

GRADE : 10

DATE : 13 / 6 / 20 16

SUBJECT : Mathematics

SOLUTIONS

TITLE : June Exam

EXAMINER : Mr A. Slaughter

TOTAL MARKS : 100

TIME : 2 hour(s)

11.	$100x = 69,6969\dots$ $x = 0,6969\dots$ $99x = 69$ $x = \frac{69}{99}$ $= \frac{23}{33}$ ✓ answer only 0/4	4		$(x - \frac{5}{x})^2 = 16)^2$ $(x - \frac{5}{x})(x - \frac{5}{x}) = 36$ $x^2 - 5 - 5 + \frac{25}{x^2} = 36$ $x^2 - 10 + \frac{25}{x^2} = 36$ LHS ✓ $x^2 + \frac{25}{x^2} = 46$ ✓	2	
1.2.	$5^3 = 125$ $6^3 = 216$ $\therefore \sqrt[3]{150}$ lies between <u>5 and 6</u> ✓ answer only 0/2	2		3.1.	$3x^5 + x^4 - 48x - 16$ $= x^4(3x+1) - 16(3x+1)$ $= (3x+1)(x^4-16)$ ✓ $= (3x+1)(x^2+4)(x^2-4)$ ✓ $= (3x+1)(x^2+4)(x+2)(x-2)$ ✓	5
2.1.	$(4x-5)(16x^2+10x+25)$ $= 64x^3 + 40x^2 + 100x - 80x^2 - 50x - 125$ $= 64x^3 - 40x^2 + 50x - 125$ ✓ -1 each error or omission	2		3.2.	$\frac{1}{2}x^2 - \frac{5}{2}x - 3$ $= \frac{x^2}{2} - \frac{5x}{2} - 3$ $= \frac{x^2 - 5x - 6}{2}$ $= \frac{(x-6)(x+1)}{2}$ ✓	2
2.1.	$2x^{\frac{1}{2}}(5x^{\frac{1}{3}} - x^{-\frac{1}{2}})$ $= 10x^{\frac{5}{6}} - 2x^0$ $= 10x^{\frac{5}{6}} - 2$ ✓	2				

3.3.		4.1.	
$-2x^{\frac{3}{4}} + 8x^{\frac{3}{2}} - 15$		$\frac{12^{3x} \left(\frac{1}{8}\right)^{-2x}}{72^{2x-1}}$	
$= 8x^{\frac{3}{2}} - 2x^{\frac{3}{4}} - 15$		$12 = 2^2 \cdot 3$	
$k = x^{\frac{3}{4}}$		$\frac{1}{8} = \frac{1}{2^3} = 2^{-3}$	
$\therefore (k)^2 = \left(x^{\frac{3}{4}}\right)^2$		$72 = 2^3 \cdot 3^2$	
$k^2 = x^{\frac{3}{2}}$		$\therefore \frac{(2^2 \cdot 3)^{2x} (2^{-3})^{-2x}}{(3^2 \cdot 2^3)^{2x-1}} \quad \checkmark \text{pb}$	
$\therefore 8k^2 - 2k - 15$		$= \frac{2^{6x} 3^{3x} 2^{6x}}{3^{2x-2} 2^{3x-3}} \quad \checkmark \text{remove ()}$	
$= (2k - 3)(4k + 5)$		$= \frac{2^{12x} \cdot 3^{3x}}{3^{2x-2} 2^{3x-3}}$	
$= (2x^{\frac{3}{4}} - 3)(4x^{\frac{3}{4}} + 5) \quad 2$		$= 2^{12x - (3x-3)} \cdot 3^{3x - (2x-2)}$	
$\quad \checkmark \text{ or } 0$		$= 2^{12x-3x+3} \cdot 3^{3x-2x+2}$	
3.4.		$= 2^{9x+3} \cdot 3^{x+2} \quad \checkmark \checkmark$	
$8 \cdot 2^{2x} + 2 \cdot 2^x - 1$		$= 2^{9x} \cdot 3^3 \cdot 3^x \cdot 3^2$	
$k = 2^x$		$= 2^{9x} \cdot 8 \cdot 3^x \cdot 9$	
$\therefore (k)^2 = (2^x)^2$		$= 72 \cdot 2^{9x} \cdot 3^x$	4
$= 2^{2x}$		$\quad \checkmark$	
$\therefore 8k^2 + 2k - 1$		4.2.	
$= (4k - 1)(2k + 1)$		$\frac{\frac{x}{y} - \frac{y}{x}}{y^3 - x^3}$	
$= (4 \cdot 2^x - 1)(2 \cdot 2^x + 1) \quad 2$		$= \frac{x^2 - y^2}{xy} \times \frac{1}{y^3 - x^3} \quad \checkmark \text{ tnt}$	
$\quad \checkmark \text{ or } 0$		$= \frac{(x-y)(x+y)}{xy} \times \frac{1}{(y-x)(y^2+xy+x^2)} \quad \checkmark$	
3.5.		$= \frac{-(y-x)(x+y)}{xy} \times \frac{1}{(y-x)(y^2+xy+x^2)} \quad \checkmark$	
$2^{x+1} - 3 \cdot 2^{x-2}$		$= \frac{x+y}{xy(y^2+xy+x^2)} \quad \checkmark$	5
$= 2^x \cdot 2^1 - 3 \cdot 2^x \cdot 2^{-2}$		$\quad \checkmark$	
$= 2^x (2 - 3 \cdot 2^{-2})$			
$= 2^x \left(2 - \frac{3}{2^2}\right)$			
$= 2^x \left(2 - \frac{3}{4}\right) \quad \frac{3}{4} \checkmark$			
$= 2^x \left(\frac{8-3}{4}\right)$			
$= 2^x \cdot \frac{5}{4} \quad 3$			

5.1.	1.	$-3 < 2x - 3 \leq 11$			$\therefore x = -7 \checkmark$	
		$0 < 2x \leq 14 \checkmark$			(1) $3(-7) - y = -23 \checkmark$	
		$0 < x \leq 7 \checkmark$	2		$2 = y \checkmark$	
		$\xrightarrow{\quad \quad \quad}$				
5.1.	2.1.	$0 \text{ --- } 7 \checkmark$	1			
				6.1.	$\frac{x-2}{x+3} = \frac{x}{x+3} - \frac{2}{x+3}$	
5.1.	2.2	$x \in (0; 7] \checkmark$	1		LCD = $(x+3)$	
		$\xrightarrow{\quad \quad \quad}$			($\therefore x \neq -3$)	
5.2.		$3x - y + 23 = 0 \quad \dots 1$			x thru	
		$34 + 4x - 3y = 0 \quad \dots 2$			$x-2 = x-2$	
		• substitution			$0 = 0$	
		(1): $3x + 23 = y \checkmark \quad \dots 2$			$\therefore x \in \mathbb{R}$	
		(2): $34 + 4x - 3(3x + 23) = 0$			So,	
		$\therefore 34 + 4x - 9x - 69 = 0$			$x \in \mathbb{R}, x \neq -3$	2
		$-35 = 5x$			$\xrightarrow{\quad \quad \quad}$	
		$-7 = x \checkmark$				
		(3): $3(-7) + 23 = y$		6.2.	$0 = -\frac{5}{x+3} + 4$	
		$2 = y \checkmark$	4		LCD = $(x+3)$	
		$\xrightarrow{\quad \quad \quad}$			($\therefore x \neq -3$)	
		• elimination			x thru	
		$3x - y = -23 \quad \dots 1$			$0 = -5 + 4(x+3) \checkmark$	
		$4x - 3y = -34 \quad \dots 2$			$0 = -5 + 4x + 12$	
		(1) $x-3$: $-9x + 3y = 69 \checkmark$			$-7 = 4x$	
		(2) : $4x - 3y = -34$			$-\frac{7}{4} = x \checkmark$	2
		$\xrightarrow{\quad \quad \quad}$			$\xrightarrow{\quad \quad \quad}$	
		$-5x = 35$				

6.3.	$x^2 = 3x$		6.7.	$2 \cdot 2^{3x+1} = \sqrt{2}$	
	$x^2 - 3x = 0 \checkmark$			$\sqrt{2}^{3x+2} = 2^{\frac{1}{2}} \checkmark$	
	$x(x-3) = 0 \checkmark$			$3x+2 = \frac{1}{2} \checkmark$	
	$x = 0 \text{ or } 3 \checkmark$	3		$3x = -\frac{3}{2}$	
	<u>$x = 0 \text{ or } 3 \checkmark$</u>			$x = -\frac{1}{2} \checkmark$	4
6.4.	$-12x^2 + 10x + 12 = 0$		6.8.	$3x^{-4/3} - 8 = 0$	
	$\div -2: 6x^2 - 5x - 6 = 0 \checkmark$			$x^{-2/3} = \frac{8}{3} \checkmark$	
	$(2x-3)(3x+2) = 0 \checkmark$			$(x^{-2/3})^{-3/2} = \pm \left(\frac{8}{3}\right)^{-3/2} \checkmark$	
	$\therefore x = \frac{3}{2} \text{ or } -\frac{2}{3} \checkmark$	3		$x = \pm 0,23 \checkmark$	4
	<u>$x = \frac{3}{2} \text{ or } -\frac{2}{3} \checkmark$</u>			<u>$x = \pm 0,23 \checkmark$</u>	
6.5.	$\frac{x+1}{8-x} = \frac{3(x-1)}{x+1}$		7.1.	$-7; 2; 11; \dots$	
	$LCD = (8-x)(x+1)$			$\begin{matrix} \vee & \vee \\ 9 & 9 \end{matrix}$	
	$(\because x \neq 8 \text{ or } -1)$			$d \checkmark$	
	$(x+1)(x+1) = 3(x-1)(8-x)$		7.1. 1.	$T_n = a + (n-1)d$	
	$x^2 + 2x + 1 = 3(8x - x^2 - 8 + x)$			$= -7 + (n-1)(9) \checkmark$	
	$x^2 + 2x + 1 = 3(-x^2 + 9x - 8)$			$= -7 + (9n-9)$	
	$2x^2 + 2x + 1 = -3x^2 + 27x - 24$			$= -7 + 9n - 9$	
	$\therefore 4x^2 - 25x + 25 = 0 \checkmark$			$= 9n - 16 \checkmark$	3
	$(x-5)(4x-5) = 0 \checkmark$			<u>$= 9n - 16 \checkmark$</u>	
	$\therefore x = 5 \text{ or } \frac{5}{4} \checkmark$	4			
	<u>$x = 5 \text{ or } \frac{5}{4} \checkmark$</u>				
6.6.	$2^{x-3} = 17$		7.1. 2.	$T_n = 9n - 16$	
	$x-3 = \frac{\log 17}{\log 2} \checkmark \log 5$			$1784 = 9n - 16 \checkmark$	
	$x = 7,09 \checkmark$	2		$200 = n \checkmark$	2
	<u>$x = 7,09 \checkmark$</u>			<u>$200 = n \checkmark$</u>	

$$7.2. \quad 7x-1 - (-3x+2) = 9x+10 - (7x-1)$$

$$7x-1+3x-2 = 9x+10-7x+1$$

$$10x-3 = 2x+11$$

$$8x = 14$$

$$x = \frac{7}{4} \checkmark$$

D

2

$$8.1. \quad \cos \hat{D} = \frac{AD}{BD} \text{ or } \frac{CD}{AD}$$

2

$$8.2. \quad 1. \quad 1 - \cos^2 100^\circ$$

$$= 1 - (\cos 100^\circ)^2$$

$$= 1 - (-0,173 \dots)^2$$

$$= 0,97 \checkmark \quad \text{answer only } \frac{2}{2}$$

2

$$8.2. \quad 2. \quad \frac{\sin 2(100^\circ + 10^\circ)}{3 \tan 100^\circ + 10}$$

$$= \frac{-0,642 \dots \checkmark}{-7,013 \dots \checkmark}$$

$$= 0,09 \checkmark \quad \text{answer only } \frac{3}{3}$$

3

$$8.3. \quad 1. \quad \frac{\sin x}{4} = \frac{\sin 20^\circ}{3}$$

$$\sin x = 0,456 \dots$$

$$x = \sin^{-1}(0,456 \dots)$$

$$= 27,13^\circ$$

2

$$8.3. \quad 2. \quad 6 - 4 \tan 8(x-7^\circ) = 1$$

$$A = 8(x-7^\circ)$$

$$6 - 4 \tan A = 1$$

$$\tan A = \frac{5}{4}$$

$$A = \tan^{-1}\left(\frac{5}{4}\right)$$

$$= 51,34 \dots^\circ$$

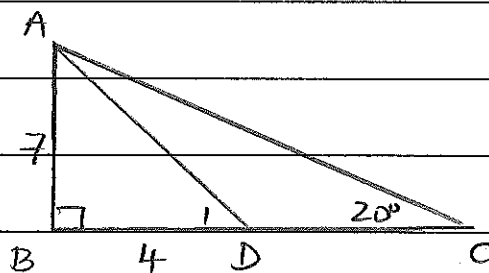
$$\therefore 8(x-7^\circ) = 51,34 \dots^\circ$$

$$x - 7^\circ = 6,417 \dots^\circ$$

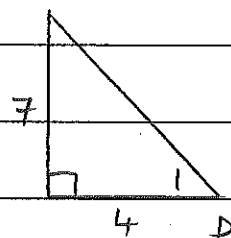
$$x = 13,42^\circ$$

3

8.4.



8.4. 1.



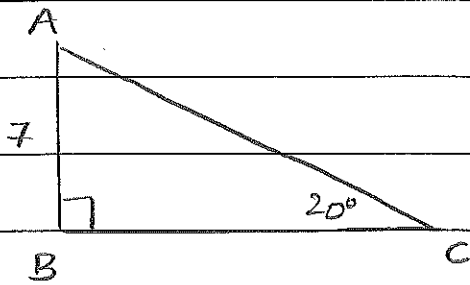
$$\tan \hat{D}_1 = \frac{7}{4} \quad \frac{0}{a}$$

$$\hat{D}_1 = \tan^{-1}\left(\frac{7}{4}\right)$$

$$= 60,26^\circ$$

2

8.4. 2.



$$\tan 20^\circ = \frac{7}{BC} \checkmark$$

$$BC \cdot \tan 20^\circ = 7$$

$$BC = \frac{7}{\tan 20^\circ} \\ = 19,232... \checkmark$$

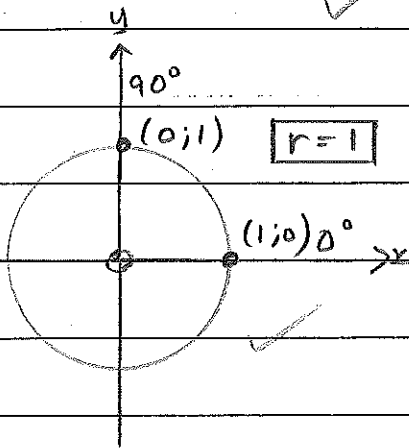
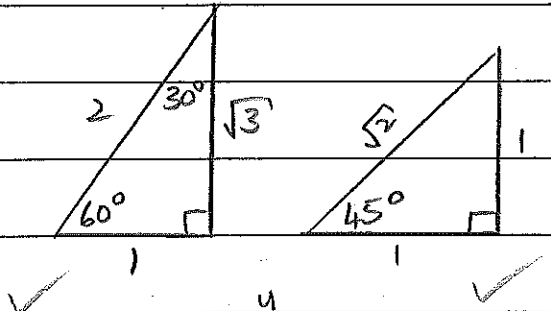
$$\therefore DC = BC - 4$$

$$= 19,232... - 4$$

$$= \underline{15,23 \text{ m}} \checkmark$$

3

9.1. 1.



3

9.1. 2.1. $\cos 30^\circ = \frac{a}{h}$
 $= \frac{\sqrt{3}}{2} \checkmark$

9.1. 2.2. $\sin 45^\circ = \frac{o}{h}$
 $= \frac{1}{\sqrt{2}} \checkmark$

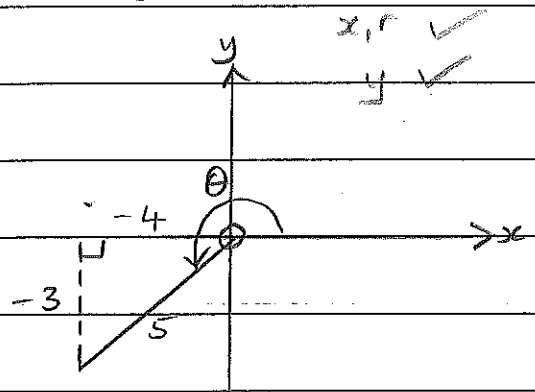
9.1. 2.3. $\cos 0^\circ = \frac{x}{r}$
 $= \frac{1}{1} \checkmark$
 $= 1$

9.2. $\cos \theta = -\frac{4}{5}$
 $= \frac{-4}{5} \frac{x}{r}$

• $\cos - \therefore$ Q II III

• $\sin - \therefore$ Q III IV

\therefore Q III



$x = -4, r = 5, y = -3$ both

$$\therefore \tan \theta = \frac{y}{x}$$

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

$$= \frac{3}{4} \checkmark$$

3