



Year 12
Summer Transition Work

Maths
Exam Board – Edexcel

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A Level Mathematics

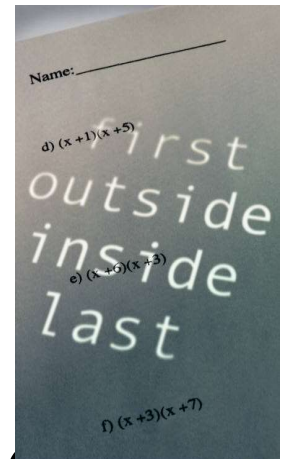
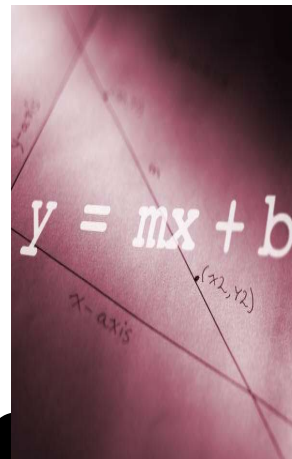
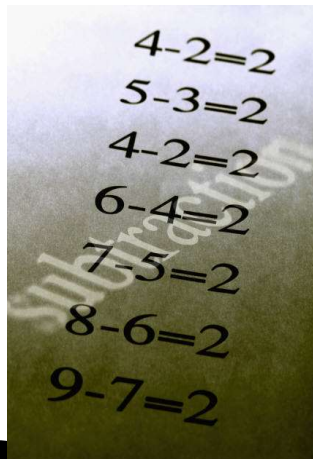
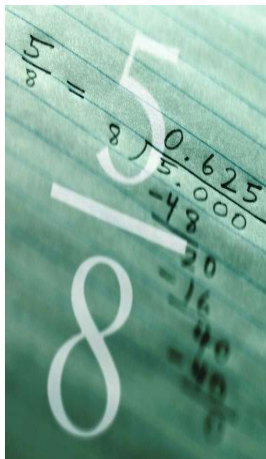
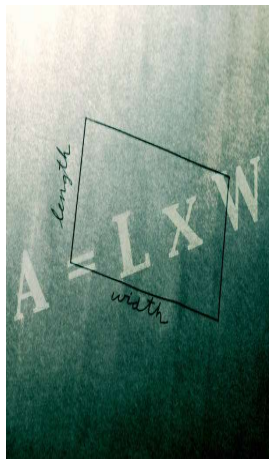
This booklet contains the essential algebraic techniques that you will need for this course. This booklet contains skills that you should have mastered as part of the GCSE Course.

You will have a short test in your first mathematics lesson to assess your understanding of this material.

If you find these difficult there is a book by CGP called **Head start to A level Maths** which gives you more information and further things to practice.

For the new exam you will need a new calculator with statistical functions.

We recommend the Casio FX-991EX ClassWiz calculator. There are others accepted by the exam board but this is the calculator teachers will be using when completing examples. The calculator is available for approximately £20 on Amazon. We will be organising a bulk order in September.



1. Simplifying

You need to be able to simplify an expression by collecting like terms.

Remember that 'like terms' have exactly the same combination of letters.

1. $5x + 3 + 3x - 12 =$
2. $6x^3 - 3x^2 + 5x - x^2 - 6x =$
3. $5x^2y + 2xy^2 - 3x^2y + y^2x =$

2. Brackets

You need to be able to multiply out brackets

Whatever is outside the bracket multiplies each separate term inside the bracket.

1. $3(2x - 5) =$
2. $4x(x - 7y) =$
3. $-2(4 - x^2 + a) =$

With double brackets you get 4 terms and you can usually simplify to 3 terms.

4. $(x - 5)(x + 2) =$
5. $(2x + 3)(x - 4) =$
6. $(3a - 1)(2a - 5) =$
7. $(x - 5)(x + 5) =$

THE DIFFERENCE
OF TWO

Remember to write out the brackets when you have squared brackets.

8. $(x + 5)^2 = (x + 5)(x + 5) =$
9. $(x + 3)^2 =$
10. $(2x - 1)^2 =$

3. Factorising

You need to be able put brackets into an expression

Take out the biggest number and highest power of each letter.

1. $8x - 12 =$

2. $3x - 18xy =$

3. $10x^2 - 25x^3y =$

4. $18ab^2 - 6a^2b^3 + 3a^3b^4 =$

To factorise a quadratic, rearrange into the form $ax^2 + bx + c$. Then write two brackets with the x's in $(x \quad)(x \quad)$. Find two numbers that multiply to get c and add/subtract to get b

5. $x^2 - 5x + 6 =$

6. $x^2 - 3x - 4 =$

7. $x^2 + 6x + 8 =$

8. $x^2 - 9 =$

THE DIFFERENCE
OF TWO

4. Algebraic

You need to be able to work with algebraic fractions.

Fractions

Use the same rules as for ordinary fractions. Multiplying and dividing are easy.

1. $\frac{ab}{3cd} \times \frac{12c^2d}{b^3} =$

2. $\frac{5x}{yz^2} \div \frac{15x^3}{yx} = \frac{5x}{yz} \times \frac{yx}{15x^3} =$

3. $\frac{36ef}{g^3} \div \frac{6e^2f^3}{g^2h} =$

To add and subtract you need to use a common denominator

$$4. \frac{5}{x} + \frac{2}{y} =$$

$$5. \frac{5}{x+2} + \frac{3}{4} =$$

$$6. \frac{3w-4}{a+3} - \frac{6}{w} =$$

5. Solving Equations

You need to be able to solve simple linear equations

$$1. \begin{aligned} 5x - 3 &= 7 \\ x &= \end{aligned}$$

$$2. \begin{aligned} 2x + 5 &= 17 \\ x &= \end{aligned}$$

$$3. \begin{aligned} 5x - 2 &= 2x + 13 \\ x &= \end{aligned}$$

If there is a fraction multiply up to get everything off the bottom:

Example $\frac{2}{x-5} = \frac{3}{5-x}$

$$2(5-x) = 3(x-5)$$
$$10 - 2x = 3x - 15$$
$$25 = 5x$$
$$x = 5$$

$$4. \frac{4}{x+3} = \frac{6}{4-x}$$
$$x =$$

$$5. \frac{2x+4}{x+5} = 4$$
$$x =$$

Remember to give your answers as fractions if there is no whole number solution.

6. Solving Quadratic Equations

You need to be able to solve quadratic equations by factorising or by using the formula.

Solve these quadratic equations by factorising

1. $x^2 - 10x + 24 = 0$

$x =$

3. $2x^2 - 5x - 3 = 0$

$x =$

2. $x^2 + 11x + 30 = 0$

$x =$

4. $x^2 + 4x = 0$

$x =$

Solve these quadratic equations using the formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ (you need to

LEARN this formula)

5. $x^2 + 4x - 15 = 0$

$x =$

6. $2x^2 + 3x - 10 = 0$

6.

$x =$

Sometimes you need to rearrange before you can solve the equation.

7. $x^2 - x = 30$

$x =$

8. $\frac{5}{x} + \frac{2}{3+x} = 1$

$x =$

7. Simultaneous Equations

You need to be able to solve simultaneous equations by elimination or substitution

1. Solve $\begin{cases} 3x - 2y = 1 \\ 2x + 3y = 11.5 \end{cases}$

2. Solve $\begin{cases} 5p + 2q = -30 \\ 3p + 4q = -32 \end{cases}$

3. Solve $\begin{cases} 2y - x = 16 \\ y + x = 4 \end{cases}$

8. Laws of Indices

You need to be able to work with indices

- $a^n \times a^m = a^{m+n}$ $a^n \div a^m = a^{m-n}$ $(a^n)^m = a^{nm}$

- A negative index means 'one over': $2^{-2} = \frac{1}{2^2} = \frac{1}{4}$

- Fractional indices are 'the root of': $125^{\frac{1}{3}} = \sqrt[3]{125} = 5$

1. 4^2 4. $64^{\frac{2}{3}}$ 6. $\left(\frac{25}{16}\right)^{-\frac{1}{2}}$

2. $9^{\frac{1}{2}}$

5. $t^7 \div t^4$

3. $4^{\frac{3}{2}}$

9. Working with Surds

You will need to be able to simplify surds

- $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$
- $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$
- you can add the same things together: $3\sqrt{a} + 2\sqrt{a} = 5\sqrt{a}$

1. simplify $\sqrt{20}$

5. simplify $\sqrt{27} - \sqrt{12} + \sqrt{75}$

2. Simplify $\sqrt{20} + \sqrt{45}$

6. simplify $\sqrt{\frac{15}{3}}$

3. Simplify $\sqrt{\frac{18}{2}}$

7. simplify: $2\sqrt{72}$

4. Simplify $\frac{\sqrt{28}}{\sqrt{14}}$

You need to be able to **rationalise the denominator**

To rationalise $\frac{\text{anything}}{\sqrt{a}}$ you need to multiply the top and bottom by $\frac{\sqrt{a}}{\sqrt{a}}$

To rationalise $\frac{\text{anything}}{\text{something} \pm \sqrt{a}}$ you need to multiply the top and bottom by

$$\frac{\text{something} \mp \sqrt{a}}{\text{something} \mp \sqrt{a}}$$

Note the change of sign.

1. $\frac{7}{\sqrt{2}}$

4. $\frac{4}{2+\sqrt{3}}$

2. $\frac{4}{3\sqrt{8}}$

5. $\frac{\sqrt{2}}{4-\sqrt{3}}$

3. $\frac{\sqrt{3}}{\sqrt{5}}$

6. $\frac{1+\sqrt{3}}{6+\sqrt{2}}$

Answers

1. Collecting Like Terms

1. $8x - 9$
2. $6x^3 - 4x^2 - x$
3. $2x^2y + 3xy^2$

2. Brackets

1. $6x - 15$
2. $4x^2 - 28xy$
3. $-8 + 2x^2 - 2a$
4. $x^2 - 3x - 10$
5. $2x^2 - 5x - 12$
6. $6a^2 - 17a + 5$
7. $x^2 - 25$
8. $x^2 + 10x + 25$
9. $x^2 + 6x + 9$
10. $4x^2 - 4x + 1$

3. Factorising

1. $4(2x - 3)$
2. $3x(1 - 6y)$
3. $5x^2(2 - 5xy)$
4. $3ab(6b - 2ab^2 + a^2b^3)$
5. $(x - 2)(x - 3)$
6. $(x + 1)(x - 4)$
7. $(x + 4)(x + 2)$
8. $(x + 3)(x - 3)$

4. Fractions

1. $\frac{4ac}{b^2}$
2. $\frac{x}{3z^2}$
3. $\frac{6h}{gf^2}$
4. $\frac{5y + 2x}{xy}$
5. $\frac{26 + 3x}{4x + 8}$

6. $\frac{3w^2 - 4w - 6a - 18}{w(a + 3)}$

5. Solving Equations

1. $x = 2$
2. $x = 6$
3. $x = 5$
4. $x = -1/5$
5. $x = -8$

6. Solving Quadratics

1. $x = 2, 8$
2. $x = -5, -6$
3. $x = -\frac{1}{2}, 3$
4. $x = 0, 4$
5. $\frac{-4 \pm \sqrt{76}}{2}$ (2.36, -6.36)
6. $\frac{-3 \pm \sqrt{89}}{4}$ (1.61, -3.11)
7. $x = -5, 6$
8. $x = -3, 4$

7. Simultaneous Equations

1. $x = 2, y = 2.5$
2. $p = -4, q = -5$
3. $y = 10/3, x = 2/3$

8. Laws of Indices

1. 16
2. 3
3. 8
4. $1/16$
5. t^3
6. $4/5$