

Name: \_\_\_\_\_

## A Level Maths Preparation Work

For pupils starting A Level Mathematics in September

**THIS SUMMER WORK IS COMPULSORY. Your maths teacher will collect in your work in your first maths lesson, you should have marked it already. Do not leave any questions unanswered!!!**

### Purpose

This work gives you the opportunity to practise the skills that will be required to start A Level Mathematics successfully. We want to ensure you do not feel overwhelmed when you begin your A level studies. You did well in your GCSE Mathematics course so we have high expectations of your algebra and number skills.

This work will also help you identify whether you need to do any extra work over the summer to ensure you are ready for maths at Key Stage 5. **You will have a basic skills test during the first few weeks in September.** Poor performance on the test could indicate that A Level Maths may not be a suitable course for you to study.

### Support

Work through the topics on <http://www.mathedup.co.uk/transition-takeaway/>

Also available is [www.examsolutions.net](http://www.examsolutions.net)

These two books might be helpful:

1. "Head Start to AS Maths" by Richard Parsons.
2. "Collins Maths - Bridging GCSE and A Level: Student Book" by Mark Rowland.

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Questions - Do not use a calculator. Show all working on additional paper.

### Section 1: Maths Skills

1. Expand and simplify

(a)  $(2x + 3)(2x - 1)$

(b)  $4x(3x - 2) - x(2x + 5)$

2. Factorise

(a)  $y^2 - 64$

(b)  $2x^2 + 5x - 3$

3. Simplify

(a)  $\frac{4x^3y}{8x^2y^3}$

(b)  $\frac{3x + 2}{3} + \frac{4x - 1}{6}$

4. Solve

(a)  $\frac{h-1}{4} + \frac{3h}{5} = 4$

(b)  $p^2 + 4p = 12$

5. Make  $x$  the subject of the formula

(a)  $v^2 = u^2 + 2ax$

(b)  $y = \frac{x+2}{x+1}$

6. Work out the values of the following, giving your answers as fractions

(a)  $4^{-2}$

(b)  $\left(\frac{8}{27}\right)^{\frac{1}{3}}$

(c)  $8^{-\frac{2}{3}}$

(d)  $\left(1\frac{5}{6}\right)^{-2}$

7. Write each of the following as single powers of  $x$  and/or  $y$

(a)  $\frac{1}{x^6}$

(b)  $\frac{1}{2x}$

(c)  $\left(\frac{4x^3y^2}{x^2}\right)^2$

8. Find the value of  $3x^3 + 2x^2 - 7$

(a) when  $x = \frac{1}{2}$  (give your answer as a fraction)

(b) when  $x = -2$

**Section 2: A Level Style Questions**

1. Express  $(3 - \sqrt{8})^2$  in the form  $b + c\sqrt{2}$ , where b and c are integers to be found.

2. Simplify

a)  $\frac{2(\sqrt{2} + 6)}{\sqrt{2}}$

b)  $\frac{5 - \sqrt{3}}{2 + \sqrt{3}}$

(hint: rationalise)

3. Given that  $2^n = 16$ , find the value of n.

4. Given that  $y = 2^x$ , find an expression for  $y^2$ .

5.  $x^2 - 8x - 29 = (x + a)^2 + b$ , where a and b are constants.

a) Find the value of a and the value of b. (Hint: complete the square)

b) Solve  $x^2 - 8x - 29 = 0$ , giving your answer in the form  $c \pm d\sqrt{5}$ , where c and d are integers to be found.

6. Solve the simultaneous equations

$$\begin{aligned} y &= x - 2 \\ y^2 + x^2 &= 10. \end{aligned}$$

7. The line L passes through the point (9, -4) and has gradient  $\frac{1}{3}$ .

Find an equation for L in the form  $ax + by + c = 0$ , where a, b, and c are integers.

8. The line  $L_1$  has equation  $y = 5 - 2x$ .

Find an equation of the line perpendicular to  $L_1$  which passes through the point (3, -1). Give your answer in the form  $ax + by + c = 0$ , where a, b, and c are integers.

Answers

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*Check your own answers so you can identify whether you need to do any additional work over the summer to prepare for Year 12.*

**Section A:** 1) a)  $4x^2 + 4x - 3$  b)  $10x^2 - 13x$  2 a)  $(y + 8)(y - 8)$  b)  $(2x - 1)(x + 3)$  3) a)  $\frac{x}{2y^2}$  b)  $\frac{10x+3}{6}$   
4) a)  $h = 5$  b)  $p = -6$  or  $p = 2$  5) a)  $x = \frac{v^2 - u^2}{2a}$  b)  $x = \frac{2-y}{y-1}$  6a)  $\frac{1}{16}$  b)  $\frac{2}{3}$  c)  $\frac{1}{4}$  d)  $\frac{36}{121}$  7a)  $x^{-6}$  b)  $\frac{1}{2}x^{-1}$  c)  $16x^2y^4$   
8a)  $-\frac{49}{8}$  b)  $-23$

**Section B:** 1)  $17 - 12\sqrt{2}$  2 a)  $2 + 6\sqrt{2}$  b)  $13 - 7\sqrt{3}$  3)  $n = 4$  4)  $2^{2x}$  5a)  $a = -4$   $b = -45$  b)  $x = 4 \pm 3\sqrt{5}$   
6)  $\frac{x}{y} = \frac{3}{1}$   $\frac{x}{y} = -\frac{1}{-3}$  7)  $3y - x + 21 = 0$  8)  $2y - x + 5 = 0$