

Congratulations on choosing to study A Level Mathematics! In order to succeed in the transition from GCSE to A level maths, it is important that you hit the ground running. We have therefore prepared some materials for you to work through before you come back in September.

You may have heard about a 'step up' from GCSE to AS Level, and that even A* students at GCSE level can find the pace and content of the course challenging, especially in the first few weeks. In order to support you with this, and maximise your chances of success we are insisting on you completing the work from the attached sheet before you begin the course in September. All of these topics are in the GCSE syllabus, although if you are an external applicant to KCC you may not have been taught them as not all schools teach the entire higher syllabus to all pupils. We will be collecting this in your first year 12 maths lesson.

The topics and questions have been chosen to reflect the maths you will use at AS and we hope that this work will help prepare you for AS studies. They have been carefully selected to help prepare you for the demands of A-level study. Every skill tested in these questions is required throughout the course. Web addresses of relevant video tutorials have been provided for each topic to help remind you of the methods involved in solving each type of question in case you are a little rusty. Please ensure you take sufficient time to complete the work well without rushing it at the last minute. We will test the skills covered in this work in the first weeks of the course. **Students that struggle with the summer work or the test will need to attend compulsory topic catch-up sessions** to ensure they gain these fundamental skills needed to succeed on the course. If you want (or need) more practice work for any of the topics covered on the questions sheet, please use the resources found here: <https://www.mathsgenie.co.uk/gcse.html> or here: <https://amsp.org.uk/resource/gcse-alevel-transition-resources>

If you have any difficulty either finding the resources, or with any aspect of the mathematics, feel free to drop me an email on: kilby.r@kingsbridgecollege.org.uk and I will try to email a reply at the earliest convenience.

If you are confident in the topics covered on the question sheet and would like to read about some mathematics outside GCSE and A level, you may enjoy exploring the resources found at the websites listed below:

- <https://www.numberphile.com/>
- <http://www.bbc.co.uk/programmes/b00srz5b>
(a brief history of mathematics on ipayer)
- <https://plus.maths.org/content/>
- <https://nrich.maths.org/secondary>
- <https://projecteuler.net/>
(if interested in programming)

<p>1. a) Write the equation $y = (x - 6)^2 - 2(25 - 3x) - 2$ in the form $y = ax^2 + bx + c$</p>	<p>b) Write the equation $y = (x - 6)^2 - 2(25 - 3x) - 2$ in the form $y = (x + d)(x + e)$</p>
<p>c) Write the equation $y = (x - 6)^2 - 2(25 - 3x) - 2$ in the form $y = (x + p)^2 + q$</p>	<p>d) Using parts a) to c) to help you, sketch the curve $y = (x - 6)^2 - 2(25 - 3x) - 2$ giving the coordinates of any points where the curve crosses the axes and any maximum or minimum points</p>

2. a) Solve this pair of simultaneous equations

$$5x + 3y = 1$$

$$2x - y = -4$$

b) Solve this pair of simultaneous equations

$$\frac{m}{3} - 10 + \frac{n}{2} = 0$$

$$\frac{m}{2} - \frac{n}{3} - 2 = 0$$

3. Solve the simultaneous equations:

$$2x - y = 1$$

$$4x^2 + y^2 + 4y = 9$$

4. $f(x) = 4x - 3, g(x) = 2x^2$

Find:

a) $fg(x)$

b) $gf(x)$

Simplify your answers as far as possible

$$f(x) = \frac{1}{x}, g(x) = \frac{2}{1+x}$$

Find:

a) $gf(x)$

b) $g^{-1}(x)$

Simplify your answers as far as possible

5. a) Simplify $\sqrt{72} + \sqrt{32} + \sqrt{200}$

b) Rationalise the denominator $\frac{10}{\sqrt{5}}$

c) Expand and simplify $(3 + 2\sqrt{3})(5 - \sqrt{6})$

d) Rationalise the denominator $\frac{5}{2\sqrt{3}}$

d) Rationalise the denominator $\frac{\sqrt{2}}{(3-\sqrt{2})}$

e) Write $\sqrt{16x}$ in the form ax^n

f) Write $\frac{2}{x^3}$ in the form ax^n

g) Write $\frac{1}{4\sqrt{x^3}}$ in the form ax^n

6. a) Find the gradient and y intercept of the equation

$$y - 2 = 4(x - 5)$$

- b) Find the equation of the line parallel to $3y + x = 2$ which passes through the point (4, 3)

7. The points A (p, 3) and B (5 ,q) lie on the line $y = 2x + 1$
Find the equation of the perpendicular bisector of AB

- a) Find the values of p and q

- b) Find the equation of the perpendicular bisector of AB