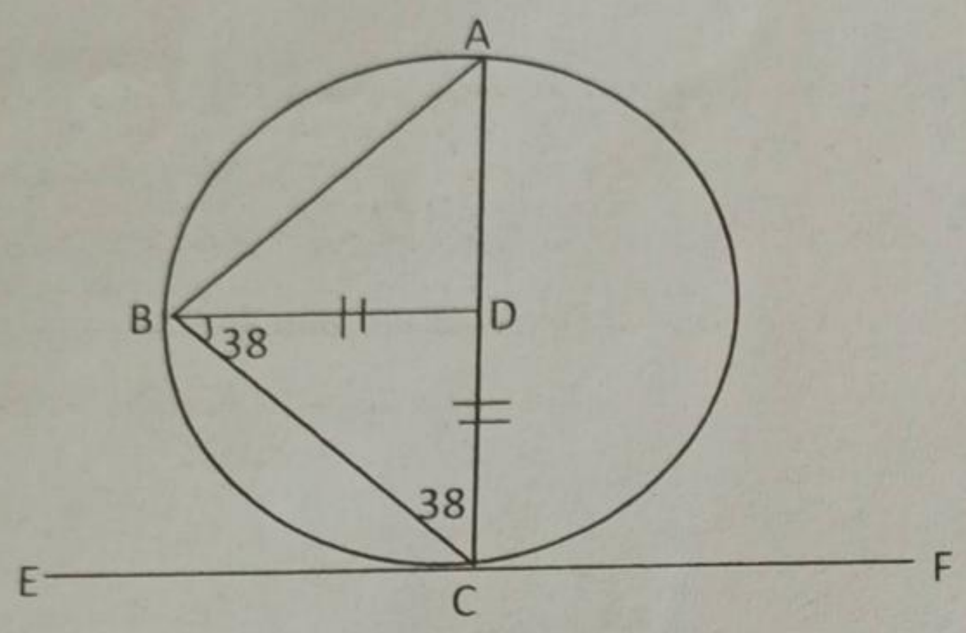
Vitebra. M308.

UCE MOCK 2022 MATH P1 MARKING GUIDE

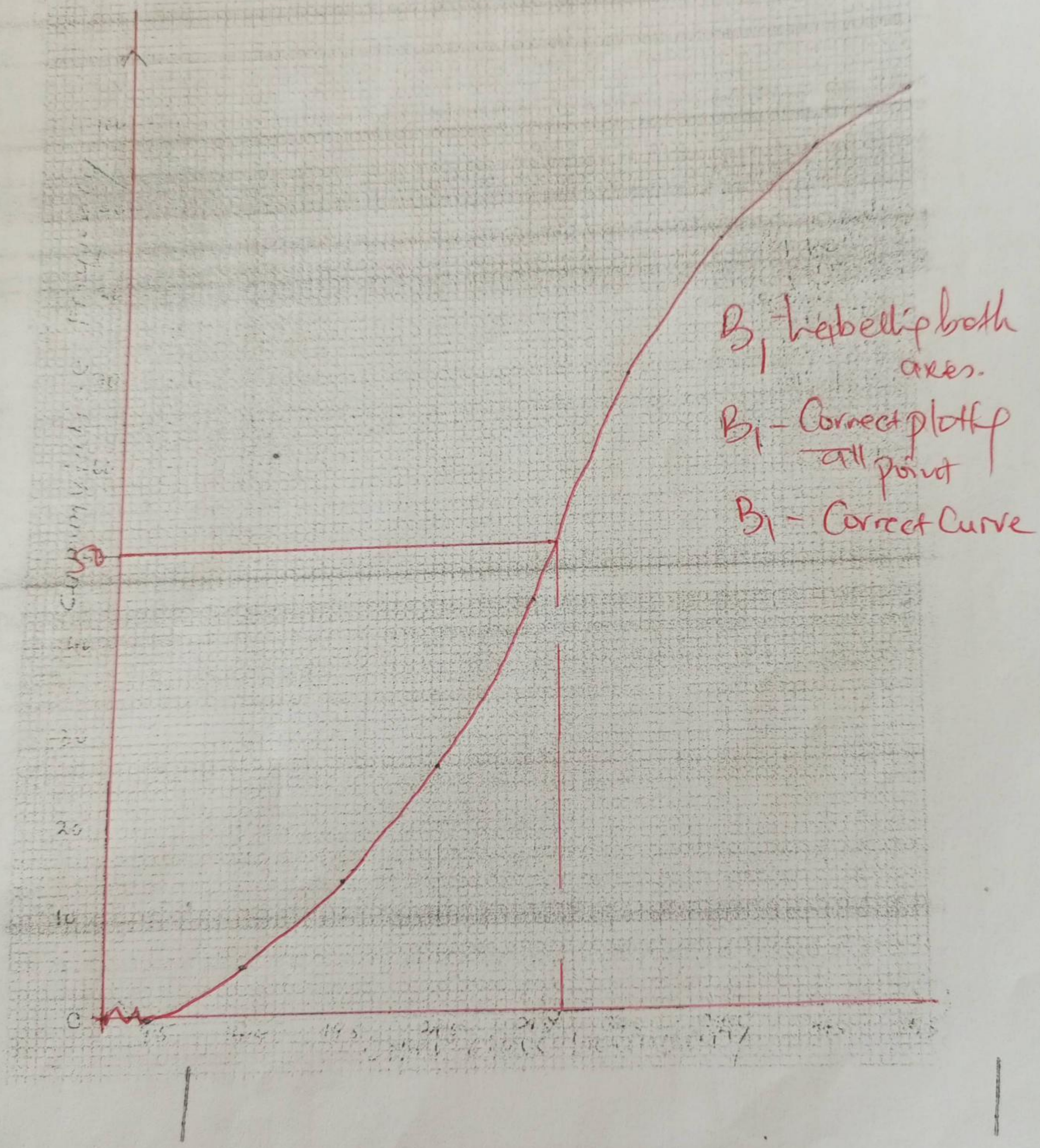
QTN	SOLUTION	MARKS	COMMENTS
1	$V = \frac{r^2}{(r-t)(r+t)}$		
	$V = \frac{r^2}{r^2 - t^2}$	M1	$for\ r^2 - t^2$
	$V(r^2 - t^2) = r^2$		Accept
	$Vr^2 - vt^2 = r^2$	M1	Correct opening of brackets $-vt^2 = r^2 - vr$ $-vt^2 = r^2(1-v)$
	$Vr^2 - r^2 = Vt^2$		
	$r^2(V-1) = Vt^2$	M1	$\frac{-vt^2}{1-v} = r^2$
	$r^2 = \frac{Vt^2}{v-1}$		
	$r = \sqrt{\frac{vt^2}{v-1}}$	A1	$r = \sqrt{\frac{-vt^2}{1-v}}$
		04	
2	$a * b = a^2 - 3b^2$		
	$2 * (5 * -3)$		
	$5 * -3 = 5^2 - 3 \times (-3)^2$	M1	
	$= 25 - 27$	A1	
	$= -2$		
	$2 * -2 = 2^2 - 3 \times (-2)^2$	M1	
	$= 4 - 12$	A1	
	$= -8$		
		04	
3	$A^2 = A.A$		
	$= \begin{pmatrix} -2 & 2 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} -2 & 2 \\ 1 & 0 \end{pmatrix}$	M1	
	$= \begin{pmatrix} 6 & -4 \\ -2 & 2 \end{pmatrix}$	A1	
	$\det A^2 = .(6 \times 2) - (-4 \times -2)$	M1	M1 for his wrong product

	$= 12 - 8$ $= 4$ $Inverse\ of\ A^2 = \frac{1}{4}\begin{pmatrix} 2 & 4 \\ 2 & 6 \end{pmatrix}$ $= \begin{pmatrix} \frac{1}{2} & 1 \\ \frac{1}{2} & \frac{3}{2} \end{pmatrix}$	A1	Accept $\begin{pmatrix} 0.5 & 1 \\ 0.5 & 1.5 \end{pmatrix}$
		04	
4	$(-3,0)\ \ (0,4)$ $Grad, m = \frac{4-0}{0+3} = \frac{4}{3}$ $y = mx + C$ $4 = \frac{4}{3} \times 0 + C$ $C = 4$ $Equation$ $y = \frac{4}{3}x + 4$ $or\ 3y - 4x = 4$ $Inequality\ is$ $3y - 4x < 4$	M1 M1 A1 A1	With or without testing. Accept $3y - 4x < 4$
		04	
5	$2x^2 - 13x - 7$ $2x^2 + x - 14x - 7$ $x(2x + 1) - 7(2x + 1)$ $(2x + 1)\ (x - 7)$ $(2x + 1))\ (x - 7) = 0$ $either$ $2x + 1 = 0\ Or\ x - 7 = 0$	M1 A1 M1	For correct factorization

	$x = \frac{-1}{2}$ Or $x = 7$	A1	For both correct values of x
		04	
6	Total of the seven numbers $= 7 \times 20$ $= 140$ Total of the Twelve numbers $= 12 \times 15$ $= 180$ Total of the five numbers $= 180 - 140$ $= 40$ $\therefore$ *mean of the five numbers* $= \frac{40}{5}$ $= 8$	M1 M1 M1 A1	For both correct values
		04	
7	Re – arranging $3a + 5b = 1$ $2a - b = -8$ $\begin{pmatrix} 3 & 5 \\ 2 & -1 \end{pmatrix}\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 1 \\ -8 \end{pmatrix}$ $\begin{pmatrix} -1 & -5 \\ -2 & 3 \end{pmatrix}\begin{pmatrix} 3 & 5 \\ 2 & -1 \end{pmatrix}\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} -1 & -5 \\ -2 & 3 \end{pmatrix}\begin{pmatrix} 1 \\ -8 \end{pmatrix}$ $\begin{pmatrix} -13 & 0 \\ 0 & -13 \end{pmatrix}\begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 39 \\ 26 \end{pmatrix}$ $\begin{pmatrix} -13a \\ -13b \end{pmatrix} = \begin{pmatrix} 39 \\ -26 \end{pmatrix}$ $-13a = 39$ $a = -3$	B1 M1 M1	

	$-13b = -26$ $b = 2$ $\therefore a = -3, \quad b = 2$	A1 04	
8			
(i)	$\angle ABD + 38 = 90^0$ $\therefore \angle ABD = 90 - 38$ $= 52^0$	M1 A1	
(ii)	$\angle BDC$ $\angle BDC = 180 - (38 + 38)$ $= 180 - 76$ $= 104^0$	M1 A1	
		04	
9	$P(same\ colour)$ $= P(R_1R_2) + P(W_1W_2) + P(B_1B_2)$ $= \frac{5}{12} \times \frac{4}{11} + \frac{3}{12} \times \frac{2}{11} + \frac{4}{12} \times \frac{3}{11}$ $= \frac{20}{132} + \frac{6}{132} + \frac{12}{132}$ $= \frac{38}{132}\ OR\ \frac{19}{66}$	M1M1 M1 A1 04	M1 for $\left(\frac{5}{12} \times \frac{4}{11}\right)$ M1 for $\frac{3}{12} \times \frac{2}{11}$ A1 for $\frac{38}{132}\ or\ \frac{19}{06}$

10	$\begin{pmatrix} 1 & x \\ y & -4 \end{pmatrix}\begin{pmatrix} 2 \\ -3 \end{pmatrix} = \begin{pmatrix} -10 \\ 4 \end{pmatrix}$	M1	
	$\begin{pmatrix} 2-3x \\ 2y+12 \end{pmatrix} = \begin{pmatrix} -10 \\ 4 \end{pmatrix}$	M1	
	$2-3x = -10$	M1	For any correct equation
	$-3x = -12$		
	$x = 4$		
	$2y + 12 = 4$		
	$2y = -8$		
	$y = -4$	A1	A1 for both $x = 4$ & $y = -4$
		04	



11							B1 for all c/B correct B1 for all cf correct B1 for all x correct B1 for all d correct M1 for all fd correct A1 for 320

Class boundary	class	f	cf	x	$d = x - A$	fd
9.5 – 14.5	10-14	5	5	12	-15	-75
14.5-19.5	15-19	9	14	17	-10	-90
19.5-24.5	20-24	12	26	22	-5	-60
24.5-29.5	25-29	18	44	27	0	0
29.5-34.5	30-34	25	69	32	5	125
34.5-39.5	35-39	15	84	37	10	150
39.5-44.5	40-44	10	94	42	15	150
44.5-49.5	45-49	6	100	47	20	120
		εd= 100				εfd=320

$$mean = A + \frac{\varepsilon fd}{\varepsilon f}$$

M1

$$= 27 + \frac{320}{100}$$

$$= 27 + 3.2$$

$$= 30.2$$

A1

(b)

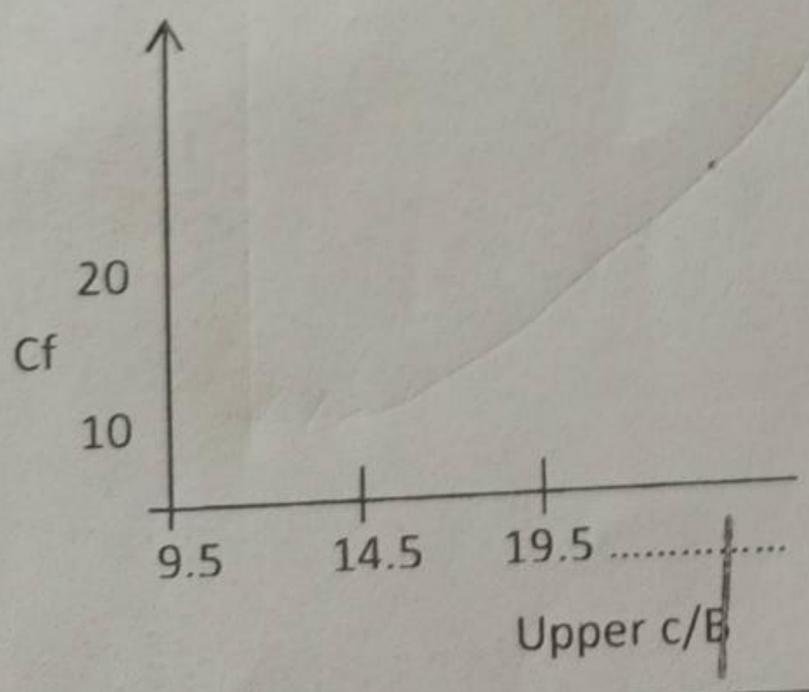
See graph

$median = 30.5 \pm 0.5$

B1

$30 - 31$

A curving with 9.5 at the starting point i.e is also acceptable



12

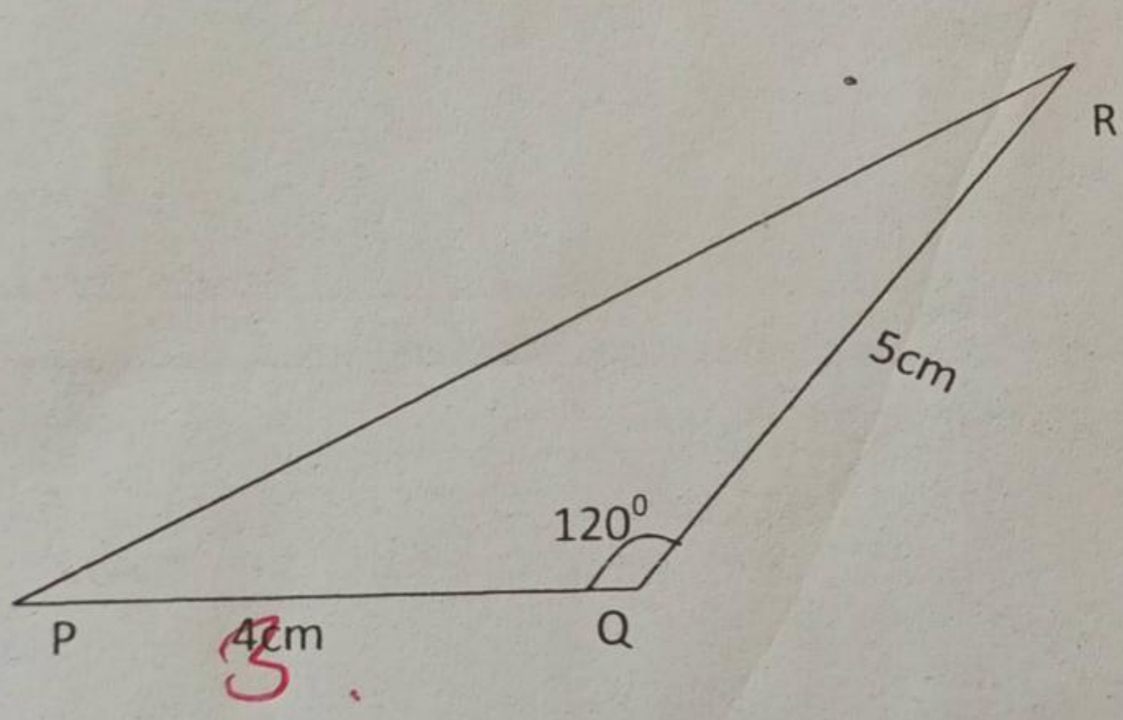
12a)

x	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	
$2x^2$	4.5	2	0.5	0	0.5	2	4.5	8	12.5	18
$-3x$	4.5	3	1.5	0	-1.5	-3	-4.5	-6	-7.5	-9
-7										
y	2	-2	-5	-7	-8	-8	-7	-5	-2	2

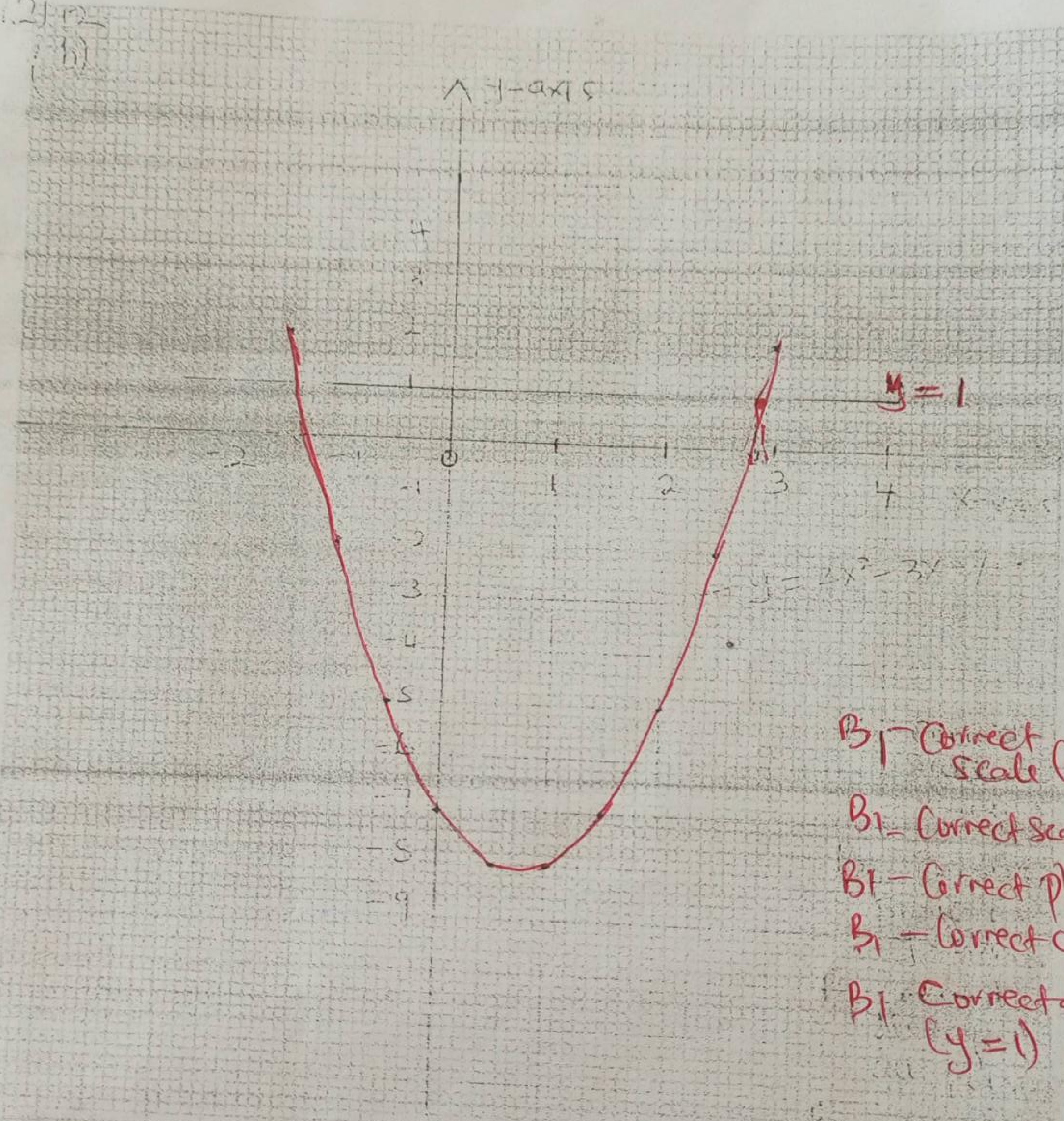
B1

B1

B2 – All correct.

C	Solving the equation , $2x^2 - 3x - 8 = 0$ $2x^2 - 3x - 7 = y$ - $2x^2 - 3x - 8 = 0$ Drawing the line $y = 1$ $x = -1.4 \pm 0.1$ *or* $x = 2.8 \pm 0.1$ $-1.5 - ^{-} 1.3$ $\quad 2.7 - 2.9$		B1 for 5-9 correct M1 A1 A1 for both values of x correct
			12
13			B1 – correct sketch

(2)(b)



B1 – Correct scale (x-axis)

B1 – Correct scale (y-axis)

B1 – Correct plotting

B1 – Correct curve

B1 – Correct drawing (y = 1)

B_1 – $\overline{PQ}$ = 3cm. ± 0.1

B_1 – 120° – Correct.

B_1 – $\overline{QR}$ = 5cm. ± 0.1

B_1 – Drawing of a line

m_1 – RS

m_1 – Bisector

(b)

RS = 4.3 ± 0.1 → B_1

4.3 — 4.5

Area of triangle PQR = $\frac{1}{2}bh$

$= \frac{1}{2} \times 4 \times 4.3$ M_1 A_1

$\Rightarrow 8.6 cm^2$.

(c) r = 4.2 ± 0.1 → B_1

4.5 — 4.3

$A_1 = \pi r^2$

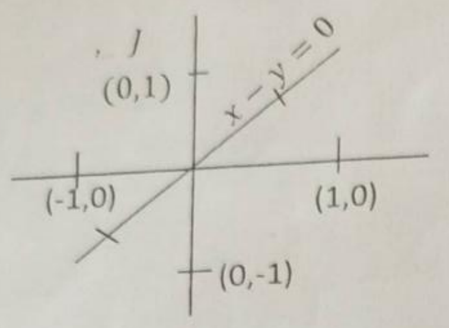
$\frac{22}{7} \times (4.2)^2 = 55.44$ M_1 A_1

14(a)			
(i)	$\begin{pmatrix} 10 & 05 & 20 & 04 \\ 20 & 15 & 5 & 30 \\ 03 & 04 & 10 & 02 \end{pmatrix}$ 3×4	B2	
(ii)	$\begin{pmatrix} 2800 & 3000 \\ 5500 & 6500 \\ 5000 & 6000 \end{pmatrix}$ 3×2	B2	
b	$\begin{pmatrix} 10 & 20 & 03 \\ 05 & 15 & 04 \\ 20 & 05 & 10 \\ 04 & 30 & 02 \end{pmatrix} \begin{pmatrix} 2800 & 3000 \\ 5500 & 6500 \\ 5000 & 6000 \end{pmatrix}$	M1	Accept the other correct arrangement $\begin{pmatrix} 2800 & 5500 & 5000 \\ 3000 & 6500 & 6000 \end{pmatrix}$ $\begin{pmatrix} 100524 \\ 20155 \\ 030410 \end{pmatrix}$ -
	$\begin{pmatrix} 28000 + 110000 + 15000 & 30000 + 130,000 + 18000 \\ 14000 + 82500 + 20000 & 15000 + 97500 + 24000 \\ 14000 + 82500 + 20000 & 60000 + 32,500 + 60000 \\ 11200 + 165000 + 10000 & 12000 + 195000 + 12000 \end{pmatrix}$	M1	For correct multiplication and addition
	$= \begin{pmatrix} 153,000 & 178,000 \\ 116,500 & 136,500 \\ 133,500 & 152,500 \\ 186,200 & 219,000 \end{pmatrix}$	A1	
	A paid 178,000 - 153000	M1	M1 for subtraction of any correct values A1 for each correct amount for A, B, C & D
	=shs. 25,000	A1	
	B paid 136,500 - 116500		
	= shs 20,000	A1	
	C paid 152,500 - 133,500		
	= shs 19,000	A1	
	D paid 219,000 - 186,200		
	= shs. 32,800	A1	
		12	

15 (a)			
	$X \geq 5$ ..... (i)	B1	
	$Y \geq 10$ ..... (ii)	B1	
	$X + Y \leq 30$ ..... (iii)	B1	
	$3X + Y \leq 54$ ..... (iv)	B1	
(b)	See graph		
	Lines to be drawn $x = 5$ $y = 10$ $x + y = 30$ (0,30) (30,0) $3x + y = 54$ (0,54) (18 ,0) (7122 - 14000 + 66,000)	M1	M1 For correct drawing and correct shading of each line ie M1 for x=5 M1 for y=10 M1 for x+y =30 M1 for 3x+y = 54 A1
	Expression for expected income per day I = $2000x + 3000y$ From the graph, the possible solutions are	B1 M1	I stands for income or any other letter used or with out a letter ie $200x+3000y$ M1 for testing any three points including (5,25)

x, y	$I = 2000x + 3000y$	Income
(5,20)	10,000 + 60,000	70,000
(15,10)	30,000 + 30,000	60,000
(5,25)	10,000 + 75,000	85,000
(9,20)	18,000 + 60,000	78,000
(18,10)	36,000 + 30,000	66,000
(15,15)	30,000 + 45,000	75,000
6,23)	12,000 + 69,000	81,000
6,24	12,000 + 72,000	84,000

	The maximum income per day is shs 85,000	A1	max value.
		12	

16 (a)		
(i)	$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$	B2
(ii)	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$	B2
b) i)	~~Matrix of reflection~~ ~~$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$~~ $A'B'C'$ $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} A & B & C \\ 3 & 3 & 1 \\ 2 & 4 & 4 \end{pmatrix} = \begin{pmatrix} A' & B' & C' \\ 2 & 4 & 4 \\ 3 & 3 & 1 \end{pmatrix}$ $A'(2,3), \quad B'(4,3), \quad C'(4,1)$	~~B2~~ ~~B2~~ M1 A1 B1
(ii)	$A''\ B''\ C''$ $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}\begin{pmatrix} A' & B' & C' \\ 2 & 4 & 4 \\ 3 & 3 & 1 \end{pmatrix} = \begin{pmatrix} A'' & B'' & C'' \\ 3 & -2 & 1 \\ -2 & -4 & -4 \end{pmatrix}$ $A''(3,-2)\ B''(3,-4)\ C''(1,-4)$	M1 A1 B1
C	Single matrix mapping A B C = A'' B'' C''	~~A1~~

	Its is equal to $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$	M1 A1	
		12	
17	$(x+5)^2 + (x+2)^2 = (2x+1)^2$	M1	Correct use of Pythagoras theorem
	$(x+5)^2 = x^2 + 10x + 25$	M1	Correct expansion
	$(x+2)^2 = x^2 + 4x + 4$	M1	Correct expansion
	$(2x+1)^2 = 4x^2 + 4x + 1$	M1	Correct expansion
	$\therefore x^2 + 10x + 25 + x^2 + 4x + 4 = 4x^2 + 4x + 1$		
	$2x^2 + 14x + 29 = 4x^2 + 4x + 1$		
	$2x^2 - 4x^2 + 14x - 4x + 29 - 1 = 0$	M1	For correcting like terms
	$-2x^2 + 10x + 28 = 0$		
	$x^2 - 5x - 14 = 0$	A1	For reduced form of quadratic equation
	$x^2 - 7x + 2x - 14 = 0$	M1	
	$x(x-7) + 2(x-7) = 0$		
	$(x-7)(x+2) = 0$		
	Either $x - 7 = 0$ $x = 7$	A1	For both 7 and -2
	Or $x + 2 = 0$ $x = -2$		
	$\therefore x = 7cm$	A1	For 7cm alone (C.A.O)

	Base = 12cm Height = 9cm Hypotenus = 15cm	A1	For all side correct
	$\therefore Area\ of\ triangle = \frac{1}{2}bh$ $= \frac{1}{2} \times 12 \times 9$	M1	
	$= 54cm^2$	A1	
		12	