

Student Name: ..... Class:.....



**YEAR 11 PRELIMINARY ASSESSMENT**

**TASK 1**

**March 2012**

**TOPICS TESTED:- Basic Arithmetic, Algebra,  
Surds, Indices, Equations**

**General Instructions**

- Reading Time – 5 minutes
- Working Time – 60 Minutes
- Start each question on a new page.

<b>Q 1</b>	
<b>Q 2</b>	
<b>Q 3</b>	
<b>Q 4</b>	
<b>Q 5</b>	
<b>TOTAL</b>	

**Question 1 (8 marks)**

- (a) Express  $1.2\dot{6}$  as a fraction in simplest form. 2
- (b) Evaluate  $\sqrt{\frac{\pi \times 5.432^2}{18.927}}$  correct to 3 significant figures. 2
- (c) Evaluate  $\frac{-4.3 \times 10^{-4} + 1.7 \times 10^{-2}}{(6.7 \times 10^6)^3}$ . Express your answer in scientific notation to 3 significant figures. 2
- (d) Simplify  $12 - 2|5 - 8| \times 3$  2

**Question 2 (11 marks)**

- (a) Factorise fully  $m^2 - n^2 + 5m - 5n$  2
- (b) Solve  $\frac{3x-2}{4} - \frac{2x+1}{8} = 5$  2
- (c) Simplify  $\frac{x+1}{x^2-x} - \frac{x-1}{x^2+x}$  3
- (d) Factorise completely  $2x^3 - 128$  2
- (e) Factorise fully  $a^2 + 12ac - 28c^2$  2

**Question 3 (8 marks)**

- (a) Simplify  $\sqrt{75} + \sqrt{48} - \sqrt{12}$  2
- (b) Express with a rational denominator  $\frac{\sqrt{5}+1}{2\sqrt{2}+3}$  2
- (c) Find integers  $a$  and  $b$  such that  $(3 - \sqrt{2})^2 = a - b\sqrt{2}$  2
- (d) Form a pair of simultaneous equations and solve them to find  $x$  and  $y$   
 $6 + \sqrt{x-y} = x + y + \sqrt{18}$  2

**Question 4 (10 marks)**

- (a) Find the exact value of  $\frac{A^2C}{B^2}$  where  $A = \left(\frac{2}{3}\right)^2$   $B = \left(\frac{4}{3}\right)^4$   $C = \left(\frac{8}{3}\right)^2$  3
- (b) Simplify  $\frac{16}{2^{3x} \times 8^{1-x}}$  2
- (c) Simplify  $\frac{x^{-1} + y^{-1}}{x + y}$  2
- (d) Simplify  $\frac{x - 5 + 6x^{-1}}{1 - 2x^{-1}}$  3

**Question 5 (17 marks)**

- (a) Solve  $|2x - 3| \leq 5$ . 2
- (b) Solve  $|x + 2| = 2x - 5$ . 3
- (c) Find the exact values of x if  $2x^2 - 4x + 1 = 0$  2
- (d) Solve the following simultaneous equations
- i)  $x + y = 5$  and  $x^2 + y^2 = 25$  2
- ii)  $2x + y = 4$  and  $5x + 2y = 9$  2
- iii)  $y = x^2 - 3x + 4$  and  $y = 2x - 2$  2
- (e) Solve  $-12 \leq \frac{2x}{3} < 4$  and graph on a number line 2
- (f) Solve  $(x - 3)^2 = 25$  2

**END OF ASSESSMENT**

# Solutions

## Question 1

$$a) 10x = 2.666\dots$$

$$x = 0.266\dots$$

$$\frac{9x = 2.4}{9x = 2.4}$$

$$x = \frac{2.4}{9}$$

$$= \frac{24}{90}$$

$$\therefore 1.26 = 1 \frac{24}{90} = 1 \frac{8}{30}$$

$$b) \sqrt{4.8976485}$$

$$= 2.21 \text{ (3 sf)}$$

$$c) 5.51 \times 10^{-23}$$

$$d) 12 - 2 \times 3 \times 3$$

$$12 - 18$$

$$-6$$

## Question 2.

$$a) (m-n)(m+n) + 5(m-n)$$

$$= (m-n)(m+n+5)$$

$$b) 2(3x-2) - (2x+1) = 40$$

$$6x - 4 - 2x - 1 = 40$$

$$4x = 45 \rightarrow$$

$$c) \frac{x+1}{x(x-1)} - \frac{x-1}{x(x+1)}$$

$$= \frac{(x+1)^2 - (x-1)^2}{x(x-1)(x+1)}$$

$$= \frac{x^2 + 2x + 1 - x^2 + 2x - 1}{x(x-1)(x+1)}$$

$$= \frac{4x}{x(x-1)(x+1)}$$

$$= \frac{4x}{x(x-1)(x+1)}$$

$$= \frac{4}{(x-1)(x+1)}$$

$$= \frac{4}{(x-1)(x+1)}$$

$$d) 2(x^3 - 64)$$

$$2(x^3 - 4^3)$$

$$2(x-4)(x^2 + 4x + 16)$$

$$e) (a+14c)(a-2c)$$

## QUESTION 3.

$$a) \sqrt{75} + \sqrt{48} - \sqrt{12}$$

$$5\sqrt{3} + 4\sqrt{3} - 2\sqrt{3}$$

$$7\sqrt{3}$$

$$b) \frac{\sqrt{5+1}}{2\sqrt{2}+3} \times \frac{2\sqrt{2}-3}{2\sqrt{2}-3}$$

$$\frac{2\sqrt{10} + 2\sqrt{2} - 3\sqrt{5} - 3}{8-9}$$

$$= \frac{2\sqrt{10} + 2\sqrt{2} - 3\sqrt{5} - 3}{-1}$$

$$= -2\sqrt{10} - 2\sqrt{2} + 3\sqrt{5} + 3$$

$$c) (3-\sqrt{2})^2 = 9 + 2 - 6\sqrt{2}$$

$$= 11 - 6\sqrt{2}$$

$$a=11 \quad b=6$$

$$d) x+y=6$$

$$x-y=18$$

$$2x=24$$

$$x=12$$

$$y=-6$$

## QUESTION 4.

$$a) \left(\frac{2}{3}\right)^4 \times \left(\frac{8}{3}\right)^2 \div \left(\frac{4}{3}\right)^8$$

$$= \left(\frac{2^4}{3^4} \times \frac{2^6}{3^2} \times \frac{3^8}{2^{16}}\right)$$

$$= \frac{3^2}{2^6} = \frac{9}{64}$$

$$b) \frac{2^4}{2^{3x} \times 2^{3-3x}} = \frac{2^4}{2^3} = 2.$$

$$c) \frac{x^{-1} + y^{-1}}{x + y}$$

$$= \frac{\frac{1}{x} + \frac{1}{y}}{x + y}$$

$$= \frac{y + x}{xy} \times \frac{1}{x + y}$$

$$= \frac{1}{xy}$$

$$d) \frac{x - 5 + \frac{6}{x}}{1 - \frac{2}{x}} = \frac{x^2 - 5x + 6}{x - 2}$$

$$= \frac{(x-3)(x-2)}{(x-2)}$$

$$= x - 3$$

### QUESTION 5.

$$a) -5 \leq 2x - 3 \leq 5$$

$$-2 \leq 2x \leq 8$$

$$-1 \leq x \leq 4.$$

$$b) x + 2 = 2x - 5 \quad -x - 2 = 2x - 5$$

$$7 = x \quad \text{or} \quad -3x = -3$$

$$x = 7 \quad \text{or} \quad x = 1$$

check solutions

$$|x + 2| = 2x - 5 \quad |1 + 2| = 2 \times 1 - 5$$

$$|9| = 14 - 5 \quad 3 = -3$$

$$= 9 \quad \text{False}$$

true

only  $x = 7$  a solution

$$c) x = \frac{4 \pm \sqrt{16 - 8}}{4}$$

$$= \frac{4 \pm \sqrt{8}}{4}$$

$$= \frac{4 \pm 2\sqrt{2}}{4} = \frac{2 \pm \sqrt{2}}{2}$$

$$d) y = 5 - x \quad x = 0 \quad x = 5$$

$$x^2 + (5 - x)^2 = 25 \quad y = 5 \quad y = 0$$

$$x^2 + 25 + x^2 - 10x = 25$$

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

$$ii) \begin{aligned} (1) \times 2 \quad 4x + 2y &= 8 \\ 5x + 2y &= 9 \\ \hline -x &= -1 \\ \therefore x &= 1 \end{aligned}$$

sub in (1)

$$2 + y = 4$$

$$y = 2$$

$\therefore x = 1 \quad y = 2$

$$iii) 2x - 2 = x^2 - 3x + 4$$

$$0 = x^2 - 5x + 6$$

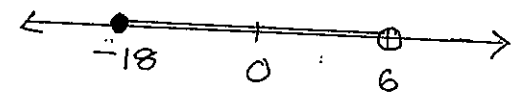
$$(x - 3)(x - 2) = 0$$

$$x = 3 \quad x = 2$$

$$y = 4 \quad y = 2$$

$$e) -36 \leq 2x < 12$$

$$-18 \leq x < 6$$



$$f) (x - 3) = \pm 5$$

$$x = 3 \pm 5$$

$$x = 8 \quad \text{or} \quad -2$$