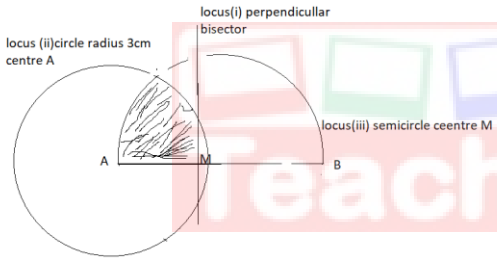
ASUMBI GIRLS HIGH SCHOOL
TERM 2– DECEMBER 2021
FORM 4 – MATHEMATICS PAPER 2

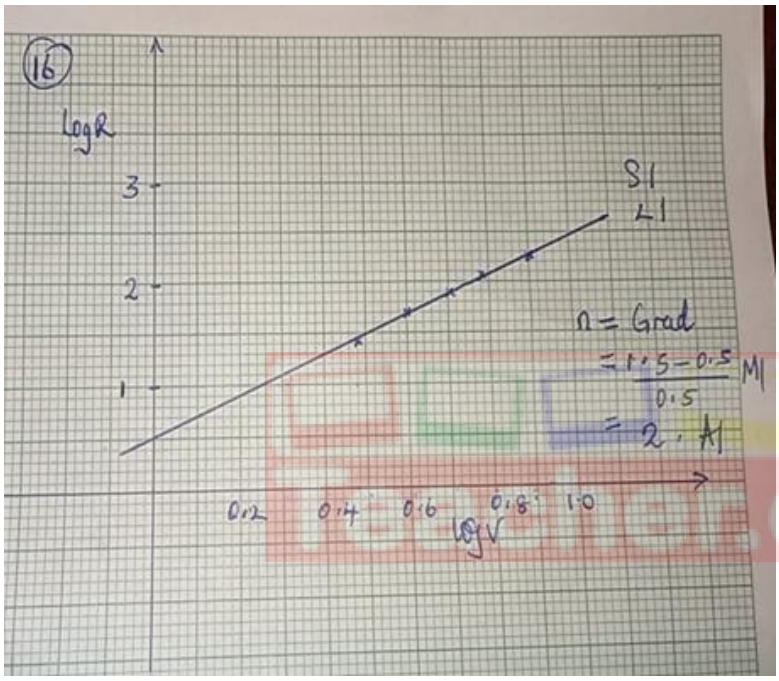
MARKING SCHEME

	WORKING	MARKS	COMMENTS
1	<table><tr><td>No.</td><td>Log</td></tr><tr><td>1.000------ 0.03506--- 28.5 ------- + 90.35 118.87------ 4.917×10^0 4.917</td><td>0.0000 2.5448 1.4552 2.0751÷3 0.6917 </td></tr></table>	M1 M1 M1 A1	For + and – For + For ÷
2.	$\frac{3}{2+\sqrt{2}}+\frac{4-\sqrt{2}}{2-\sqrt{2}}$ $=\frac{3(2-\sqrt{2})+(4-\sqrt{2})(2+\sqrt{2})}{(2+\sqrt{2})(2-\sqrt{2})}$ $=\frac{6}{\frac{3\sqrt{2}+8+4\sqrt{2}-2\sqrt{2}-2}{4-2}}$ $=\frac{12-\sqrt{2}}{2}$	M1 M1 A1	
3	$(p-3q)^5 = p^5+5p^4(-3q)-10p^3(-3q)^2+10p^2(-3q)^3$ $= p5 +-15p^4q +90p^3q^2 -270p^2q^3$ (i) Coefficient =-15 (ii) 4^{th} term $=-270p^2q^3$		
4	$b=\sqrt{k}-ac$ $b^2=k-c$ $c=\frac{k-b^2}{a}$	M1 A1	

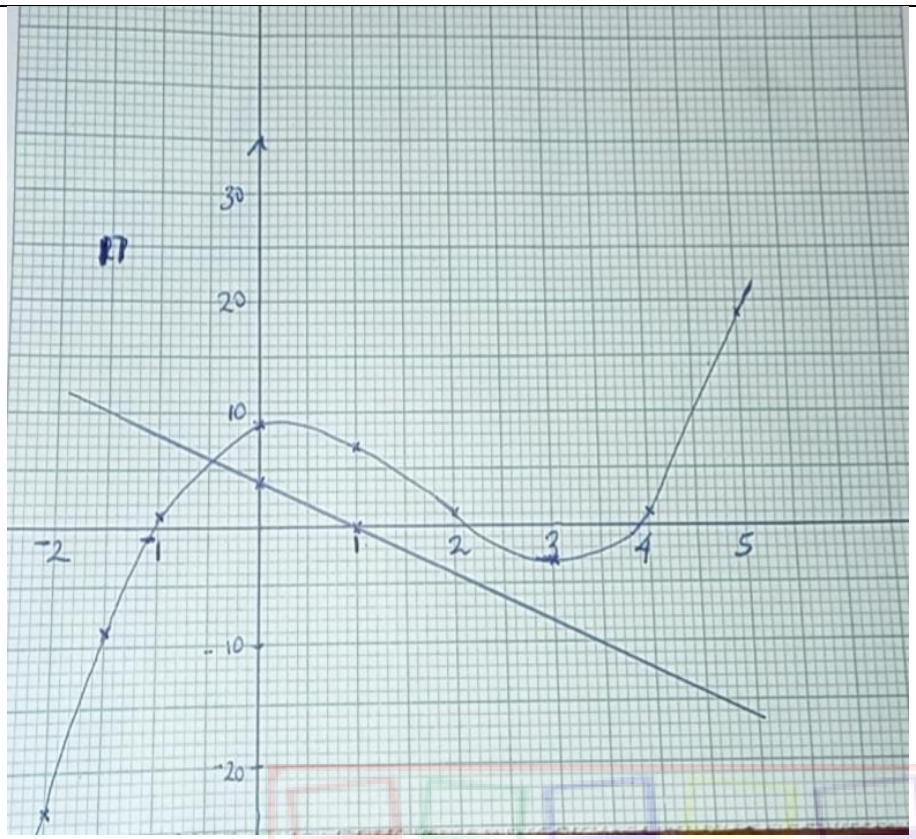
	c=$\frac{1^2-2^2}{4}$ = - $\frac{3}{4}$		
5	$\begin{pmatrix} 3x & x-6 \\ -6 & 2x-2 \end{pmatrix}$ D = 3x$(2x-2)$ -6$(x-6)$=0 =6x^2-6x-6x+6=0 =6x^2-12x+6=0 =6x^2-6x-6x+6 =0 6x$(x-1)$- 6$(x-1)$=0 $(x-1)$(6x-6)=0 X=1	M1 M1 A1 3	
6	Error = $\frac{\frac{max-min}{2}}{actual}$ × 100 = $\frac{½(2041.2-1573.2)}{40\times45}$ × 100 = 13%	M1M1 A1 **3**	
8	$Log_2 8(2+3x) = log_2 4(2x+6)$ 16 +24x = 8x + 24 16x = 8 X= ½	M1 M1 A1 3	

9	5.2(RT) = 3.2x4.7 RT = $\frac{3.2 \ x \ 4.7}{5.2}$ = 2.59 RS = 5.2 + 2.89 = 8.09		
	 	B1 B1 B1 B1	For perpendicular bisector Circle centre A Semicircle Shaded region
11	$3X^2 + 3Y^2 - 18X + 12Y - 9 = 0$ $X^2 + Y^2 - 6X + 4Y = 0$ $X^2 - 6X + 9 + Y^2 + 4Y + 4 = 3 + 9 + 4$ $(X - 3)^2 + (Y + 2)^2 = 16$ Centre (3,-2) Radius = 4	 B1 B1 B1 3	 For factorized For centre For radius

12	147 ≫ 105% Cp = $\frac{100}{105}$ x 147 = sh 140 Let the ratio b 1∶ n = $\frac{100x1+150n}{1+n}$ 140 100 +105n = 140 + 140n 10n = 40 n =4 ratio 1 ∶ 4	M1 M1 B1 3	
13	Total tax= 3038+1162= 4200 Tax calc $\frac{8400}{20}$ x2 = 840 $\frac{9600}{20}$ x3 = 1440 $\frac{x}{20}$ x 4 = 1920 total = 4200 x= $\frac{1920x20}{4}$ = 9600 Income = (18000+9600) x $\frac{100}{115}$ = sh 24000	M1 M1 M1 A1 4	
14	x (x+3) -12=0 x^2 + 3x-12 = 0 x2+ 4x-x -12 =0 x(x+4)-1(x+4)=0 (x-1)(x+4)= 0 X=1 x=-4	M1 M1 A1 3	For determinant equated to 0 Factors

15	$\frac{240}{sin45} = \frac{b}{sin105}$ b = $\frac{240}{sin45}$ x sin105 327.8461	B1 M1 A1 3	
16	 		
	SECTION II		
17			

X	-2	-1.5	-1	0	1	2	3	4	5
y	-23	-8.625	1	9	7	1	-3	1	19

			
18 i	$Y = nX + \frac{m}{X}$ $Y = nX + \frac{m}{X}$ $135 = 2n + \frac{m}{2}$ $140 = 3n + \frac{m}{3}$ $4m + n = 270$ $\underline{9m + n = 420}$ $5m \quad = 150$ $M = 30$ $n = 270-120 = 150$	M1 M1 A1 B1 B1	For both equations Elimination of one unknown
Ii	$y = 30x + \frac{150}{x}$ $y = 30x10 + \frac{150}{10}$	M1	

iii	= 315 $30x + \frac{150}{x} = 180$ $30x^2 + 150 = 180x$ $30x^2 - 180x + 150 = 0$ $(x-5)(x-1) = 0$ $X=5$ or $x=1$	A1 M1 M1 A1 10	
19a b (i)	a a+3d a+ 12d a+ 2d + a+ 10d =30 2a + 12a =30 $\frac{a+3d}{a} = \frac{a+12d}{a+3d}$ $(a+3d)^2 = a^2 + 12ad$ $9d^2 - 6ad + 9d^2 = a^2 + 12ad$ $9d^2 - 6ad = 0$ $9d^2 - 90d(15-6d) = 0$ $9d^2 - 90d + 36d^2 = 0$ $45d^2 + 90d = 0$ $9d(5d - 10) = 0$ $d = 0$ or $d = 2$ $a = 15-6d$	B1 M1 M1 M1 A1	

	= 15-12 = 3	A1	
ii	$r = \frac{a+3d}{a} = \frac{3+6}{3}$	M1	
	= 3	A1	
iii	$S_{10} = 3(3^{10} - 1) / 2 = 888572$	M1A1	
		10	
20a	Dist AB = $\frac{\alpha}{360}$ x 2π R Cosθ		
	$3000 = \frac{\alpha}{360}$ x 2π R Cos30	M1	
	A = 31.15^0	A1	
b	$60\alpha \cos\theta = 5x600$		
	$\alpha = 50/\cos60$		
	$= 100^0$		
	$K = 100 - 45$		
	$= 55^0$		
	Long diff = $45^0 + 55^0 = 90^0$		
	Time diff = 100 x4 / 60		
	= 6hrs 40mins		
	Time at Q = 10.45am + 6hrs 40 mins		
	17 25 HRS		
	Time when the plane reached 17 25hrs + 5 hrs		
	22 25 HRS		
21 i	P(wakes up early) = p(BE' or B' E')		
	$= \frac{2}{3} \times \frac{2}{5} + \frac{1}{3} \times \frac{6}{7}$	M1	

	$= \frac{11}{14}$	A1	
ii	P(wakes up early but late for class)= P(BEC' or B' EC') $= \frac{2}{3} \times \frac{2}{5} \times \frac{5}{7} + \frac{1}{3} \times \frac{1}{7} \times \frac{5}{7}$	M1	
	$= \frac{26}{147}$	A1	
iii	P(bed late but early for class)= P(B'EC or B' E'C) $= \frac{1}{3} \times \frac{1}{7} \times \frac{2}{7} + \frac{1}{3} \times \frac{6}{7} \times \frac{1}{4}$	M1	
	= 25/294	A1	
iv	P(late) = P(BEC 'or B E'C' or B'EC' or B'E'C') $= \frac{2}{3} \times \frac{3}{5} \times \frac{5}{7} + \frac{1}{3} \times \frac{1}{7} \times \frac{5}{7} + \frac{2}{3} \times \frac{2}{5} \times \frac{3}{4} + \frac{1}{3} \times \frac{6}{7} \times \frac{3}{4}$	M1	
	$= \frac{1289}{1470}$	A1	
		10	
22	a. $\begin{matrix} 1 & k \\ 0 & 1 \end{matrix} \begin{matrix} 3 \\ 1 \end{matrix} = \begin{matrix} 5 \\ 1 \end{matrix}$	M1	
	$3 + k = 5$ $K = 2$ $\begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$	A1 B1	
	b. $\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 1 & -2 \\ 3 & 3 \end{bmatrix} = \begin{bmatrix} 2 & -3 \\ 4 & -1 \end{bmatrix}$	M1	
	$a + 3b = 2$ $\underline{-2a + 3b = -3}$ $3a = 5$ $\quad a = 5/3$ $3b = 2 - 5/3$ $3b = 1/3$ $\quad b = 1/9$	M1	
	$c + 3d = 4$ $\underline{-2c + 3d = -1}$ $3c = 5$ $\quad c = 5/3$ $d = (4 - 5/3)/3$ $\quad d = 7/9$	M1	

	$\begin{bmatrix} 5/3 & 1/9 \\ 5/3 & 7/9 \end{bmatrix}$ c. $\begin{bmatrix} 2 & 1 \\ 0 & 2 \end{bmatrix}\begin{bmatrix} 3 & 0 \\ 1 & 3 \end{bmatrix}\begin{bmatrix} 3 \\ -2 \end{bmatrix}$ $\begin{bmatrix} 7 & 3 \\ 2 & 6 \end{bmatrix}\begin{bmatrix} 3 \\ -2 \end{bmatrix} = \begin{bmatrix} 15 \\ -6 \end{bmatrix}$ (15,-6)	A1 M1 A1 B1	
23	a. $52x + 32y \geq 500$ $13x + 8y \geq 125$……1 $200x + 300y \geq 3500$ $2x + 3y \geq 35$……2 $x + y \leq 15$ ……3 $x \geq 0$, $y \geq 0$		
24	a. $\int_2^3 (t2 - 2t + 4)\, dt$ $[t^3/3 - t^2 + 4t]_2^3$ $(27/3 - 9+12) - (8/3 -4 +8)$ $12 - 4 - 8/3$ $8 - 8/3$ $(24-8)/3$ 16/3 or 5 1/3 b. $t^2 - 4t + 4 = 0$ $t = \frac{4 \pm \sqrt{(16-4(4)}}{2}$ $\frac{4 \pm 0}{2} = 2$ c. $a = dv/dt$ $= 2t - t$ (at t = 2) $a= 2(2) - 2$ $a= 2\ m/s^2$	M 1 M1 M1 A1 M1 M1 A1 M1 M1 A1	