MARANDA HIGH SCHOOL

Kenya Certificate of Secondary Education

THE MOCK EXAMINATIONS, 2025

121/2 **MATHEMATICS** **PAPER 2**

June, 2025

MARKING SCHEME

121/2 MATHEMATICS ALTERNATIVE A

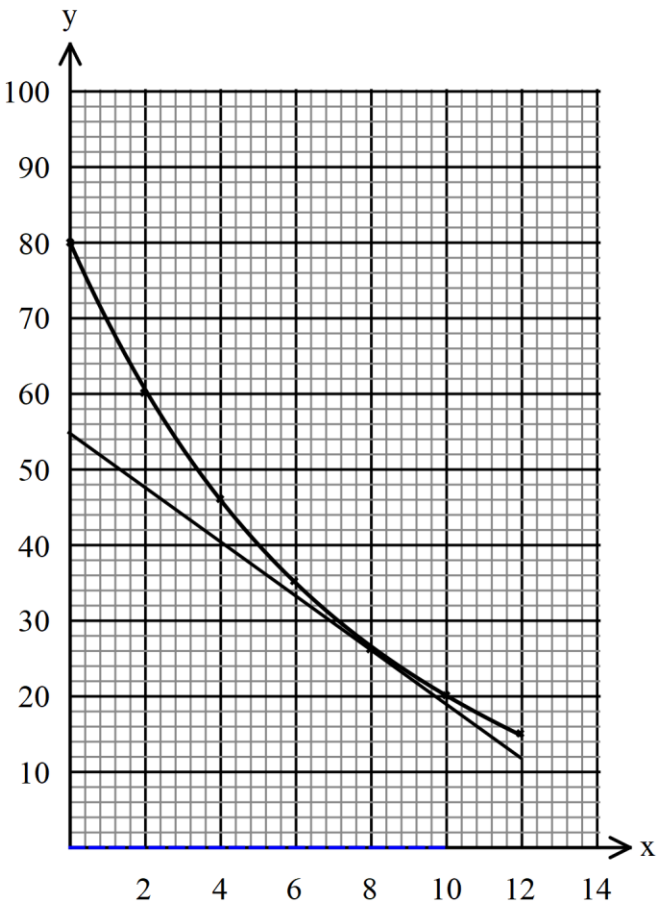
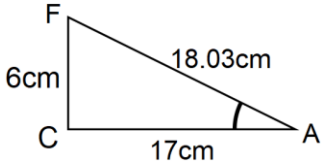
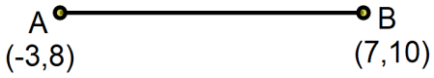
SECTION I

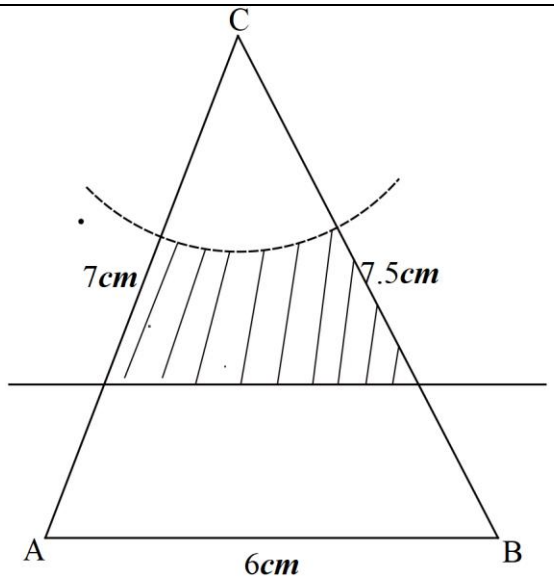
NO.	Working	Marks	Comments
1.	Error = 0.05 Max. : $\frac{1}{3}\ x\ 2.55x1.85x7.1 = 11.16475$ Min : $\frac{1}{3}\ x\ 2.45x1.75x7.1 = 10.14708$ AE : $\frac{11.16475-10.14708}{2}$ √ 0.508835 AV : $\frac{1}{3}\ x\ 2.5x1.8x7.1 = 10.65$ PE : $\frac{0.508835}{10.65}\ X\ 100\%$ √ 4.778% √	M1 M1 A1	ALT. 1 $PE : (\frac{0.05}{2.5} + \frac{0.05}{1.8})$ √100 √ 4.778 % √ ALT 2 Max: $2.55x1.85 = 4.2875$ Max: $2.45x1.75 = 4.2875$ AE : $\frac{4.7175 - 4.2875}{2}$ √ PE: $\frac{0.215}{4.5}\ X\ 100$ √ 4.778% √
		03	
2.	a) Amplitude : undefined√ b) Phase angle : 40^0 √ c) Period : $\left(\frac{360}{z}\right)$ √	B1 B1 B1	
		03	
3.	$(2x - y = 4)1$ √ $(x + 2y = 7)2$ $2x - y = 4$ - $\underline{2x + y = 14}$ 5y =10 y =2 2x = 4 +2 x = 3	M1 M1 A1	Formation of simultaneous equations Eliminating one of the unknowns Both values correct
		03	
4.	$\frac{2\sqrt{2}}{\sqrt{3}-1}$ $\frac{2\sqrt{2}(\sqrt{3}+1)}{(\sqrt{3}-1)(\sqrt{3}+1)}$		

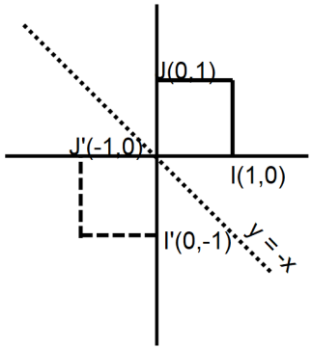
	$\frac{2\sqrt{6}+2\sqrt{2})}{3-1}$ √ $\sqrt{6}+\sqrt{2}$ √	M1 A1	Simplification of numerator and rationalization of denominator
		02	
5.	$p = (45000 - 75000)$ =375000 $A = 375000\left(1+\frac{15}{100}x\frac{1}{12}\right)^{12}$ √ $A = 435\,282.944$ Monthly installments $\frac{435282.944}{12}$ √ = sh.36274 √	 M1 M1 A1	
		03	
6	a) $t = \frac{5x4.8}{6} = 4cm$√ b) $(BT)^2 = 18X8$√ BT = $\sqrt{18x8}$ BT =12 cm √	B1 M1 A1	For both method and accuracy
		03	
7.	a) $\frac{1}{3}x\frac{4}{7}x\frac{3}{4}x\frac{1}{5}x\frac{1}{2}x\frac{3}{5}$√ $\frac{2}{175}$√ b) $\left(\frac{1}{3}x\frac{4}{7}x\frac{1}{4}\right)+(\frac{1}{3}x\frac{4}{7}x\frac{3}{4}x\frac{4}{5})$√ $\frac{1}{21}+\frac{4}{35}$ $\frac{17}{105}$√	M1 A1 M1 A1	For both probabilities correct
		04	
8.	**PQ** = h**QR** $\begin{bmatrix}1\\2\end{bmatrix}-\begin{bmatrix}7\\-10\end{bmatrix}=h(\begin{bmatrix}-3\\10\end{bmatrix}-\begin{bmatrix}1\\2\end{bmatrix})$√ $\begin{bmatrix}-6\\12\end{bmatrix}=h\begin{bmatrix}-4\\8\end{bmatrix}$ $\begin{bmatrix}-6\\12\end{bmatrix}=\begin{bmatrix}-4h\\8h\end{bmatrix}$ $h=\frac{3}{2}$√ $\boldsymbol{PQ}=\frac{3}{2}\boldsymbol{QR}$	M1 A1	For showing parallelism of any pair of vectors (follow through for other pair of vectors)

	P,Q and R are collinear since **PQ ⇈ *QR and they share a common point Q*** √	B1	For the comment
		03	
9.	a) $\frac{(47x10)+58}{11} = 48$√ b) $11 = \sqrt{(\frac{\sum fx^2}{10} - (47)^2}$ $121 = \frac{\sum fx^2}{\sum f} - 2209$ $\sum fx^2 = 23300$√ $New\ s.d = \sqrt{\frac{23300 + 58^2}{11} - (48)^2}$ √ 10.95√	B1 B1 M1 A1	For getting the new mean For getting original $\sum fx^2$ **ALT :** $11 = \sqrt{\frac{\sum fd^2}{10}}$ $1210 = \sum fd^2$ √ $New\ s.d =$ $\sqrt{\frac{1210 + 11^2}{11} - (\frac{11}{11})^2}$ √ 10.95√
		04	
10.	$q = at$ $r = bt^2$ $m = at + bt^2$ 16 = 2a+4b $33 = 3a + 9b$ √ $48 = 6a + 12b$ $66 = 6a + 18b$ $18 = 6b$ $b = 3$ a= $[16 - 4(3)]/2$ a=2 √ t=8 m= $2(8) + 3(8)^2$ 208 √	M1 A1 B1	For the two simultaneous equations For the two values of the co-efficients For m=208
		03	
11			

Time (minutes)	0	2	4	6	8	10	12
Temperature(^{0}C)	80	60	46	35	26	20	15

	 Rate : $\frac{26-55}{8-0}$ √ -3.625 √	P1 C1 M1 A1	Allow subtraction of correct values read within ± 1
		02	
12.	$AC = \sqrt{8^2 + 15^2} = 17$  $\propto = tan^{-1}\frac{6}{17}$ √ 19.44^0 √	M1 A1	Follow through for other ratios used
		02	
13	 $(\frac{-3+7}{2}), (\frac{8+10}{2})$		

	Centre (2,9) Radius $\sqrt{(8-9)^2+(-3-2)^2}$ $=\sqrt{26}]$ Eqn: $(x-2)^2+(y-9)^2$ $=[\sqrt{26}]^2$ √ $x^2-4x+4+y^2-18y+81=26$ $x^2+y^2\pm 4x-18y+59=0$ √	B1 M1 A1	For both Centre and radius
		03	
14	**AB** = $\begin{bmatrix}k & 4\\ 3 & 2\end{bmatrix}\begin{bmatrix}1 & 2\\ 3 & 4\end{bmatrix}$ $\begin{bmatrix}k+12 & 2k+16\\ 9 & 14\end{bmatrix}$√ $14[k+12]-9[2k+16]=k$ √ $[14k+168-18k-144]=k$ 24 = 5k 4.8 = k √	 M1 M1 A1	 For correct multiplication of matrices Correct equation in k as determinant
		03	
15	$[x^4+x^2+x+c]_{-2}^{3}$ √ $[3^4+3^2+3+c]$ - $[(-2)^4+(-2)^2+(-2)+c]$ √ $[93+c]-[18+c]=75$ √	 M1 M1 A1	 Correct integration with limits Correct substitution of limits
		03	
16		B1 B1 B1 B1 	Correct construction of triangle ABC Construction of a straight line parallel to AB at 2metres Construction of a dotted arc of radius 3metres from C Correct shading

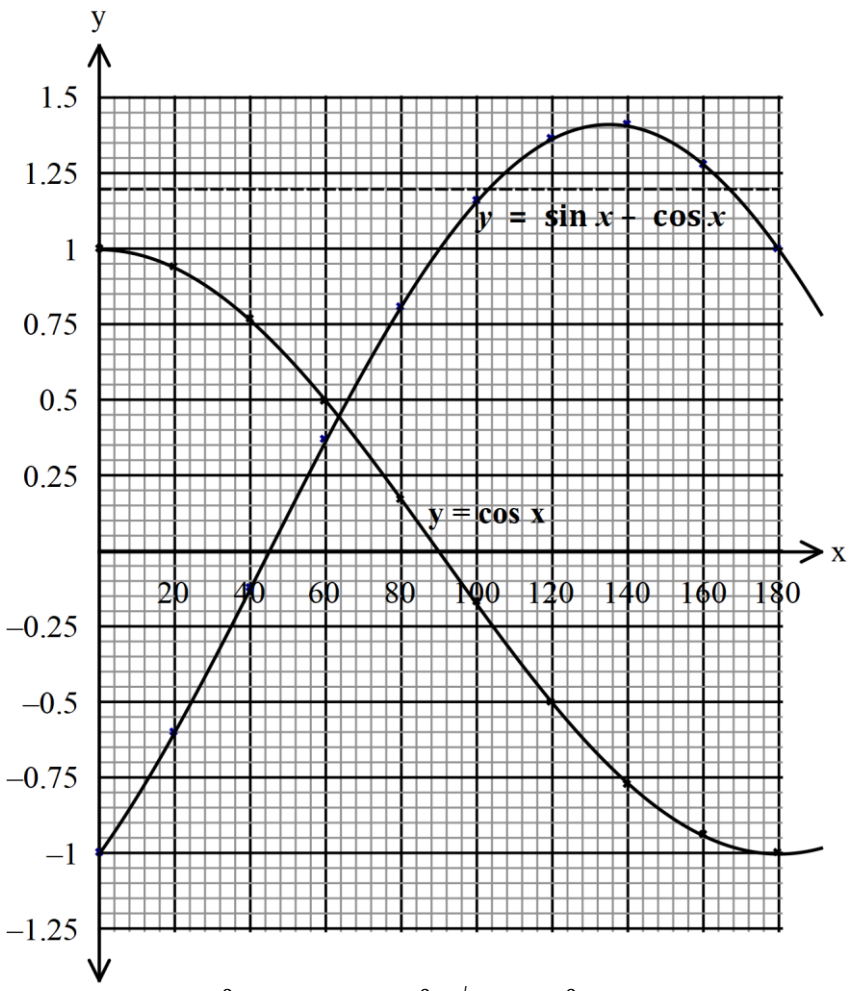
		04	
	SECTION 2		
17	$\begin{bmatrix} a & b \\ c & d \end{bmatrix}\begin{bmatrix} 5 & 4 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix}$		
	(5a + 3b = -1)1		
	(4a + b = 2)3 √	M1	Correct pair of simultaneous linear equations
	5a +3b = -1		
	12a + 3b = 6		
	7a = 7		
	a =1		
	b = 2 – 4		
	= -2 √	M1	
	5c + 3d = 3		Correct solving of first simultaneous equations
	4c + d = 1		
	5c + 3d = 3		
	12c + 3d = 3		
	-7c = 0		
	c = 0		
	3d = 3		
	d = 1 √	M1	Correct solving of second simultaneous equation
	R = $\begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}$ √	A1	Correct matrix R
	b). $\begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix}\begin{bmatrix} 2 \\ 3 \end{bmatrix} = \begin{bmatrix} -4 \\ 3 \end{bmatrix}$ √	M1	
	A (-4,3) √	A1	
			
	Transformation matrix $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}$ √	B1	
	$\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}\begin{bmatrix} -4 & -1 & 2 \\ 3 & 3 & 1 \end{bmatrix}$		
	A(-3,4) B(-3, 1) C(-1, -2) √	B1	
	d). $\begin{bmatrix} 0 & -1 \\ -1 & 0 \end{bmatrix}\begin{bmatrix} 1 & -2 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & -1 \\ -1 & 2 \end{bmatrix}$ √	M1	

	det. -1 matrix = $-1\begin{bmatrix}2 & 1\\1 & 0\end{bmatrix}$ $\begin{bmatrix}-2 & -1\\-1 & 0\end{bmatrix}$ √	A1	
		10	
18.	a).		

x^o	0	20	40	60	80	100	120	140	160	180
Cos x					**0.17**		**-0.5**		**-0.94**	
Sin x – Cos x			**-0.12**			**1.16**		**1.41**		

B1 For any 4 correct values

B2 For all values correct



S1 Correct use of the given scale

P1 Correct plotting of the values of y = cos x

C1 Smooth curve drawn

P1 Correct plotting of points of y =sin x – cos x

C1 Smooth curve drawn

c) (i) $102^0 \leq x \leq 166^0$ √ $\pm 2^0$

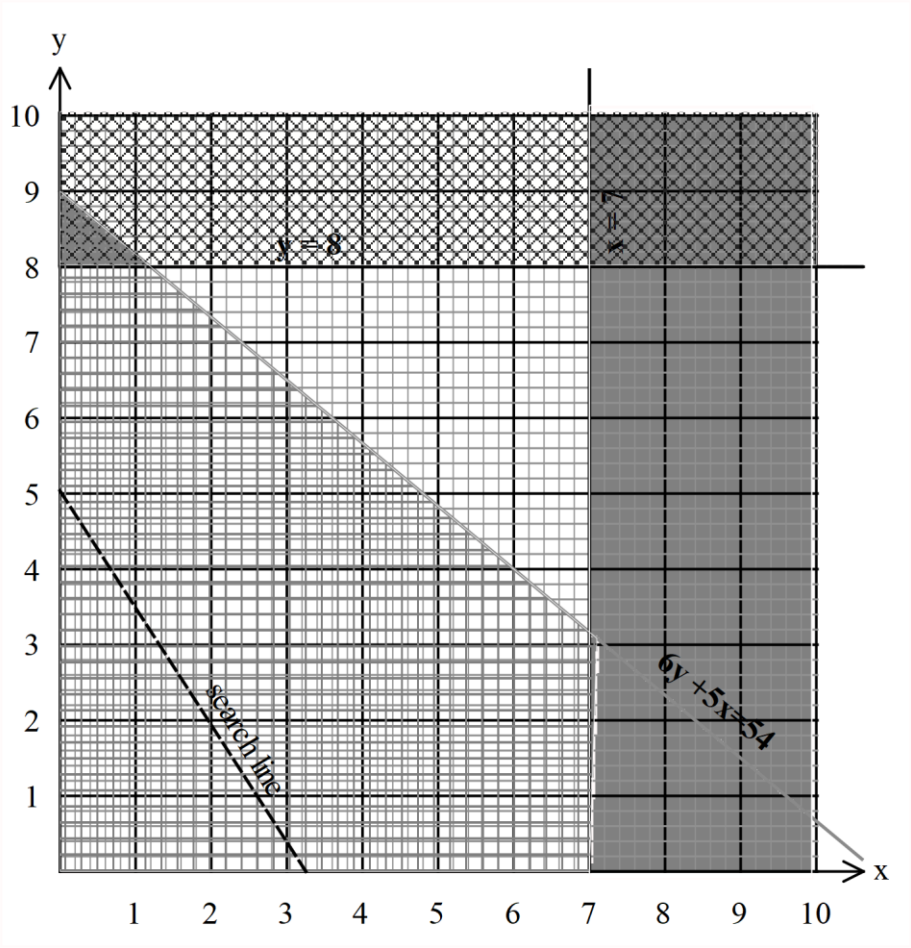
B1

(ii) $2\cos x = \sin x$ √

64^0 $\pm 2^0$ √

M1
A1

		10	
19	a) $6y + 5x \geq 54$ √ $x \leq 7$ √ $y \leq 8$ √	B1 B1 B1	

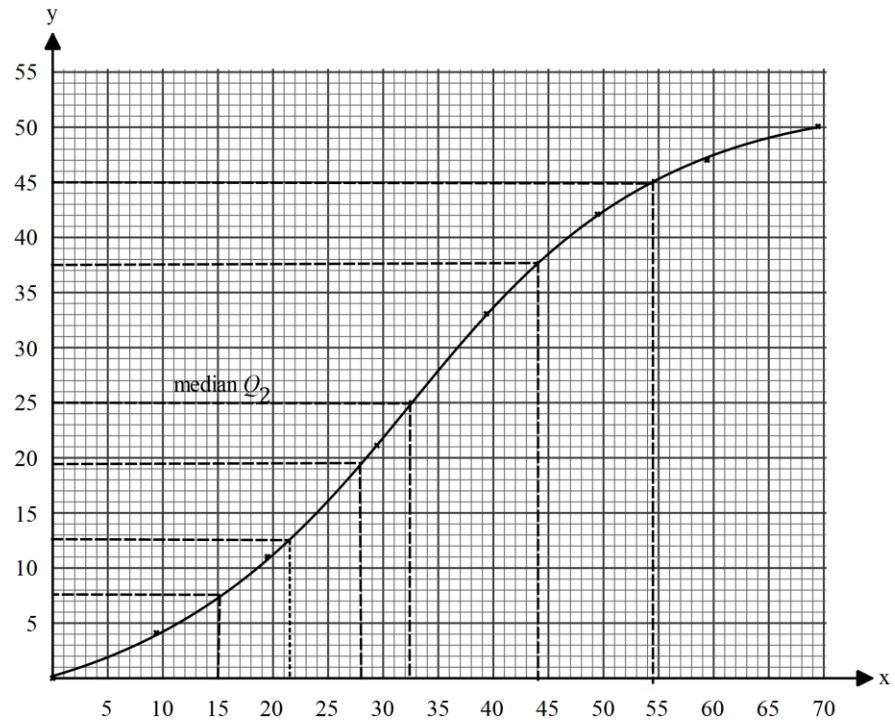
	b)  c) 2000x + 3000y = C (2,2) 2000(2) + 3000(2) = 10000 2x + 3y = 10 x | 5 | 2 y | 0 | 2 Least combination (6, 4) 2000(6) + 3000(4) = 24000 √	S1 B1 B1 B1 B1 B1 B1	Linear and accommodative For 6y + 5x ≥ 54 For x ≤7 For y≤ 8 Correct search line drawn Correct minimum point identified (6,4) Correct least cost found shs. 24000
		10	
20	a) D = (20 + 40) 60Cos60 √ 1800nm Speed $\frac{1800}{4}$ √ = 450Knots √ b) Distance = 120x60Cos 60 √ 3600nm Time taken = $\frac{3600}{500}$ √ $7\frac{1}{5}hrs$ √ / 7hrs 12min / 7.2 hrs c) Time at C when helicopter left A $\frac{120\,X4}{60}$ = 8 hrs	M1 M1 A1 M1 M1 A1 M1	

	1300hrs – 8 hrs. √ = 0500 hrs. Time reached at C by helicopter from 0500 +7hrs 12min √ = 1212hrs Time taken by helicopter T to reach C $\frac{60X\ 60}{600}$ √$= 6hrs$ Time helicopter T left B is 1212 + 6hrs = 1812hrs √	M1 M1 A1	
		10	
21.	a) i) T.I = $56000 + \frac{10}{100} X\ 56000 + 12000 + 10000)$ Shs. 83,600 √	B1	
	(ii) 1st band $10164\ x\frac{10}{100} = 1016.4$ 2nd band $9576\ x\frac{15}{100} = 1436.4$ 3rd band $9576\ x\frac{20}{100} = 1915.2$ √ 4th band $9576\ x\frac{25}{100} = 2394$ 5th band $44708.\ x\frac{30}{100} = 13412.4$ √	M1 M1	For the first 3 tax bands For the next 2 tax bands
	$G.T = (1016.4 + 1436.4 + 1915.2 + 2394 + 13412.4) = 20174.4$ $N.T = 20174.4 - \left(1162 + \frac{15}{100}\ X6000\right)$ √ Shs. 18112.40 √	M1 A1	For Gross tax less relief
	b) Deductions = $1000 + \frac{2}{100}\ X56000 + 1500)$ SHS. 9620 N,S = 83600 – (18112.4+9620) √ Shs.. 55867.60 √	M1 A1	For Gross salary less (N.T + Deductions)
	c) $\frac{150}{100}\ x10164 = 15246$ $0.1\ x15246 = 1524.6$ Las band $0.3\ x\ (44708 - 5082) = 11887.8$ Change in Net Tax = 508.2 -1524.6 √ -1016.4 $\%\ change = \frac{-1016.4}{18112.4}\ x\ 100$ 5.612% decrease √	M1 M1 A1	For change in net tax % change in net tax
		10	
22			

C.F	0	9.5	19.5	29.5	39.5	49.5	59.5	69.5

U.C.B	0	4	11	21	33	42	47	50	

a)



b) i) median 33

ii). 14 – 8 = 6 ±1 7 matches √

c) (Q3 – Q1)/2
(44 – 21.5)/2 ±1 for Q_1 OR Q_3
= 11.2

d) 45^{th} = 54 5^{th} = 11 √
54 – 11
= 43 goals ±1
$\frac{43}{50}$ *X* 100% √ = 86%√

S1	Linear and accommodative scale
P1	All points correctly plotted
C1	Smooth curve drawn
B1	**NOTE:** Once you have accepted the students curve kindly read from his graph.
B1	
M1	
A1	
M1	For any of the two correct
M1	
A1	
10	

23

a) i). $4500 = \frac{n}{2}\{630 + 270\}$ √
900 = 900n
n = 10
Last term :
10^{th} term = a + 9d
270 = 630 + 9d √
-360 = 9d
d = - 40 √
7^{th} term: 630 + 6(-40) = 390 √

ii). 4^{th} term 270 + 3(40)
390√

M1	
M1	
A1	
B1	
B1	
M1	

	b) i). $\frac{a+12}{a+6} = \frac{a+21}{a+12}$ √ $(a+12)(a+12) = (a+6)(a+21)$ $a^2 + 24a + 144 = a^2 + 21a + 6a + 126$ 18 = 3a a = 6 √ 1st term = 6 + 2(3) 12√ (ii) r: $\frac{6+12}{6+6} = 1.5$ $S_n = \frac{12(1.5^{11}-1)}{1.5-1}$ √ 2051.941406 ≈ 2052 √	A1 B1 M1 A1	
		10	
24	a) $v = \int(2t-8)dt$ $v = t^2 - 8t + c$ √ When v = 15 t = 0 $15 = (0)^2 - 8(0) + c$ √ c = 15 $v = t^2 - 8t + 15$ √ b) $0 = t^2 - 8t + 15$ √ $0 = t(t-3) - 5(t-3)$ $0 = (t-3)(t-5)$ √ $t = 3 \text{ and } t = 5$ √ c) $\int_3^5 (t^2 - 8t + 15)dt$ $\left[\frac{t^3}{3} - 4t^2 + 15t + c\right]_3^5$ √ $\left[\frac{5^3}{3} - 4(5)^2 + 15(5) + c\right] - \left[\frac{3^3}{3} - 4(3)^2 + 15(3) + c\right]$ √ $\left\{16\frac{2}{3} + C\right\} - \{18 + C\}$ √ $-1\frac{1}{3}$ $1\frac{1}{3}$ √	M1 M1 A1 M1 M1 M1 M1 A1	Correct integration Substitution for t=0 Equating velocity function v = 0 Complete factorization of the RHS or its equivalent For both values of **t** Correct integration of velocity function with limits Substitution of both limits on the integral fnc. For the absolute value taken
		10	

t	3	4	5
v	0	-1	0