

# St Bede's Catholic College

Year 11 into 12  
Transition Work

Mathematics



**Exam board:** Edexcel

**Course length:** Two years

**Link to specification:** <https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2017.html>

**Exam structure:**

3 Exams at the end of 2 years:

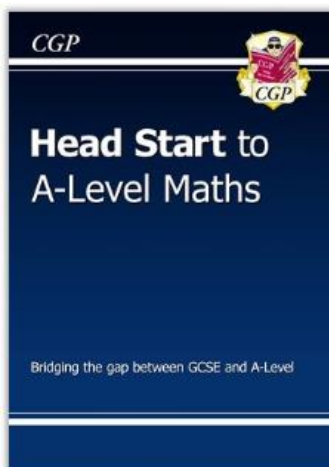
Paper 1: Pure Mathematics  
33%  
2 hours  
100 marks

Paper 2: Pure Mathematics  
33%  
2 hours  
100 marks

Paper 3: Mechanics and  
Statistics  
33%  
2 hours  
100 marks

**Useful textbooks:**

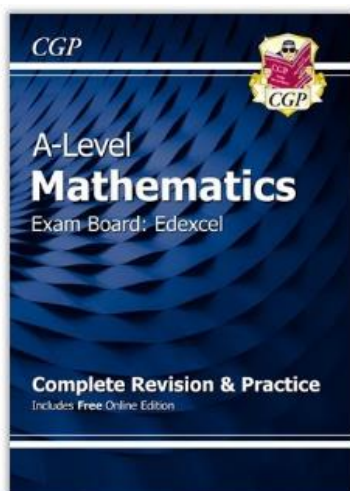
**Before starting course**



**CGP** New Head Start to A-Level Maths

## Whilst studying course

CGP (Edexcel) New A-Level Maths for Edexcel: Year 1 & 2 Complete Revision & Practice with Online Edition



## Useful websites:

[www.drfrostmaths.com](http://www.drfrostmaths.com)

<https://www.mathsgenie.co.uk/newalevel.html>

<https://crashmaths.com/>

<https://www.examsolutions.net/a-level-maths/edexcel/>

[www.westiesworkshop.com](http://www.westiesworkshop.com)

## Sample/past papers:

<https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2017.coursematerials.html#%2FfilterQuery=category:Pearson-UK:Category%2FSpecification-and-sample-assessments&filterQuery=category:Pearson-UK:Document-Type%2FSample-assessment-material>

<https://qualifications.pearson.com/en/qualifications/edexcel-a-levels/mathematics-2017.coursematerials.html#filterQuery=Pearson-UK:Category%2FExam-materials>

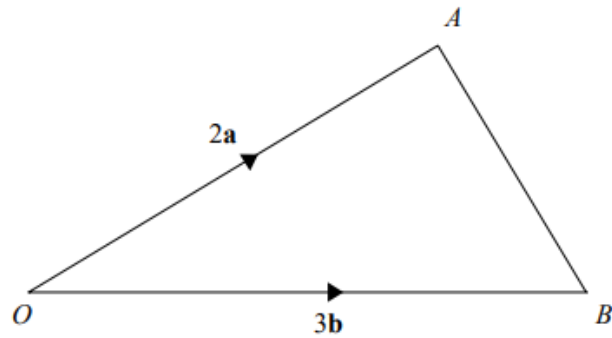
## Transition work:

Please **complete** the below questions on **lined paper** and your answers to these questions will be collected in during the second week back in September. During the third week you will be given a short test on these topics to check your understanding. It is important that you aim for no less than 75% on this test.

Topics: **Vectors, Simultaneous Equations, Functions, Surds, Index Laws, Types of Graphs, Straight Line Graphs, Regions, Solving Quadratics, Rearranging Equations**

A) Vectors - <https://www.mathsgenie.co.uk/vectors.html>

2



$$\vec{OA} = 2\mathbf{a}$$

$$\vec{OB} = 3\mathbf{b}$$

P is the point on AB such that  $AP:PB = 3:2$

$$\vec{OP} = k(4\mathbf{a} + 9\mathbf{b})$$

Find the value of  $k$

4 A is the point (3, 2) and B is the point (4, -1).

(a) Write down as a column vector  $\vec{AB}$

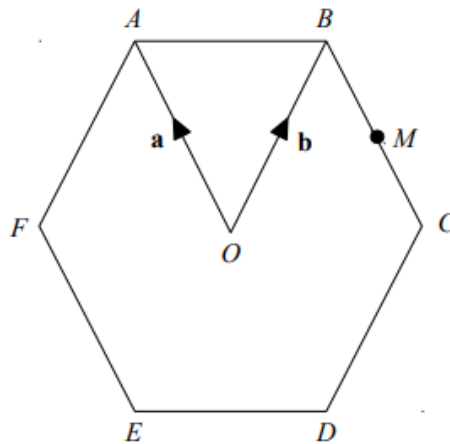
.....  
(1)

C is the point (5, -2) and D is the point (2, 1).

(b) Write down as a column vector  $\vec{CD}$

.....  
(1)

4  $ABCDEF$  is a regular hexagon with centre  $O$ .



$$\vec{OA} = a$$

$$\vec{OB} = b$$

$M$  is the midpoint of  $BC$ .

$X$  is the point on  $AB$  extended, such that  $AB:BX = 3:2$

Prove that  $E$ ,  $M$  and  $X$  are on the same straight line.

**B) Simultaneous Equations** <https://www.mathsgenie.co.uk/simultaneous.html> and <https://www.mathsgenie.co.uk/simultaneous-quadratic.html>

Solve each of the following pairs of simultaneous equations

a)  $3x + 2y = 13$   
 $2x - y = 2$

b)  $2x + 3y = 10$   
 $5x + 2y = 3$

c)  $3x + y = 7$   
 $2x - 3y = 23$

d)  $8x + 4y = 5$   
 $6x - 8y = 1$

Solve each of the following pairs of simultaneous equations

a)  $y = x^2 - x - 6$   
 $y = x + 2$

b)  $y = 2x + 3$   
 $y(5 - x) = 20$

**C) Functions** - <https://www.mathsgenie.co.uk/functions.html>

4. Given that  $f(x) = x^2 - 3$  find:

a)  $f(10)$

..... (1)

b)  $f(-1)$

..... (1)

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

..... (2)

5. Given that  $f(x) = 2x - 4$  and  $g(x) = 3x + 5$

a) Find:  $gf(3)$

..... (2)

b) Work out an expression for:  $f^{-1}(x)$

..... (2)

c) Solve:  $f(x) = g(x)$

Given that  $f(x) = 3x + 1$  and  $g(x) = x^2$

(a) Find  $fg(x)$

(2)

(b) Work out an expression for  $gf(x)$

(2)

**D) Surds-** <https://www.mathsgenie.co.uk/surds.html>

Write the following in the form  $a\sqrt{b}$

a)  $\sqrt{44}$

b)  $\sqrt{320}$

c)  $\sqrt{75}$

d)  $\sqrt{304}$

e)  $\sqrt{\frac{32}{25}}$

f)  $\sqrt{\frac{27}{16}}$

g)  $\sqrt{\frac{50}{9}}$

e)  $\sqrt{\frac{496}{304}}$

Write each of the following as a single surd in its simplest form

a)  $4\sqrt{7} - 3\sqrt{7} + 6\sqrt{7}$

b)  $4\sqrt{2} - \sqrt{50} + \sqrt{98}$

c)  $\sqrt{3}(7 + 2\sqrt{3})$

d)  $(\sqrt{7} - \sqrt{3})(\sqrt{7} + \sqrt{3})$

**E) Index Laws -** <https://www.mathsgenie.co.uk/indices2.html>

Evaluate (i.e. work out)

a)  $2^{-3}$

b)  $25^{\frac{1}{2}}$

c)  $\left(\frac{1}{3}\right)^{-2}$

d)  $\left(\frac{64}{27}\right)^{-\frac{4}{3}}$

e)  $\left(6\frac{1}{4}\right)^{\frac{1}{2}}$

f)  $49^{\frac{3}{2}}$

Simplify the following expressions

a)  $7^3 \times 7^4$

b)  $\frac{3^4 \times 3^6}{3^5}$

c)  $(4^3)^8$

d)  $\frac{2^5 \times 2^9}{(2^3)^5}$

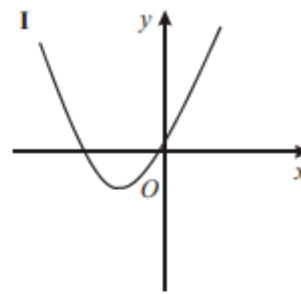
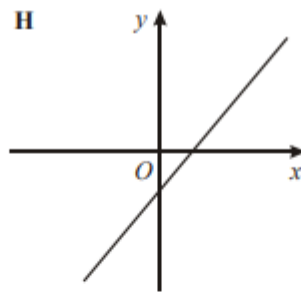
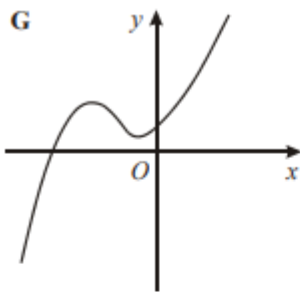
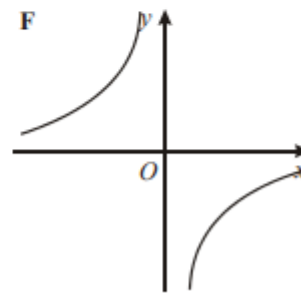
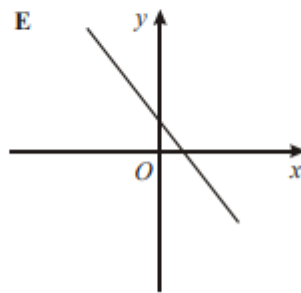
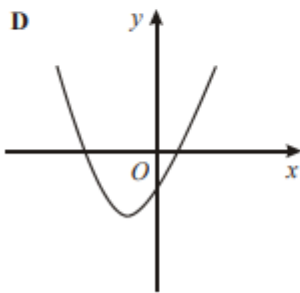
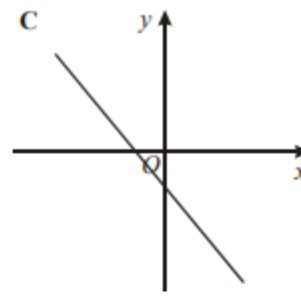
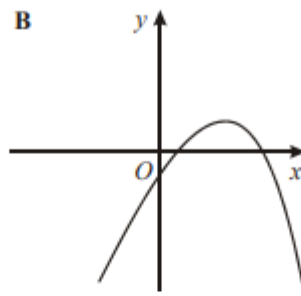
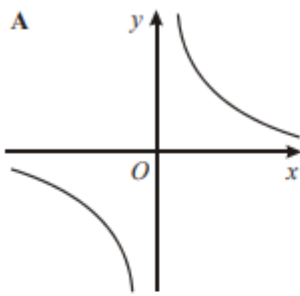
e)  $4x^3 \times 2x^5$

f)  $(3a)^3$

g)  $(-2p^2q^3)^4$

h)  $\frac{2x^2y^3z \times 6x^4yz^3}{(9xy^4z^2)^2}$

F) Types of Graphs - <https://www.mathsgenie.co.uk/cubic-reciprocal.html>



1. Write down the letter of the graph which could have the equation

(i)  $y=3x-2$  ..... (1)

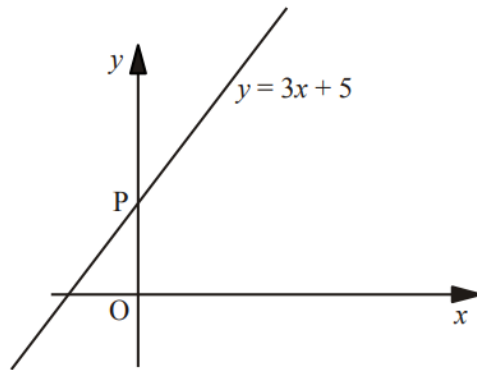
(ii)  $y=2x^2+5x-3$  ..... (1)

(iii)  $y=\frac{3}{x}$  ..... (1)



G) Straight Line Graphs <https://www.mathsgenie.co.uk/equation-of-a-line.html>

1.



(a) The line  $y=3x+5$  crosses the y axis at P.  
What is the value of y at P?

..... (1)

(b) Write down the equation of another line which  
is parallel to  $y=3x+5$

..... (1)

6a) A straight line has equation  $2y-10x=8$   
Work out the gradient of this line.

..... (2)

b) Write down the equation of a line parallel to this line.

..... (1)

7a) A straight line has equation  $4y-5x=2$   
Work out the gradient of this line.

..... (2)

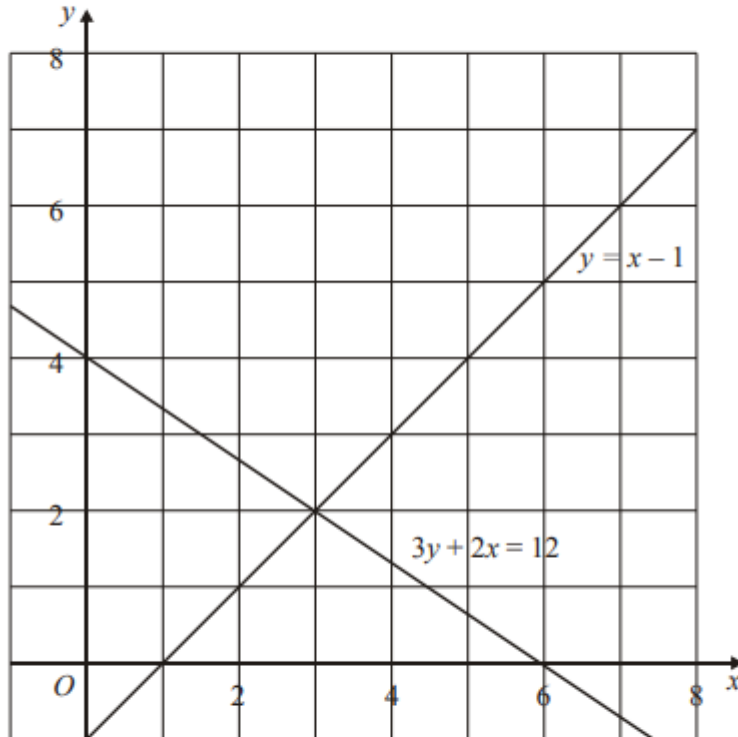
H) Regions - <https://www.mathsgenie.co.uk/inequalities-on-graphs.html>

3. The graphs of the straight lines with equations

$$3y + 2x = 12 \quad \text{and}$$

$$y = x - 1$$

have been drawn on the grid.



$$3y + 2x > 12$$

$$y < x - 1$$

$$x < 6$$

$x$  and  $y$  are integers.

On the grid, mark with a cross ( $\times$ ), each of the **four** points which satisfies **all** 3 inequalities.

(Total 3 marks)

1) Solving Quadratics = <https://www.mathsgenie.co.uk/solving-quadratics.html>

Solve the following equations

a)  $x^2 + 15x + 54 = 0$

b)  $t^2 - 3t - 40 = 0$

c)  $3x^2 - x - 14 = 0$

d)  $7a - 6a^2 + 20 = 0$

e)  $9x^2 + 12x + 4 = 0$

f)  $x + 1 = \frac{6}{x}$

### J) Completing the square.

Solve the following equations using completing the square. Give your answer in surd form

<https://www.mathsgenie.co.uk/completing-the-square.html>

a)  $x^2 + 12x + 20 = 0$

b)  $t^2 + 9t + 4 = 0$

c)  $3x^2 - 7x = 1$

### J) Rearranging Equations

Solve the following equations using completing the square. Give your answer in surd form

<https://www.mathsgenie.co.uk/changing-the-subject2.html>

a) Make a the subject  $v = u + at$

b) Make u the subject  $v^2 = u^2 + 2as$

c) Make u the subject  $s = ut + \frac{1}{2}at^2$

d) Make t the subject  $s = ut + \frac{1}{2}at^2$

e) Make m the subject  $T = \frac{1}{2}mv^2$

f) Make x the subject  $mx + 10 = nx + 20$

g) Make x the subject  $mx - a = nx + b$

h) Make x the subject  $2x + a = b(x - 2)$