

OPENER EXAMINATION: TERM 1 2024
FORM FOUR

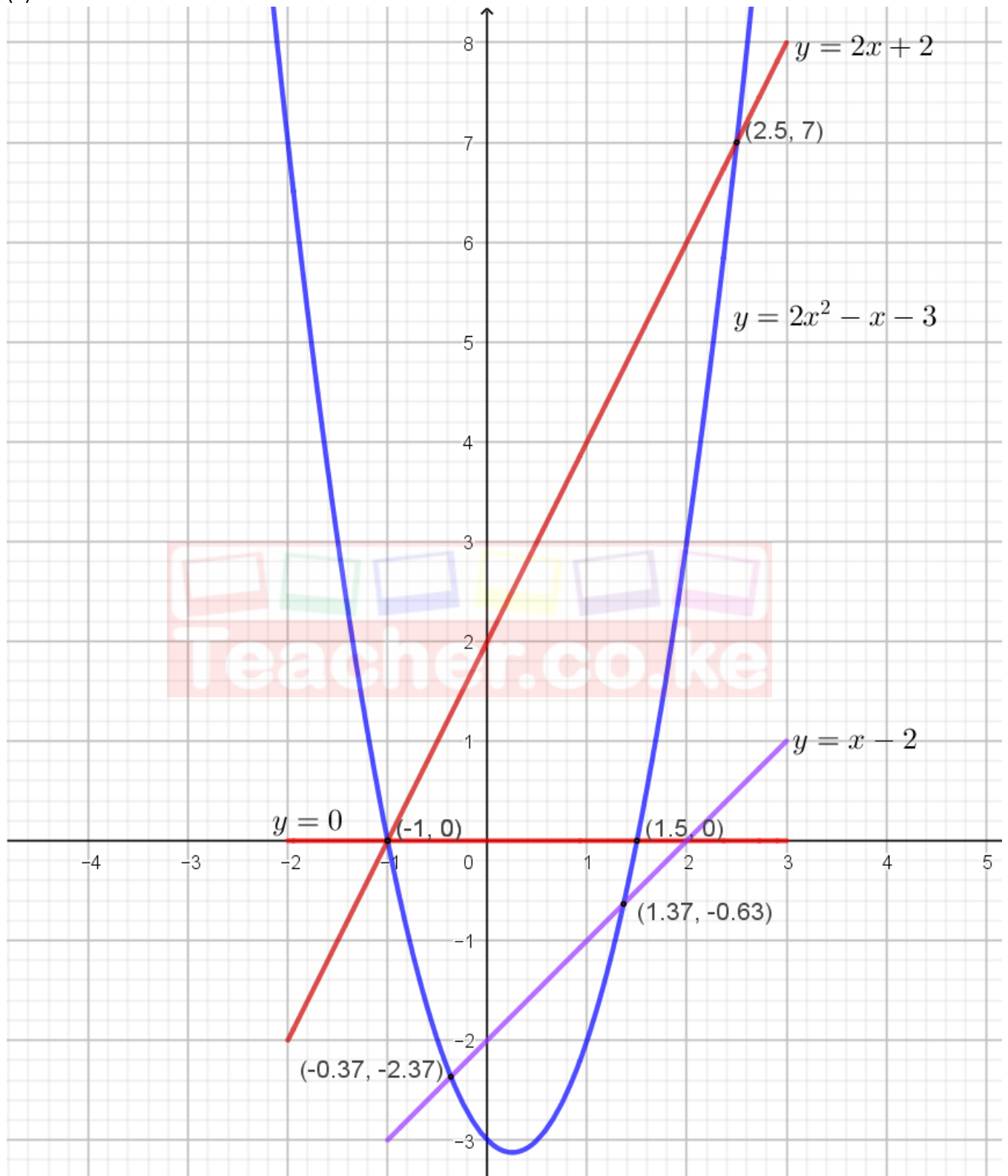
MATHEMATICS PAPER ONE MARKING SCHEME

No	Workings	Marks/Comments
1	$\frac{0.38 \times 0.23 \times 2.7 \times 10^7}{0.114 \times 0.0575 \times 10^7}$ $= \frac{38 \times 23 \times 2700}{114 \times 575}$ $= 36$	M1 M1 A1
2	a) Prime numbers are 2,3,5,7 Number \Rightarrow 7532 b) $5 \times 100 = 500$	B1 B1
3	$\sqrt{0.3446} = \sqrt{34.46 \times 10^{-2}} = 0.58703$ $\frac{1}{0.58703} = \frac{1}{5.8703 \times 10^{-1}} = 1.704$ $(0.8673)^2 = 75.22 \times 10^{-2} = 0.7522$ $\Rightarrow (2 \times 1.704) + 0.7522 = 4.1602$	M1 M1 M1 A1
4	$2^{5(x-3)} \times 2^{3(x+4)} = 2^6 \div 2^x$ $5x - 15 + 3x + 12 = 6 - x$ $8x - 3 = 6 - x$ $9x = 9$ $x = 1$	M1 M1 A1
5	$m_1 = \frac{6 - 0}{0 + 4} = \frac{6}{4}$ Equation of L_1 $\frac{6}{4} = \frac{y}{x + 4}$ $y = 1.5x + 6$ At P $2x - 2 = 1.5x + 6$ $x = 16$ $y = 1.5(16) + 6 = 30$ Co-ordinates of P are (16, 30)	M1 M1 A1 both values
6	$L = (x + 3)$ $W = \frac{2}{3}(x + 3) = \frac{2}{3}x + 2$ $20 = (x + 3) + \left(\frac{2}{3}x + 2\right)$	M1

	$15 = x + \frac{2}{3}x$ $x = \frac{15 \times 3}{5} = 9 \text{ cm}$ $\text{width} = \frac{2}{3}(9) + 2 = 8 \text{ cm}$	M1 A1
7	$1 \text{ EURO} = \text{Ksh. } 147.87$ $24,000 = ?$ $= 24000 \times 147.87 = \text{Ksh. } 3\,548\,880$ $= 3548880 - 200\,000 = \text{Ksh. } 3\,348\,880$ $1 \text{ US DOLLAR} = \text{Ksh } 74.50$ $? = \text{Ksh. } 3\,348\,880$ $= \frac{3348880}{74.50} = 44\,951 \text{ dollars}$	M1 M1 A1
8	a) $180 - (60 + 70) = 50^\circ$ \Rightarrow Angle sum of a triangle b) $\angle ABD = \angle CDE = 25^\circ$ \Rightarrow Alternate angles	B1 B1 B1
9	$L_1 \Rightarrow 3y \geq x - 5$ $L_2 \Rightarrow x \geq -1$ $L_3 \Rightarrow 5y < -3x + 5$	B1 B1 B1
10	a) $2x + x - 30 = 90$ $3x = 120$ $x = 40$ b) $\tan 60 = 1.732$	M1 A1 B1
11	a) $\angle ADB = 180 - (45 + 68) = 67^\circ$ b) $\angle ABD = 180 - (67 + 82) = 31^\circ$	M1 A1 M1 A1
12	$\text{Volume of cube} = (6.7)^3 = 300.763 \text{ cm}^3$ $300.763 = \frac{4}{3} \times \frac{22}{7} \times r^3$ $r^3 = \frac{3}{4} \times \frac{7}{22} \times 300.763 = 71.77$ $r = \sqrt[3]{71.77} = 4.156 \text{ cm}$	M1 M1 A1

13																																										
14	$N \Rightarrow p^2 + 2pq + q^2 = (p + q)(p + q)$ $D \Rightarrow p^3 - pq^2 + p^2q - q^3 = (p + q)(p^2 - q^2)$ $= (p + q)(p + q)(p - q)$ $\frac{N}{D} = \frac{(p + q)(p + q)}{(p + q)(p + q)(p - q)}$ $= \frac{1}{p - q}$	M1 M1 M1 A1																																								
15	Using sine rule $\frac{14}{\sin 70} = \frac{AC}{\sin 30}$ $AC = \frac{14 \times \sin 30}{\sin 70} = 7.44 \text{ cm}$ $\text{Area} = 0.5 \times 14 \times 7.44 \times \sin 80 = 3.663 \text{ cm}^2$	M1 M1 A1																																								
16	$\text{Total distance} = \left(\frac{1}{2} \times 4 \times 80\right) + \left(\frac{1}{2} \times 4 \times 80\right) + (16 \times 80)$ $= 160 + 1280 + 160 = 1600 \text{ m}$ $\text{Half distance} = \frac{1600}{2} = 800 \text{ m}$ $\text{time} = \frac{800}{80} = 10 \text{ secs}$	M1 B1 A1																																								
17	a) <table border="1" style="margin-left: 20px;"> <tbody> <tr> <td>x</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>$2x^2$</td> <td>18</td> <td>8</td> <td>2</td> <td>0</td> <td>2</td> <td>8</td> <td>18</td> </tr> <tr> <td>$-x$</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> <td>-3</td> <td>-2</td> <td>-3</td> </tr> <tr> <td>-3</td> <td>-3</td> <td>-3</td> <td>-3</td> <td>-3</td> <td>-3</td> <td>-3</td> <td>-3</td> </tr> <tr> <td>y</td> <td>18</td> <td>7</td> <td>0</td> <td>-3</td> <td>-4</td> <td>3</td> <td>12</td> </tr> </tbody> </table>	x	-3	-2	-1	0	1	2	3	$2x^2$	18	8	2	0	2	8	18	$-x$	3	2	1	0	-3	-2	-3	-3	-3	-3	-3	-3	-3	-3	-3	y	18	7	0	-3	-4	3	12	
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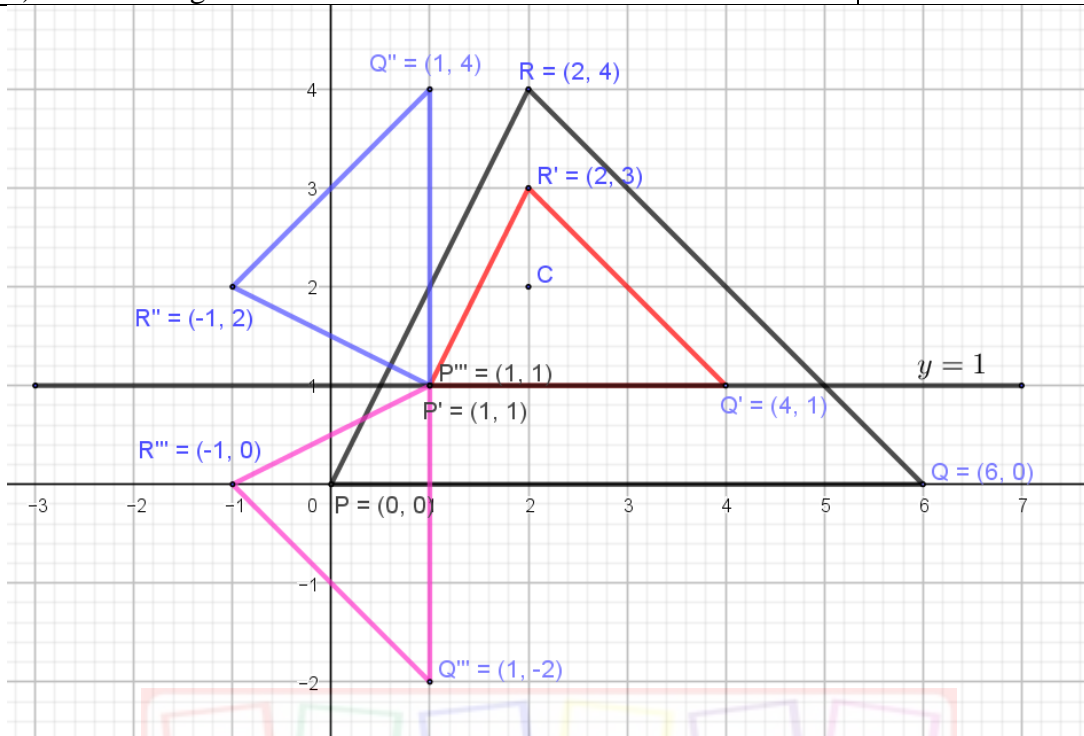
(b)



17	(c) (i) $y = 0$ $x = -1$ or 1.5	B1
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	(ii) $y = 2x + 2$ $x = -1 \text{ or } 2.5$ (iii) $y = x - 2$ $x = 1.4 \text{ or } -0.4$	B1 A1 B1 A1
18	a) Area = $0.5 \times 12 \times 12 \times \sin 60 = 62.35 \text{ cm}^2$ b) Volume = $\frac{1}{3} \times 62.35 \times 21 = 436.45 \text{ cm}^3$ c) (i) Volume of cone = volume of pyramid = 436.45 cm^3 $436.45 = \frac{1}{3} \times \frac{22}{7} \times 4.2^2 \times h$ $h = \frac{436.45}{\frac{1}{3} \times \frac{22}{7} \times 4.2^2} = 23.62 \text{ cm}$ $l = \sqrt{23.62^2 + 4.2^2} = 23.99 \text{ cm}$ (ii) TSA = $\pi r^2 + \pi r l$ $= \left(\frac{22}{7} \times 4.2^2\right) + \left(\frac{22}{7} \times 4.2 \times 23.99\right)$ $= 372.108 \cong 372.11 \text{ cm}^2$	M1 A1 M1 A1 M1 M1 A1 M1 M1 A1
19	a) <div style="text-align: center;"> </div>	B1 for P B1 for Q B1 for R B1 for S
	b) (i) Bearing = $330 \pm 1^\circ$ Distance = $350 \text{ km} \pm 10 \text{ km}$ (ii) Bearing = $232 \pm 1^\circ$ Distance = $560 \pm 10 \text{ km}$	B1 B1 B1 B1
	c) Area = $(0.5 \times 350 \times 350 \times \sin 120^\circ) + (0.5 \times 500 \times 560 \times \sin 70^\circ)$ $= 53044.06 + 131556.97 = 184601 \text{ km}^2$	M1 A1
20	a) On the Cartesian plane b) $P'(1,1) Q(4,1) R(2,3)$ c) $P'''(1,1) Q(1,-2) R(-1,0)$	B1 B1B1B1 B1B1B1

d) On the cartesian plane	B1 B1
e) Direct congruence	B1



21	a) (i) $\frac{16\,200}{x}$ (ii) $\frac{16\,200}{x+3}$	M1
		M1
		M1
	b) (i) $\frac{16\,200}{x} - \frac{16\,200}{x+3} = 60$ $60(x^2 + 3x) = 48\,600$ $x^2 + 3x - 810 = 0$ $x = \frac{-3 \pm \sqrt{3249}}{2}$ $x = \frac{-3 \pm 57}{2} = 27 \text{ or } -30$ $x = 27 \text{ chairs}$	M1
		M1
		M1
	(ii) $\frac{16\,200}{30} = \text{Ksh. } 540$	A1
	(iii) marked price = Sh. 540 + 60 = 600	M1 A1
	Buying price = $0.85 \times 600 = \text{Sh. } 510$	
	Savings = $600 - 510 = \text{Sh. } 90$	M1 A1

22	<p>a) $\cos 26^\circ = \frac{x}{10}$ $x = 10 \times \cos 26$ $x = 8.9879 \text{ cm}$ $\cos 48.6 = \frac{x}{4}$ $x = 2.6452 \text{ cm}$ $AB = 8.9879 + 2.6452 = 11.63 \text{ cm}$</p> <p>b) Area of sector PBQ = $\frac{97.2}{360} \times 3.142 \times 16 = 13.57 \text{ cm}^2$</p> <p>c) <i>area of quadrilateral</i> $= \left(\frac{1}{2} \times 10^2 \times \sin 52\right) + \left(\frac{1}{2} \times 4^2 \times \sin 97.2\right)$ $= 39.40 + 7.937$ $= 47.34 \text{ cm}^2$</p> <p>d) <i>Area of shaded region</i> = $47.34 - 13.57 = 33.77 \text{ cm}^2$</p>	<p>M1 M1 A1</p> <p>M1 A1</p> <p>M1 M1 A1</p> <p>M1 A1</p>
23	<p>a) $C:Z:T$ $3(3:2)$ $2(3:5) = 9:6:10$</p> <p>b)</p> <p>i. $\text{tin} = \frac{10}{25} \times 250 = 100 \text{ kg}$</p> <p>ii. In A, $\text{copper} = \frac{9}{25} \times 250 = 90 \text{ kg}$ In B, $\text{copper} = \frac{70}{100} \times 90 = 63 \text{ kg}$ Zinc + Tin = $250 - 63 = 187 \text{ kg}$</p> <p>iii. Tin in B = $\frac{8}{11} \times 187 = 136 \text{ kg}$ Difference in Tin = $136 - 100 = 36 \text{ kg}$</p>	<p>M1 A1</p> <p>M1 A1</p> <p>M1 M1 A1</p> <p>M1 M1 A1</p>

24	a)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Class</th> <th style="width: 10%;">x</th> <th style="width: 10%;">f</th> <th style="width: 15%;">fx</th> <th style="width: 10%;">c.f</th> </tr> </thead> <tbody> <tr><td>10 – 19</td><td>14.5</td><td>3</td><td>43.5</td><td>3</td></tr> <tr><td>20 – 29</td><td>24.5</td><td>4</td><td>98</td><td>7</td></tr> <tr><td>30 – 39</td><td>34.5</td><td>8</td><td>276</td><td>15</td></tr> <tr><td>40 – 49</td><td>44.5</td><td>6</td><td>267</td><td>21</td></tr> <tr><td>50 – 59</td><td>54.5</td><td>10</td><td>545</td><td>31</td></tr> <tr><td>60 – 69</td><td>64.5</td><td>11</td><td>709.5</td><td>42</td></tr> <tr><td>70 – 79</td><td>74.5</td><td>6</td><td>447</td><td>48</td></tr> <tr><td>80 – 89</td><td>84.5</td><td>8</td><td>676</td><td>56</td></tr> <tr><td>90 – 99</td><td>94.5</td><td>4</td><td>378</td><td>60</td></tr> <tr> <td></td> <td></td> <td style="text-align: center;">$\sum f = 60$</td> <td style="text-align: center;">$\sum fx = 3440$</td> <td></td> </tr> </tbody> </table>	Class	x	f	fx	c.f	10 – 19	14.5	3	43.5	3	20 – 29	24.5	4	98	7	30 – 39	34.5	8	276	15	40 – 49	44.5	6	267	21	50 – 59	54.5	10	545	31	60 – 69	64.5	11	709.5	42	70 – 79	74.5	6	447	48	80 – 89	84.5	8	676	56	90 – 99	94.5	4	378	60			$\sum f = 60$	$\sum fx = 3440$		B1 for class B1 for frequency B1 for fx B1 for c.f
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		b) 60 – 69 c) $\bar{x} = \frac{3440}{60} = 57.3$ d) $median = 49.5 + \left(\frac{30-21}{10}\right) \times 10$ $= 49.5 + 9$ $= 58.5$	B1 M1 A1 M1 M1 A1																																																							