Transition Work
From GCSE to A/S level
Mathematics

IMPORTANT

THIS WORK MUST BE DONE IN ORDER TO JOIN THE COURSE

PLEASE HAND IT TO YOU'RE A LEVEL MATHS TEACHER BY THE

END OF THE FIRST FULL WEEK OF TERM IN SEPTEMBER

You need to be competent and fluent with the skills involved in the following questions prior to starting the year 12 maths course at Barking Abbey 6th Form. Please attempt all of the following and practice the topics that you are struggling with. Use worksheets from https://corbettmaths.com/contents/

Learn these before starting work

Indices	Laws of indices	Surds

$a^0 = 1$

$a^m \times a^n = a^{m+n}$

$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$

$a^{-1} = \dfrac{1}{a}$

$\dfrac{a^m}{a^n} = a^m \div a^n = a^{m-n}$

$\dfrac{\sqrt{a}}{\sqrt{b}} = \sqrt{\dfrac{a}{b}}$

$a^{\frac{1}{2}} = \sqrt{a}$

$\left(a^m\right)^n = a^{mn}$

$a^{\frac{m}{n}} = \sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m$

Quadratic Equations

For $ax^2 + bx + c = 0$ $\qquad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ this is known as the quadratic formula

SECTION A

(Please complete on separate paper)

1. Collecting like terms:

Simplify the following expressions

a) $x^3 + 2x^2 - 5x + 7x^2 + 3x - 4$ $\qquad$ b) $x^4 - 3x^3 - 2x^2 + 2x^3 - 6x^2 - 4x$

c) $2ab - a^2 + 4b^2 - 2ab$ $\qquad$ d) $3x^2 + 6xy - 12x - 2xy + 6y^2 + 8y$

2. Indices

Evaluate (i.e. work out)

a) 2^{-3} $\qquad$ b) $25^{\frac{1}{2}}$ $\qquad$ c) $\left(\dfrac{1}{3}\right)^{-2}$ $\qquad$ d) $\left(\dfrac{64}{27}\right)^{-\frac{4}{3}}$ $\qquad$ e) $\left(6\dfrac{1}{4}\right)^{\frac{1}{2}}$ $\qquad$ f) $49^{\frac{3}{2}}$

3. Laws of Indices

Simplify the following expressions

a) $7^3 \times 7^4$ b) $\dfrac{3^4 \times 3^6}{3^5}$ c) $\left(4^3\right)^8$ d) $\dfrac{2^5 \times 2^9}{\left(2^3\right)^5}$ e) $4x^3 \times 2x^5$ f) $\left(3a\right)^3$

g) $\left(-2p^2q^3\right)^4$ h) $\dfrac{2x^2y^3z \times 6x^4yz^3}{\left(9xy^4z^2\right)^2}$

4. Changing the subject of a formula

Make the variable shown in brackets the subject

a) $v = u + at$ (a)

b) $s = \dfrac{1}{2}(u+v)t$ (v)

c) $A = 2\pi r^2 + 2\pi rh$ (h)

d) $y = \dfrac{x+1}{x-1}$ (x)

5. Expanding brackets

Multiply out and simplify

a) $6(2x+3)$ b) $-2x(x-5)$ c) $2xy^2(3x-5y)$ d) $5y(4-3x)-2x(3-2y)$

e) $(x+7)(x-7)$ f) $(2x-3)(x+5)$ g) $(2x+y)(2-3y)$ h) $(3a+4b)(5b-2a)$

6. Factorising expressions

Factorise fully

a) $7x+21$ b) $3ab-12b$ c) $7x^2y+21x^3y^2$ d) $30xy+6x^2-15x$

7. Factorising quadratic expressions

Factorise

a) $x^2+9x+20$ b) $x^2-12x+35$ c) $y^2-2y-63$

d) $a^2-6a-16$ e) $2x^2+3x+1$ f) $2x^2+5xy-3y^2$

g) x^2-9 h) $9x^2-25y^2$ i) $16x^2-3$

8. Solving quadratic equations

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) $x + 1 = \dfrac{6}{x}$

9. Solving quadratic equations

Solve the following equations giving your answer in surd form

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

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

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

10. Surds

Simplify the following into the form $a\sqrt{b}$,where b is as small as possible

a) $\sqrt{44}$

b) $\sqrt{320}$

c) $\sqrt{75}$

d) $\sqrt{304}$

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

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

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

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

11. Surds

Write each of the following in its simplest form

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

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

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

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

12. Solving Simultaneous equations

Solve each of the following pairs of simultaneous equations

a) $\begin{array}{l} 3x + 2y = 13 \\ 2x - y = 2 \end{array}$

b) $\begin{array}{l} 2x + 3y = 10 \\ 5x + 2y = 3 \end{array}$

c) $\begin{array}{l} 3x + y = 7 \\ 2x - 3y = 23 \end{array}$

d) $\begin{array}{l} 8x + 4y = 5 \\ 6x - 8y = 1 \end{array}$

13. Solving Simultaneous equations

Solve each of the following pairs of simultaneous equations

a) $\begin{array}{l} y = x^2 - x - 6 \\ y = x + 2 \end{array}$

b) $\begin{array}{l} y = 2x + 3 \\ y(5 - x) = 20 \end{array}$

SECTION B

1 Simplify these expressions.

a $\dfrac{x^3 \times x^4}{x^2}$ **(1 mark)**

b $(2x^3)^4$ **(1 mark)**

c $\dfrac{9x^{\frac{1}{2}}}{(27x^{-2})^{\frac{2}{3}}}$ **(3 marks)**

2 Solve $2x^2 \times 4x^4 = 512$ **(2 marks)**

3 Find the value of *x*.

$x^{-\frac{4}{3}} = \dfrac{1}{256}$ **(2 marks)**

4 **a** Write $\sqrt{240}$ in the form $a\sqrt{15}$, where *a* is an integer. **(1 mark)**

b Expand and simplify $(2 - \sqrt{3})(5 + 2\sqrt{3})$. **(2 marks)**

c Simplify $\dfrac{2 + \sqrt{5}}{3 - \sqrt{5}}$ giving your answer in the form $a + b\sqrt{c}$, where *a*, *b* and *c* are

rational numbers. **(3 marks)**

5 The area of a triangle is given as $(7 + 3\sqrt{3})$ cm².

The base of the triangle is $(5 - \sqrt{3})$ cm, and the perpendicular height is $(p + q\sqrt{3})$ cm.

Find the values of *p* and *q*. **(4 marks)**

6 Expand and simplify these expressions.

a $3(x - 2y)$ **(1 mark)**

b $(2x - 3)(3x + 5)$ **(2 marks)**

c $(x - 2)^2(x + 5)$ **(3 marks)**

7 Fully factorise these expressions.

a $2xy - 4x$ **(1 mark)**

b $x^2 + 2x - 3$ **(1 mark)**

8 Solve these equations.

a $3x - 7 = 17$ **(1 mark)**

b $x^2 - 6x + 5 = 0$ **(2 marks)**

c $2x^2 - 5x + 1 = 0$ **(2 marks)**

9 Solve these pairs of simultaneous equations.

   a $2x + y = 7$ **(3 marks)**
     $3x - y = 8$

   b $y = 3x - 1$ **(3 marks)**
     $3y = 6x + 1$

   c $2x - y = 9$ **(4 marks)**
     $x^2 + y^2 = 17$

10 Solve these inequalities.

   a $7x - 6 \leqslant 8$ **(1 mark)**

   b $3x + 2 \geqslant 7x - 4$ **(2 marks)**

   c $x^2 + 12x - 28 > 0$ **(2 marks)**

11 The function f is defined as $f(x) = 5x + 2$

   Find the value of $f(-4)$. **(1 mark)**