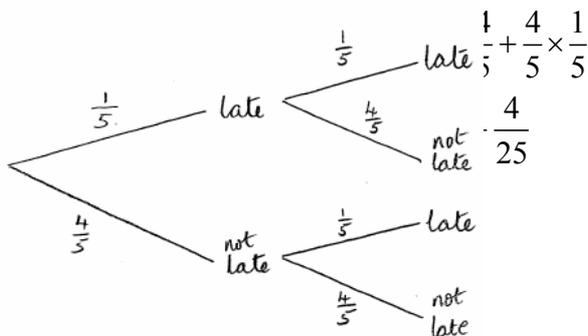
e.g.

acceleration and
area represents distance travelled

Gradient represents velocity

Gradient
represents

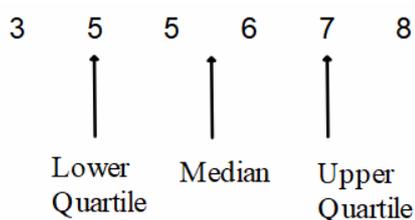10) <u>Use tree diagrams to calculate probabilities</u>

$$\text{late} \quad \frac{1}{5} + \frac{4}{5} \times \frac{1}{5}$$

$$\text{not late} \quad \frac{4}{25}$$

11) <u>Calculate the mean of a set of grouped data</u>

e.g. Find the mean value of x from this table

x	Frequency
$0 \le x < 5$	3
$5 \le x < 10$	6
$10 \le x < 15$	2

12) <u>Find median, quartiles and interquartile range for ungrouped data</u>

3   5   5   6   7   8

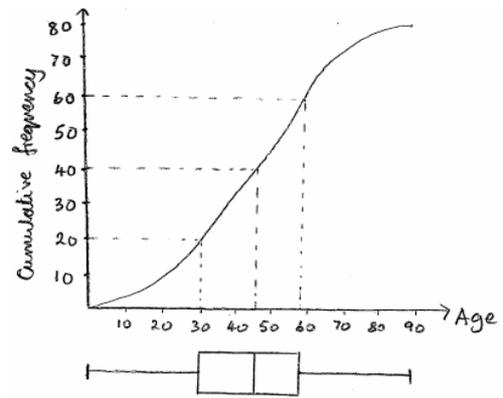Lower Quartile   Median   Upper Quartile

Median = 6.5

Interquartile range = $7 - 5 = 2$

13) **Cumulative frequency graphs and box and whisker plots**

Use a cumulative frequency graph to estimate median and quartiles of a set of grouped data
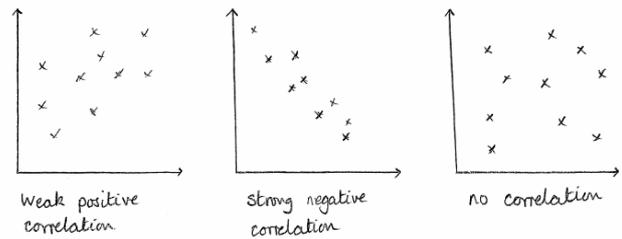
Draw box and whisker plots and understand their use in comparing sets of data

14) **Scatter diagrams**

Plot a scatter diagram and draw a line of best fit by eye and recognise:

strong/weak/no/positive/negative correlation

15) **Histograms**

Know that the frequency is proportional to the area of the bar