

# KCSE 2024

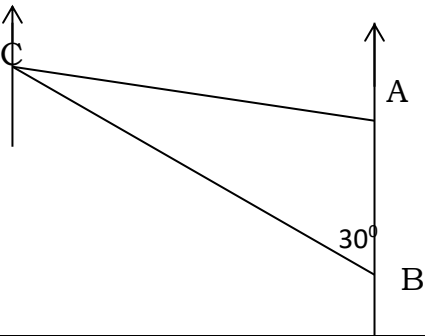
## MATHS PAPER 1

### MARKING SCHEME

	WORK OUT	MKS	COMMENTS
1.	$6(2 \times \frac{22}{5}) = \frac{264}{5}$ $\frac{112}{5} \div \frac{264}{5} = \frac{14}{33}$ $\frac{1}{2} + \frac{14}{33} = \frac{61}{66}$ $6(8 \times \frac{3}{22}) = \frac{72}{11}$ $\frac{1}{2} \times \frac{72}{11} = \frac{36}{11}$ $\frac{61}{66} \div \frac{36}{11} = \frac{61}{216}$	<p>M1</p> <p>M1</p> <p>A1</p>	
		<b>03</b>	
2.	$\frac{(y^2 + x^2)(y + x)(y - x)}{y(y + x)(y - x)}$ $\frac{y^2 + x^2}{y}$	<p>M1</p> <p>M1</p> <p>A1</p>	<p>Simplifying the numerator fully</p> <p>Simplifying the denominator fully</p>
		<b>03</b>	
3.	$2^{2x-1} \times 2^{-3+3x} = 2^{6x+2}$ $2x - 1 - 3 + 3x = 6x + 2$ $x = -6$	<p>M1</p> <p>M1</p> <p>A1</p>	<p>All numbers to base two</p> <p>All the powers picked correctly</p>
		<b>03</b>	
4.	<p>Customers selling price</p> $= \left( \frac{90}{100} + 24,000 \right)$ $= 21,600$ $\frac{100 \times 21,600}{120}$ $= 18,000$	<p>M1</p> <p>M1</p> <p>A1</p>	
		<b>03</b>	
5.	No. xy		



	$x + y = 12$ $10y + x - 15 = 2(10x + y)$ $8(12 - x) - 19x = 15$ $x = 3 \quad y = 9$ Original number 39	M1  M1 A1 B1	For the 2 equations  Expressing in one variable For the two
		<b>04</b>	
6.	$9.452^2 = 89.34$  $\frac{1}{63.37} = 0.01578$ 89.35578	B1  B1  B1	Accept at least 4 sf
		<b>03</b>	

	WORK OUT	MKS	COMMENTS
7.	$\text{L.S.F} = \sqrt[3]{\frac{6750}{2000}}$ $= 1.5$ Radius of the large container = $(15.5 \times 1.5) \times \frac{1}{2}$ $=$ 11.625cm $=$ 11.6cm	M1  M1  A1	
		<b>03</b>	
8.	$AB = \begin{pmatrix} 3 \\ -1 \\ -3 \end{pmatrix} - \begin{pmatrix} 1 \\ 3 \\ -4 \end{pmatrix}$ $= \begin{pmatrix} 2 \\ -4 \\ 1 \end{pmatrix} = 2i - 4j + k$ $/AB/ = \sqrt{2^2 + (-4)^2 + 1^2}$ $\sqrt{\quad} = 21$ $= 4.583$	M1  M1  A1	
		<b>03</b>	
9.			





14	<p>Volume <math>\left( \frac{63000}{7} \right)</math></p> <p><math>= 9000\text{cm}^3</math></p> <p>Volume L <math>(15 \times 12) - (12 \times 10) h = 9000</math></p> <p><math>60h = 9000</math></p> <p><math>h = 1.5\text{m}</math></p>	M1	
		M1	
		A1	
		<b>03</b>	
15	<p>(a) Jane Mary</p> <p>5 : 4</p> <p>Dev. Div Re</p> <p>4 : 5 : 6</p> <p>Dev = <math>\frac{4}{15} \times 81000</math></p> <p><math>= \text{sh. } 21600</math></p> <p>(b) Div = <math>\frac{5}{15} \times 81000</math></p> <p><math>= 27000</math></p> <p>Mary got <math>\frac{4}{9} \times 27000</math></p> <p><math>= 12000</math></p>	M1	
		A1	
		M1	
		A1	
		<b>04</b>	
16	<p>(a) <math>D = \frac{1}{2} \times 80 (24 + 16)</math></p> <p><math>= 1600\text{m}</math></p> <p>(b) Deceleration = <math>\frac{80}{4}</math></p> <p><math>= 20\text{m/s}^2</math></p>	M1	Any other equivalent method
		A1	
		A1	
		<b>03</b>	

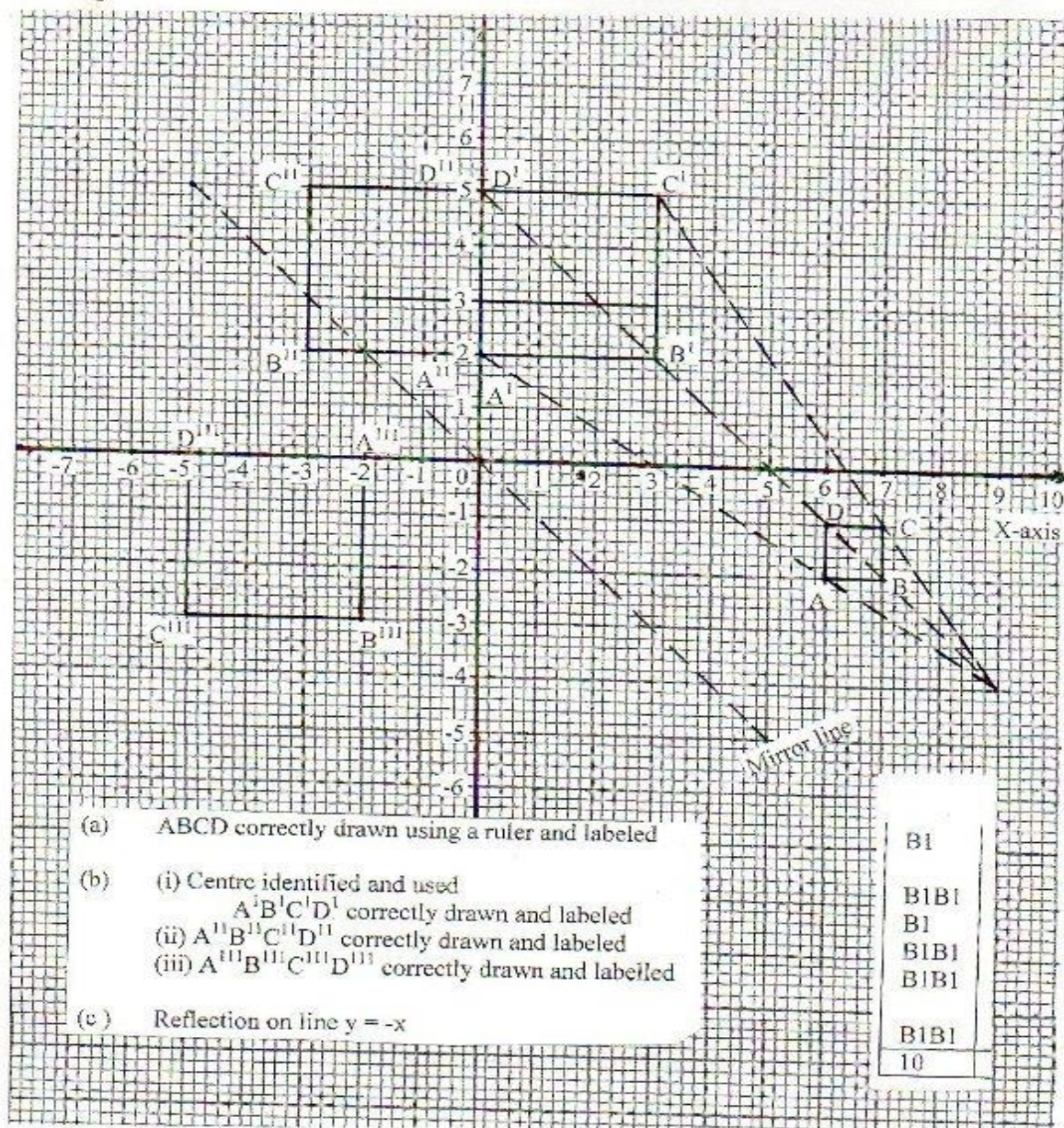
## Section II

17	<p>(a) let the constant amount be x</p> <p>Peter - <math>(\frac{3}{8}x) / =</math></p> <p>John's - <math>\frac{2}{5} (\frac{5}{8}x) / =</math></p> <p><math>= \frac{1}{4}x / =</math></p> <p>Remaining <math>\frac{3}{8}x - 18,000</math></p> <p><math>x = 48,000</math></p> <p>Therefore the original amount is 48,000</p> <p>(b) John received</p> <p><math>(\frac{1}{4} \times 48,000)</math></p> <p><math>= 12,000 / =</math></p> <p>(c) Business maintenance</p> <p><math>(\frac{1}{3} \times 12,000)</math></p>	M1	Any other equivalent method
		M1	
		M1	
		A1	
		A1	
		M1	









19 (a) bottom =  $\frac{22}{7} \times 4.2^2 = 55.44\text{cm}^2$

M1

Top =  $4 \times \frac{22}{7} \times 3.5^2 \times \frac{1}{2} = 77\text{cm}^2$

M1

M1

Curved =  $\frac{22}{7} \times 8 \times (4.2 + 3.5) = 193.6\text{cm}^2$

M1

A1

$T_{SA} = 77 + 55.44 + 193.6 = 326.04\text{cm}^2$

(b)  $\frac{r}{1.2} \sqrt{\frac{81.51}{326.04}}$   
 $r = 2.1\text{cm}$

B1

From working

(c)  $H \sqrt{8^2 - 0.7^2}$   
 $= 7.97\text{cm}$

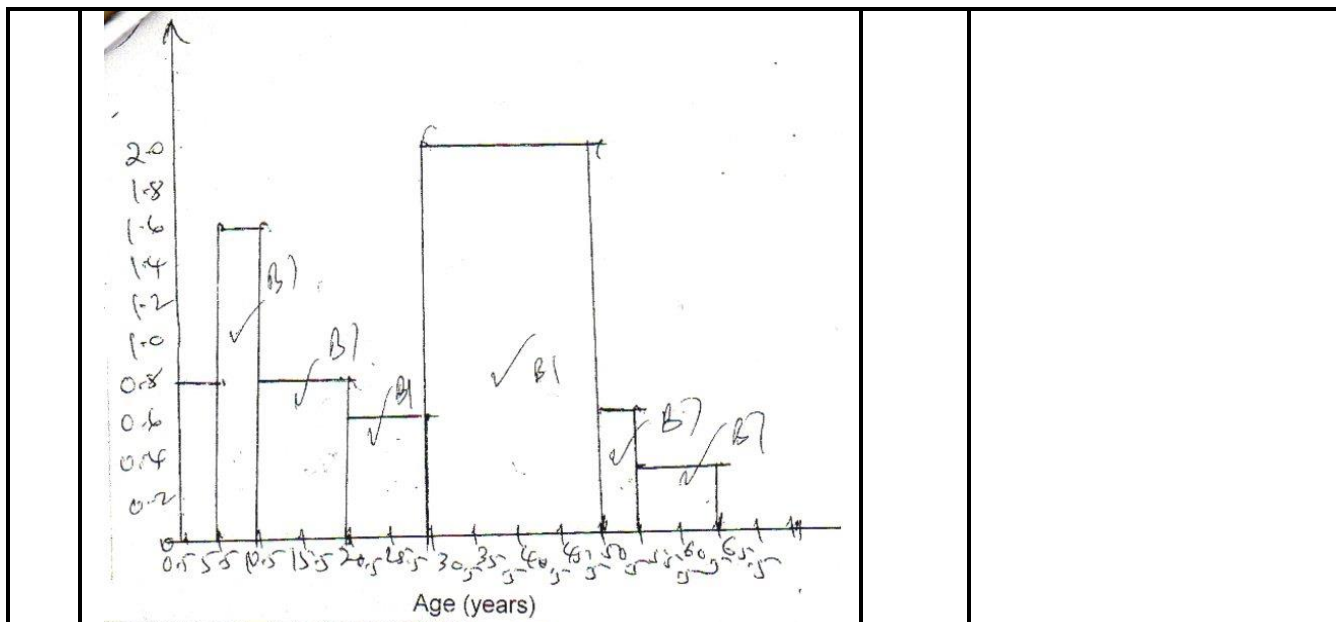
B1

From working



	<p>C (ii) volume = <math>\frac{1}{3} \times \frac{22}{7} \times 7.97 (4.22 + 3.5 + 4.2 \times 3.5) + \frac{1}{2} \times \frac{4}{3} \times \frac{22}{7} \times 3.5^3</math></p> <p>= <math>\frac{1}{3} \times \frac{22}{7} \times 7.97 \times 44.59 + 89.83</math></p> <p>= 462.13 cm<sup>3</sup></p>	<p>M1</p> <p>M1</p> <p>A1</p>	
		<b>10</b>	
20	<p>(a) (i)</p> <p>Relative speed = (40 + 60) km/h = 100km/h</p> <p>Relative Distance = 80km – 0.5h x 40km/h = 60km</p> <p>Time = <math>\frac{\text{Distance}}{\text{Relative speed}} = \frac{60}{100} = 0.6 \text{ hours}</math></p> <p>Distance from A = 20km + 0.6 x 40 = 44km</p> <p>(ii)</p> <p>10.30am + 36 minutes = 11.06am</p> <p>(b)</p> <p>Time taken by Kamau = 11.06am – 10.20am = 46 minutes</p> <p>Average Speed = <math>\frac{44}{\frac{46}{60}}</math> = 57.39km/h</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>	
		<b>10</b>	
21	(a)		





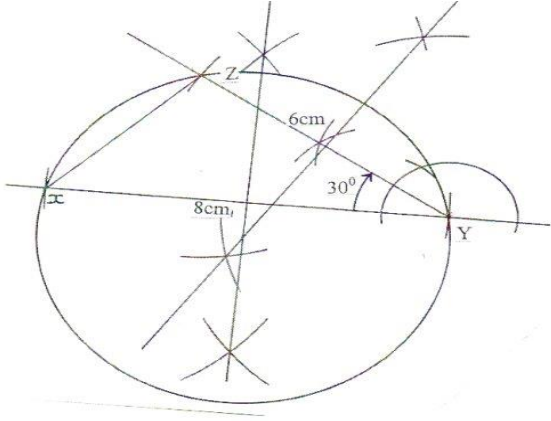
121/1 Mathematics paper 1

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21	<p>(b)</p> <table border="1"> <thead> <tr> <th>Class</th><th>x</th><th>f</th><th>fx</th></tr> </thead> <tbody> <tr> <td>1 – 5</td><td>3</td><td>4</td><td>12</td></tr> <tr> <td>6 – 10</td><td>8</td><td>8</td><td>64</td></tr> <tr> <td>11 – 20</td><td>15.5</td><td>8</td><td>124</td></tr> <tr> <td>21 – 30</td><td>25.5</td><td>6</td><td>153</td></tr> <tr> <td>31 – 50</td><td>40.5</td><td>40</td><td>1620</td></tr> <tr> <td>51 – 55</td><td>53</td><td>3</td><td>159</td></tr> <tr> <td>56 – 65</td><td>60.5</td><td>3</td><td>181.5</td></tr> <tr> <td></td><td></td><td><u>72</u></td><td><u>2313.5</u></td></tr> </tbody> </table> <p>Mean = <math>\frac{\sum fx}{\sum f}</math></p> <p>= <math>\frac{2313.5}{72}</math></p> <p>= 32.13</p>	Class	x	f	fx	1 – 5	3	4	12	6 – 10	8	8	64	11 – 20	15.5	8	124	21 – 30	25.5	6	153	31 – 50	40.5	40	1620	51 – 55	53	3	159	56 – 65	60.5	3	181.5			<u>72</u>	<u>2313.5</u>	<p>B1</p> <p>B1</p> <p>M1</p> <p>A1</p>	
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22	<p>(a) <math>\angle BAR + \angle QAB = 180^\circ</math> – opposite angles in a quadrilateral add up to <math>180^\circ</math></p> <p><math>\angle BAR = 80^\circ</math> – angles in a straight line add up to <math>180^\circ</math></p> <p>(b) <math>\angle STR + \angle STR = 180 - (80 + 70^\circ)</math></p> <p>= <math>30^\circ</math> – angles in a straight line add up to <math>180^\circ</math></p> <p>(c) <math>\angle BSU + \angle UBS = 180 - 115^\circ = 65^\circ</math> – angles in a straight line add up to <math>180^\circ</math></p> <p><math>\angle BSU = 45^\circ</math> – angles in a straight line add up to <math>180^\circ</math></p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>																																					

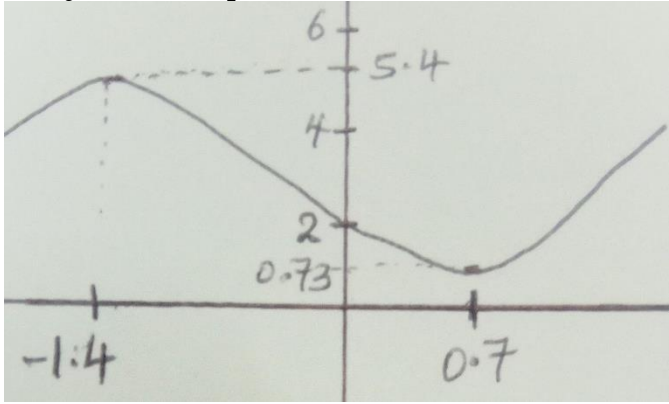




	<p>(d) <math>\text{BRS} &lt; \text{SBA} = 115^\circ</math> – vertically opposite angles are equal  <math>&lt; \text{BRS} = 65^\circ</math> – opposite angles in a cyclic quadrilateral add up to <math>180^\circ</math></p> <p>(e) <math>\text{SBU} - 180 - 115 = 65^\circ</math> – angles on a straight line</p>	B1B1	
		<b>10</b>	
23	 <p>XY and YZ</p> <p><math>\angle XYZ</math> construction of <math>\angle 30^\circ</math>  Completing <math>\Delta XYZ</math></p> <p>(b) <math>XZ = 4.0\text{cm} \pm 0.1</math>  (c) Bisecting any 2 sides  Curve circle</p> <p>(d) Radius = <math>4.2\text{cm} \pm 0.1</math></p> <p>(e) Area of circle <math>\rightarrow 3.142 (4.2)^2</math>  Area of <math>\Delta \rightarrow \frac{1}{2} \times 8 \times 6 \sin 30^\circ</math>  Area = <math>55.425 - 12</math>  = <math>43.43\text{cm}^2</math></p>	B1 B1 B1 B1 B1 B1  B1 M1 M1 A1	
		<b>10</b>	

24	<p>(a) <math>\frac{dy}{dx} = 3x^2 + 2x - 3</math></p> <p>(b) <math>3x^2 + 2x - 3 = 0</math>  <math display="block">x = \frac{-2 \pm \sqrt{4 + 36}}{6}</math> <math display="block">x = \frac{-2 \pm 6.325}{6}</math> <math display="block">x = -1.3875 \text{ or } 0.7208</math> <math display="block">\frac{d^2y}{dx^2} = 6x + 2</math> <math display="block">6(-1.3875) + 2 = -6.325</math> <math display="block">6(0.7208) + 2 = 6.3248</math></p>	B1  M1  M1  A1    M1	         Testing for Max or min
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	<p><math>(-1.3875, 5.416)</math> is maximum turning point</p> <p><math>(0.7208, 0.7316)</math> is minimum turning point</p> <p>(c)</p> <p>y – intercept = 2</p> 	<p>A1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>For y – intersect</p> <p>Max, Min pts estimated</p> <p>Curve</p>
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