MATIGO EXAMINATIONS BOARD



465/1

MATHEMATICS MARKING GUIDE 2023 PAPER 1

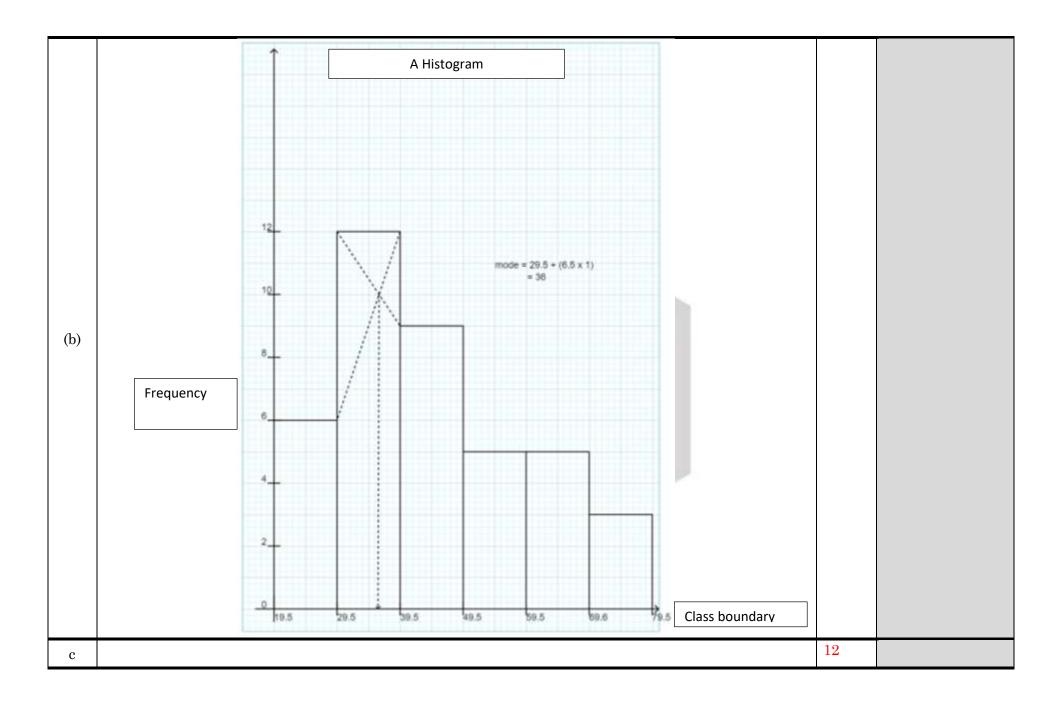
Qn	Answers	Marks	comment
	SECTION A		
	$MM^{-1} = \begin{pmatrix} 1 & 2 \\ c & d \end{pmatrix} \begin{pmatrix} -3 & 2 \\ 2 & -1 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	B1	For $MM^{-1} = I$
	$-3c + 2d = 1 \dots \dots (i)2c - b = 0 \dots \dots (ii),$ $d = 2c - 1, -3c + 4c - 2 = 0$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

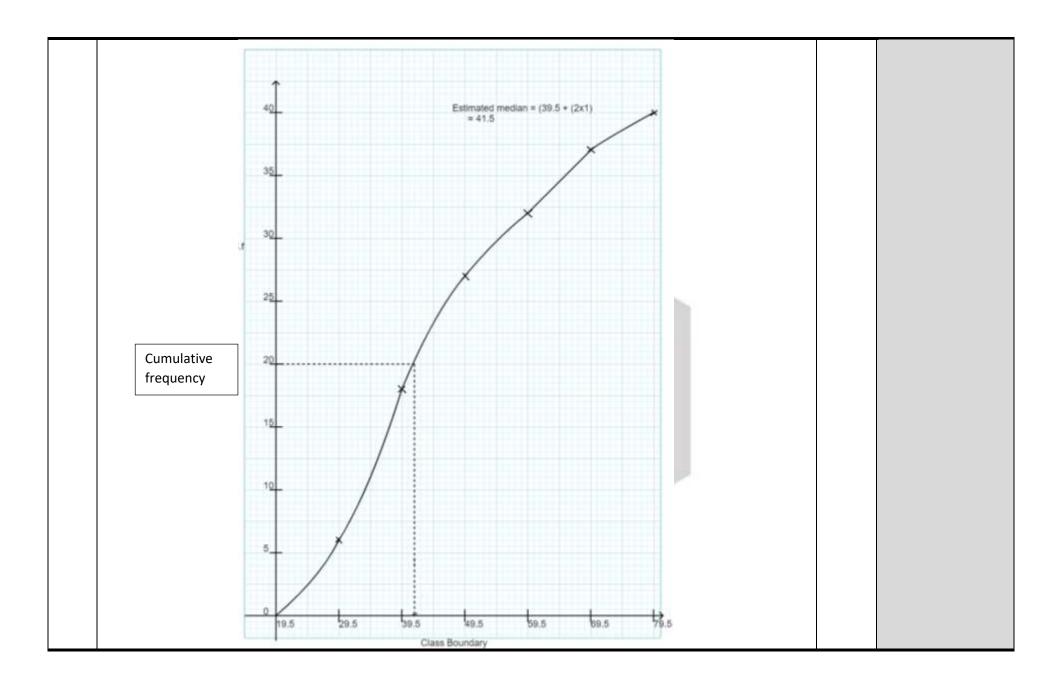
	(2) 1/2 1/22	1 4 -	3.5 11
	(i) median = 1430 $(ii) median = 1430 + 1440 + 1440 + 1460 + 1500 + 1600$	A1	Median
	(ii) mean = 1170 + 1200 + 1220 + 1230 + 1290 + 1390 + 1410 + 1430 + 1440 + 1460 + 1500 + 16	M1	Summation
	+ 1680 + 1730 + 1810		
	$=\frac{21560}{15}$		
	15_{1}	A1	Accept 1437.3333
	$=1437\frac{1}{3}$		
	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	x	711	inequality
		B1	Number line
	* 	Di	Number mile
	-9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3		
			<u> </u>
		04	
	$(2x^2) - 3^2 = 0$	M1	Difference of two
	(2x-3)(2x+3)		Difference of two squares
	$(2x-3)(2x+3) \therefore (2x-3)(2x+3) = 0$		
	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ either	M1	squares
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ either	M1	squares
5	$(2x-3)(2x+3)$ $\therefore (2x-3)(2x+3) = 0$ either	M1 B1 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	$(2x-3)(2x+3) \therefore (2x-3)(2x+3) = 0$	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

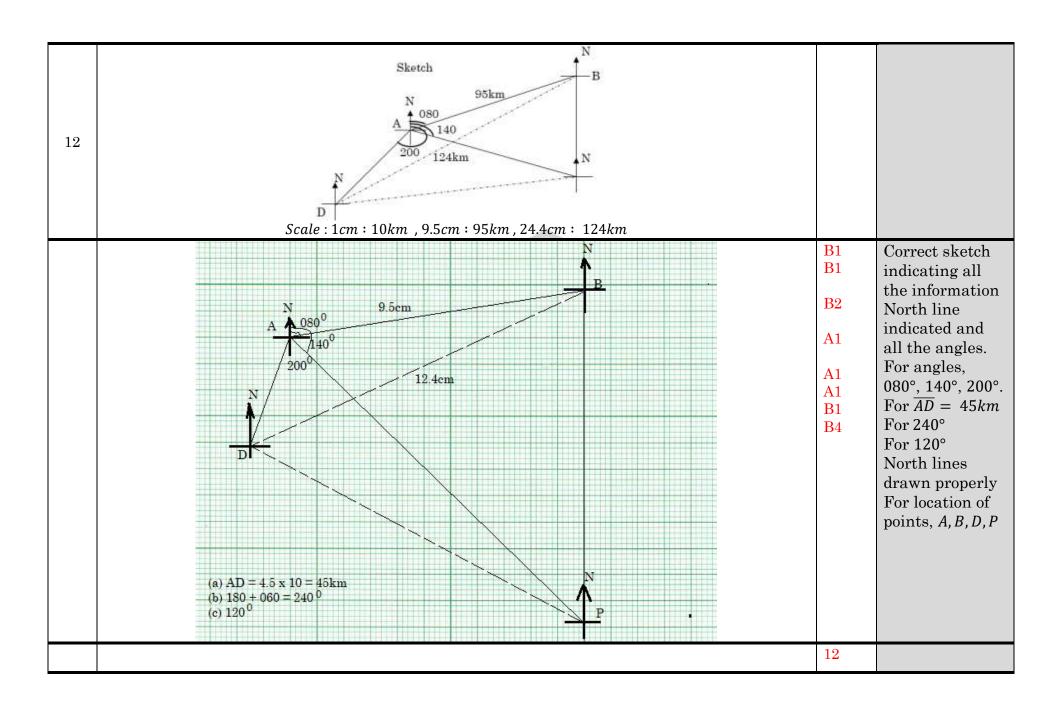
		04	
	$k = -2, A(4,3), A^{1}(4,-5), O(x,y)$		
7	$k = -2, A(4,3), A^{1}(4,-5), O(x,y)$ $\frac{OA^{1}}{OA} = K$ $\frac{A^{1} - O}{A - O} = K$ $\frac{\binom{4-5}{5} - \binom{x}{y}}{\binom{4}{3} - \binom{x}{y}} = -2$ $\frac{\binom{4-x}{5-y}}{\binom{4-x}{3-y}} = -2$ $\binom{4-x}{5-y} = -2\binom{4-x}{3-y}$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

	$C.E = (4, \frac{1}{3})$	A1	
	. 73	04	
8	B 205° A 025° A 025°	B1B1	For correct diagram
	B is 56km from A on a bearing of 025° or N25° E	M1A1	
-	0 (450 405 510 504 045 051)	04	G 1
9	$S = \{452, 425, 542, 524, 245, 254\}$	M1	Sample space
(a)	$E = \{425, 245\}$ $P(E) = \frac{2}{6}$	M1	Elements
(b)	$= \frac{1}{3}$ $no Event$ $P(prime) = 0$	A1 A1	
		04	
10	$60^{\circ} + x = 180^{\circ}$ $x = 120^{\circ}$		

		nu	$mber\ of\ sides = \frac{36}{12}$			M1	
			= 3 sides it is a triangle	0°		M1	
		One int	ALTERNATIVELY terior angle = $\frac{1800}{1000}$	(n-2)		A1 A1	
			$60 = \frac{180(n-2)}{n}$ $60n = 180n - 360$ $120n 360^{\circ}$	n		M 1	
			$\frac{120n}{120} = \frac{300}{120}$ $n = 3 \text{ sides}$ $its \text{ atriangle}$			M1 A1	Formula Sides
						A1	Answer
						04	40MARKS
			SECTION B				
	MARKS	C. B	Tallying	f	c.f	3.61	G +0 :
	20 – 29	19.5 – 29.5	## /	6	6	M1 M1	Correct O-give Location of the
	30 – 39	29.5 - 39.5	####	12	18	A1 M1	media Correct median(44-45)
	40 - 49	39.5 - 49.5	+ +	9	27	M1 M1	For correct marks For correct
11(a)	50 - 59	49.5 – 59.5	##	5	32	M1 M1	tallying For C.B, f, c.f
11(a)	60 - 69	59.5 - 69.5	##	5	37	M1M1	correct
	70 – 79	69.5 - 79.5	///	3	40	M1M1 A1	For labelling graph correctly For correct bars
	12						For location of the mode Correct mode(42-43)







$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			D1	For all 42 some of
13		r -2 -1 0 1 2 3 4 5 6	B1	For all x^2 correct
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	10		D1	For all
(a) $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	13		BI	
(a) $y = 17 = 10 = 5 = 2 = 1 = 1 = 5 = 10 = 17$ $y = x^2 - 4x + 5 = -0 = x^2 - 4x - 5 = -0 = x^2 - 4x - 5 = -0 = x^2 - 4x - 5 = -1, x = 5$ $y = 10$ (b) The solution occurs where the line $y = 10$ meets the curve $y = x^2 - 4x + 5 = -0 = x^2 - 4x + 5 = x^2 - 4x + 5 = x^2 - 4x + 5 = x^$			Di	-4x correct
(a) $y = x^2 - 4x + 5$ $- 0 = x^2 - 4x - 5$ $y = 10$ (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 $y = x^2 - 4x + 5$ $y = 5$ The minimum point is (2,1) $y = x^2 - 4x + 5$ $y = 5$ $x = $			BI	T 11 .
(b) The solution occurs where the line $y = 10$ meets the curve $y = x^2 - 4x + 5$ i.e $x = -1, x = 5$ and $y = 10$ The solution occurs where the line $y = 10$ meets the curve $y = x^2 - 4x + 5$ and $y = 5$ meets the curve $y = x^2 - 4x + 5$ and $y = 5$ meets the curve $y = x^2 - 4x + 5$ and $y = 5$ meets the curve $y = x^2 - 4x + 5$ and $y = 5$ meets the curve $y = x^2 - 4x + 5$ and $y = 5$ for drawing the line $y = $			3.543.54	For all y correct
(b) The solution occurs where the line $y = 10$ meets the curve $y = x^2 - 4x + 5$ i.e $x = -1, x = 5$ $y = x^2 - 4x + 5$ $y = x^2 - 4x + 5$ $y = 5$ 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 $(2,1)$ $y = 5$ For $x = 0, x = 4$ For minimum point is $(2,1)$ $y = 5$ For $x = 0, x = 4$ For minimum point is $(2,1)$ $y = 5$ For $x = 0, x = 4$ For minimum point is $(2,1)$ $y = 5$ For $x = 0, x = 4$ For minimum point is $(2,1)$ $y = 5$ For $x = 0, x = 4$ For minimum point is $(2,1)$ $y = 10$ $y = 10$ For the line $y = 1$ in $(2,1)$ No solution shown Labelling axes $(3,1)$ For drawing the line $(3,1)$ For $(3,1)$ Fo	(a)	$y = x^2 - 4x + 5$	M1M1	
(b) The solution occurs where the line $y = 10$ meets the curve $y = x^2 - 4x + 5 i.e x = -1, x = 5$ $y = x^2 - 4x + 5$ $y = 5$ 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 $(2,1)$ $y = 5$ $y = 5$ The minimum point is $(2,1)$ $y = x^2 - 4x + 5$ $y = 5$ $y = x^2 - 4x + 5 i.e x = 0, x = 4$ The minimum point is $(2,1)$ $y = x^2 - 4x + 5$ $y = 5$ $y = x^2 - 4x + 5$ $y = 5$ $y = x^2 - 4x + 5$ $y = 5$		$-0 = x^2 - 4x - 5$		
The solution occurs where the line $y=10$ meets the curve $y=x^2-4x+5$ i.e $x=-1,x=5$ and $y=x^2-4x+5$ by $y=x^2-4x+5$ and $y=5$ and $y=5$ by $y=5$ and $y=5$ by $y=$				correctly
$y = x^2 - 4x + 5 \cdot i.e x = -1, x = 5$ $y = x^2 - 4x + 5$ $y = 5$ $y = 5$ $y = 5$ $y = x^2 - 4x + 5 \cdot i.e x = 0, x = 4$ $y = x^2 - 4x + 5 \cdot i.e x = 0, x = 4$ $y = x^2 - 4x + 5 \cdot i.e x = 0, x = 4$ $x = x = x = 0$ $y = x^2 - 4x + 5 \cdot i.e x = 0, x = 4$ $x = x = 0$ $y = x^2 - 4x + 5$ $y = x + 5$ $x $			M1	
$y = x^2 - 4x + 5 \cdot i.e x = -1, x = 5$ $y = x^2 - 4x + 5$ $y = 5$ $y = 5$ $y = 5$ $y = x^2 - 4x + 5 \cdot i.e x = 0, x = 4$ $y = x^2 - 4x + 5 \cdot i.e x = 0, x = 4$ $y = x^2 - 4x + 5 \cdot i.e x = 0, x = 4$ $x = x = x = 0$ $y = x^2 - 4x + 5 \cdot i.e x = 0, x = 4$ $x = x = 0$ $y = x^2 - 4x + 5$ $y = x + 5$ $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 $y = x^2 - 4x + 5, i.e. x = 0, x = 4$ The minimum point is $(2,1)$ $y = x^2 - 4x + 5$ $y = x^2 - 4x + 5, i.e. x = 0, x = 4$ The minimum point is $(2,1)$ $y = x^2 - 4x + 5$ $y = x + 5$ $y = x^2 - 4x + 5$ $x = x^2$		$y = x^2 - 4x + 5 i.e x = -1.x = 5$	A1	10
$\frac{-0=x^2-4x+5}{y=5}$ 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 $(2,1)$ $y=x^2-4x+5$		$y = x^2 - 4x + 5$	M 1	
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 $(2,1)$ $y=x^2-4x+5$ $y=x^2$		$-0 = x^2 - 4x + 5$	M 1	No solution
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 $(2,1)$ $y = x^2 - 4x + 5$				shown
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 solution occurs where the line $y=5$ meets the curve $y=x^2-4x+5$ For $x=0, x=4$ For minimum point $y=x^2-4x+5$ $y=x^2-4x+5$ $y=x^2-4x+5$ $y=x^2-4x+5$ $y=x^2-4x+5$ $y=x^2-4x+5$		v = 5	M 1	Labelling axes
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 $(2,1)$ $y=x^2-4x+5$ $y=x^2$		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 solution ecours where the line we I make the survey		
The minimum point is $(2,1)$ $y = x^2 - 4x + 5$ 16 14 12 19 19 10 8 4 2 4 2 1 1 1 1 1 1 1 1 1 1		The solution occurs where the line $y = 5$ meets the curve	111	illie y 0
For minimum point is (2,1) y = x^2 - 4x + 5	(c)			For $y = 0$ $y = 4$
point y = x² - 4x + 5 18- 16- 14- 12- 19- 19- 19- 19- 19- 19- 19- 19- 19- 19		The minimum point is (2,1)		
18- 167 144 12 10 8- 8- 8- 10 11 10 11 11 11 12 12 11 10 11 11 12 12 11 11 12 13 14 15 18 18 18 18 18 18 18 18 18 18 18 18 18				
18- 16- 16- 14- 12- 10 8- 4- 2- 4- 2- 11 0 1 1 2 3 4 5 8 7		20 1 2 2 10 1 5		pomit
16 14 12 y=10 8 4 2 1 10 1 1 2 3 4 5 6 7				
14 12 y=10 y=10 y=5 4 - 2 - 2 - 3 4 5 6 7		X \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		
12 y=10 y=10 8 -		16		
12 y=10 y=10 8 -		141		
10 y=10 8 -				
8- 6 2- 12 11 0 1 2 3 4 5 6 7				
2- 1-2 1-1 0 1-1 2 3 4 5 8 7				
2- 1-2 1-1 0 1-1 2 3 4 5 8 7				
2- 1-2 1-1 0 1-1 2 3 4 5 8 7		, , , , , , , , , , , , , , , , , , ,		
12 11 0 1 2 3 4 5 6 7		8 1 y=5		
12 11 0 1 2 3 4 5 6 7		4.1		
12 11 0 1 2 3 4 5 6 7				
1-2 11 0 1 2 3 4 5 6 7				
12		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
			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	

	/ 4	M1	
	$= \begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix}$	1/11	
	$MO = I$ $\begin{pmatrix} 1 & \sqrt{3} \end{pmatrix}$	M1	
	$\begin{pmatrix} \frac{1}{2} & -\frac{\sqrt{3}}{2} \\ \frac{\sqrt{3}}{2} & \frac{1}{2} \end{pmatrix} \begin{pmatrix} 2 \\ 4 \end{pmatrix} = \begin{pmatrix} 1 - 2\sqrt{3} \\ \sqrt{3} + 2 \end{pmatrix}$ $\therefore P^{1}(1 - 2\sqrt{3}, \sqrt{3} + 2)$		
	$\sqrt{\frac{2}{2}}$ $\sqrt{\frac{2}{2}}$	A1	
	$\therefore P^{1}(1-2\sqrt{3},\sqrt{3}+2)$	12	
15(a)	120m θ	B1	For correct diagram
	$Sin\theta = \frac{8}{120}$ $\theta = Sin^{-1} (\frac{8}{120})$ $= 3.82^{\circ}$ $Tan\theta = \frac{7}{24}, 180^{\circ} \le \theta \le 360^{\circ}$	M1M1	
	$\frac{24}{90}^{\circ}$		
(b)	$\frac{\theta}{180^{\circ}}$ $\frac{-24}{180^{\circ}}$ $\frac{\theta}{180^{\circ}}$ $\frac{1}{180^{\circ}}$ $\frac{1}{180^{$	A1	
	-7		
	$(-7)^2 + (-24)^2 = c^2$		
	$c^2 = \sqrt{625}$		

	= 25	B1	
			For correct
	$Sin\theta = \frac{-7}{25}$	M1	diagram
	$Cos\theta = \frac{-24}{25}$	A 1	
	$Sin\theta - Cos\theta = 1/-7$ 24	A1	
	$\frac{Cos\theta = \frac{-24}{25}}{\frac{Sin\theta - Cos\theta}{2}} = \frac{1}{2} \left(\frac{-7}{25} + \frac{24}{25} \right)$ $= \frac{1}{2} \left(\frac{17}{25} \right)$		
	$=\frac{1}{2}\left(\frac{1}{2}\right)$	A1	
	$\begin{array}{c} 2 (25) \\ -17 \end{array}$		
	$= \frac{17}{50}$ $13^2 - 5^2 = b^2$	3.51	
	$13 - 3 = b$ $169 - 25 = b^2$	M1	
	b = 12	A1	
	P = 2(L+W) $P = 2(12+5)$	M 1	
(-)	P = 34m	A 1	
(c)		A1 12	
		12	
16(a)	$A = \begin{pmatrix} 2 & -1 \\ 4 & -1 \end{pmatrix}, \qquad B = \begin{pmatrix} 1 & 1 \\ -4 & k \end{pmatrix}$		
	$\det B = 0$	N/T1	
	k+4=0	M1 M1	
	k = -4	M1	
(b)	$\det A = (2 \times -1) - (4 \times -1)$	A1	
	= -2 + 4 = 2		
	$A^{-1} = \frac{1}{2} \begin{pmatrix} -1 & 1 \\ -4 & 2 \end{pmatrix}$	M1	
	$A^{-1} = \frac{1}{2} \begin{pmatrix} -4 & 2 \end{pmatrix}$	A1	
	$=\begin{pmatrix} -1/2 & 1/2 \\ -2 & 1 \end{pmatrix}$		
	\ -2 1 /		
	(-1/ 1/) (1 1)	A =	
	$A^{-1}B = \begin{pmatrix} -/2 & -/2 \\ -2 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ -4 & -4 \end{pmatrix}$	A1 A1	
	$A^{-1}B = \begin{pmatrix} -1/2 & 1/2 \\ -2 & 1 \end{pmatrix} \begin{pmatrix} 1 & 1 \\ -4 & -4 \end{pmatrix}$ $= \begin{pmatrix} -5/2 & -5/2 \\ -6 & -6 \end{pmatrix}$	AI	
	$=\begin{pmatrix} 72 & 72 \\ -6 & -6 \end{pmatrix}$		
		M1	
(c)	$A - 2I = \begin{pmatrix} 2 & -1 \\ 4 & -1 \end{pmatrix} - 2 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	M1	
	$\begin{pmatrix} 4 & -1 \end{pmatrix} \qquad \begin{pmatrix} 0 & 1 \end{pmatrix}$	M1	

	$ = \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	
17(a)	$x + y \le 11 \dots $	M1	
- ' (=)	$x \leq 9 \dots \dots \dots 2$	M1	
	$y \leq 5 \dots \dots 3$	M1	
	$4 \times 90 \times x + 3 \times 150 \times y \ge 3600$	1,11	
	$360x + 450y \ge 3600$		
	$4x + 5y \ge 40 \dots \dots \dots \dots 4$	M 1	
	4x + 5y = 40		
	270 1 0 9	M1	
		1111	
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		
	y 8 0		
	(0,8), (10,0)		
	x + y = 11	M1M1	
	x = 0, y = 11		
	(0,11)		
	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) 1,050000		
	(5,5) 1,950000 (6,5) 2,100000		
	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	

