



Self-Study Unit 1 for Core Mathematics

Summer 2020

Name: _____

To be completed for Friday 11th September 2020

Introduction

These units are to be completed over the summer holidays in preparation for starting the A Level mathematics course in September. The aim of these units is to allow you an insight into what will be expected prior knowledge for when the course begins. It is also a way of preparing you to be a good independent learner as it is proven that the best A Level students are also good independent learners.

To be a good independent learner you should be able to:

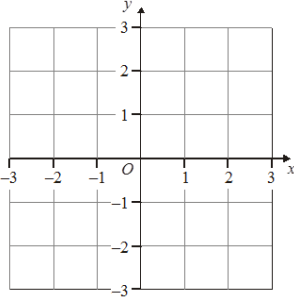
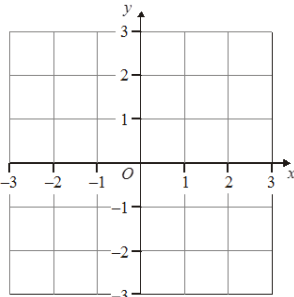
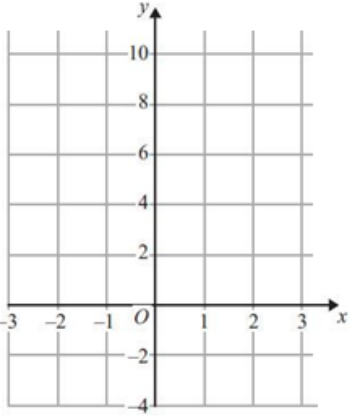
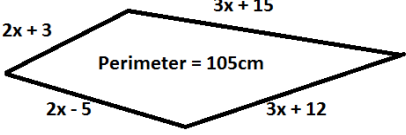
- Take responsibility for your own learning
- Be able to look information up for yourself
- Be able to structure questions to ask your teacher that will help you understand topics in more depth.

The idea of these units is to cover GCSE skills that are a requirement to be successful at A level maths. Depending on your Y11 class, there may be topics that you have not covered or can't really remember, if this is the case you need to take the initiative and look them up. This can be done by using revision guides or by watching revision videos on www.999maths.com or other revision websites.

Hegarty maths is a really useful youtube channel with several half hour videos under the titles 'A-Level prep with Mr Hegarty!'. These are well worth a watch as part of your preparation before returning in September.

You then need to complete the skills check at the end. These are the skills that you **MUST** be fully confident in to start the course, there will be an assessment on these and other GCSE skills, in one of your first lessons in September with a minimum % required to complete the course.

Good luck and we will expect these booklets to be handed in to your core teacher in your first lesson with them in September.

A. State the nth term of the sequence 5, 8, 11, 14...	B. State the first 4 terms of the sequence $3n^2 + 1$	C. State the formula for the nth term of this quadratic sequence: 7, 9, 13, 19, 27.....
D. Expand and simplify $3(2x + 4) - 5(x - 1)$ $(2x - 1)(3x + 4)$	E. Factorise fully: $10a^2 + 15ab$ $x^2 - 36$ $x^2 + 5x + 6 =$	F. Proof – consecutive numbers Any numbers: $n, n+1, n+2,$ Even numbers: Odd numbers:
G. If $a = 10$ $b = -2$ and $c = 0.5$, calculate the value of: $\frac{2a - b}{c} =$	H. Estimate the value of: $\frac{31 \times 9.97}{0.51} =$	I. Solve the quadratic inequality $2x^2 + 5x < 3$
J. Draw the line $y = 2$  Draw the line $y = x$ 	K. Draw the line $y = 2x + 2$  State the equation of any other line with the same gradient?	M. The perimeter of this square is 105cm. Form and solve an equation to find the size of 'x': 
N) Complete the square of $y = x^2 - 2x - 3$ writing it in the form $(x + a)^2 + b$ Hence, state the coordinates of the turning point of the graph.		

O. Simultaneous equations:

4 adults and 2 child tickets cost £47

1 adult and 3 child tickets cost £25.50

Work out the costs of an adult and a child ticket.

P. Expand and simplify:

$$(2x - 5)(x + 1)(x - 2)$$

Q. Solve the following:

a) $4x - 2 = 13$

b) $2(2x - 5) > 5 - 3x$

c) $\frac{3x+1}{4} - 2 = 8$

R. Rearrange the following formulae to make 's' the subject:

$$\frac{s + k}{m} = t$$

$$p = k + \sqrt{sd}$$

$$\frac{sg + k}{f - s} = t$$

S) ITERATIONa) Show that $x^3 - 3x - 5 = 0$ has a solution between 2 & 3b) Show that $x^3 - 3x - 5 = 0$ can be rearranged to give $x = \sqrt{\frac{5}{x} + 3}$

T) Functions

$$f(x) = 5x + 3 \quad g(x) = 3(x + 1)$$

a) What is the value of $f(10)$?

b) Solve $f(x) = 23$

c) Find $f^{-1}(x)$

d) State $fg(x)$

U) Iterative Methods

The amount of bugs (B) at the start of year n is B_n .

The amount of bugs in following years is calculated using $B_{n+1} = 2(B_n + 20)$

In 2017, there are 50 bugs. How many will there be in 2021?

W) Solve the simultaneous equations:

$$y = x - 7$$

$$x^2 + y^2 = 25$$