

GRADE : 10

DATE : \_\_\_ / 11 / 20 20

SUBJECT : Mathematics

TITLE : Nov PI

**SOLUTIONS**

EXAMINER : Mr A. Slaughter

TOTAL MARKS : 100

TIME : 2 hour(s)

1.1.	$100x = 278.7878\dots$		2.1.	$3x^{\frac{1}{2}}(2x^{-\frac{1}{2}} - x^{\frac{1}{2}})$	
	$x = 2.7878\dots$			$= 6x^0 - 3x^1$	
	$99x = 276$			$= \frac{6 - 3x}{\checkmark \quad \checkmark} \rightarrow$	2
	$x = \frac{276}{99} \checkmark$				
	$= \frac{92}{33} \checkmark$	3			
	$\rightarrow$				
1.2.	$2x - 5 < 0 \checkmark$		2.2.1.	$\frac{x+2}{5} - \frac{x-4}{10}$	
	$2x < 5$			$= \frac{2(x+2) - (x-4)}{10}$	
	$x < \frac{5}{2} \checkmark$	2		$= \frac{2x+4-x+4}{10}$	
	$\rightarrow$			$= \frac{x+8}{10} \checkmark$	2
				$\checkmark$ $\checkmark$ $\rightarrow$	
			2.2.2.	$\frac{2^{3x} - 5 \cdot 8^{x+1}}{2^{3x}}$	
				$= \frac{2^{3x} - 5(2^3)^{x+1}}{2^{3x}}$	
				$= \frac{2^{3x} - 5 \cdot 2^{3x+3} \checkmark}{2^{3x}}$	
				$= \frac{2^{3x} - 5 \cdot 2^{3x} \cdot 2^3}{2^{3x}}$	
				$= \frac{2^{3x}(1 - 5 \cdot 2^3) \checkmark}{2^{3x}}$	
				$= -39 \checkmark$	3
				$\rightarrow$	

2.3.1.	$3x^4 - 48$		3.1.1.	$2x^2 = 3x$	
	$= 3(x^4 - 16)$ ✓			$2x^2 - 3x = 0$	
	$= 3(x^2 + 4)(x^2 - 4)$ ✓			$x(2x - 3) = 0$ ✓	
	$= 3(x^2 + 4)(x + 2)(x - 2)$ ✓	3		$x = 0$ or $\frac{3}{2}$ ✓	2
2.3.2.	$8x^3 + \frac{27}{x^2}$		3.1.2.	$2^{x(x-5)} - \frac{1}{16} = 0$	
	$= (2x + \frac{3}{x})(4x^2 - 6 + \frac{9}{x^2})$ ✓	2		$2^{x^2 - 5x} = \frac{1}{16}$	
				$= \frac{1}{2^4}$	
				$= 2^{-4}$	
2.3.3.	$5(a-2b)x^2 + 13(2b-a)xy + 6(a-2b)y^2$			$\therefore x^2 - 5x = -4$ ✓	
	$= 5(a-2b)x^2 - 13(a-2b)xy + 6(a-2b)y^2$			$x^2 - 5x + 4 = 0$ ✓	
	$= (a-2b)(5x^2 - 13xy + 6y^2)$ ✓			$(x-1)(x-4) = 0$ ✓	
	$= (a-2b)(x-2y)(5x-3y)$ ✓	3		$\therefore x = 1$ or $4$ ✓	4
			3.1.3.	$3x^{-2/5} - 15 = 0$	
				$x^{-2/5} = 5$ ✓	
				$(x^{-2/5})^{-5/2} = \pm (5)^{-5/2}$ ✓	
				$x = \pm 0,02$ ✓	11
				$^{-5/2} \sqrt{\quad} \times \text{max } 2/4$	

3.2.	$f(x) = -8x^2 + 4x$		3.3.2. (a)		✓	1
3.2.1.	$f(-12) = -8(-12)^2 + 4(-12)$ $= -1200$ ✓	1	(b)	$x \in (-\frac{9}{2}; 4]$ ✓	✓	1
3.2.2.	$f(x) = -12$ $-8x^2 + 4x = -12$ $-8x^2 + 4x + 12 = 0$ $\div -4 :$ $2x^2 - x - 3 = 0$ $(2x-3)(x+1) = 0$ $\therefore x = \frac{3}{2} \text{ or } -1$ ✓	3	3.4.	$3x + 4y + 33 = 0 \dots 1$ $7x - y - 47 = 0 \dots 2$		
3.3.	$-5 \leq 3 - 2x < 10$		(1):	$3x + 4y + 33 = 0$		
3.3.1.	$-3: -8 \leq -2x < 7$ ✓ $\div -2: 4 \geq x > -\frac{7}{2}$ ✓	2	(2) $\times 4:$	$28x - 4y - 188 = 0$ ✓ $31x - 155 = 0$ ✓ $\therefore x = 5$ ✓		
			(2):	$7(5) - y - 47 = 0$ $-y = 12$ $y = -12$ ✓	✓	4
				(OR)		

$$(2): -y = -7x + 47$$

$$\rightarrow -1: y = 7x - 47$$

$$(1): 3x + 4(7x - 47) + 33 = 0$$

$$3x + 28x - 188 + 33 = 0$$

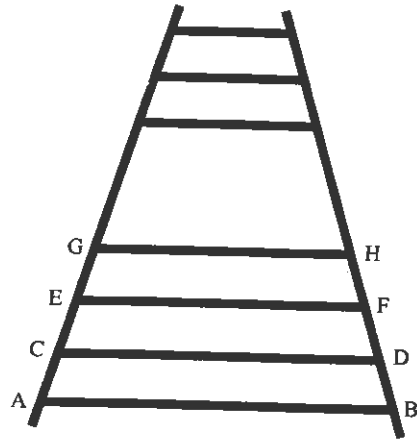
$$31x = 155$$

$$x = 5 \checkmark$$

$$y = 7(5) - 47$$

$$= -12 \checkmark$$

4.1.



$$4.1.1. GH = 1,91 \text{ m} \checkmark$$

$$4.1.2. a = 2 \quad d = -0,03 \checkmark$$

$$R_n = 2 + (n-1)(-0,03)$$

$$= 2 + (-0,03n + 0,03)$$

$$= 2 - 0,03n + 0,03$$

$$= 2,03 - 0,03n$$

$$4.1.3. R_n = 0,38$$

$$2,03 - 0,03n = 0,38 \checkmark$$

$$-0,03n = -1,65$$

$$n = 55 \checkmark$$

$$4.2. \quad 2x-7; 10x+1; -7x-5$$

Arithmetic

$\therefore d$  constant

$$10x+1 - (2x-7) = -7x-5 - (10x+1)$$

$$10x+1 - 2x+7 = -7x-5-10x-1$$

$$8x+8 = -17x-6$$

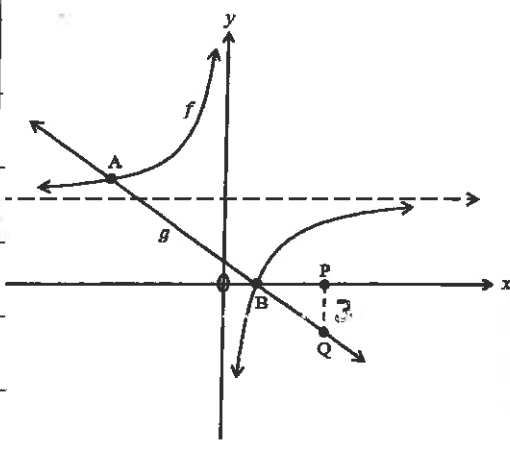
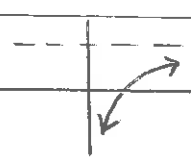
$$25x = -14$$

$$x = -\frac{14}{25} \checkmark$$

2

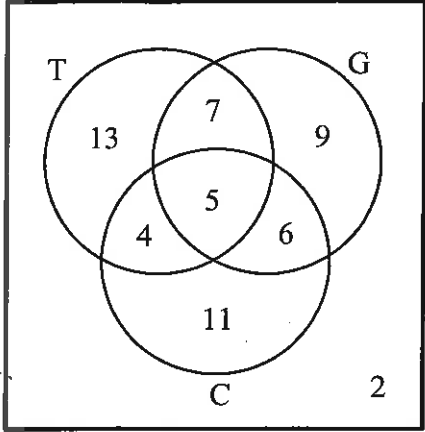
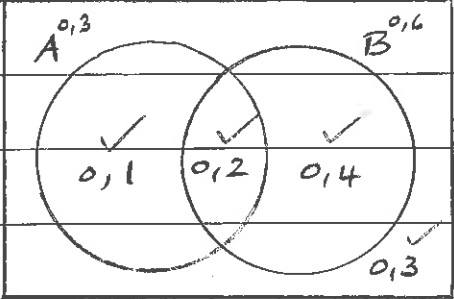
5	$f: y = ax^2 + c$ $g: y = mx + c$		• str line	
			$A(-2;0) \quad B(0;-4)$	
			$m = \frac{-4 - 0}{0 - (-2)}$	
			$= -2 \quad \checkmark$	4
			5.3. $y \in [-4; \infty) \quad \checkmark$	1
			5.4. $f$ inc $\uparrow L \rightarrow R$ $x \in (0; \infty) \quad \checkmark$	1
5.1.	$C(2;0) \quad \checkmark$	1		
5.2.	$B(0;-4)$		5.5. $f(x) > g(x)$	
	$\therefore c = -4 \quad \checkmark$		$y_f > y_g$	
	• parabola		$x \in (-\infty; -2) \text{ or } (0; \infty) \quad \checkmark$	2
	$y = ax^2 - 4$		$x < -2 \text{ or } 0 < x$	
	sub $A(-2;0)$		$0 < x < -2 \quad x \cdot \frac{1}{2}$	
	$0 = a(-2)^2 - 4 \quad \checkmark$		• "and" max $\frac{1}{2}$	
	$4 = 4a$			
	$1 = a \quad \checkmark$			



7.	$f: y = -\frac{10}{x} + 2$		7.3.	$y = -\frac{1}{5}x + 1$	
	$g: y = -\frac{1}{5}x + 1$			$y = -\frac{10}{x} + 2$	
				Find where 2 graphs cross : solve sim.	
				$-\frac{1}{5}x + 1 = -\frac{10}{x} + 2$	
				L.O = $5x$ ( $\therefore x \neq 0$ )	
				$x$ thru	
				$-x^2 + 5x = -10.5 + 10x$	
				$-x^2 - 5x + 50 = 0$	
				$x-1: x^2 + 5x - 50 \stackrel{\checkmark}{=} 0$	
				$(x-5)(x+10) \stackrel{\checkmark}{=} 0$	
7.1.	$x \in \mathbb{R}; x \neq 0 \checkmark$	1		$\therefore x = \cancel{5} \text{ or } -10$	
	$x \in (-\infty; 0) \text{ or } (0; \infty)$			reject	
				$\therefore y = -\frac{1}{5}(-10) + 1$	
				$= 3$	
				$\therefore A(-\sqrt{10}; \sqrt{3})$	5
7.2.	$y_0 = -3$				
	$-3 = -\frac{1}{5}x_0 + 1$				
	$-4 = -\frac{1}{5}x_0$		7.4.	$h$	
	$x_0 = 20$				
	$Q(20; -3)$	2		$y = -x + 2$	2
	$\checkmark_A \checkmark_A$			$\checkmark \checkmark$	



8.1.1	Deposit = $\frac{20}{100} \times 3750$		8.3.	$P = 50\ 000$	
	= 750 ✓			$A = ?$	
	∴ Balance			$i = \frac{7}{1200}$ ✓	
	= 3750 - 750			$n = 5\frac{1}{2} \times 12$	
	= R 3 000 ✓	2		= 66 ✓	
	<u>                    </u> →				
8.1.2	$A = P(1 + in)$			$A = P(1 + i)^n$	
	= $3000(1 + \frac{13}{100} \cdot 3)$			= $50\ 000(1 + \frac{7}{1200})^{66}$ ✓	
	= 4 170			= <u>R 73 398,57</u> ✓	4
	∴ Monthly payment				
	= $\frac{4170}{36} + 35$				
	= R 150,83 ✓	3			
	<u>                    </u> →				
8.2.	$\$ 25000 \times 16,89$				
	= R 422 250 ✓				
	R 422 250 ÷ 21,87				
	= <u>R 19 307,27</u> ✓	2			
	<u>                    </u> →				
	ao 2/2				

9.1.	$P(A) = 0,3$ $P(B) = 0,6$		9.2.				
	$P(A \cup B) = 0,7$						
9.1.1.	$P(B) + P(B') = 1$						
	$0,6 + P(B') = 1$						
	<u><math>P(B') = 0,4</math></u> ✓	1					
9.1.2.	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$		9.2.1.	<u>5</u> ✓	1		
	$0,7 = 0,3 + 0,6 - P(A \cap B)$						
	<u><math>P(A \cap B) = 0,2</math></u> ✓	2	9.2.2.	<u>2</u> ✓	1		
9.1.3.	$S = 1$						
		4	9.2.3.	$13 + 9 + 11$ <u><math>= 33</math></u> ✓	1		
9.1.4.	$P(A \cap B) = 0,2$		9.2.4.	<u>7</u> ✓	1		
	<u><math>\neq 0</math></u> ✓	1	9.2.5.	$7 + 4 + 6 + 5$ <u><math>= 22</math></u> ✓	1		