## MATIGO EXAMINATIONS BOARD



## 465/1

## MATHEMATICS MARKING GUIDE 2023 PAPER 1

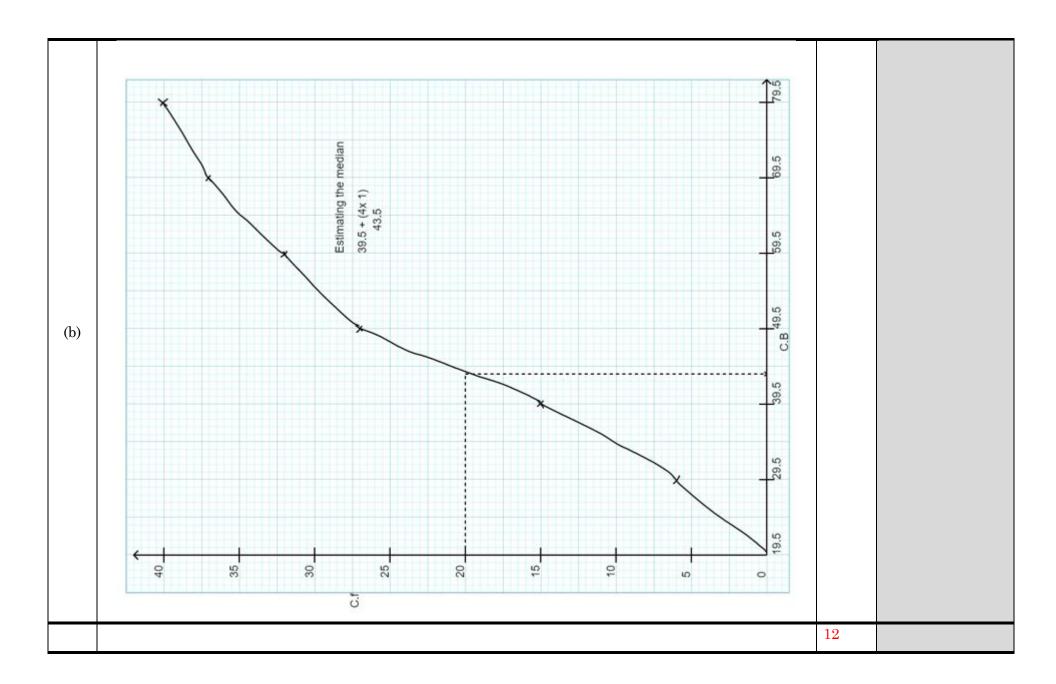
Qn	Answers	Marks	comment
	SECTION A		
	$MM^{-1} = \begin{pmatrix} 1 & 2 \\ c & d \end{pmatrix} \begin{pmatrix} -3 & 2 \\ 2 & -1 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	B1	$For MM^{-1} = I$
	$-3c + 2d = 1 \dots \dots \dots (i)2c - b = 0 \dots \dots \dots (ii),$ d = 2c - 1, -3c + 4c - 2 = 0 c - 2 = 0, c = 2	M1	Solving equation (i) and (ii)
1	c-2 = 0, c = 2 $d = (2)(c) - 1 = 4 - 1 = 3$	M1	simultaneously simultaneously
		A 1	Correct values of c and d
		A1	
		04	
	$\frac{2X-Y}{X-2Y} = \frac{4}{3}$		
	3(2X - Y) = 4(X - 2Y)	M1	Cross multiplying
2	6X - 3Y = 4X - 8Y	M1	Opening brackets
	2X = -5Y	M1	Collecting like
	$\frac{Y}{x} - \frac{-2}{x}$		terms
	$\frac{1}{X} = \frac{1}{5}$	A1	Correct answer
		04	
3	1170,1200,1220,1230,1290,1390,1410,1430,1440,1460,1500,1600,1680,1730,1810	B1	Arrangement

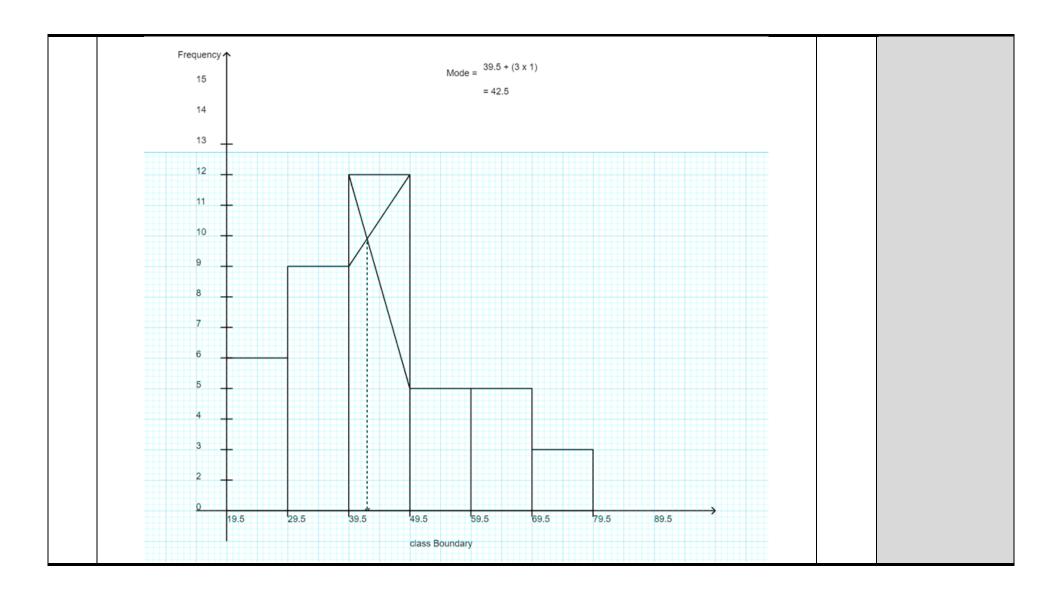
	(1) 1/1 1/100		3.5 11
	(i) median = 1430 $(ii) median = 1430 + 1440 + 1440 + 1460 + 1500 + 1600$	A1	Median
	(ii) mean = 1170 + 1200 + 1220 + 1230 + 1290 + 1390 + 1410 + 1430 + 1440 + 1460 + 1500 + 16	<b>M</b> 1	Summation
	+ 1680 + 1730 + 1810		
	$=\frac{21560}{15}$		
	$15_{1}$	A1	Accept 1437.3333
	$=1437\frac{1}{3}$		
	3		
		04	
	$-9 \le 2X + 5 \le 1$		
	$-9-5 \le 2X \le 1-5$	M1	Collecting like
	$-14 \le 2X \le -6$	1111	terms
	$-7 \le X \le -3$	M1	Simplifying
		A1	Inequality
4	$\boldsymbol{x}$	111	inequality
	_ ~		
		B1	Number line
	<del>*                                      </del>	DI	Number ime
	-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3		
		04	
		04	
	$(2x^2) - 3^2 = 0$	M1	Difference of two
	$(2x^2) - 3^2 = 0$ (2x - 3)(2x + 3)		
	(2x-3)(2x+3)		squares
	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ either	M1	
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ either	M1	squares
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ either	M1 B1	squares Factorizing
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ either	M1 B1 M1	squares Factorizing Either & or
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ either	M1 B1	squares Factorizing
5	$(2x-3)(2x+3)  \therefore (2x-3)(2x+3) = 0$	M1 B1 M1	squares Factorizing Either & or
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ either	M1 B1 M1 A1	squares Factorizing Either & or
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ $either$ $(2x-3) = 0 \text{ or } (2x+3) = 0$ $\frac{2x}{2} = \frac{3}{2} \text{ or } \frac{2x}{2} = \frac{-3}{2}$ $x = \frac{3}{2} \text{ or } x = \frac{-3}{2}$	M1 B1 M1	squares Factorizing Either & or
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ $either$ $(2x-3) = 0 \text{ or } (2x+3) = 0$ $\frac{2x}{2} = \frac{3}{2} \text{ or } \frac{2x}{2} = \frac{-3}{2}$ $x = \frac{3}{2} \text{ or } x = \frac{-3}{2}$ $6t^2 + 5y^2 + 6ty + 5ty$	M1 B1 M1 A1	squares Factorizing Either & or Answer
	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ $either$ $(2x-3) = 0 \text{ or } (2x+3) = 0$ $\frac{2x}{2} = \frac{3}{2} \text{ or } \frac{2x}{2} = \frac{-3}{2}$ $x = \frac{3}{2} \text{ or } x = \frac{-3}{2}$ $6t^2 + 5y^2 + 6ty + 5ty$ $= 6t^2 + 6ty + 5ty + 5y^2$	M1 B1 M1 A1  04 M1	squares Factorizing  Either & or Answer  Correct
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ $either$ $(2x-3) = 0 \text{ or } (2x+3) = 0$ $\frac{2x}{2} = \frac{3}{2} \text{ or } \frac{2x}{2} = \frac{-3}{2}$ $x = \frac{3}{2} \text{ or } x = \frac{-3}{2}$ $6t^2 + 5y^2 + 6ty + 5ty$ $= 6t^2 + 6ty + 5ty + 5y^2$ $= 6t(t+y) + 5y(t+y)$	M1 B1 M1 A1  04  M1 M1M1	squares Factorizing  Either & or Answer  Correct arrangement
	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ $either$ $(2x-3) = 0 \text{ or } (2x+3) = 0$ $\frac{2x}{2} = \frac{3}{2} \text{ or } \frac{2x}{2} = \frac{-3}{2}$ $x = \frac{3}{2} \text{ or } x = \frac{-3}{2}$ $6t^2 + 5y^2 + 6ty + 5ty$ $= 6t^2 + 6ty + 5ty + 5y^2$	M1 B1 M1 A1  04 M1	squares Factorizing  Either & or Answer  Correct
	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ $either$ $(2x-3) = 0 \text{ or } (2x+3) = 0$ $\frac{2x}{2} = \frac{3}{2} \text{ or } \frac{2x}{2} = \frac{-3}{2}$ $x = \frac{3}{2} \text{ or } x = \frac{-3}{2}$ $6t^2 + 5y^2 + 6ty + 5ty$ $= 6t^2 + 6ty + 5ty + 5y^2$ $= 6t(t+y) + 5y(t+y)$	M1 B1 M1 A1  04  M1 M1M1	squares Factorizing  Either & or Answer  Correct arrangement

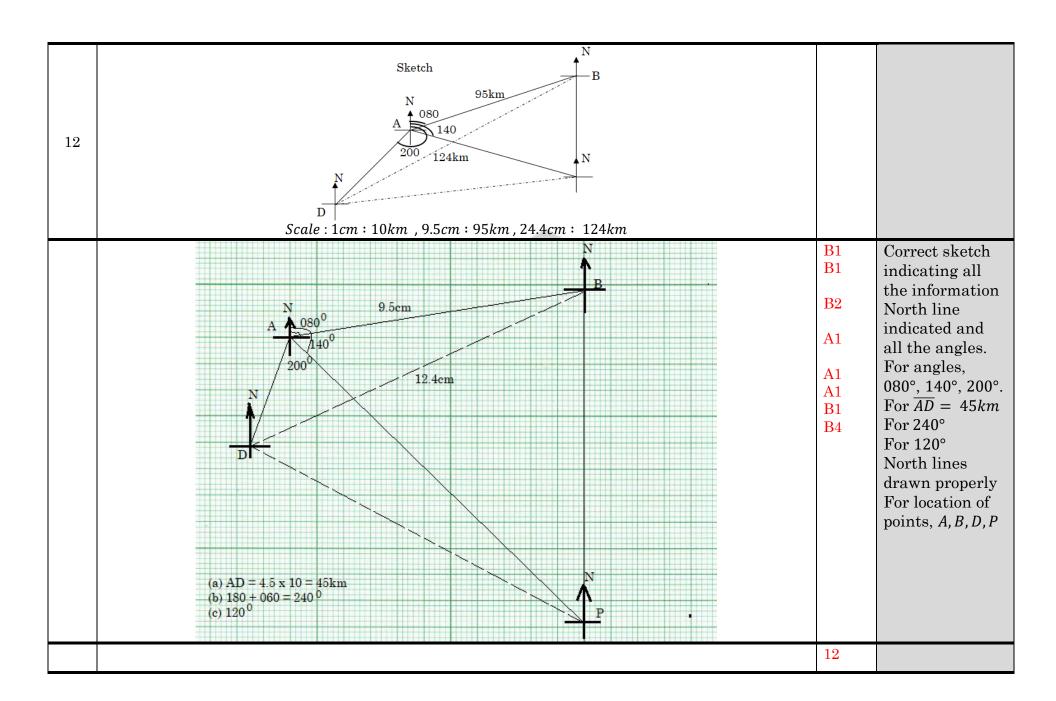
		04	
	$k = -2, A(4,3), A^{1}(4,-5), O(x,y)$		
7	$k = -2, A(4,3), A^{1}(4,-5), O(x,y)$ $\frac{OA^{1}}{OA} = K$ $\frac{A^{1} - O}{A - O} = K$ $\frac{\binom{4-5}{5} - \binom{x}{y}}{\binom{4}{3} - \binom{x}{y}} = -2$ $\frac{\binom{4-x}{5-y}}{\binom{4-x}{3-y}} = -2$ $\binom{4-x}{5-y} = -2\binom{4-x}{3-y}$ $4 - x = -8 + 2x$ $-3x = -12$ $x = -4$ $-5 - y = -6 + 2y$ $-3y = -1$ $y = \frac{1}{3}$ $O(x,y) = (4,\frac{1}{3})$	M1 M1M1	Correct substitution
		04	
	ALTERNATIVELY		
	ALTERNATIVELY $C. E = \frac{1}{K-1}(KO - I)$		
	$=\frac{1}{-2-1}\left(-2\binom{4}{3}-\binom{4}{-5}\right)$	M1	Proper substitution
	$=\frac{1}{-3}\binom{-12}{-1}$	M1	
	$C.E = \begin{pmatrix} 1 \\ 4 \\ 1/3 \end{pmatrix}$	M1	

	$C.E = (4, \frac{1}{3})$	A1	
	. 73	04	
8	N 205° A 025° A - 025°	B1B1	For correct diagram
	B is 56km from A on a bearing of 025° or N25°E	M1A1	
		04	
9	$S = \{452, 425, 542, 524, 245, 254\}$	M1	Sample space
(a)	$E = \{425, 245\}$ $P(E) = \frac{2}{6}$	M1 A1	Elements
(b)	$= \frac{1}{3}$ $no Event$ $P(prime) = 0$	A1	
		04	
10	$60^{\circ} + x = 180^{\circ}$ $x = 120^{\circ}$		

		nun		60° 20°		M1	
			= 3 sides it is a triangle	20		<b>M</b> 1	
		A	ALTERNATIVELY 180	(n-2)		A1 A1	
		One into	erior angle = $\frac{180}{60}$ $60 = \frac{180(n-2)}{n}$	$\frac{\sqrt{n}}{n}$			
			$60n = 180n - 360$ $120n  360^{\circ}$			M1	
			$\frac{120}{120} = \frac{120}{120}$ $n = 3 \text{ sides}$			M1	Formula
			its atriangle			A1	Sides
						A1	Answer
			SECTION B		_	04	40MARKS
			SECTION D				
	MARKS	C. B	Tallying	f	c. f	M1	Correct O-give
	20 – 29	19.5 – 29.5	##	6	6	M1 A1	Location of the media Correct
	30 – 39	29.5 – 39.5	##	9	15	M1 M1	median(44-45) For correct marks
	40 – 49	39.5 – 49.5	### ###-	12	27	M1 M1	For correct tallying
11(a)	50 – 59	49.5 – 59.5	-    -	5	32	M1	For <i>C.B</i> , <i>f</i> , <i>c.f</i>
	60 - 69	59.5 – 69.5	##	5	37	M1M1 M1M1	For labelling
	70 – 79	69.5 – 79.5	///	3	40	A1	graph correctly For correct bars For location of the
							mode Correct mode(42-43)







$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			D1	E
13		$\begin{bmatrix} x & -2 & -1 & 0 & 1 & 2 & 3 & 4 & 5 & 6 \end{bmatrix}$	B1	For all $x^2$ correct
(a)	10		D1	For all
(a) $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	13		BI	
(a) $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			D4	-4x correct
(a) $y = x^2 - 4x + 5$ $y = 10$ (b) The solution occurs where the line $y = 10$ meets the curve $y = x^2 - 4x + 5$ $y = x^2 - 4x + 5$ $y = 5$ $y = 5$ The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5$ $y = 5$ $x = 5$ $x = 7$			BI	T 11
(b) The solution occurs where the line $y = 10$ meets the curve $y = x^2 - 4x + 5$ i.e $x = -1, x = 5$ $y = x^2 - 4x + 5$ $y = x^2 - 4x + 5$ $y = x^2 - 4x + 5$ $y = 5$ The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5$ t.e $x = 0, x = 4$ The minimum point is (2,1)  The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5$ i.e $x = 0, x = 4$ For drawing the line $y = 5$ For $x = 0, x = 4$ For minimum point is (2,1)  The minimum point is (2,1)  The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5$ i.e $y = 5$ For $y = $			3.543.54	For all y correct
(c) The solution occurs where the line $y = 10$ meets the curve $y = x^2 - 4x + 5$ i.e $x = -1, x = 5$ $y = x^2 - 4x + 5$ $y = x^2 - 4x + 5$ $y = 5$ The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5$ i.e $x = 0, x = 4$ The minimum point is $(2,1)$ The minimum point is $(2,1)$ The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5$ i.e $x = 0, x = 4$ For $x = 0, x = 4$ For minimum point is $(2,1)$ The minimum point is $(2,1)$ T	(a)	$y = x^2 - 4x + 5$	M1M1	
(b) The solution occurs where the line $y=10$ meets the curve $y=x^2-4x+5 \text{ i.e. } x=-1, x=5\\ y=x^2-4x+5\\ y=5\\ \hline The solution occurs where the line y=5 meets the curve y=x^2-4x+5 \text{ i.e. } x=0, x=4\\ The minimum point is (2,1)  (c) y=10 y=x^2-4x+5 \text{ i.e. } x=-1, x=5\\ y=5 x=5 x=5 x=5 x=5 x=5 x=5 x=5 x=5 x=4 x=5 x=5 x=5 x=4 x=5 x=5 x=5 x=5 x=4 x=5 $		$-0 = x^2 - 4x - 5$		
The solution occurs where the line $y=10$ meets the curve $y=x^2-4x+5$ i.e $x=-1,x=5$ $y=x^2-4x+5$ $y=x^2-4x+5$ $y=5$		<del></del>		correctly
$y = x^2 - 4x + 5 i.e x = -1, x = 5$ $y = x^2 - 4x + 5$ $- 0 = x^2 - 4x + 5$ $y = 5$ $y = 5$ The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5 i.e x = 0, x = 4$ $y = x^2 - 4x + 5 i.e x = 0, x = 4$ $y = x^2 - 4x + 5 i.e x = 0, x = 4$ $x = x + 5 i.e x = 0, x = 0$ $x = x + 5 i.e x = 0, x = 0$ $x = x + 5 i.e x = 0, x = 0$ $x = x + 5 i.e x$			M1	
$y = x^2 - 4x + 5 i.e x = -1, x = 5$ $y = x^2 - 4x + 5$ $- 0 = x^2 - 4x + 5$ $y = 5$ $y = 5$ The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5 i.e x = 0, x = 4$ $y = x^2 - 4x + 5 i.e x = 0, x = 4$ $y = x^2 - 4x + 5 i.e x = 0, x = 4$ $x = x + 5 i.e x = 0, x = 0$ $x = x + 5 i.e x = 0, x = 0$ $x = x + 5 i.e x = 0, x = 0$ $x = x + 5 i.e x$	(b)	The solution occurs where the line $y = 10$ meets the curve		For the line $y =$
$y = x^2 - 4x + 5$ $y = 5$ The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5 \cdot i.e \times = 0, x = 4$ The minimum point is $(2,1)$ $y = x^2 - 4x + 5 \cdot i.e \times = 0, x = 4$ The minimum point is $(2,1)$ $y = x^2 - 4x + 5$		$y = x^2 - 4x + 5 i.e x = -1.x = 5$	A1	
$\frac{-0=x^2-4x+5}{y=5}$ $y=5$ The solution occurs where the line $y=5$ meets the curve $y=x^2-4x+5 i.ex=0, x=4$ The minimum point is $(2,1)$ $y=x^2-4x+5$ $y=5$ For $x=0, x=4$ For minimum point is $(2,1)$ $y=x^2-4x+5$ $y=5$		$y = x^2 - 4x + 5$	M1	
The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5$ i.e $x = 0, x = 4$ The minimum point is (2,1)  The minimum point is (2,1)  The minimum point is $y = 5$ meets the curve and $y = x^2 - 4x + 5$ i.e $y = 0, x = 4$ For $y = 0, x = 4$ For minimum point is $y = 0$ in $y = $		$-0 = x^2 - 4x + 5$		No solution
The solution occurs where the line $y = 5$ meets the curve $y = x^2 - 4x + 5$ i.e $x = 0, x = 4$ The minimum point is $(2,1)$ $y = x^2 - 4x + 5$ $y = x - 4x + 5$ $y = $				
The solution occurs where the line $y=5$ meets the curve $y=x^2-4x+5$ i.e $x=0, x=4$ The minimum point is $(2,1)$ For drawing the line $y=5$ For $x=0, x=4$ For minimum point $y=x^2-4x+5$		y = 5	M1	
The solution occurs where the line $y=5$ meets the curve $y=x^2-4x+5$ i.e $x=0, x=4$ The minimum point is (2,1)  The minimum point is (2,1)  The solution occurs where the line $y=5$ meets the curve $y=x^2-4x+5$ For $x=0, x=4$ For minimum point is (2,1)  The minimum point is (2,1) $y=x^2-4x+5$ $y=10$		y = 3		_
(c) $y = x^2 - 4x + 5 i.e x = 0, x = 4$ The minimum point is (2,1) $y = x^2 - 4x + 5$ $y$				
The minimum point is (2,1) $y = x^2 - 4x + 5$ $18$ $19$ $19$ $19$ $19$ $19$ $19$ $10$ $8$ $4$ $2$ $19$ $10$ $10$ $10$ $10$ $10$ $10$ $10$ $10$		The solution occurs where the line $y = 5$ meets the curve	711	IIIIC y = 3
For minimum point is (2,1)    18-	(a)			$F_{ON} \times = 0 \times = 4$
point  y = x² - 4x + 5  18- 16- 14- 12- 19- 19- 19- 19- 19- 19- 19- 19- 19- 19	(6)	The minimum point is (2,1)		
18- 16- 14- 19- 19- 19- 19- 19- 19- 19- 19- 19- 19				
18* 16* 14* 12* 10  8 -  4 -  2 -  1 1		2 4		point
16				
14 12 y=10 y=10 y=5 4 -		X \ \ X		
12 y=10 y=5 4.		167		
12 y=10 y=5 4.		1.4		
8 - y=5				
8 - y=5		12		
2. 12 11 0 1 2 3 4 5 6 7		₩ 10 ₩ y=10		
2. 12 11 0 1 2 3 4 5 6 7				
2. 12 11 0 1 2 3 4 5 6 7		, ° <b>1</b>		
2 1 0 1 2 3 4 5 6 7		<b>b t y</b> =5		
2 1 0 1 2 3 4 5 6 7		41		
2 1 0 1 2 3 4 5 6 7				
			12	
			12	

14(a)	$Let P = \begin{pmatrix} a & c \\ b & d \end{pmatrix}$ $M0 = I$ $\begin{pmatrix} a & c \\ b & d \end{pmatrix} \begin{pmatrix} 1 & -2 \\ 3 & -3 \end{pmatrix} = \begin{pmatrix} 2 & -3 \\ 4 & -11 \end{pmatrix}$ $a + 3c = 2 \dots \dots$	M1 M1M1 M1	For the equation  For the two sets of equations
	$a + 3c = 2$ $+ -2a - 3c = -3$ $a = 1$ $put a = 1 \text{ in equation } 1$ $a + 3c = 2$ $1 + 3c = 2$ $c = \frac{1}{3}$ $b + 3d = 4$ $+ -2b - 3d = -11$ $-b = -7$ $b = 7$ $put b = 7 \text{ in equation } 3$ $b + 3d = 4$ $7 + 3d = 4$	M1	
	$3b = -3$ $d = -1$ $P = \begin{pmatrix} 1 & 1/3 \\ 7 & -1 \end{pmatrix}$	A1	
(b)	$P(2,4)$ $M = \begin{pmatrix} Cos\theta & -Sin\theta \\ Sin\theta & Cos\theta \end{pmatrix}$ $= \begin{pmatrix} Cos60 & -Sin60 \\ Sin60 & Cos60 \end{pmatrix}$	M1	

	$= \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$	M1	
	$M0 = I$ $\begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix} \begin{pmatrix} 2 \\ 4 \end{pmatrix} = \begin{pmatrix} 1 - 2\sqrt{3} \\ \sqrt{3} + 2 \end{pmatrix}$ $\therefore P^{1}(1 - 2\sqrt{3}, \sqrt{3} + 2)$	M1 A1 12	
15(a)	$Sin\theta = \frac{8}{120}$ $\theta = Sin^{-1} \binom{8}{120}$ $\theta = 3.82^{\circ}$ $Tan\theta = \frac{7}{24}, 180^{\circ} \le \theta \le 360^{\circ}$ $90^{\circ}$	B1 M1M1	For correct diagram
(b)	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	A1	

	= 25	B1	
			For correct
	$Sin\theta = \frac{-7}{25}$	M1	diagram
	$Cos\theta = \frac{-24}{25}$	A1	
	$\frac{Sin\theta - Cos\theta}{2} = \frac{1}{2} \left( \frac{-7}{2} + \frac{24}{2} \right)$	AI	
	$\frac{Cos\theta = \frac{-24}{25}}{\frac{Sin\theta - Cos\theta}{2}} = \frac{1}{2} \left( \frac{-7}{25} + \frac{24}{25} \right)$ $= \frac{1}{2} \left( \frac{17}{25} \right)$		
	$=\frac{1}{2}\left(\frac{17}{25}\right)$	A1	
	$= \frac{17}{50}$ $13^2 - 5^2 = b^2$		
	$13^2 - 5^2 = b^2$	M1	
	$169 - 25 = b^2$	1411	
	b = 12	A1	
	P = 2(L + W)	λ/[1	
	P = 2(12+5)	M1	
(c)	P=34m	A1	
		12	
16(a)	(2 -1) $(1 1)$		
10(a)	$A = \begin{pmatrix} 2 & -1 \\ 4 & -1 \end{pmatrix}, \qquad B = \begin{pmatrix} 1 & 1 \\ -4 & k \end{pmatrix}$		
	$\det B = 0$	M1	
	k + 4 = 0 $k = -4$	M1	
	$\det A = (2 \times -1) - (4 \times -1)$	M1	
(b)	= -2 + 4 $= 2$	A1	
	= 2	M1	
	$A^{-1} = \frac{1}{2} \begin{pmatrix} -1 & 1 \\ -4 & 2 \end{pmatrix}$	A1	
	(-1/2, 1/2)		
	$=\begin{pmatrix} -\overline{1}/2 & 1/2 \\ -2 & 1 \end{pmatrix}$		
	$A^{-1}B = \begin{pmatrix} -1/2 & 1/2 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$	A1	
	$\begin{pmatrix} -2 & 1 \end{pmatrix} \begin{pmatrix} -4 & -4 \end{pmatrix}$	A1	
	$A^{-1}B = \begin{pmatrix} -1/2 & 1/2 \\ -2 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ -4 & -4 \end{pmatrix}$ $= \begin{pmatrix} -5/2 & -5/2 \\ -6 & -6 \end{pmatrix}$		
		M1	
(c)	$A - 2I = \begin{pmatrix} 2 & -1 \\ 4 & -1 \end{pmatrix} - 2 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	M1	
	$A = \begin{pmatrix} 1 & -1 \end{pmatrix} = \begin{pmatrix} 1 & 1 \end{pmatrix}$	M1	

	2 4 2 0	1	
	$= \begin{pmatrix} 2 & -1 \\ 4 & -1 \end{pmatrix} - \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$ $= \begin{pmatrix} 0 & -1 \\ 4 & -3 \end{pmatrix}$	A1	
	\ <del>4</del> −3/		
17(a)	$x + y \le 11 \dots $	M1	
	$x \leq 9 \dots \dots 2$	M1	
	$y \le 5 \dots \dots \dots 3$	M1	
	$4 \times 90 \times x + 3 \times 150 \times y \ge 3600$		
	$360x + 450y \ge 3600$		
	$4x + 5y \ge 40 \dots \dots \dots \dots 4$	M1	
	4x + 5y = 40		
		M1	
	$\begin{array}{c ccc} x & 0 & 10 \\ \hline y & 8 & 0 \\ \end{array}$		
	(0,8), (10,0) $x + y = 11$	M1M1	
	x = 0,  y = 11		
	$   \begin{array}{c}     (0,11) \\     y = 0, x = 11   \end{array} $		
	y = 0, x = 11 (11,0)		
	Objective equation $150000x + 240000y$		
	(9,1)  1,590000		
	(9,2) 1,830000		
	(5,4) 1,740000		
	(4,5) 1,800000		
	(5,5) 1,950000		
	(6,5) 2,100000		
<i>a</i> >	9type A lories and 1 type B lories for minimum cost		
(b)	6 type A lories and 5 type B lories for minimum number of bags each day		
	Either 4 type A lories and 5 type B lories or 5 type A lories and 4 type B lories for a minimum number		
(c)	of drivers		
		12	

