MARKING GUIDE

GAYAZA HIGH SCHOOL

G.H.S ***INTERNAL MOCK EXAMS*** ***JULY, 2014***

S.4 MATHEMATICS

456/1

TIME : 2 HOURS 30 MINUTES

SECTION A

1. Solve for x in $32^{\frac{3}{5}} \div x^{\frac{1}{2}} = 2.$ (4 marks)

ANS:

$$32^{\frac{3}{5}} \div x^{\frac{1}{2}} = 2.$$

$$\left(2^5\right)^{\frac{3}{5}} \div x^{\frac{1}{2}} = 2 \qquad M_1$$

$$2^3 \div x^{\frac{1}{2}} = 2$$

$$x^{\frac{1}{2}} = \frac{2^3}{2}$$

$$x^{\frac{1}{2}} = 2^2 \qquad B_1$$

$$\left(x^{\frac{1}{2}}\right)^2 = \left(2^2\right)^2 \qquad M_1$$

$$\underline{\underline{x = 16}} \qquad A_1$$

2. Evaluate; $\dfrac{1\frac{1}{5} + 4\frac{1}{2} \div 1\frac{1}{2}}{3\frac{3}{5} - 2\frac{2}{5} \times 1\frac{1}{4}}.$ (4marks)

ANS:

$$\frac{1\frac{1}{5}+4\frac{1}{2}\div 1\frac{1}{2}}{3\frac{3}{5}-2\frac{2}{5}\times 1\frac{1}{4}} = \frac{\frac{6}{5}+\frac{9}{2}\div\frac{3}{2}}{\frac{18}{5}-\frac{12}{5}\times\frac{5}{4}} \qquad B_1$$

$$= \frac{\frac{6}{5}+\frac{9}{2}\times\frac{2}{3}}{\frac{18}{5}-\frac{12}{5}\times\frac{5}{4}} \qquad M_1$$

$$= \frac{\frac{6}{5}+3}{\frac{18}{5}-3}$$

$$= \frac{\frac{6+15}{5}}{\frac{18-15}{5}} \qquad M_1$$

$$= \frac{21}{5}\div\frac{3}{5}$$

$$= \frac{21}{5}\times\frac{5}{3}$$

$$= 7 \qquad A_1$$

3. Given that the scale of a map is 1 : 250,000, find the length of a horizontal road on the map whose length on the ground is 66.25km long. (4marks

ANS:

$$1:250{,}000$$

$$66.25km = (66.25\times 100000)cm$$

$$= 6625000cm$$

$$1cm \text{ represents } 250{,}000cm \qquad B_1$$

$$xcm \text{ represent } 6625000cm$$

$$x = \frac{6625000}{250{,}000} \qquad M_1 \quad B_1$$

$$= 26.5cm \qquad A_1$$

The length of the road is 26.5cm on the map.

4. Two quantities y and x are related by the equation $y = a + bx$. When $y = 4,\ x = 2$ and when $y = 6,\ x = 4$. Find the values of a and b. (4 marks)

ANS:

$y = a + bx$

$y = 4 \quad when \; x = 2$

$\Rightarrow 4 = a + 2b$

$a + 2b = 4..........(i)$ $\qquad B_1$

$Also \; y = 6 \; when \; x = 4$

$\Rightarrow 6 = a + 4b$

$a + 4b = 6...............(ii)$ $\qquad B_1$

$Solve \; (i) \; and \; (ii) \; simultaneously;$

$(ii) - (i) \Rightarrow 2b = 2$ $\qquad M_1$

$b = 1$

$From \; eqn \, (i) \; a + 2(1) = 4$

$a = 2$

$\therefore \; a = 2 \; and \; b = 1$. $\qquad A_1 (Both)$

5. A coin is tossed and a die is thrown. What is the probability of obtaining a head on the coin and an even number on the die? (4 marks)

DIE

COIN		1	2	3	4	5	6
	H	H,1	H,2	H,3	H,4	H,5	H,6
	T	T,1	T,2	T,3	T,4	T,5	T,6

B_1

$$P(HnE) = \frac{n(HnE)}{n(s)}$$

$$= \frac{3}{12} \qquad M_1 \; B_1$$

$$= \frac{1}{4} \qquad A_1$$

6. Factorise completely: $3x^2 + 2xy - 8y^2$. (4 marks)

ANS:

$3x^2 + 2xy - 8y^2 = 3x^2 + 6xy - 4xy - 8y^2$ $\qquad M_1 \; B_1$

$= 3x(x + 2y) - 4y(x + 2y)$ $\qquad B_1$

$= (3x - 4y)(x + 2y)$ $\qquad A_1$

7. Solve the inequality $x^2 - x - 6 \leq 0$ and represent the solution set on the number line. (4 marks)

Answer:

$x^2 - x - 6 \le 0$ Product $= -6$, $Sum = -1$, $(2, -3)$

$x^2 + 2x - 3x - 6 \le 0$ M_1

$x(x+2) - 3(x+2) \le 0$

$(x-3)(x+2) \le 0$ B_1

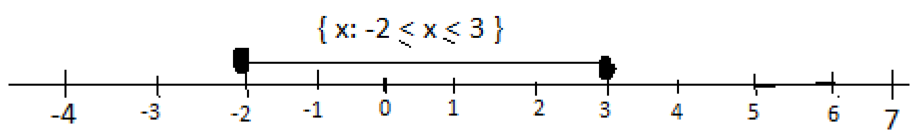
For the product of $(x-3)$ and $(x+2)$ to be negative (less than zero), one bracket must be negative and the other positive.

So; Either $x - 3 \le 0$ *and* $x + 2 \ge 0$ *or* $x - 3 \ge 0$ *and* $x + 2 \le 0$

The first statement leads to $x \le 3$ *and* $x \ge -2 \Rightarrow -2 \le x \le 3$ *as a solution.*

The 2^{nd} *statement leads to* $x \ge 3$ *and* $x \le -2$ *which gives no possible solution.*

$\therefore$ *The solution is* $-2 \le x \le 3.$ A_1



A_1

8. Express 0.31466… in the form $\frac{p}{q}$ and find the values of p *and* q. (4 marks)

ANS:

Let $x = 0.31466.....$

$1000x = 314.666................(i)$

$10 \times 1000x = 314.666........ \times 10$ M_1

$(ii) - (i) \Rightarrow 9000x = 2832.000$ M_1

$9000x = 2832$

$x = \frac{2832}{9000}$ B_1

$x = \frac{118}{375}$ A_1

9. An object whose area is 30 cm^2 is mapped onto its image by the transformation matrix $\begin{pmatrix} 3 & 2 \\ 4 & 7 \end{pmatrix}$. Calculate the area of the image. (4 marks)

ANS:

$$\begin{pmatrix} 3 & 2 \\ 4 & 7 \end{pmatrix}$$

$$Area\ \ scale\ \ factor = \det of \begin{pmatrix} 3 & 2 \\ 4 & 7 \end{pmatrix}$$

$$= (3\times 7)-(4\times 2) \qquad M_1$$

$$= \quad 13 \qquad B_1$$

$$Area\ of\ \ the\ \ image = 30\times 13 \qquad M_1$$

$$\underline{\underline{=390cm^2}} \qquad A_1$$

10. Macheso paid shs 480 to purchase a certain number of items, but the nice vender gave her two extra. This decreased the price per item by shs1. How many items did she receive (including the two extra)? (4 marks)

ANS:

$$Let\ \ the\ number\ of\ \ items\ \ without\ \ the\ extra\ two\ \ be\ x$$

$$\text{Pr}ice\ \ per\ item\ before\ \ getting\ \ the\ \ extra\ two = shs\left(\frac{480}{x}\right)$$

$$\text{Pr}ice\ \ per\ item\ after\ \ getting\ \ the\ extra\ two \quad = shs\left(\frac{480}{x+2}\right)$$

$$\Rightarrow \left(\frac{480}{x}\right)-\left(\frac{480}{x+2}\right)=1 \qquad M_1$$

$$\frac{480(x+2)-480x}{x(x+2)}=1$$

$$\frac{480x+960-480}{x^2+2x}=1$$

$$x^2+2x=960$$

$$x^2+2x-960=0 \qquad B_1$$

$$x^2+32x-30x-960=0$$

$$x(x+32)-30(x+32)=0 \qquad M_1$$

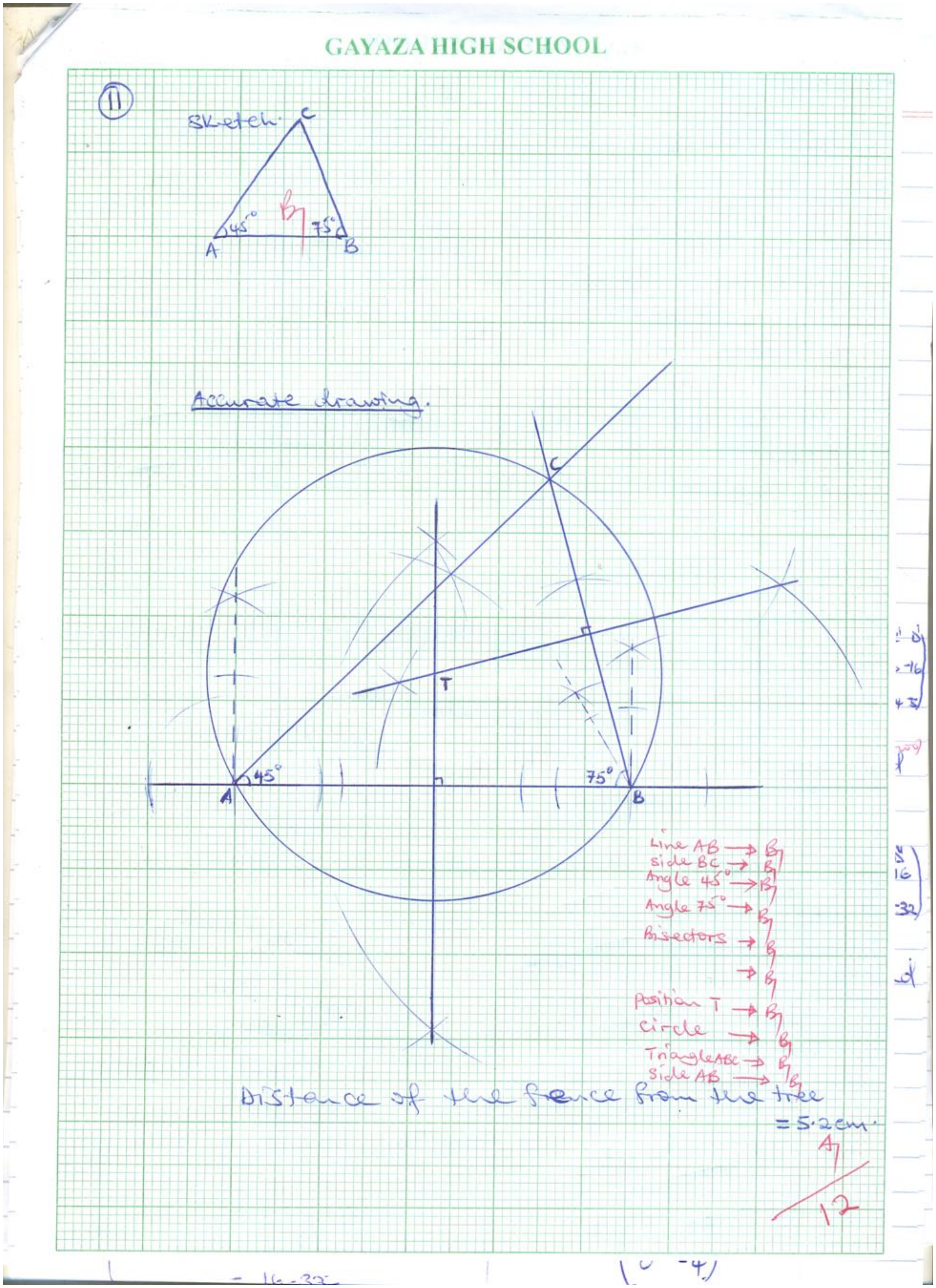
$$(x+32)(x-30) \quad = 0$$

$$x=30 \quad or \quad x=-32(Neglect\ \ this\ \ Negative\ value)$$

$$She\ recieved\ (30+2)\ items$$

$$\underline{\underline{=32\ items.}} \qquad A_1$$

11.


GAYAZA HIGH SCHOOL
Sketch
Accurate drawing.
Line AB → B1
side BC → B1
Angle 45° → B1
Angle 75° → B1
Bisectors → B1
→ B1
Position T → B1
Circle → B1
Triangle ABC → B1
Side AB → B1
Distance of the fence from the tree
= 5.2cm.
A1
12

12. (a)

$$x^2+x-12=x^2+x+\left(\frac{1}{2}\right)^2-\left(\frac{1}{2}\right)^2-12 \qquad M_1$$

$$=\left(x+\frac{1}{2}\right)^2-\frac{1}{4}-12$$

$$=\left(x+\frac{1}{2}\right)^2-\left(\frac{1+48}{4}\right) \qquad B_1$$

$$=\left(x+\frac{1}{2}\right)^2-\frac{49}{4} \qquad A_1$$

$\underline{Hence:}$

$$x^2+x-12=0$$

$$\Rightarrow\left(x+\frac{1}{2}\right)^2-\frac{49}{4}=0$$

$$\left(x+\frac{1}{2}\right)^2=\frac{49}{4} \qquad M_1$$

$$x+\frac{1}{2}=\pm\sqrt{\frac{49}{4}}$$

$$x=-\frac{1}{2}\pm\frac{7}{2}$$

$$x=-\frac{1}{2}+\frac{7}{2}\quad or\quad x=-\frac{1}{2}-\frac{7}{2}$$

$$x=\frac{6}{2}\quad or\quad x=\frac{-8}{2}$$

$$\underline{\underline{x=3\quad or\quad x=-4.}} \qquad A_1\ A_1$$

(b)

$$f(x)=\frac{x+5}{2},\qquad g(x)=\frac{1-3x}{3}$$

$$fg(x)=f[g(x)]$$

$$=\frac{\frac{1-3x}{3}+5}{2} \qquad M_1$$

$$fg(x)=\frac{1-3x+15}{6}$$

$$=\frac{16-3x}{6}$$

$$But \quad fg(x)=\frac{x^2+2x-20}{6}$$

$$\Rightarrow \frac{x^2+2x-20}{6}=\frac{16-3x}{6} \qquad B_1$$

$$x^2+5x-36=0$$

$$x^2+9x-4x-36=0 \qquad M_1$$

$$x(x+9)-4(x+9)=0$$

$$(x+9)(x-4)=0 \qquad B_1$$

$$x=4 \;\; or \;\; x=-9. \qquad A_1 \; A_1$$

13.

$$(a) \quad \begin{pmatrix} 0 & -2 \\ -2 & 0 \end{pmatrix}\begin{pmatrix} A & B & C & D \\ 4 & 12 & 12 & 4 \\ 0 & 0 & 8 & 8 \end{pmatrix}=\begin{pmatrix} A' & B' & C' & D' \\ 0 & 0 & -16 & -16 \\ -8 & -24 & -24 & -8 \end{pmatrix} \qquad M_1$$

$$A'(0,-8), \; B'(0,-24), \; C'(-16,-24) \;\; and \;\; D'(-16,-8) \qquad A_1 \; A_1$$

(b) (i)

$$\begin{pmatrix} 0 & -2 \\ 2 & 0 \end{pmatrix}\begin{pmatrix} A' & B' & C' & D' \\ 0 & 0 & -16 & -16 \\ -8 & -24 & -24 & -8 \end{pmatrix}=\begin{pmatrix} A'' & B'' & C'' & D'' \\ 16 & 48 & 48 & 16 \\ 0 & 0 & -32 & -32 \end{pmatrix} \qquad M_1$$

$$A''(16,0), \; B''(48,0), \; C'(48,-32) \;\; and \;\; D''(16,-32) \qquad A_1 \; A_1$$

$$(ii) \quad ABCD \xrightarrow{NM} A''B''C''D''$$

$$NM=\begin{pmatrix} 0 & -2 \\ 2 & 0 \end{pmatrix}\begin{pmatrix} 0 & -2 \\ -2 & 0 \end{pmatrix} \qquad M_1$$

$$=\begin{pmatrix} 4 & 0 \\ 0 & -4 \end{pmatrix} \qquad \det=-16 \qquad B_1$$

$$Inverse=\frac{1}{\det}(Adjo\,\text{int})=\frac{1}{-16}\begin{pmatrix} -4 & 0 \\ 0 & 4 \end{pmatrix}=\begin{pmatrix} \frac{1}{4} & 0 \\ 0 & \frac{-1}{4} \end{pmatrix} \qquad A_1$$

A single matrix that maps $A''B''C''D''$ back onto $ABCD$ is $\begin{pmatrix} \frac{1}{4} & 0 \\ 0 & -\frac{1}{4} \end{pmatrix}$

(ii) det of $\begin{pmatrix} 4 & 0 \\ 0 & -4 \end{pmatrix} = (4\times -4) - (0\times 0)$

$= -16$ B_1

Area of $A''B''C''D'' = 16\times 64$ M_1

$= 1024 cm^2$ A_1

14. Answer:

(a) Let x and y be the number of trips made by the pick-up and the lory respectively.

$x \geq 0$......(i)

$y \geq 0$......(ii) (A vehicle can not make negative trips)

$60x + 150y \geq 870$ (crates to be carried)

$2x + 5y \geq 29$.......(iii) (simplifying the above inequality) Inequalities $\rightarrow B_1\ B_1$

$20{,}000x + 25{,}000y \leq 220{,}000$ (C0st)

$4x + 5y \leq 44$.........(iv) (Simplified)

Since the pick-up makes more journeys than the lorry,

$\Rightarrow x > y$........(v)

(b) From $x \geq 0$......(i), the boundary line is $x = 0$ (solid line).

Points on the line include;

x	0	0
y	2	-2

Using (1,1) as the chosen point, $x = 1 > 0$, so (1,1) is in the wanted region.

From $y \geq 0$.....(ii), the boundary line is $y = 0$ (solid line)

Points on the line include:

x	1	4
y	0	0

Using (1,1) as the chosen point, $y = 1 > 0$, so (1,1) is in the wanted region.

From $2x + 5y \geq 29$......(iii), the boundary line is $2x + 5y = 29$ (solid)

Points on the line include:

$When\ y=3 \Rightarrow 2x+5(3)=29$

$2x=29-15$

$2x=14$

$x=7$

$When\ x=2 \Rightarrow 2(2)+5y=29$

$5y=29-4$

$5y=25$

$y=5$

B_1

x	7	2
y	3	5

Using $(0,0)$ *as the chosen point*, $2(0)+5(0)=0<29$ (*Not in aggreement with the inequality*), *so* $(0,0)$ *is in the unwanted region.*

From $4x+5y \le 44$.......(*iv*), *the boundary line is* $4x+5y=44$ (*solid*)

Points on the line include:

$When\ y=0 \Rightarrow 4x+5(0)=44$

$4x+0=44$ (11, 0)

$4x=44$

$x=11$

$When\ x=1 \Rightarrow 4(1)+5y=44$

$5y=44-4$ (1, 8)

$5y=40$

$y=8$

x	11	1
y	0	8

B_1

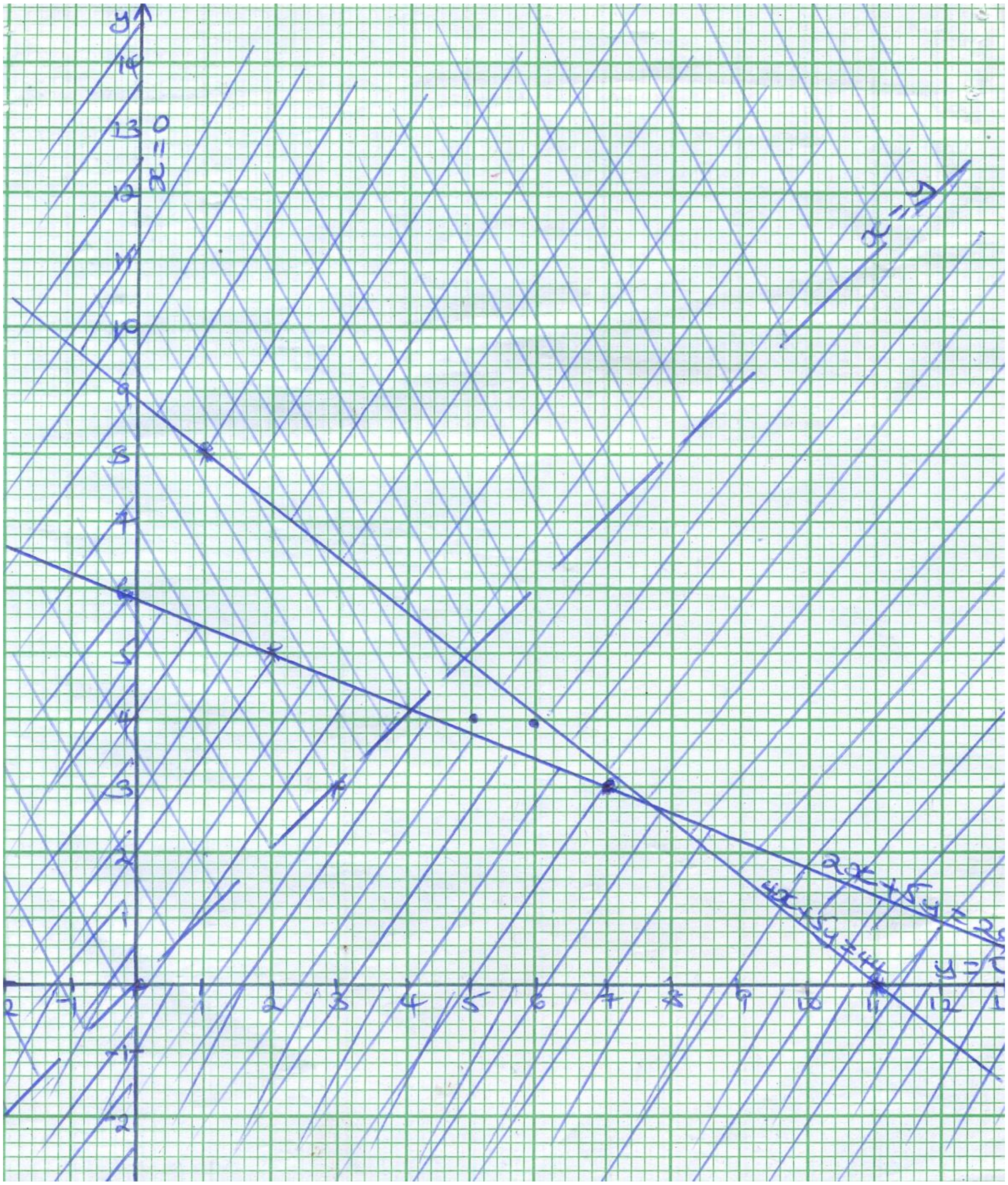
Using $(0,0)$ *as the chosen point*, $4(0)+5(0)=0<44$ (*It is in aggreement with the inequality*), *so* $(0,0)$ *is in the wanted region.*

From $x>y$.......(*v*), *the boundary line is* $x=y$ (*dotted line*)

Points on the line include:

x	0	3
y	0	3

Using $(1,2)$ *as the chosen point*, $x=1$ *and* $y=2 \Rightarrow 1<2$ (*Not in aggreement with the inequality*). *so* $(1,2)$ *is in the unwanted region.*



$Axes \rightarrow B_1$

$Lines \rightarrow B_1\ B_1\ B_1$

(c) Points in the feasible region (possible combinations) are; (5,4), (6,4) *and* (7,3).

$$Costs: \ (5,4) = 20{,}000 \times 5 + 25{,}000 \times 4 = 200{,}000/=$$

$$(6,4) = 20{,}000 \times 6 + 25{,}000 \times 4 = 220{,}000/= \qquad B_1$$

$$(7,3) = 20{,}000 \times 7 + 25{,}000 \times 3 = 215{,}000/=$$

So, in order to keep the transport costs as low as possible, the pick-up and the lorry should make 5trips and 4trips respectively. A_1

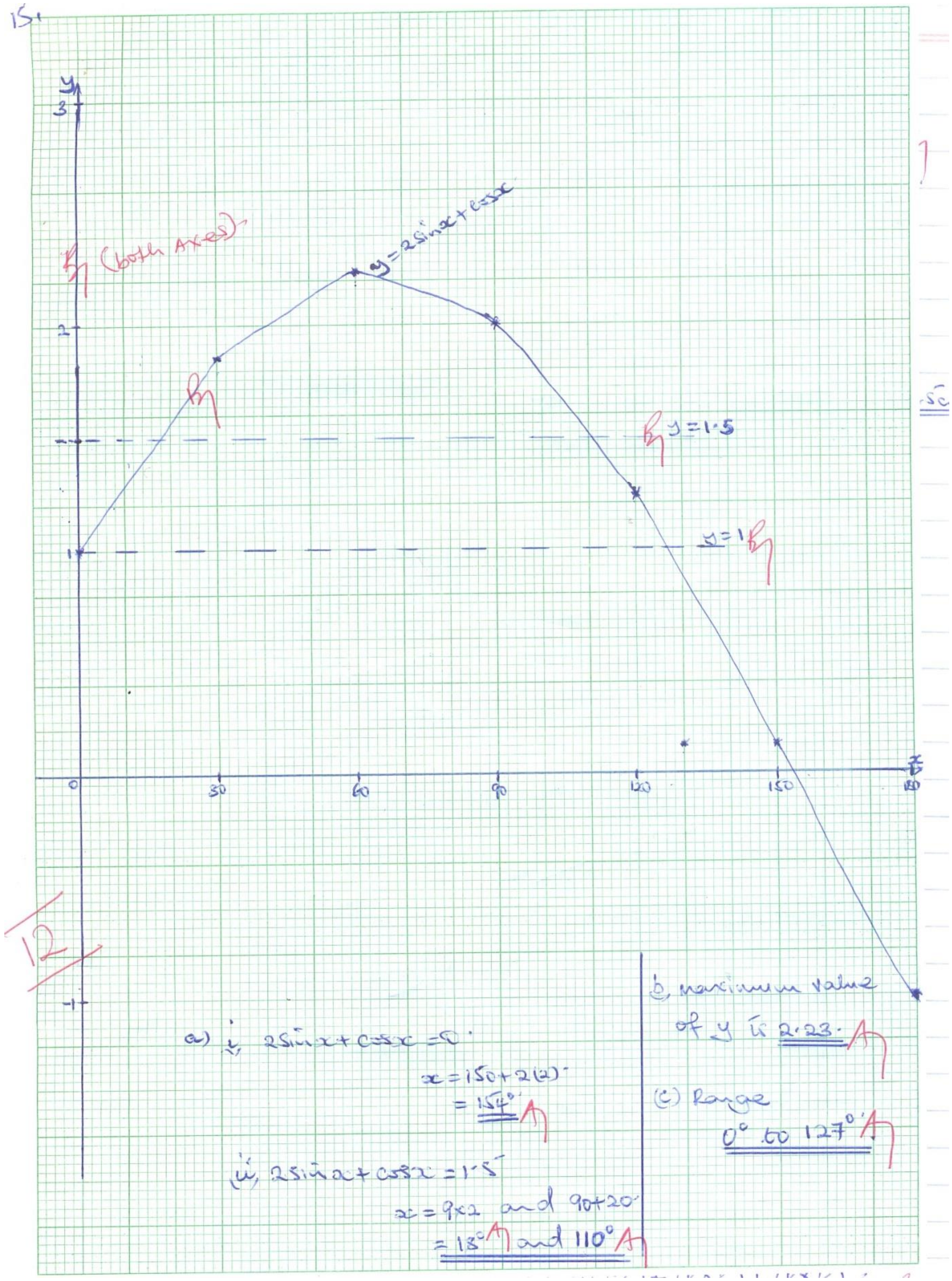
$$Amount\ saved = 220{,}000 - 200{,}000 \qquad M_1$$
$$= sh.20{,}000. \qquad A_1$$

$Note: Points\ on\ full\ (solid)\ lines\ are\ included\ in\ the\ feasible\ region\ while\ points\ on\ a\ dotted\ line\ are\ not\ in\ the\ feasible\ region.$

15.

x^0	0	30	60	90	120	150	180
$2\sin x$	0.000	1.000	1.732	2.000	1.732	1.000	0.000
$\cos x$	1.000	0.866	0.500	0.000	-0.500	-0.866	-1.000
$y = 2\sin x + \cos x$	1.000	1.866	2.232	2.000	1.232	0.134	-1.000

$Last\ 3\ rows\ B_1\ B_1\ B_1$


15.
y
3
2
1
-1
y = 2sin x + cos x
B1 (both Axes)
B1
B1 y = 1.5
y = 1 B1
0
30
60
90
120
150
180
x
12
a) i, 2sin x + cos x = 0.
x = 150 + 2(2)
= 154° A1
ii, 2sin x + cos x = 1.5
x = 9x2 and 90+20
= 18° A1 and 110° A1
b, maximum value of y is 2.23. A1
(c) Range
0° to 127° A1

16.

$(a)(i) \quad V \alpha\, r^2 h$

$V = kr^2 h$

$V = 616,\ r = 7\ \ and\ \ h = 12$ $\qquad M_1$

$616 = k \times 7^2 \times 12$

$k = \frac{22}{21}$

$V = \frac{22}{21} r^2 h$ $\qquad B_1$

$when\ r = 3.5cm\ \ \ and\ \ h = 9cm$

$V = \frac{22}{21} \times 3.5^2 \times 9$

$= 115.5cm^3$ $\qquad A_1$

$(ii)\ New\ \ radius = \frac{130}{100} \times 3.5\ =\ 4.55cm$

$New\ Volume = \frac{22}{21} \times 4.55^2 \times 9 = 195.195cm$ $\qquad B_1$

$Change\ in\ V = 195.195 - 115.5 = 79.695cm^2$ $\qquad B_1$

$\%age\ change\ in\ V = \frac{79.695}{115.5} \times 100$

$= 69\%$ $\qquad A_1$

$(iii)\ r = 10cm\ \ \ and\ h = 4cm$

$New\ volume = \frac{22}{21} \times 10^2 \times 4$

$= 419.0476cm^3$ $\qquad B_1$

$Change\ in\ volume = 419.0476 - 115.5$ $\qquad M_1$

$= 303.5476cm^3$ $\qquad A_1$

16b)

$Let\ Kansime's\ \ weight\ be\ x,\ \ Dad\ is\ y\ \ and\ \ Mum\ is\ \ z$

$x + y = 117..............(i)$

$x + z = 88.................(ii)$ $\qquad B_1$

$y + z = 161...............(iii)$

$From\ (i) \Rightarrow x = 117 - y.........(iv)$

$Substitute\ eqn\ (iv)\ into\ eqn\ (ii) \Rightarrow 117 - y + z = 88$

$y - z = 29.....(\otimes)$

$$y - z = 29 \ldots\ldots\ldots.(\otimes)$$
$$y + z = 161 \ldots\ldots..(iii)$$
$$\otimes + (iii) \Rightarrow 2y = 190 \qquad M_1$$
$$y = 95kg$$

$$From\ \ eqn\,(iv) \Rightarrow x = 22kg$$
$$From\ \ eqn\ (iii)\quad 95 + z = 161$$
$$z = 66kg$$

$$Total\ \ weight\ \ of\ \ Mum,\ \ Dad\ \ and\ \ Kansime = 95 + 22 + 66$$
$$= 183\,kg \qquad A_1$$

17 (a) Modal class is 40-49 A_1

Class boundaries	Class limit	Freq	Mid-value (x)	fx	Cumm.Freq.
19.5-29.5	20-29	3	24.5	73.5	3
29.5-39.5	30-39	7	34.5	241.5	10
39.5-49.5	40-49	16	44.5	712	26
49.5-59.5	50-59	14	54.5	763 B_1	40
59.5-69.5	60-69	6	64.5	387	46
69.5-79.5	70-79	3	74.5	223.5	49
79.5-89.5	80-89	1	84.5	84.5	50
		$\Sigma f = 50$		$\Sigma fx = 2485$	

B_1 B_1 B_1 B_1 B_1 B_1

$$(c)\ \ (i)\ \ Mean\ mark = \frac{\Sigma fx}{\Sigma f}$$
$$= \frac{2485}{50} \qquad M_1$$
$$= 49.7 \qquad A_1$$

$$(ii)\ \ median = L_{m_e} + \left(\frac{\frac{N}{2} - C_{fb}}{f_m} \right) \times i$$

$$= 39.5 + \left(\frac{\frac{50}{2} - 10}{16} \right) \times 10 \qquad M_1$$

$$= 39.5 + 9.375$$

$$= \underline{\underline{48.875}} \qquad A_1$$

END

S.4 MATHEMATICS

456/1

TIME : 2 HOURS 30 MINUTES

INSTRUCTIONS

- *Answer* ***all*** *questions in section A and* ***only five*** *from section B.*
- *All necessary calculations must be done on the same page as the rest of the answer.*
- *Only silent non – programmable scientific calculators may be used.*
- *No paper should be given for rough work.*

SECTION A

1. Solve for x in $32^{\frac{3}{5}} \div x^{\frac{1}{2}} = 2.$ (4 marks)

2. Evaluate; $\dfrac{1\frac{1}{5}+4\frac{1}{2}\div 1\frac{1}{2}}{3\frac{3}{5}-2\frac{2}{5}\times 1\frac{1}{4}}.$ (4marks)

3. Given that the scale of a map is 1 : 250,000, find the length of a horizontal road on the map whose length on the ground is 66.25km long. (4marks)

4. Two quantities y and x are related by the equation $y = a + bx.$ When $y = 4,\ x = 2$ and when $y = 6,\ x = 4$. Find the values of a and b. (4 marks)

5. A coin is tossed and a die is thrown. What is the probability of obtaining a head on the coin and an even number on the die? (4 marks)

6. Factorise completely: $3x^2 + 2xy - 8y^2$. (4 marks)

7. Solve the inequality $x^2 - x - 6 \le 0$ and represent the solution set on the number line. (4 marks)

8. Express $0.31466\ldots$ in the form $\dfrac{p}{q}$ and find the values of p and q. (4 marks)

9. An object whose area is $30\ \text{cm}^2$ is mapped onto its image by the transformation matrix $\begin{pmatrix} 3 & 2 \\ 4 & 7 \end{pmatrix}$. Calculate the area of the image. (4 marks)

10. Macheso paid shs 480 to purchase a certain number of items, but the nice vender gave her two extra. This decreased the price per item by shs1. How many items did she receive (including the two extra)? (4 marks)

SECTION B

11. Tom wishes to clear a triangular plot ABC on his piece of land in which $\overline{AB} = 9.2cm$, angle $CAB = 45^0$ and angle $ABC = 75^0$.
(a) Construct a plan for this plot.
(b) Find the position of a tree T on the plot which is equidistant from all the three vertices.
(c) On the plan show the possible position of the fence made equidistant from point T, touching the three vertices and covering the whole plot. Hence determine the distance of the fence from the tree. (12 marks)

12. a) Express $x^2 + x - 12$ in the form $(x+p)^2 + q$ where p and q are constants. Hence solve the equation $x^2 + x - 12 = 0$. (6marks)

b) Given that $f(x) = \frac{x+5}{2}$ and $g(x) = \frac{1-3x}{3}$, determine the values of x for which $fg(x) = \frac{x^2 + 2x - 20}{6}$. (6marks)

13. ABCD is a square with vertices A(4,0), B(12,0), C(12,8) and D(4,8). $A'B'C'D'$ is the image of ABCD under the transformation whose matrix is **M** = $\begin{pmatrix} 0 & -2 \\ -2 & 0 \end{pmatrix}$.

(a) Find the coordinates of $A'B'C'$ and D'.

(b) $A''B''C''D''$ is the image of $A^1B^1C^1D^1$ under transformation whose matrix is **N**=$\begin{pmatrix} 0 & -2 \\ 2 & 0 \end{pmatrix}$.

Find: (i) the coordinates of $A''B''C''$ and D''

(ii) the matrix of a single transformation that maps $A''B''C''D''$ back onto ABCD.

(iii) the area of the $A''B''C''D''$ given that the area of ABC is $64cm^2$.

(12marks)

14. Gayaza High School canteen wishes to transport 870 crates of soda from a Coca cola factory at Namanve. It has a lorry which can carry 150 crates at a time and a pick-up truck which can carry 60 crates at a time. The cost of each journey for the lorry is sh.25, 000 and for the pick-up sh. 20,000. The pick-up makes more journeys than the lorry because it travels faster. The amount of money available for transporting soda is sh.220, 000.
    (a) Write down five inequalities representing the above information.
    (b) Plot a graph for the inequalities, shading out the unwanted regions.
    (c) How many journeys should the lorry and pick-up make so as to keep the transport cost as low as possible. Hence state how much money the canteen saves by making these journeys. (12 marks)

15. Draw the graph of $y = 2\sin x + \cos x$ for $0^0 \leq x \leq 180^0$, taking 1cm to 10^0 on x – axis and 5cm to 1 unit on y – axis, Use the graph:

    (a) Solve the equations (i) 2sin x + cos x = 0

    (ii) 2sin x + cos x = 1.5

    (b) Find the maximum value of y.

    (c) State the range of x for which $y \geq 1$.

(12 marks)

16. (a) The volume *(V)* of a cone varies jointly with its height (h) and the square of its radius(r). If $V=616\ cm^3$ when $r = 7$ and $h = 12\ cm$.

    Calculate: (i) the volume V when $r = 3.5\ cm$ and $h = 9\ cm$. *(3 marks)*

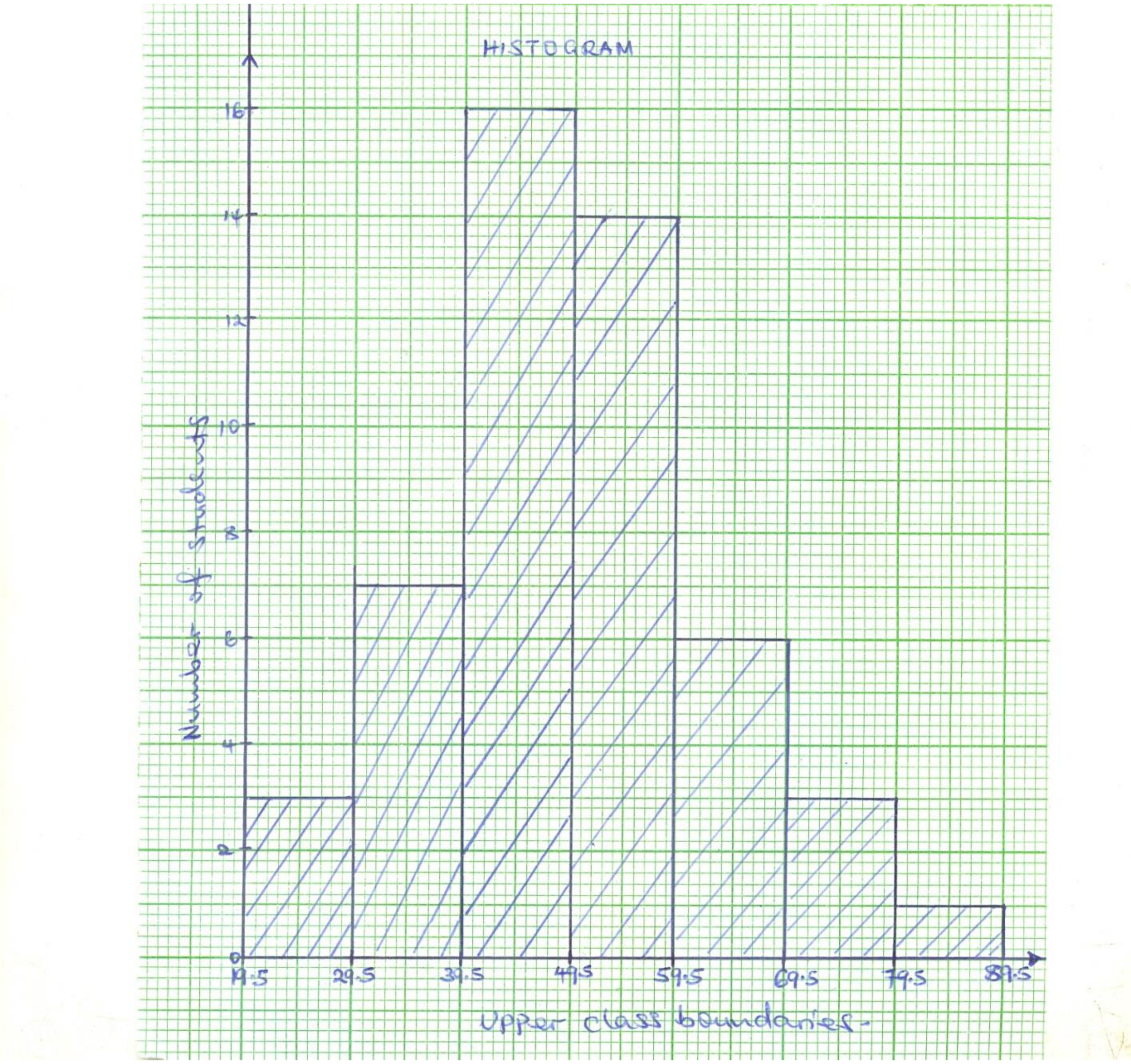
    (ii) the percentage change in V, when r increases by *30%* . *(3 marks)*

    (iii) the change in volume V, when r increases to *10* and h decreases to *4 cm.*

    (3 marks)

(b) Kansime and her Dad have a total weight of 117kg. Kansime and her Mum together weigh 88kg. Mum and Dad together weigh 161kg. What is the total weight of Mum, Dad and Kansime? (3 marks)

17. The graph below is a histogram showing the marks scored by 50 students in a mathematics test.



(a) State the modal class.

(b) Use the histogram to construct a grouped frequency distribution table.

(c) Calculate: (i) the mean mark,

ii) the median mark. (12 marks)

END