

GRADE : 10
 SUBJECT : Maths
 TITLE : Paper 1
 EXAMINER : Mr A. Slaughter
 TOTAL MARKS : 150

DATE : / 11 / 20 12

SOLUTIONS

TIME : 3 hour(s)

<p>1.1. $K = (2x+1)^2 - (2x-1)^2$</p>	<p>2.1. 1. $x^2 - x - y^2 + y$ ✓ $= x^2 - y^2 - x + y$ $= (x-y)(x+y) - (x-y)$ ✓ $= (x-y)[(x+y) - 1]$ $= (x-y)[x+y-1]$ ✓</p>
<p>1.1. $4x^2 + 4x + 1 - (4x^2 - 4x + 1)$ $= 4x^2 + 4x + 1 - 4x^2 + 4x - 1$ $= 8x$ ✓</p>	<p>2. $2(8x^2 - 6x - 9)$ $= 2(2x-3)(4x+3)$ ✓</p>
3	4
<p>1.2. $((2x+1) - (2x-1))((2x+1) + (2x-1))$ $= (2x+1-2x+1)(2x+1+2x-1)$ $= (2)(4x)$ $= 8x$ ✓</p>	<p>3. $\frac{6x^2 - 3x - 12}{6}$ $= \frac{(2x-3)(3x+4)}{6}$ ✓</p>
2	2
<p>1.1. 2. $2x+1 = 100\ 001$ $\therefore x = 50\ 000$ ✓ $\therefore (100\ 001)^2 - (99\ 999)^2$ $= 8(50\ 000)$ <small>x not stated</small> $= 400\ 000$ ✓ <small>0/2</small></p>	<p>2.2. $\frac{3}{x+2} - x$ $= \frac{3 - x(x+2)}{x+2}$ $= \frac{3 - x^2 - 2x}{x+2}$ $= \frac{-x^2 - 2x + 3}{x+2}$ ✓ $= \frac{-(x^2 + 2x - 3)}{x+2}$ ✓ $= \frac{-(x+3)(x-1)}{x+2}$ ✓</p>
2	4
<p>2. $(x + \frac{1}{x})^2 = (9)^2$ $x^2 + 2 + \frac{1}{x^2} = 81$ ✓ $x^2 + \frac{1}{x^2} = 79$ ✓</p>	
2	

2.3.

$$\frac{\frac{y^3 - x^3}{x^3 y^3}}{\frac{y^2 - x^2}{xy}}$$

$$= \frac{y^3 - x^3}{x^3 y^3} \times \frac{xy}{y^2 - x^2}$$

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

$$= \frac{y^2 + xy + x^2}{x^2 y^2 (y+x)}$$

5

2.4.

$$\frac{5}{(x-2)(x+2)} - \frac{x+1}{3(x-2)} + \frac{1}{6(2+x)}$$

$$= \frac{5 \cdot 6 - (x+1)(2(x+2)) + 1(x-2)}{6(x-2)(x+2)}$$

$$= \frac{30 - (x+1)(2x+4) + x-2}{6(x-2)(x+2)}$$

$$= \frac{30 - (2x^2 + 6x + 4) + x - 2}{6(x-2)(x+2)}$$

$$= \frac{30 - 2x^2 - 6x - 4 + x - 2}{6(x-2)(x+2)}$$

$$= \frac{-2x^2 - 5x + 24}{6(x-2)(x+2)}$$

$$= \frac{-(2x^2 + 5x - 24)}{6(x-2)(x+2)}$$

7

(5)² - 4(2)(-24)

= 217

∴ PS ∴ (x)xx

3.1. 1. $x^2(2x-3) + 4(2x-3) = 0$

$$(2x-3)(x^2+4) = 0$$

$$x = \frac{3}{2} \text{ or } x^2 = -4$$

4

2. $x \in \mathbb{R}, x \neq -2$

2

3. LCD = (x-5)

(∴ x ≠ 5)

x thm

$$0 = -3 + 4(x-5)$$

$$\frac{3}{4} = x-5$$

$$\frac{23}{4} = x$$

2

4. LCD = (x+1)(3x-1)

(∴ x ≠ -1 and $\frac{1}{3}$)

x thm

$$(3x-1)(3x-1) = (5x+1)(x+1)$$

$$9x^2 - 6x + 1 = 5x^2 + 6x + 1$$

$$4x^2 - 12x = 0$$

$$\div 4: x^2 - 3x = 0$$

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

$$x = 0 \text{ or } 3 \text{ both}$$

6

3.1. 5. $x^{\frac{2}{3}} = \frac{4}{5} \checkmark \checkmark$

$$\left(\sqrt[3]{x^2}\right)^3 = \left(\frac{4}{5}\right)^3$$

$$x^2 = \frac{64}{125} \checkmark$$

$$x = \sqrt[4]{\frac{64}{125}}$$

$$x = \pm 0,72 \checkmark \quad 4$$

(OR)

$$\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = \pm \left(\frac{4}{5}\right)^{\frac{3}{2}} \checkmark$$

$$x = \pm 0,72 \checkmark \quad 4$$

6. $8\pi x - \frac{680}{x^2} = 0$

LCD = x^2

($\because x \neq 0$)

x thru

$$8\pi x^3 - 680 = 0$$

$$x^3 = \frac{680}{8\pi} \checkmark \quad 27,05...$$

$$x = \sqrt[3]{\frac{680}{8\pi}} \checkmark$$

$$= 3 \checkmark \quad 3$$

7. $4a^2x - b^2x = 2a - b$

$$x(4a^2 - b^2) = 2a - b$$

$$x = \frac{2a - b}{4a^2 - b^2} \checkmark$$

$$= \frac{2a - b}{(2a - b)(2a + b)} \checkmark$$

$$= \frac{1}{2a + b} \checkmark \quad 4$$

3.2. $-3 < 4 - 2x \leq 5$

3.2. 1. $-7 < -2x \leq 1 \checkmark$

$$\frac{7}{2} > x \geq -\frac{1}{2} \checkmark \quad 2$$

2.1.  $\checkmark \quad 1$

2.2. $x \in [-\frac{1}{2}; \frac{7}{2}) \checkmark \quad 1$

3.3. $4y + 3x = 18 \quad (1)$

$2x + y = 2 \quad (2)$

• substitution

$$y = 2 - 2x \checkmark$$

$$4(2 - 2x) + 3x = 18 \checkmark$$

$$8 - 8x + 3x = 18$$

$$-10 = 5x$$

$$-2 = x \checkmark$$

$$\therefore y = 2 - 2(-2) = 6 \checkmark \quad 4$$

So, $x = -2$ and $y = 6$

(OR)

elimination

$$(1) \times 1: 3x + 4y = 18$$

$$(2) \times 4: -8x - 4y = -8 \checkmark$$

$$-5x = 10 \checkmark$$

$$x = -2 \checkmark$$

$$2(-2) + y = 2$$

$$y = 6 \checkmark$$

So, $x = -2$ and $y = 6$ \rightarrow

$$4.1. \quad 3x - 6x^0 \\ = 3x - 6 \checkmark$$

2

$$4.2. \quad (2 \cdot 3^{x+1})^3 = 2^3 \cdot 3^{3x+3} \checkmark \\ \sqrt[3]{3^{16x}} = 3^{\frac{16x}{3}} = 3^{8x} \checkmark \\ 12^{3-2x} = (2^2 \cdot 3)^{3-2x} \\ = 2^{6-4x} \cdot 3^{3-2x} \checkmark$$

$$\therefore \frac{2^3 \cdot 3^{3x+3}}{3^{8x} \cdot 2^{6-4x} \cdot 3^{3-2x}} \\ = \frac{2^3 \cdot 3^{3x+3}}{2^{6-4x} \cdot 3^{3+6x}} \\ = 2^{3-(6-4x)} \cdot 3^{3x+3-(3+6x)} \\ = 2^{-3+4x} \cdot 3^{-3x} \checkmark$$

4

$$4.3. 1. \quad (2^3)^x = 2^{3x} \\ = (2^x)^3 \\ = a^3 \checkmark$$

1

$$2. \quad 2^x \cdot 2^3 \\ = a \cdot 8 \\ = 8a \checkmark$$

1

4.3. $3 \cdot 5 \cdot 2^{-x}$
 $= 5 \cdot 2^{-x}$
 $= 5 \cdot a^{-x}$
 $= \frac{5}{a^x}$ ✓

1

4.4. $2x^{-\frac{3}{4}} - 7x^{-\frac{3}{4}} - 4$
 $= (x^{-\frac{3}{4}} - 4)(2x^{-\frac{3}{4}} + 1)$

✓ var $x^{-\frac{3}{4}}$
 ✓ coef's

2

4.5. $4 \cdot 3^{2x-1} - \frac{1}{3} \cdot 3^{2x} \cdot 3^2 = -\frac{5}{3}$
 $3^{2x} (4 \cdot 3^{-1} - \frac{1}{3} \cdot 3^2) = -\frac{5}{3}$
 $3^{2x} (4 \cdot \frac{1}{3} - \frac{1}{3} \cdot 9) = -\frac{5}{3}$
 $3^{2x} (\frac{4}{3} - 3) = -\frac{5}{3}$
 $3^{2x} (\frac{4-9}{3}) = -\frac{5}{3}$
 $3^{2x} (-\frac{5}{3}) = -\frac{5}{3}$
 $3^{2x} = 1$ ✓
 $= 3^0$
 $\therefore 2x = 0$
 $x = 0$ ✓

4

5.1. $17; 15; 13; \dots$

1. $a = 17$
 $d = -2$
 $T_n = a + (n-1)d$
 $= 17 + (n-1)(-2)$
 $= 17 - 2n + 2$
 $= 19 - 2n$

1

2. $-981 = 19 - 2n$ ✓
 $2n = 1000$
 $n = 500$

2

5.2. $4x+7 - (3x-1) = 2x-5 - (4x+7)$ ✓
 $4x+7 - 3x+1 = 2x-5 - 4x-7$
 $x+8 = -2x-12$
 $3x = -20$
 $x = -\frac{20}{3}$
 $= -6,67$

2

6.1. 1. $f(x) = 3x - 7$

$f(5) = 3(5) - 7$

$= 8$ ✓
 →

1

2. $g(x) = 2$

$g(-1) = 2$ ✓
 →

1

6.2. $h(x) = -3x + 2$

$h(x+4) = -3(x+4) + 2$

$= -3x - 12 + 2$

$= -3x - 10$ ✓

$\therefore 2(-3x - 10) - 5x = 6$

$-6x - 20 - 5x = 6$

$-11x = 26$

$x = -\frac{26}{11}$ ✓
 →

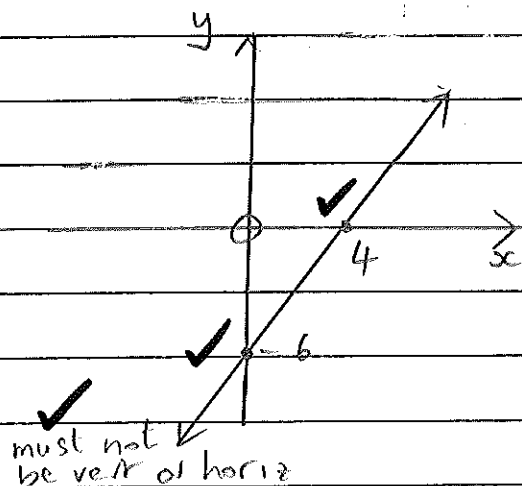
2

7.1. $3x - 2y = 12$

• str line

• y int: $-2y = 12 \therefore y = -6$

• x int: $3x = 12 \therefore x = 4$



3

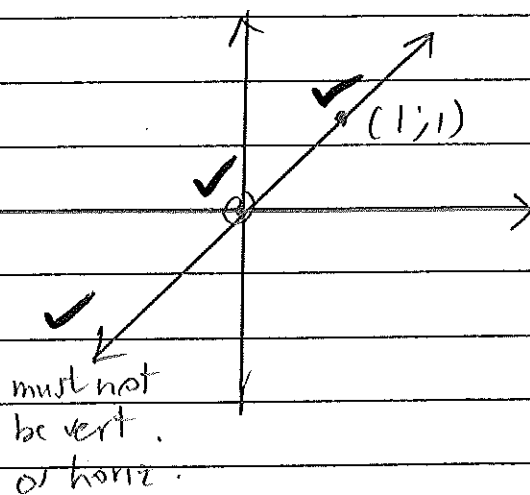
7.2. $y = x$

$c = 0$

• str line

• y int: $y = 0$

• grad: $m = 1 = \frac{\Delta y}{\Delta x}$



3

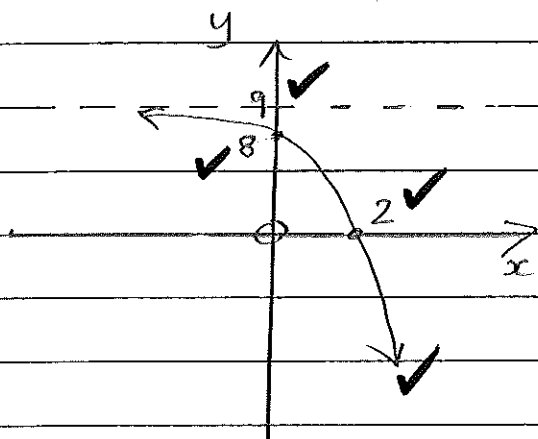
7.3. $y = -3^x + 9$
 $= -1 \cdot 3^x + 9$

• exponential

• y int: $y = -1 \cdot 3^0 + 9$
 $= 8$

• x int: $0 = -3^x + 9$
 $3^x = 3^2$
 $x = 2$

• ha: $y = 9$



4

8.1. $A(-3; 0)$ ✓

8.2. $y = a(x+3)(x-3)$ ✓

sub $(-5; 32)$

$32 = a(-5+3)(-5-3)$
 $= a \cdot 16$

$2 = a$

$\therefore y = 2(x+3)(x-3)$ ✓ **3**

8.3. At $x = 0$

$y = 2(0+3)(0-3)$
 $= -18$ ✓

8.4. $x \in (-\infty; 0)$ ✓

8.5. 1. $\frac{2}{0}$ ✓

2. x is associated with only one

y ✓

9.1. $f: y = \frac{k}{x} + q$
 $g: y = a \cdot b^x + q$

$q = -4$ ✓ ha
 ↓

$f: y = \frac{k}{x} - 4$
 sub (3;0)
 $0 = \frac{k}{3} - 4$ ✓
 $12 = k$ ✓
 ↓

$g: y = a \cdot b^x - 4$
 sub (0;-2) ✓
 $-2 = a \cdot b^0 - 4$
 $2 = a$ ✓
 ↓

$\therefore y = 2 \cdot b^x - 4$
 sub (3;0)
 $0 = 2 \cdot b^3 - 4$
 $2 = b^3$
 $\sqrt[3]{2} = b$
 $1,26 = b$ ✓
 ↓

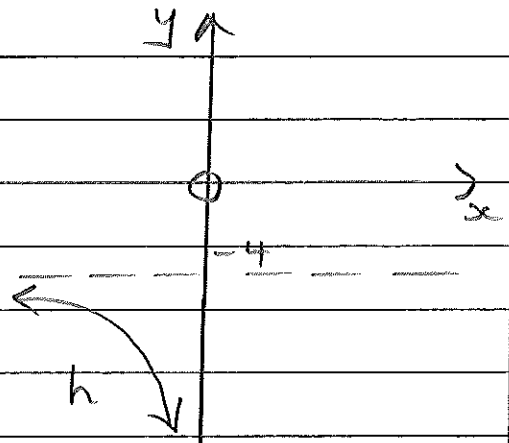
7

9.2. 2. $y_f \cdot y_g \neq 0$
 $\therefore x \in (-\infty; 0) \text{ or } (3; \infty)$ 2
 ✓✓ -1 each end of omission

9.3. $y \in \mathbb{R}; y \neq -4$ 1
 ↓
 (OR)

$y \in (-\infty; -4) \text{ or } (-4; \infty)$ 1
 ↓

9.4.



$\therefore y = x - 4$ ✓
 ↓

1

9.2. 1. $y_f - y_g < 0$
 $y_f < y_g$
 $x \in (-\infty; 0) \text{ or } (3; \infty)$ 2
 ✓
 -1 each error or omission

2

$$10.1. \quad A = P(1+i)^n \cdot i$$

$$\overset{\text{compd}}{\text{sub}} \checkmark = 10\,000 \left(1 + \frac{5}{1200}\right)^{35} \checkmark^n$$

$$= \underline{R\ 11\,566,53} \checkmark \quad 4$$

$$\frac{5}{1200} = \frac{1}{240} = 0,0041\bar{6}$$

$$10.2. \quad A = P(1+i)^n$$

$$2x = x \left(1 + \frac{5}{100}\right)^n \checkmark$$

$$\div x \quad (\text{as } x \neq 0)$$

$$2 = \left(\frac{21}{20}\right)^n$$

$$n = \frac{\log 2}{\log \frac{21}{20}} \checkmark \begin{matrix} \text{logs} \\ \text{must} \\ \text{be shown} \end{matrix}$$

$$= 14,21 \text{ years} \checkmark \quad 3$$

$$(15 \text{ full years})$$

$$10.3. \quad A = P(1+i)^n$$

$$7 \checkmark = 4,50 (1+i)^6$$

$$\frac{14}{9} \checkmark = (1+i)^6$$

$$\sqrt[6]{\frac{14}{9}} = 1+i \checkmark$$

$$1,076... = 1+i$$

$$0,076... = i$$

$$0,076... \times 100 = I$$

$$\underline{7,64\%} \checkmark \quad 4$$

$$10.4. \quad 50\,000 - \frac{20}{100} \cdot 50\,000$$

$$= 50\,000 - 10\,000$$

$$= 40\,000 \checkmark$$

$$A = P(1+in)$$

$$\checkmark = 40\,000 \left(1 + \frac{10}{100} \cdot 4\right)$$

$$= 56\,000$$

$$\therefore \text{Monthly repayments}$$

$$= \frac{56\,000}{48} \checkmark + 75$$

$$= \underline{R\ 1\,241,67} \checkmark \quad 4$$

11.1.	$U = 80$		11.3. 4.	$\frac{8+9+7+6}{110}$ $= \frac{30}{110}$ $= \frac{3}{11} \checkmark \quad 0,27$
	$54-x + x + 42-x + 7 = 80$ $\checkmark 23 = x$	4	5.	$\frac{7}{110} \checkmark \quad 0,06$
11.2.	$P(B) + P(B') = 1$ $P(B) + 0,4 = 1 \checkmark$ $P(B) = 0,6 \checkmark$ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $0,7 = P(A) + 0,6 - 0$ $\underline{0,1 = P(A)} \checkmark$	4	6.	$7, 8, 9, 21 \quad M$ <p style="text-align: center;">or</p> $\cancel{1}, \cancel{2}, 20, 17 \quad S'$ $\therefore \frac{7+8+9+21+20+17}{110}$ $= \frac{82}{110}$ $= \frac{41}{55} \checkmark \quad 0,75$
11.3. 1.	$\frac{17}{110} \checkmark \quad 0,15$	1		
2.	$\frac{21+22+20}{110}$ $= \frac{63}{110} \checkmark \quad 0,57$	1		
3.	$\frac{93}{110} \checkmark \quad 0,85$	1		