

Section A. Basic Arithmetic. (11 marks)		Marks
1.	The population of a city is 6 241 300. Write this number in scientific notation, correct to 4 significant figures.	2
2.	Evaluate $\sqrt{\frac{296 \cdot 3}{6 \cdot 2 \times 3 \cdot 5}}$ correct to 2 decimal places.	2
3.	The cost of a DVD player is \$297. This includes a 10% tax on the original price. Calculate the original price of the DVD player.	2
4.	Simplify: $ -2 - 3 $	1

5.	Express $0.\overline{517}$ as a fraction.	2
6.	Find the exact value of $\frac{a^3c}{b^2}$ where $a = \left(\frac{2}{3}\right)^2$, $b = \left(\frac{4}{3}\right)^4$ and $c = \left(\frac{8}{3}\right)^7$.	2

Section B. Algebra and Surds (20 marks)		Marks
1.	Simplify: $6x - 2 + 5x - 3$	1
2.	Expand and simplify: $2(3 - 2x) - (5 - 3x)$	2
3.	Factorise fully: a. $3y^2 + 4y - 7$	1
	b. $2a - 2b + a^2 - b^2$	2
	c. $a^3 + 27$	1

4.	Simplify fully: $\frac{7a-14b}{7}$	1
5.	Express as a single fraction in its simplest form: a. $\frac{x-3}{2} - \frac{x-1}{3}$ b. $\frac{5}{x-2} \div \frac{x+7}{x^2-4}$	2 2
6.	Write without either a fractional or negative index: $(x+1)^{-\frac{2}{3}}$	1

7.	Rationalise the denominator: a. $\frac{1}{\sqrt{5}}$ b. $\frac{3}{\sqrt{7+2}}$	1 2
8.	Express $\frac{1}{5-\sqrt{3}} + \frac{1}{5+\sqrt{3}}$ in simplest form with a rational denominator.	2
9.	Find the exact value of $t^4 - t^2 + 1$ when $t = 3\sqrt{2}$.	2

Section C. Equations and Inequations. (12 marks)		Marks
1.	Solve $x + 8 \geq 5$ and graph the solution on a number line.	2
2.	Solve: $ 3x - 2 < 1$.	2
3.	Solve: $3x - \frac{2x - 5}{2} = 1$	2

4.	Solve, leaving your answer in simplest surd form: $5x^2 - 10x + 2 = 0$	2
5.	Solve the pair of simultaneous equations: $2x + y = 9$ $x - 2y = 2$	2
6.	Find t given that $s = ut + \frac{1}{2}at^2$ if $a = 8$, $u = -3$ and $s = 10$.	2
END OF THE PAPER.		

Section A. Basic Arithmetic. (11 marks)		Marks
1.	<p>The population of a city is 6 241 300. Write this number in scientific notation, correct to 4 significant figures.</p> $6.2413 \times 10^6 \doteq 6.241 \times 10^6$	2
2.	<p>Evaluate $\sqrt{\frac{296.3}{6.2 \times 3.5}}$ correct to 3 decimal places.</p> $= 3.695183065\dots$ $= 3.70$	2
3.	<p>The cost of a DVD player is \$297. This includes a 10% tax on the original price. Calculate the original price of the DVD player.</p> $110\% \text{ of price} = \297 $1\% \text{ of price} = \frac{297}{110}$ $100\% \text{ of price} = \frac{297}{110} \times 100$ $= \$270$ <p>\therefore original price is \$270</p>	2
4.	<p>Simplify: $-2 - 3$</p> $= 2 - 3$ $= -1$	1

5.

Express $0.\dot{5}1\dot{7}$ as a fraction.

$$\text{Let } x = 0.5171717\dots \quad \text{--- ①}$$

$$100x = 51.71717\dots \quad \text{--- ②}$$

② - ①

$$99x = 51.2$$

$$x = \frac{51.2}{99}$$

$$x = \frac{512}{990}$$

$$= \frac{256}{495}$$

$$\therefore 0.\dot{5}1\dot{7} = \frac{256}{495}$$

2

6.

Find the exact value of $\frac{a^3c}{b^2}$ where $a = \left(\frac{2}{3}\right)^2$, $b = \left(\frac{4}{3}\right)^4$ and $c = \left(\frac{8}{3}\right)^7$.

$$\frac{\left[\left(\frac{2}{3}\right)^2\right]^3 \left(\frac{8}{3}\right)^7}{\left[\left(\frac{4}{3}\right)^4\right]^2}$$

$$= \frac{\left(\frac{2}{3}\right)^6 \left(\frac{8}{3}\right)^7}{\left(\frac{4}{3}\right)^8}$$

$$= \frac{2^6}{3^6} \times \frac{(2^3)^7}{3^7} \times \frac{3^8}{(2^2)^8}$$

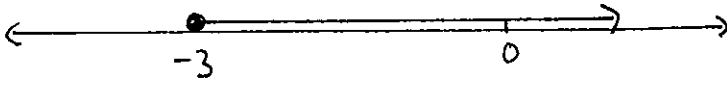
$$= \frac{2^6 \times 2^{21} \times 3^8}{3^6 \times 3^7 \times 2^{16}}$$

$$= \frac{2^{11}}{3^5} = \frac{2048}{243}$$

2

Section B. Algebra and Surds (20 marks)		Marks
1.	Simplify: $6x - 2 + 5x - 3$ $= 11x - 5$	1
2.	Expand and simplify: $2(3 - 2x) - (5 - 3x)$ $= 6 - 4x - 5 + 3x$ $= 1 - x$	2
3.	Factorise fully: a. $3y^2 + 4y - 7$ $= (3y + 7)(y - 1)$ b. $2a - 2b + a^2 - b^2$ $= 2(a - b) + (a - b)(a + b)$ $= (a - b)(2 + a + b)$	1 2
	c. $a^3 + 27$ $= (a + 3)(a^2 - 3a + 9)$	1

4.	<p>Simplify fully:</p> $\frac{7a-14b}{7}$ $= \frac{7(a-2b)}{7}$ $= a-2b$	1
5.	<p>Express as a single fraction in its simplest form:</p> <p>a.</p> $\frac{x-3}{2} - \frac{x-1}{3}$ $= \frac{3(x-3) - 2(x-1)}{6}$ $= \frac{3x-9-2x+2}{6}$ $= \frac{x-7}{6}$ <p>b.</p> $\frac{5}{x-2} \div \frac{x+7}{x^2-4}$ $= \frac{5}{x-2} \times \frac{x^2-4}{x+7}$ $= \frac{5}{\cancel{x-2}} \times \frac{(\cancel{x-2})(x+2)}{x+7}$ $= \frac{5(x+2)}{x+7}$	2 2
6.	<p>Write without a fractional or negative index:</p> $(x+1)^{-3} = \frac{1}{\sqrt[3]{(x+1)^2}}$	1

Section C. Equations and Inequations. (12 marks)		Marks
1.	Solve $x + 8 \geq 5$ and graph the solution on a number line. $x \geq -3$ (1) 	2
2.	Solve: $ 3x - 2 < 1$. $3x - 2 < 1$ or $-(3x - 2) < 1$ $3x < 3$ or $3x - 2 > -1$ $x < 1$ (1) or $3x > 1$ $x > \frac{1}{3}$ (1) \therefore solution is $\frac{1}{3} < x < 1$	2
3.	Solve: $3x - \frac{2x - 5}{2} = 1$ $6x - \frac{2(2x - 5)}{2} = 2$ $6x - 2x + 5 = 2$ $4x + 5 = 2$ $4x = -3$ $x = -\frac{3}{4}$ (1)	2

4.	<p>Solve, leaving your answer in simplest surd form:</p> $5x^2 - 10x + 2 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{10 \pm \sqrt{(-10)^2 - 4 \times 5 \times 2}}{2 \times 5}$ $x = \frac{10 \pm \sqrt{60}}{10}$ $x = \frac{10 \pm 2\sqrt{15}}{10} = \frac{5 \pm \sqrt{15}}{5}$	2
5.	<p>Solve the pair of simultaneous equations:</p> $2x + y = 9 \quad \text{--- (1)}$ $x - 2y = 2 \quad \text{--- (2)}$ $\textcircled{1} \times 2 \quad 4x + 2y = 18 \quad \text{--- (3)}$ $\quad \quad \quad x - 2y = 2 \quad \text{--- (2)}$ <hr style="width: 10%; margin-left: 0;"/> $\textcircled{2} + \textcircled{3} \quad 5x = 20$ $x = 4$ <p>Sub into (1)</p> $8 + y = 9$ $y = 1$ <p>\therefore solution is $x = 4, y = 1$</p>	2
6.	<p>Find t given that $s = ut + \frac{1}{2}at^2$ if $a = 8, u = -3$ and $s = 10$.</p> $10 = -3t + \frac{1}{2} \times 8 \times t^2$ $10 = -3t + 4t^2$ $4t^2 - 3t - 10 = 0$ $\frac{(4t+5)(t-2)}{41} = 0 \quad \begin{array}{l} 40 \\ -3 \end{array}$ $(4t+5)(t-2) = 0$ $4t = -5 \quad \text{or} \quad t - 2 = 0$ $t = -\frac{5}{4} \quad \quad \quad t = 2$ <p style="text-align: center;">END OF THE PAPER.</p>	2