



121/1 MS
MATHEMATICS ALT. A
Paper 1
July 2026
MARKING SCHEME

KALA TRIAL EXAMINATIONS COUNCIL

Kenya Certificate of Secondary Education

MATHEMATICS Alt. A

Paper 1

MARKING SCHEME
(CONFIDENTIAL)

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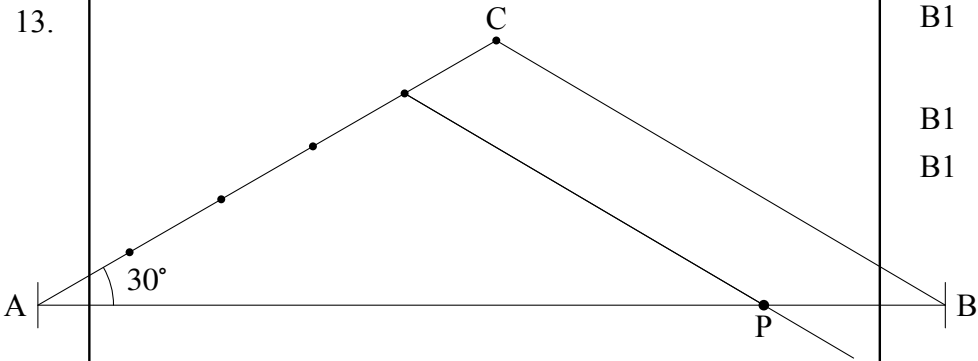
This marking scheme consists of 16 printed pages.

121/1 MATHEMATICS ALT. A
SECTION I

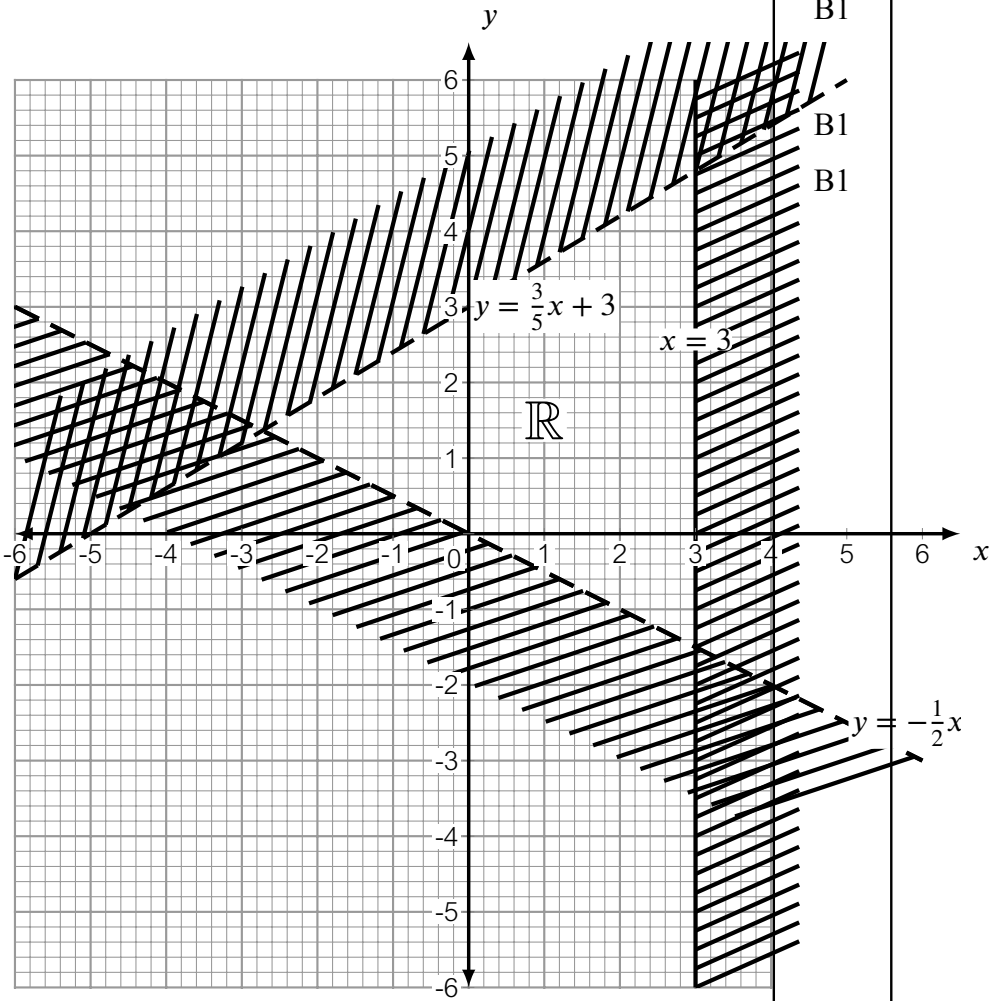
No.	Working	Marks	Comments
1.	$\frac{-3(4+2) - (-12) \div 4 + 7}{-4 \times (-3) + (-5) \times 2} = \frac{-3 \times 6 - -3 + 7}{12 + -10}$ $= \frac{-18 + 3 + 7}{12 - 10}$ $= \frac{-8}{2}$ $= -4$	M1 M1 A1 3	Simplification of Numerator Simplification of Denominator
2.	Maize flour used after reduction = $280 \times \frac{5}{7} = 200$ kg 125 g = 0.125 kg Number of students = $\frac{200}{0.125}$ = 1600 students	M1 M1 A1 3	
3.	Area of semicircle = $\frac{22}{7} \times \frac{1}{2} \times (6.3)^2 = 62.37 \text{ cm}^2$ Area of 4 triangles = $4 \times \frac{1}{2} \times (6.3)^2 \times \sin 45^\circ = 56.13 \text{ cm}^2$ Area of shaded region = $62.37 - 56.13 = 6.24 \text{ cm}^2$	M1 M1 A1 3	

No.	Working	Marks	Comments
7.	(a) Angle ABE $\angle DBE = 180^\circ - (71^\circ + 90^\circ) = 19^\circ$ $\angle ABE = 180^\circ - (109^\circ + 19^\circ)$ $= 52^\circ$ (b) Angle BXE $\angle BXE = \angle XDE + \angle DEX$ $= 71^\circ + 41^\circ = 112^\circ$	.	
		B1	
		B1	
		3	
8.	$24 \text{ hours} = 24 \times 60 \times 60 = 86400 \text{ seconds}$ $\text{Time taken to gain } 86400 \text{ seconds} = \frac{86400}{15} = 5760 \text{ hours}$ $5760 \text{ hours} = \frac{5760}{24} = 240 \text{ days}$ $31 + 31 + 30 + 31 + 30 + 31 + 31 = 215 \text{ days}$ $240 - 215 = 25 \text{ days}$ Hence, the clock will next read the correct time on 26th February 2027 at 0800 hours	.	
		B1	
		B1	
		3	

No.	Working	Marks	Comments
9.	Midpoint of the line joining the points $M\left(\frac{-4 + (-2)}{2}, \frac{2 + (-1)}{2}\right) = \left(-3, \frac{1}{2}\right)$	B1	
	Gradient of the line joining the points $m_1 = \frac{-1 - 2}{-2 - (-4)} = -\frac{3}{2}$	M1	
	Hence, the gradient of the required line is $m_2 = \frac{2}{3}$ $\frac{y - \frac{1}{2}}{x - (-3)} = \frac{2}{3}$ $\frac{y - \frac{1}{2}}{x + 3} = \frac{2}{3}$ $3\left(y - \frac{1}{2}\right) = 2(x + 3)$ $6y - 3 = 4x + 12$ $\boxed{4x - 6y = -15}$	A1	
		3	
10.	If $\sin(4x - 15^\circ) = \cos(x + 5)$, then $(4x - 15) + (x + 5) = 90^\circ$ $5x = 100^\circ$ $x = 20^\circ$ $4x - 15^\circ = 4(20^\circ) - 15^\circ = 65^\circ$ $\tan(4x - 15^\circ) = \tan 65^\circ$ $\tan 65^\circ = 2.1445069 \dots$ $\boxed{\tan(4x - 15^\circ) \approx 2.145}$	M1	
		A1	
		B1	
		3	

No.	Working	Marks	Comments
11.	(a) Amount received $= 150\,000 \times 171.80 = \text{Ksh } 25\,770\,000$	B1	
	(b) Cost of equipment in Kenyan Shillings $80\% \text{ of } 25\,770\,000 = \frac{80}{100} \times 25\,770\,000$ $= 20\,616\,000$ Cost of equipment in South African Rand $\text{South African Rand} = \frac{20\,616\,000}{840.33} \times 100$ $= 2\,453\,409$	M1 A1	
		3	
12.	$\mathbf{w} = \mathbf{u} + 2\mathbf{v} = \begin{pmatrix} k \\ 1 \end{pmatrix} + 2 \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ $= \begin{pmatrix} k+4 \\ -5 \end{pmatrix}$ $ \mathbf{w} = \sqrt{(k+4)^2 + (-5)^2} = \sqrt{26}$ $(k+4)^2 + 25 = 26$ $(k+4)^2 = 1$ $k+4 = \pm 1$ $k = -3 \text{ or } k = -5$	M1	
		M1	
		A1	
		3	
13.		B1	$\angle BAC = 30^\circ$ line drawn. Division line. Point P located
		B1 B1	
		3	

No.	Working	Marks	Comments
14.	$A = x(150 - 2x) = 150x - 2x^2$ $\frac{dA}{dx} = 150 - 4x$ At maximum area, $\frac{dA}{dx} = 0$ $150 - 4x = 0$ $x = 37.5$ $A_{\max} = 37.5(150 - 2 \times 37.5) = 2812.5 \text{ m}^2$ 2812.5 m²	B1 M1 A1 B1	Alternative $A = \frac{x}{2}(150 - x)$ $A = 75x - \frac{1}{2}x^2$ $\frac{dA}{dx} = 75 - x$ At maximum area, $\frac{dA}{dx} = 0$ $75 - x = 0$ $x = 75$ $A_{\max} = \frac{75}{2}(150 - 75)$ $= 2812.5 \text{ m}^2$ 2812.5 m²
		4	
15.	Time taken by Chepkemioi to reach the finish line: $t = \frac{348}{5.8} = 60 \text{ s}$ Distance Chebet covered in the same time: $348 + 42 - 18 = 372 \text{ m}$ Chebet's average speed: $v = \frac{372}{60} = 6.2 \text{ m/s}$	M1 M1 A1	
		3	

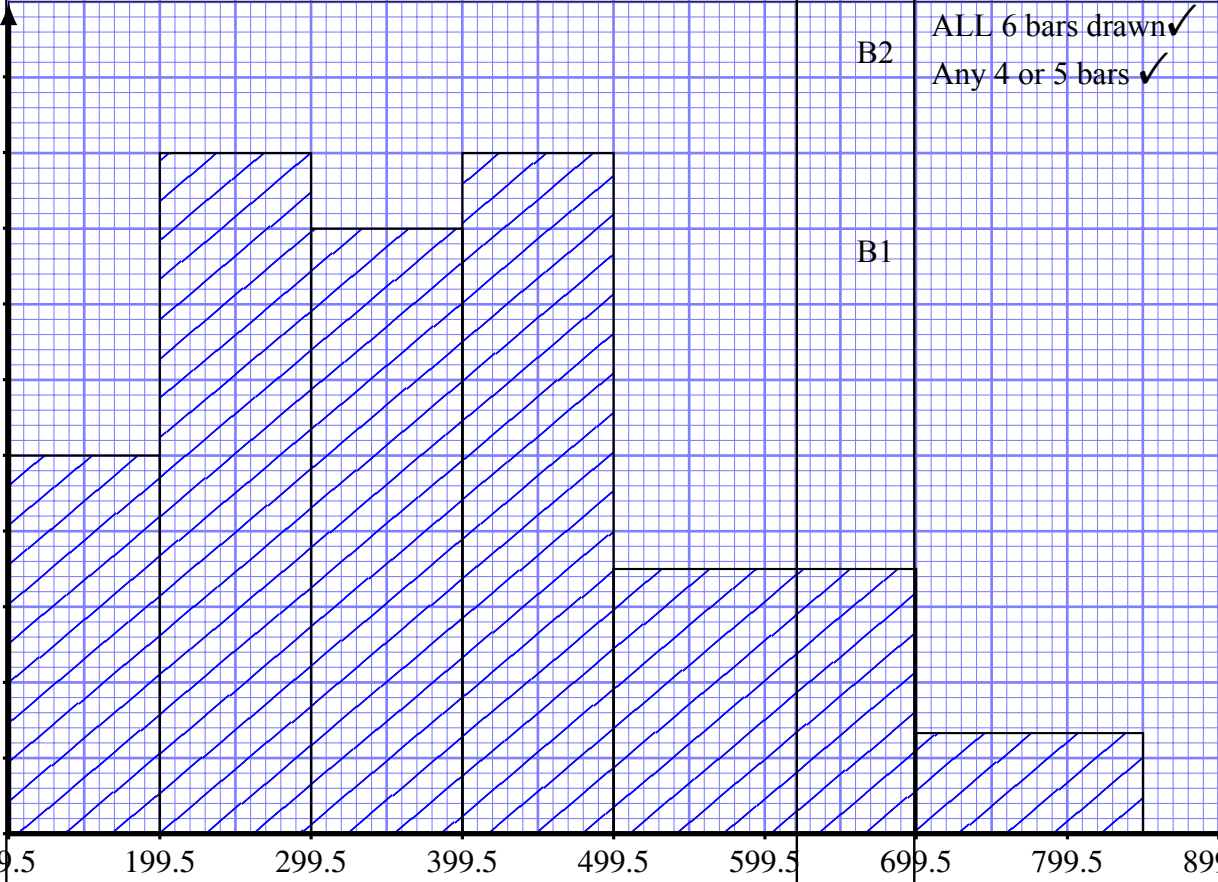
No.	Working	Marks	Comments
16.	Plotting inequalities 	B1 B1 B1 3	

SECTION II

No.	Working	Marks	Comments
17.	(a) (i) $\frac{2,625,000}{x}$	B1	
	(ii) $\frac{2,625,000}{x} + 2,500$	B1	
	(b) $\frac{2,625,000}{x} + 2,500 = \frac{2,625,000}{x-5}$		
	$2,625,000(x-5) + 2,500x(x-5) = 2,625,000x$	M1	
	$2,500x^2 - 12,500x - 13,125,000 = 0$	M1	
	$x^2 - 5x - 5,250 = 0$		
	$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-5250)}}{2(1)}$		
	$x = \frac{5 \pm \sqrt{25 + 21000}}{2}$		
	$x = \frac{5 \pm 145}{2}$		
	$x = 75 \text{ or } x = -70$	M1	
	$\therefore x = 75$		
	Hence, the institution originally planned to buy (75) computers and actually bought		
	$75 - 5 = 70$	A1	
	70 computers		
	(c) Original price per computer: $\frac{2,625,000}{75} = 35,000$	B1	
	New price per computer: $35,000 + 2,500 = 37,500$	M1	
	Percentage increase:		
	$= \frac{2,500}{35,000} \times 100$	M1	
	$= 7.142857143\%$	A1	
	Correct to 4 significant figures:		
	7.143%		
		10	

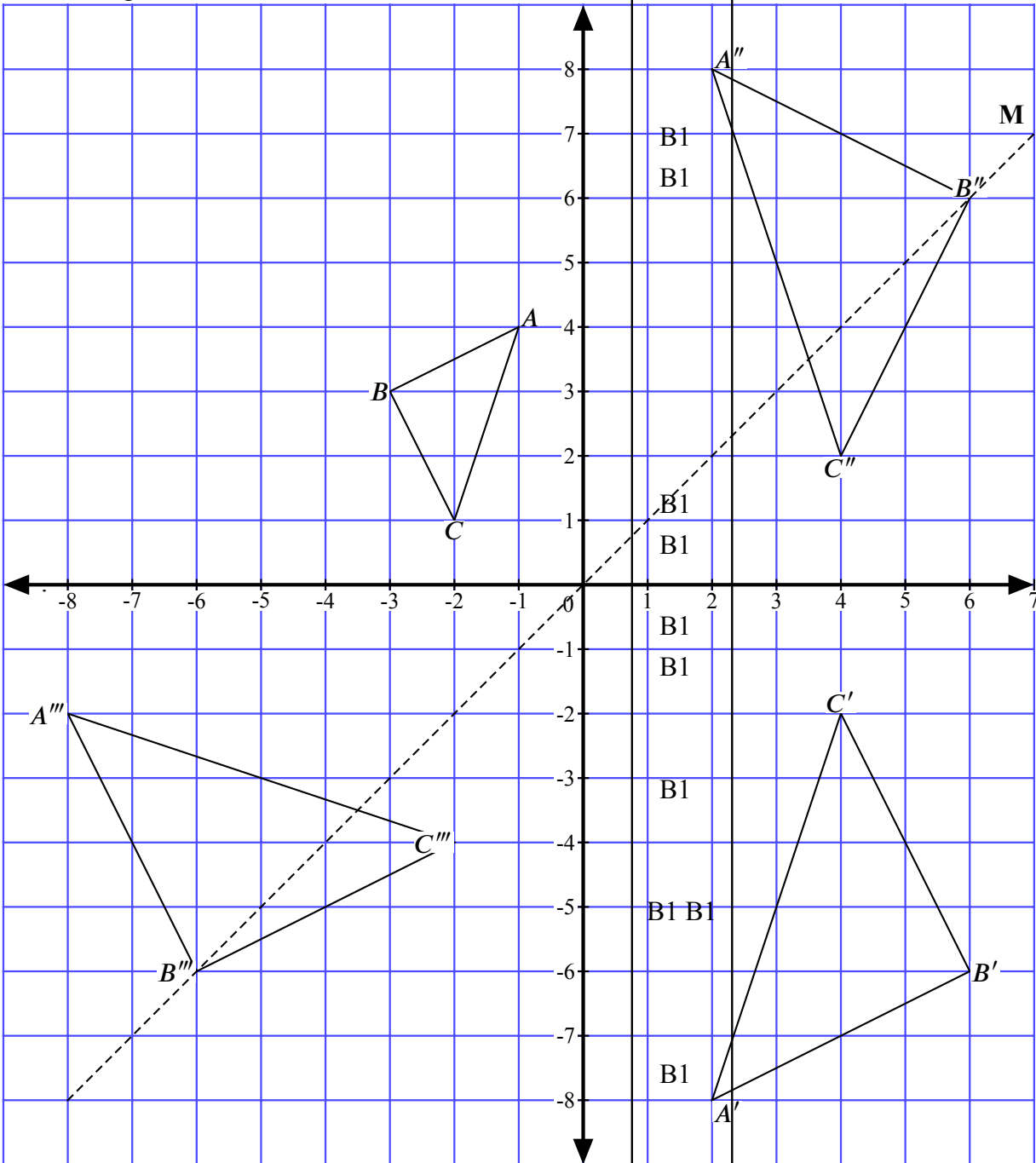
No.	Working	Marks	Comments
18.	(a) 1 cm represents 5 km (b) (i) $343^\circ \pm 1^\circ$ (ii) $025^\circ \pm 1^\circ$ (iii) $(10.4 \pm 0.1) \times 10\text{km}$ $104 \pm 1\text{km}$ (iv) $70 + 85 + 95 + 70 + (10.4 \pm 0.1) \times 10 \text{ km}$ $= 70 + 85 + 95 + 70 + (10.4 \pm 0.1) \times 10$ $= 70 + 85 + 95 + 70 + (104 \pm 1)$ $= 424 \pm 1 \text{ km}$	B1 B1 B1 B1 B1 B1 M1 A1 B1 B1	Location station A Location observation post Location water point Location Forest HQ
		10	

No.	Working	Marks	Comments
19.	(a) (i) Outer frustum $V_1 = \frac{1}{3} \times \frac{22}{7} \times 50 (21^2 + 21 \times 10.5 + 10.5^2) = 40\,425 \text{ cm}^3$ Inner hollow frustum $V_2 = \frac{1}{3} \times \frac{22}{7} \times 50 (16.8^2 + 16.8 \times 6.3 + 6.3^2) = 22\,407 \text{ cm}^3$ Volume of concrete frustum $V_{\text{frustum}} = V_1 - V_2 = 40\,425 - 22\,407 = 18\,018 \text{ cm}^3$	M1 M1 M1 A1	
	(ii) Volume of cylindrical base $V_c = \frac{22}{7} \times 14.7^2 \times 30 = 20\,374.2 \text{ cm}^3$	M1 A1	
	(b) Surface area $L = \sqrt{100^2 + 25.2^2} = 103.1, l = \sqrt{50^2 + 14.7^2} = 52.12$ $\text{S.A} = \left(\frac{22}{7} \times 25.2 \times 103.1 \right) - \left(\frac{22}{7} \times 52.12 \times 14.7 \right) = 5788$ Curves Surface area of cylinder = $\frac{22}{7} \times 2 \times 14.7 \times 30 = 2772$ Area of upper annulus ring $\frac{22}{7} (25.2^2 - 21^2) = 609.84$ T.S.A = $5788 + 2772 + 609.84 = 9159.84$	B1 B1 B1 B1	
		10	

No.	Working	Marks	Comments																												
20.	(a) Completing the F.D table	B1	Any 4 or 5																												
	<table border="1"><tr><td>Number of learners</td><td>100–199</td><td>200–299</td><td>300–399</td><td>400–499</td><td>500–699</td><td>700–849</td></tr><tr><td>Number of schools</td><td>5</td><td>9</td><td>8</td><td>9</td><td>7</td><td>2</td></tr></table>	Number of learners	100–199	200–299	300–399	400–499	500–699	700–849	Number of schools	5	9	8	9	7	2	B2	All✓														
	Number of learners	100–199	200–299	300–399	400–499	500–699	700–849																								
	Number of schools	5	9	8	9	7	2																								
	(b) Histograms		FD= $\frac{F}{CW}$																												
	<table border="1"><tr><td>Class interval</td><td>100–199</td><td>200–299</td><td>300–399</td><td>400–499</td><td>500–699</td><td>700–849</td></tr><tr><td>Frequency</td><td>5</td><td>9</td><td>8</td><td>9</td><td>7</td><td>2</td></tr><tr><td>Class width</td><td>100</td><td>100</td><td>100</td><td>100</td><td>200</td><td>150</td></tr><tr><td>Freq. density</td><td>0.05</td><td>0.09</td><td>0.08</td><td>0.09</td><td>0.035</td><td>0.0133</td></tr></table>	Class interval	100–199	200–299	300–399	400–499	500–699	700–849	Frequency	5	9	8	9	7	2	Class width	100	100	100	100	200	150	Freq. density	0.05	0.09	0.08	0.09	0.035	0.0133	B2	All 6 FD
	Class interval	100–199	200–299	300–399	400–499	500–699	700–849																								
	Frequency	5	9	8	9	7	2																								
	Class width	100	100	100	100	200	150																								
	Freq. density	0.05	0.09	0.08	0.09	0.035	0.0133																								
	B1	Any 4 FD or 5✓																													
	B2	ALL 6 bars drawn✓ Any 4 or 5 bars✓																													
	B1																														
(c) (i) Median class 300 – 399		M1																													
$5 + 9 + (x - 299.5) \times 0.08 = \frac{1}{2} \times 40$ $14 + 0.08(x - 299.5) = 20$ $x - 299.5 = 75 \implies x = 374.5$		A1																													
(ii) Number of schools		M1																													
$= (699.5 - 600) \times 0.04 + 2$ $= 5.98 \approx 6 \text{ schools}$		A1																													
		10																													

No.	Working	Marks	Comments
21.	(a) $\mathbf{AB} = \begin{pmatrix} x & 2 \\ 4 & 1 \end{pmatrix} \begin{pmatrix} 3 & 5 \\ 2 & 4 \end{pmatrix} = \begin{pmatrix} 3x+4 & 5x+8 \\ 14 & 24 \end{pmatrix}$ Since $\mathbf{AB}$ is singular, $\det(\mathbf{AB}) = 0$ Therefore, $(3x+4)(24) - (5x+8)(14) = 0$ $72x + 96 - 70x - 112 = 0$ $2x - 16 = 0$ $x = 8$ (b) (i) The equations are $5x + 4y = 420$ and $3x + 6y = 270$ (ii) Writing in matrix form, $\begin{pmatrix} 5 & 4 \\ 3 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 420 \\ 270 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 5 & 4 \\ 3 & 6 \end{pmatrix}^{-1} \begin{pmatrix} 420 \\ 270 \end{pmatrix}$ $= \frac{1}{18} \begin{pmatrix} 6 & -4 \\ -3 & 5 \end{pmatrix} \begin{pmatrix} 420 \\ 270 \end{pmatrix} = \frac{1}{18} \begin{pmatrix} 1440 \\ 90 \end{pmatrix} = \begin{pmatrix} 80 \\ 5 \end{pmatrix}$ Hence, $x = 80$, $y = 5$ ‘ (c) Cost of exercise books = $10 \times 5 \times 12 \times 80 = 48\,000$ Cost of pens = $6 \times 20 \times 5 = 600$ $\therefore$ Total amount spent = $48\,000 + 600 = \text{Ksh } 48\,600$	10	

No.	Working	Marks	Comments																		
22.	(a) Using the trapezium rule, $h = \frac{3-(-4)}{7} = 1$	B1																			
	<table border="1"><tr><td>x</td><td>-4</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>$x^2 + 3$</td><td>19</td><td>12</td><td>7</td><td>4</td><td>3</td><td>4</td><td>7</td><td>12</td></tr></table>	x	-4	-3	-2	-1	0	1	2	3	$x^2 + 3$	19	12	7	4	3	4	7	12	B1	
	x	-4	-3	-2	-1	0	1	2	3												
	$x^2 + 3$	19	12	7	4	3	4	7	12												
	$A = \frac{h}{2} [y_0 + y_7 + 2(y_1 + y_2 + y_3 + y_4 + y_5 + y_6)]$																				
	$= \frac{1}{2} [19 + 12 + 2(12 + 7 + 4 + 3 + 4 + 7)]$	M1																			
	$= \frac{1}{2}(105)$	M1																			
	$A \approx 52.5$ square units	A1																			
	(b) Using the mid-ordinate rule,																				
	<table border="1"><tr><td>Midpoint (x)</td><td>-3.5</td><td>-2.5</td><td>-1.5</td><td>-0.5</td><td>0.5</td><td>1.5</td><td>2.5</td></tr><tr><td>$x^2 + 3$</td><td>15.25</td><td>9.25</td><td>5.25</td><td>3.25</td><td>3.25</td><td>5.25</td><td>9.25</td></tr></table>	Midpoint (x)	-3.5	-2.5	-1.5	-0.5	0.5	1.5	2.5	$x^2 + 3$	15.25	9.25	5.25	3.25	3.25	5.25	9.25	B1			
	Midpoint (x)	-3.5	-2.5	-1.5	-0.5	0.5	1.5	2.5													
	$x^2 + 3$	15.25	9.25	5.25	3.25	3.25	5.25	9.25													
$A = h (M_1 + M_2 + M_3 + M_4 + M_5 + M_6 + M_7)$	B1																				
$= 1(15.25 + 9.25 + 5.25 + 3.25 + 3.25 + 5.25 + 9.25)$	M1																				
$= 50.75$	M1																				
$A \approx 50.75$ square units	A1																				
	10																				

No.	Working	Marks	Comments
23.	(a) Drawing  (b) Enlargement, S.F = -2 centre $(0, 0)$ (c) (d) $y = -x$ or $y + x = 0$ (e) Opposite congruency.	B1 B1 B1 B1 B1 B1 B1 B1 B1 B1 B1 10	

No.	Working	Marks	Comments
24.	(a) Displacement at $t = 3$. $s = \frac{2}{3}t^3 + \frac{3}{2}t^2 - 9t + 5$ $s(3) = \frac{2}{3}(3)^3 + \frac{3}{2}(3)^2 - 9(3) + 5$ $= \frac{36 + 27 - 54 + 10}{2}$ $= \frac{19}{2} = 9.5 \text{ m}$	M1	
		A1	
	(b) Value of t when the particle is momentarily at rest. $v = \frac{ds}{dt} = 2t^2 + 3t - 9$ At rest, $v = 0 \Rightarrow 2t^2 + 3t - 9 = 0$	B1	
	$t = \frac{-3 \pm \sqrt{3^2 - 4(2)(-9)}}{2(2)} = \frac{-3 \pm 9}{4} \Rightarrow t = \frac{3}{2} \text{ or } -3$	M1	
		A1	
	$\therefore t = \frac{3}{2} = 1.5 \text{ s}$	B1	
	(c) Displacement during the fourth second. $s(4) = \frac{2}{3}(4)^3 + \frac{3}{2}(4)^2 - 9(4) + 5 = \frac{107}{3}$ $s(3) = \frac{2}{3}(3)^3 + \frac{3}{2}(3)^2 - 9(3) + 5 = \frac{19}{2}$ Displacement during the fourth second $= s(4) - s(3) = \frac{107}{3} - \frac{19}{2} = \frac{157}{6} \text{ m}$	B1	
		B1	
	(d) Particle's initial acceleration. $a = \frac{dv}{dt} = \frac{d}{dt}(2t^2 + 3t - 9) = 4t + 3$ $a(0) = 4(0) + 3 = 3$ $\therefore a = 3 \text{ m s}^{-2}$	M1	
		A1	
		10	

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