

This is a copy of the practice aptitude test and mark scheme that was used on Induction day. You will be given a similar paper (in test conditions) in your first maths lesson in September that will test the same numerical and algebraic concepts. You will be expected to achieve a minimum of 80% in this test to have the necessary skills to begin a course of maths in the sixth form.

Should you need to do some practice on these skills in preparation for September, we would recommend the book 'Bridging GCSE and A level Maths' ISBN 9780007410231.

Both Maths and Further Maths A levels are now linear courses.

The standard maths A level exam will consist of 3 papers at the end of year 13: Two pure maths papers of 2 hours each and one combined mechanics and statistics paper (also 2 hours). A graphical calculator will be used as a teaching tool throughout the course and it is strongly recommended that all students have their own to use. We will be using the **CASIO fx-9750GII**, which will be available from the finance office. (current price is £48)
The further maths A level exams will consist of two compulsory further pure papers (1.5 hours each) and two option papers (also 1.5 hours each).

AS Mathematics Aptitude Test

Non- Calculator

Complete all questions, showing full working out (use additional paper if necessary):

1. (a) Simplify

(i) $w^2 \times w^6$ (1)

(ii) $w^{10} \div w^4$ (1)

(iii) $(w^4)^3$ (1)

(b) If $x = 3^p$ and $y = 3^q$

Express in terms of x and/or y

(i) 3^{p-q} (1)

(ii) 3^{2p} (1)

(iii) 3^{q+2} (1)

(Total 6 marks)

2. Work out $4\frac{1}{5} - 1\frac{2}{3}$

(Total 3 marks)

3. (a) You are given the formula $y = \frac{5+x}{x}$

Rearrange the formula to give x in terms of y .

(3)

(b) Simplify $(3xy^2)^4$.

(2)

(Total 5 marks)

4. Solve the equation

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

You must show all your working.

(Total 4 marks)

5. (a) Factorise $7x + 14$ (1)

(b) Expand and simplify $4(m + 3) + 3(2m - 5)$ (2)

(c) Solve the simultaneous equations:

$$\begin{aligned}2x + 3y &= 9 \\3x + 2y &= 1\end{aligned}$$

You **must** show all your working.
Do **not** use trial and improvement.

(4)

(d) Factorise $x^2 + 6x - 16$ (2)

(Total 9 marks)

6. (a) Simplify fully the expression

$$\frac{8x^2 + 24x}{2x^2 + 5x - 3}$$

(3)

(b) You are given that $(x + a)^2 + b = x^2 - 6x + 13$.

Find the values of a and b .

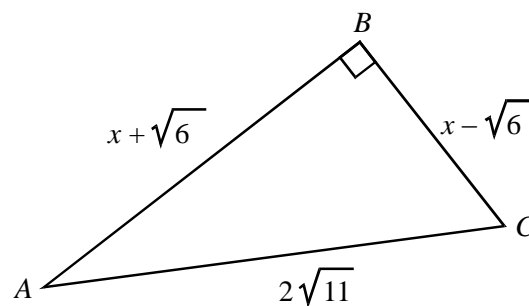
(3)

(Total 6 marks)

7. (a) Multiply out and simplify $(x + \sqrt{6})^2$.

(2)

(b) Triangle ABC has a right angle at B .



Find the value of x .

You **must** explain clearly how you obtain your answer.

(5)

(Total 7 marks)

8. Solve the equation

$$x^2 - 10x - 5 = 0$$

Express your answer in the form of $a \pm \sqrt{b}$

(Total 3 marks)

Mark Scheme

1. (a) (i) w^8 B1
- (a) (ii) w^6 B1
- (a) (iii) w^{12} B1
- (b) (i) $\frac{x}{y}$ B1
Allow $x \div y$ or $x \times y^{-1}$
- (b) (ii) x^2 B1
Allow $x \times x$

(b) (iii) $9y$

B1

Allow y^9 $9 \times y$ $y \times 9$ $3^2 \times y$ $y \times 3^2$

[6]

2. 3 and common denominator

M

1

or $\frac{21}{5} - \frac{5}{3}$ $1.66(6 \dots)$

(3 +) $\frac{3}{15} - \frac{10}{15}$

Allow one error in numerator

M1

or $\frac{63}{15} - \frac{25}{15}$ 4.2

Allow a total of 1 error in either 1st or 2nd M mark

$2\frac{8}{15}$

A1

oe eg $\frac{38}{15}$ $2.533(3 \dots)$

SC2 $(3) - \frac{7}{15}$ *oe* 2.53 *scores* M2

[3]

3. (a) $xy = 5 + x$

M

1

$x(y - 1) = 5$

M1

$x = 5/(y - 1)$

A1

(b) $81x^4y^8$

B2

or $?x^4y^8$

B1

or $81x^2y^8$

B1

or $81x^4y^?$

B1

[5]

4. Answer only is 0 total

$2(x + 1) + (x - 3) (= 8)$

M

1

Second set of brackets not needed

Or $4(x + 1) + 2(x - 3)$

$2x + 1 + x - 3$ is M0 unless invisible bracket recovered

$x/2 + 1/2 + x/4 - 3/4$ is M1

$3x - 1 (= 8)$

A1

$6x - 2 (= 16) \quad 3x/4 - 1/4 (= 2) \quad A1$

Their $3x - 1 = 8$

D

M1

Their $6x - 2 = 16$

nb $2(x + 1) + x - 3 = 8$

Or $4(x + 1) + 2(x - 3) = 16$ gets M2

$3x/4 = 9/4$

$x = 3 \text{ ft}$

A1

ft

[4]

5. (a) $7(x + 2)$

B1

allow one error

(b) $4m + 12 + 6m - 15$

M

1

$$10m - 3$$

A1

allow 10m + -3

(c) $6x + 9y = 27$ $4x + 6y = 18$

M1

and or and

$$6x + 4y = 2$$

9x

$$+ 6y = 3$$

$$5y = 25$$
 or

5x

$$= -15$$
 M1dep

$$y = 5$$
 or $x = -3$

A1

$$x = -3$$
 and

y =

$$5$$
 A1

SC1 correct answer with no working or using T&I

(d) $(x + 8)(x - 2)$

B2

B1 $(x \pm 8)(x \pm 2)$

[9]

6. (a) $\frac{8x}{(2x-1)}$

B3

$$8x(x + 3)$$

B1

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

B1

(b) $2a = -6$

1	M
$a^2 + b = 13$	
1	M
$a = -3$ and $b = 4$	A1
<i>or $x^2 + 2ax + a^2 + b (= x^2 - 6x + 13)$</i>	

[6]

7. (a) $x^2 + 2x\sqrt{6} + 6$	B2
<i>- 1 eeo but must have middle terms at some stage.</i>	

(b) 4 with convincing explanation

M1,A1,M1,A1,A1

M1 for $(x + \sqrt{6})^2 + (x - \sqrt{6})^2$
A1 for $2x^2 + 12$
M1 for $(x + \sqrt{6})^2 + (x - \sqrt{6})^2 = (2\sqrt{11})^2$
A1 for $2x^2 = 32$
A1 for $x=4$

[7]

8. $(x - 5)^2 - 30 = 0$	M
1	
<i>For attempt at $(x - 5)^2$,</i>	
$x = 5 \pm \sqrt{30}$	A1

A1