

**CATHOLIC DIOCESE OF KAKAMEGA EVALUATION TEST
JULY/AUGUST EXAM 2025**

121/1 MATHEMATICS PAPER 1 MARKING SCHEME

NO	WORKING	MK	COMMENT
1.	$\frac{2}{5} \div \frac{1}{2} \text{ of } \frac{4}{9} - 1\frac{1}{10} = \frac{2}{5} \div \frac{2}{9} - \frac{11}{10} = \frac{9}{5} - \frac{11}{10} = \frac{7}{10}$ $\frac{1}{8} - \frac{1}{6} \times \frac{3}{8} = \frac{1}{8} - \frac{1}{16} = \frac{1}{16} = \frac{1}{16}$ $= \frac{7}{10} \times \frac{16}{1} = 11\frac{1}{5}$	B ₁ B ₁ B ₁	Numerator Denominator
2.	LCM = $2^4 \times 3^4 \times 5^2 \times 7 \times 11$	M ₁ A ₁	
3.	$28 \text{ rec } (3.0 \times 10^{-1}) + 4 \text{ rec } (4.6 \times 10^{-3})$ $(28 \times 0.3333 \times 10) + (4 \times 0.2174 \times 10^3)$ $93.324 + 869.6$ 962.9	M ₁ M ₁ A ₁	
4.	$5^{2(y+1)} + 5^{2(y+1)} = 2 \times 5^4$ $2(5^{2y+2}) = 2(5^4)$ $2y + 2 = 4$ $y = 1$	M ₁ M ₁ A ₁	Single terms
5.	$\frac{(2x+1)(2x-1)}{(x+1)(x-1)} \div \frac{(2x+1)}{(x-1)}$ $\frac{(2x+1)(2x-1)}{(x+1)(x-1)} \times \frac{(x-1)}{(2x+1)}$ $\frac{2x-1}{x+1}$	M ₁ M ₁ A ₁	Factorization Correct attempt to simplify
6.	$3s + 2t = 840$ $4s + 5t = 1680$ $12s + 8t = 3360$ $12 + 15t = 5040$ $-7t = -1680$ $t = 240$ $3s + 2(240) = 840$ $s = 120$ $\text{Total cost} = 120 + 240 = 360$	M ₁ M ₁ A ₁ B ₁	Formation of simultaneous linear equations Correct attempt to solve (one unknown) For both t = 240 & s = 120
7.	$A:W:M = 50:40:25$ Let total profit be x $\frac{5}{23}x = 10,000$ $x = \frac{23}{5} \times 10,000$ $= 46,000$ Atieno's share $\frac{10}{23} \times 46,000 = 20,000$ Wambui's share $\frac{8}{23} \times 46,000 = 16,000$ $20,000 - 16,000$ $4,000$	M ₁ A ₁ M ₁ A ₁	Expression for total profit Total profit Expression for share difference
8.	$-5y = -2x + 3$ $y = \frac{2}{5}x - \frac{3}{5}$ $M_1 = \frac{2}{5}$ $M_2 = \frac{-5}{2}$ $\frac{-5}{2} = \frac{y+2}{x-5}$	B ₁ M ₁	$M_2 = \frac{-5}{2}$

	$y = \frac{-5}{2}x + \frac{21}{2}$ $2y + 5x - 21 = 0$	A ₁										
9.	$\frac{dy}{dx} = 4x - 5$ $4x - 5 = 0$ $4x = 5$ $x = 1 \frac{1}{4}$	M ₁ A ₁	Equating to zero CAO									
10.	$\frac{CP'}{CP} = sf$ $\frac{\binom{4}{6} - \binom{x}{y}}{\binom{0}{2} - \binom{x}{y}} = 3$ $\frac{\binom{4-x}{6-y}}{\binom{0-x}{2-y}} = 3$ $\binom{4-x}{6-y} = 3 \binom{-x}{2-y}$ $4 - x = -3x$ $6 - y = 6 - 3y$ $x = -2, y = 0$ $C(-2, 0)$	M ₁ M ₁ A ₁										
11.	<table border="1" style="margin-bottom: 10px;"> <thead> <tr> <th></th> <th>3yrs ago</th> <th>Present age</th> </tr> </thead> <tbody> <tr> <td>Njeri</td> <td>x + 5</td> <td>x + 8</td> </tr> <tr> <td>Ngima</td> <td>x - 3</td> <td>x</td> </tr> </tbody> </table> $(x - 3)(x + 5) = 105$ $x^2 + 2x - 120 = 0$ $x^2 - 10x + 12x - 120 = 0$ $x(x - 10) + 12(x - 10) = 0$ $(x - 10)(x + 12) = 0$ $x = 10 \text{ or } x = -12$ <p>Present age Njeri 10 + 8 = 18yrs Ngima 10 yrs</p>		3yrs ago	Present age	Njeri	x + 5	x + 8	Ngima	x - 3	x	M ₁ M ₁ A ₁	Equation Correct attempt to solve quadratic equation For both
	3yrs ago	Present age										
Njeri	x + 5	x + 8										
Ngima	x - 3	x										
12.	$\frac{1}{3} \pi r^2 h = \frac{4}{3} \pi R^3$ $r^2 h = 4R^3$ $5^2 \times 12 = 4 \times R^3$ $R^3 = \frac{25 \times 12}{4} = 75$ $R = 4.217$ $R = 4.21$	M ₁ M ₁ A ₁ B ₁	Correct substitution R ³ made subject CAO									
13.	<p>(a) $850 = \frac{1}{2} (60 + 25)h$ $850 = 42.5h$ $h = \frac{850}{42.5}$ $= 20\text{m/s}$</p> <p>(b) $\frac{20-0}{15}$ $1 \frac{1}{3} \text{m/s}^2$</p>	M ₁ A ₁ M ₁ A ₁										
14.	$9 + 3 < 2x + 4x$ $12 < 6x$ $2 < x$	B ₁										

	$2x - x < 3 + 3$ $x < 6$ Integral values 3,5	B ₁ B ₁	
15.	$9x + x = 180$ $10x = 180, x = 18$ Number of sides = $\frac{360}{18}$ = 20	M ₁ M ₁ A ₁	
16.	$A = \frac{1}{2} ab \sin C$ = $\frac{1}{2} \times 190 \times 120 \sin \theta = 5700$ $11400 \sin \theta = 5700$ $\sin \theta = 0.5$ $\theta = \sin^{-1} 0.5 = 30^\circ$ Reflex angle = $360 - 30 = 330^\circ$	M ₁ A ₁ B ₁	
17.	(a) $(\frac{95}{100} \times 2,000) \times 200$ = 380,000 (b) 1 st 50,000 = $\frac{4}{100} \times 50,000 = 2,000$ Next 50,000 = $\frac{5}{100} \times 50,000 = 2,500$ Next 180,000 = $\frac{10}{100} \times 180,000 = 18,000$ Total commission = 22,500 Total earnings = 22,500 + 20,000 = 42,500 (c) New basic salary = $1.15 \times 20,000$ = 23,000 Commission earned = $47,500 - 23,000$ = 24,500 Less commission for 1 st and 2 nd = $24,500 - 4,500$ = 20,000 Total sales = $200,000 + \frac{20,000}{0.1}$ = 400,000	M ₁ A ₁ B ₁ M ₁ A ₁ M ₁ M ₁ M ₁ M ₁ A ₁	
18.	(a) Det P = $2k - 12$ Det Q = $4 - 6 = -2$ $-2(2k - 12) = 4$ $-4k + 24 = 4$ $-4k = -20$ $k = 5$ (b) Det M = $45 - 42 = 3$ $M^{-1} = \frac{1}{3} \begin{pmatrix} 9 & -6 \\ -7 & 5 \end{pmatrix}$ = $\begin{pmatrix} 3 & -2 \\ -7 & 5 \end{pmatrix}$ (c) (i) $5p + 6m = 2440$ $7p + 9m = 3560$ $\begin{pmatrix} 5 & 6 \\ 7 & 9 \end{pmatrix} \begin{pmatrix} p \\ m \end{pmatrix} = \begin{pmatrix} 2400 \\ 3560 \end{pmatrix}$ (ii) $\frac{1}{3} \begin{pmatrix} 9 & -6 \\ -7 & 5 \end{pmatrix} \begin{pmatrix} 5 & 6 \\ 7 & 9 \end{pmatrix} \begin{pmatrix} p \\ m \end{pmatrix} = \frac{1}{3} \begin{pmatrix} 9 & -6 \\ -7 & 5 \end{pmatrix} \begin{pmatrix} 2400 \\ 3560 \end{pmatrix}$ $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} p \\ m \end{pmatrix} = \frac{1}{3} \begin{pmatrix} 600 \\ 720 \end{pmatrix}$ $\begin{pmatrix} p \\ m \end{pmatrix} = \begin{pmatrix} 200 \\ 240 \end{pmatrix}$ p = 200, m = 240	M ₁ M ₁ A ₁ M ₁ A ₁ B ₁ M ₁ M ₁ M ₁ A ₁	Matrix equation
19.	(a) height of frustum		

	$\frac{5}{1.5} = \frac{1+7}{1}$ $5l = 1.5l + 10.5$ $3.5l = 10.5$ $l = 3$ $H = \sqrt{10^2 - 5^2}$ $= 8.660$ $h = \sqrt{3^2 - 1.5^2}$ $= 2.598$ $H - h = 8.660 - 2.598$ $= 6.06$ $(b) T.S.A = (\pi RL - \pi rl) + \pi R^2 + \pi r^2$ $(3.142 \times 5 \times 10 - 3.142 \times 1.5 \times 3) + (3.142 \times 5^2) + (3.142 \times 1.5^2)$ $(157.1 - 14.139) + 78.55 + 7.0695$ $142.961 + 78.55 + 7.0695$ 228.5805 228.58	<p>M₁</p> <p>M₁</p> <p>M₁</p> <p>A₁</p> <p>M₁M₁</p> <p>M₁M₁</p> <p>M₁</p> <p>A₁</p>																																				
20.	<p>(a)</p> <p>(b) 7.2×100 720km</p> <p>(c) $270 + 31$ =301</p> <p>(d) 100</p> <p>(e) $t = \frac{720}{280}$ = $2\frac{4}{7}$</p>	<p>B₁</p> <p>B₁</p> <p>B₁</p> <p>M₁</p> <p>A₁</p> <p>M₁</p> <p>A₁</p> <p>B₁</p> <p>M₁</p> <p>A₁</p>	<p>Locating Wilson Airport</p> <p>Locating Airstrip P</p> <p>Locating Airstrip Q</p> <p>Allow ± 10</p> <p>Allow ± 1</p> <p>Allow ± 1</p> <p>Follow through, $d = 720 \pm 10$</p>																																			
21.	<p>(a) $x = 40 - (2 + 2 + 7 + 15)$ = $40 - 26 = 14$</p> <p>(b) (i) 15 (ii) $35 - 44$</p> <p>(c) (i)</p> <table border="1"> <thead> <tr> <th>Class</th> <th>x</th> <th>f</th> <th>cf</th> <th>fx</th> </tr> </thead> <tbody> <tr> <td>5-14</td> <td>9.5</td> <td>2</td> <td>2</td> <td>19</td> </tr> <tr> <td>15-29</td> <td>22</td> <td>2</td> <td>4</td> <td>44</td> </tr> <tr> <td>30-34</td> <td>32</td> <td>7</td> <td>11</td> <td>224</td> </tr> <tr> <td>35-44</td> <td>39.5</td> <td>15</td> <td>26</td> <td>592.5</td> </tr> <tr> <td>45-49</td> <td>47</td> <td>14</td> <td>40</td> <td>658</td> </tr> <tr> <td></td> <td></td> <td>$\Sigma f = 40$</td> <td></td> <td>$\Sigma fx = 1537.5$</td> </tr> </tbody> </table> <p>$\bar{X} = \frac{\Sigma fx}{\Sigma f} = \frac{1537.5}{40} = 38.4$</p> <p>(ii) $M = 34.5 + (\frac{20-11}{15})10$ = $34.5 + 6 = 40.5$</p>	Class	x	f	cf	fx	5-14	9.5	2	2	19	15-29	22	2	4	44	30-34	32	7	11	224	35-44	39.5	15	26	592.5	45-49	47	14	40	658			$\Sigma f = 40$		$\Sigma fx = 1537.5$	<p>M₁</p> <p>A₁</p> <p>B₁</p> <p>B₁</p> <p>B₁</p> <p>B₁</p> <p>M₁A₁</p> <p>B₁</p> <p>M₁</p> <p>A₁</p>	<p>fx</p> <p>cf</p>
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		$\Sigma f = 40$		$\Sigma fx = 1537.5$																																		
22.	(a) $QS = 2 \times 17$	M ₁																																				

	$= 34$ (b) $PS = \sqrt{34^2 - 16^2}$ $= 30$ (c) $\sin \theta = \frac{30}{34}$ $\theta = \sin^{-1} \frac{30}{34} = 61.93$ (d) $\angle POS = 2 \times 61.93 = 123.86$ Shaded area = $\frac{\theta}{360} \pi r^2 - \frac{1}{2} ab \sin \theta$ $= \frac{123.86}{360} \times 3.142 \times 17^2 - \frac{1}{2} \times 17^2 \sin 123.86$ $= 312.4155 - 119.9930$ $= 192.42$	A ₁ M ₁ A ₁ M ₁ A ₁ M ₁ M ₁ M ₁ A ₁	
23.	(a) $y = (-1)^3 - 4(-1)^2 - 3(-1)$ $= -2$ (b) $\frac{dy}{dx} = 3x^2 - 8x - 3$ $3x^2 - 8x - 3 = 0$ $3x^2 - 9x + x - 3 = 0$ $(3x + 1)(x - 3) = 0$ $x = 3 \text{ or } x = -\frac{1}{3}$ when $x = 3, y = (3)^3 - 4(3)^2 - 3(3) = -18$ when $x = -\frac{1}{3}, y = (-\frac{1}{3})^3 - 4(-\frac{1}{3})^2 - 3(-\frac{1}{3}) = \frac{14}{27}$ $(3, -18)$ and $(-\frac{1}{3}, \frac{14}{27})$ (c) At $x = 1$, gradient of tangent = $3(1)^2 - 8(1) - 3 = -8$ At $x = 1, y = y = (1)^3 - 4(1)^2 - 3(1) = -6$ Gradient of normal = $\frac{1}{8}$ $\frac{y + 6}{x - 1} = \frac{1}{8}$ $y + 6 = \frac{1}{8}x - \frac{1}{8}$ $y = \frac{1}{8}x - 6\frac{1}{8}$	M ₁ A ₁ M ₁ A ₁ M ₁ M ₁ A ₁ B ₁ M ₁ A ₁	Correct substitution Equating to zero For both For both Gradient of normal Accept equivalents
24.	a) <ul style="list-style-type: none"> (i) $\overrightarrow{BC} = -\mathbf{a} - \mathbf{d} + 2\mathbf{a}$ $= \mathbf{a} - \mathbf{d}$ (ii) $\overrightarrow{AX} = k \overrightarrow{AC} = k(-\mathbf{d} + 2\mathbf{a})$ $= 2\mathbf{ak} - \mathbf{kd}$ (iii) $\overrightarrow{DX} = h \overrightarrow{DB} = h(\mathbf{d} + \mathbf{a})$ $= h\mathbf{d} + h\mathbf{a}$ (b) $\overrightarrow{AX} = 2\mathbf{ak} - \mathbf{kd}$ $\overrightarrow{AX} = (h-1)\mathbf{d} + h\mathbf{a}$ $2\mathbf{ak} - \mathbf{kd} = (h-1)\mathbf{d} + h\mathbf{a}$ $2\mathbf{ak} = h\mathbf{a}$ $2k = h \dots\dots\dots(i)$ $-\mathbf{kd} = (h-1)\mathbf{d}, -k = h - 1,$ $k = 1 - h \dots\dots\dots(ii)$ $k = 1 - 2k$ $3k = 1$ $k = \frac{1}{3}$ $h = 2 \times \frac{1}{3} = \frac{2}{3}$	M ₁ A ₁ M ₁ A ₁ B ₁ M ₁ M ₁ M ₁ M ₁ A ₁	Equating the 2 ways of \overrightarrow{AX} Correct attempt to solve For both k and h