KING EDWARD VII SCHOOL

*** If you are intending to study Core Maths, rather than A-Level Maths, please complete the bridging work for that course. ***

Further Maths A-Level MATHEMATICS TRANSITION WORK (sections A and B)

Please note:

- The questions in sections A and B will be taken in and marked – and you will be expected to write up your solutions clearly and neatly – not just your final answers. You may explore the questions in rough but then **write up your working and answers** neatly on A4 paper (and graph paper where needed) with each question clearly labelled. Try to use mathematical notation where you can.

- You should not use a calculator on section A, please show enough working so that we can see where your answers came from.

- We would encourage you to try these questions on your own but if you do collaborate with another student or use the internet to find formulae etc. please say so on your solution sheet.

- Section A questions are quite like GCSE questions and are designed to show how ready you are to start the course. If you are struggling with these questions then you need to do some extra study, see the link to AMSP resources in the box below or contact dheller@kes.sheffield.sch.uk for more info on where to find resources.

- Section B are 'Pure maths' questions, but set in context. They test your ability to translate a real world problem into mathematical language and use trigonometry and quadratics to solve it.

- Solutions should be handed into your class teacher in your first lesson.
  We hope you find the questions challenging but enjoyable!

- If you are intending to study **Further Mathematics** should also attempt part (h) of Section B.

King Edward VII Mathematics Department

The most popular choice at A level is Mathematics; however, many students say that they find the initial transition from GCSE to A level challenging.

The resources linked below were designed for students to complete independently and will develop fluency in the fundamental techniques and the key mathematical concepts that underpin A level Mathematics.
https://amsp.org.uk/teachers/11-16-maths/transition-to-level-3-maths/essential-skills/

Please use these resources to top-up your knowledge from GCSE and get in touch if there any problems you are struggling with. We do not expect you to complete all the work – but pick the topics where you know you will need extra help!

SECTION A: GCSE STYLE QUESTIONS [Non- Calculator]

1. Mandy is x years old.
Her brother is 5 years older than Mandy.
The product of their ages is 84.

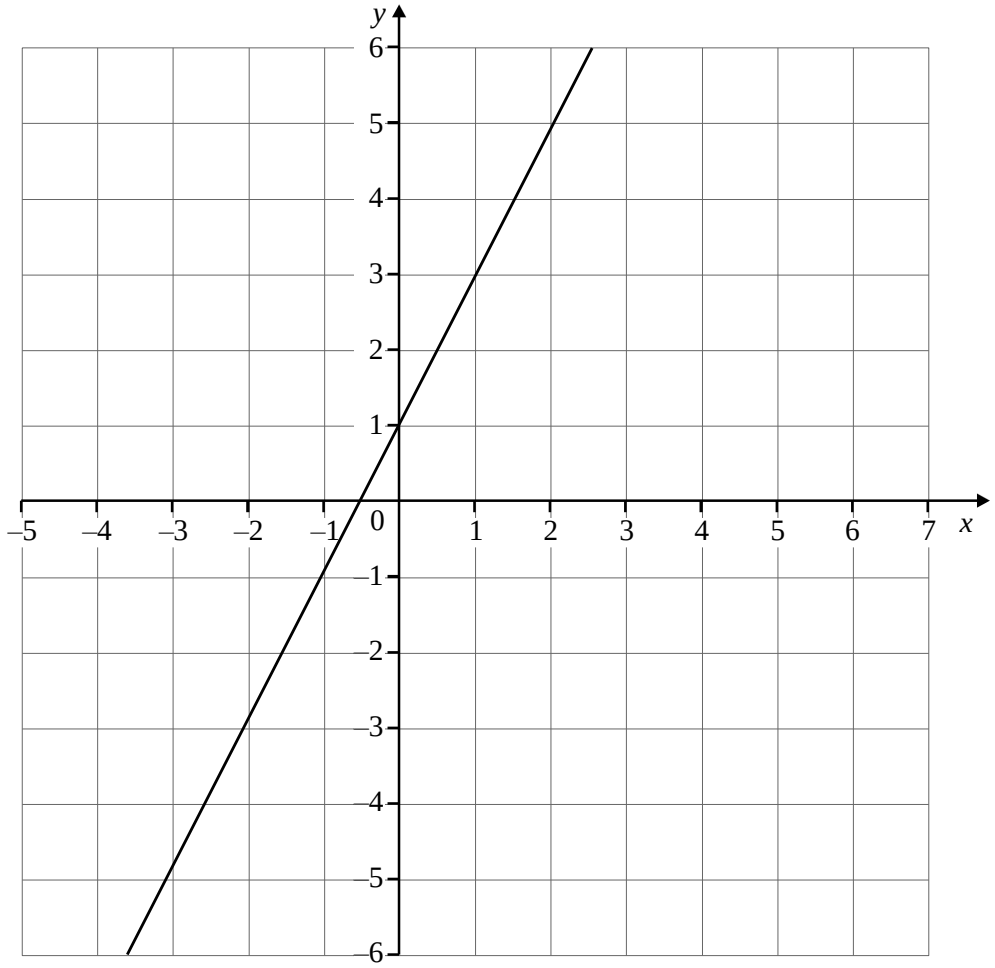
(a) Show that $x^2 + 5x - 84 = 0$ (1)

(b) Solve $x^2 + 5x - 84 = 0$

Do **not** use a trial and improvement method. (3)

(c) How old is Mandy (1)

2. The diagram shows the graph of $y = 2x + 1$.



A line passes through the point (2, - 3) and is perpendicular to $y = 2x + 1$.

The equation of this line can be written in the from $ax + by = c$.

What are the values of a, b and c? (3)

SECTION A: GCSE STYLE QUESTIONS [Non Calculator] (continued)

3. (a) (i) Find the value of x in $4^x = \frac{1}{16}$ (1)

(ii) Find the value of y in $8^y = 2$ (1)

(b) What is the value of $27^{\frac{2}{3}}$ (2)

4. (a) Simplify fully the expression

$$\frac{8x^2 + 24x}{2x^2 + 5x - 3}$$ (3)

(b) You are given that $(x + a)^2 + b = x^2 + 6x + 13$.

Find the values of a and b. (3)

5. (a) List the integer values of x such that

$-2 \leq x < 3$ (2)

(b) Solve the inequality

$x^2 > 64$ (2)

6. (a) You are given the formula $y = \frac{5 + x}{x}$

Rearrange the formula to give x in terms of y. (3)

(b) Simplify $(3xy^2)^4$. (2)

7. Solve the simultaneous equations

$$x^2 + y^2 = 24$$

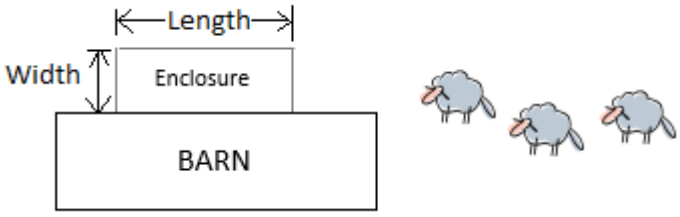
$$y = 6 - x$$

Give your answers in the form a + √b

(7)

SECTION B: THE FARMER'S FIELD

A farmer has a barn and some sheep. He wishes to make an enclosure for his sheep from the 36m of fencing that he has. He wants to make the area as large as possible.



(a) Complete the table to show the areas that can be made with particular dimensions

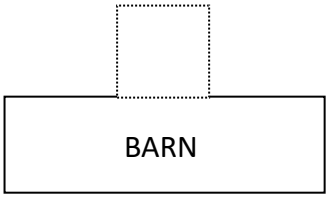
Width	0	2	4	6	8	10	12	14	16	18
Length		32m				16m				
Area			$112m^2$							

(b) Draw a graph to show these results – plot **width** on the x axis and **area** on the y axis

(c) What is the formula which links Area and width [can you write a formula that does not use 'length']?

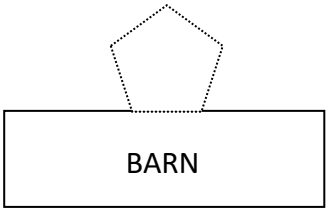
(d) What is the maximum area that the farmer can enclose with 36m of fencing?
What width of fence gives this area?
(Extension: Can you verify that this is the maximum area using algebra and/or calculus?)

(e) Now, Mr Farmer is a bit mathematical and begins to wonder about different shaped enclosures that can be made with his 36m of fencing. He starts with a square:



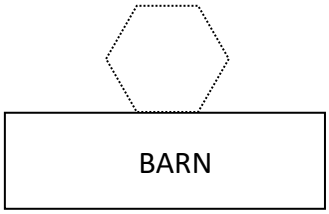
What would the area be?
Remember that the fence only needs to have 3 sides as the barn will make the fourth side.

(f) Then he moves onto a pentagon shaped enclosure – again he has 36m of fencing.



What would the area be?
Remember that the fence only needs to have 4 sides as the barn will make the fifth side.

(g) Next he moves onto a hexagonal shaped enclosure – again he has 36m of fencing.



What would the area be?

(h)
Then he wonders if he could find a general formula to help him work out the area for a regular enclosure of n sides…. What would it be?