

**BLANTYRE SECONDARY SCHOOL
2026 JUNIOR CERTIFICATE OF EDUCATION
CLUSTER MOCK EXAMINATION**

MATHEMATICS

(100 Marks)

Date : February 2026

Subject number: J131

Time allowed: 2 hours

Instructions

1. This paper contains **14** pages. Please check.
2. Attempt **all** the **20** questions in this paper
3. The maximum number of marks for each answer is indicated against each question.
4. Write your **name** at the top of each page of your question paper in the spaces provided.
5. Scientific calculators may be used.
6. Write your answers in the spaces provided on this paper
7. All working must be clearly shown
8. In the table provided on this page, tick against the question number you have answered.

Question number	Tick if answered	Do not write in these columns	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Turn over



Answer all the twenty questions in the spaces provided under each question.

1. a. Given that $b = 4$, $x = -\frac{1}{2}$, $n = 2$ and $d = -\frac{1}{3}$. Evaluate $b(x^n - d)$

$$\begin{aligned}
 & b(x^n - d) \\
 \Rightarrow & 4\left[\left(-\frac{1}{2}\right)^2 - \left(-\frac{1}{3}\right)\right] \Rightarrow \frac{28}{12} \\
 \Rightarrow & 4\left[\frac{1}{4} + \frac{1}{3}\right] \text{ M1} \Rightarrow \frac{7}{3} \text{ A1} \\
 \Rightarrow & 4\left[\frac{3+4}{12}\right] \\
 \Rightarrow & 4\left[\frac{7}{12}\right] \text{ M1}
 \end{aligned}$$

[3 marks]

b. Simplify $1432_5 - 233_4 + 5632_7$, giving your answer in base 6.

$$1432_5 - 233_4 + 5632_7$$

Convert to base 10

$$\begin{aligned}
 1432_5 &= 1(5^3) + 4(5^2) + 3(5^1) + 2(5^0) \\
 &= 125 + 100 + 15 + 2 \\
 &= 242_{10} \quad \text{M1}
 \end{aligned}$$

233_4 to base 10

$$\begin{aligned}
 233_4 &= 2(4^2) + 3(4^1) + 3(4^0) \\
 &= 32 + 12 + 3 \\
 &= 47_{10} \quad \text{M1}
 \end{aligned}$$

5632_7 to base 10

$$\begin{aligned}
 5632_7 &= 5(7^3) + 6(7^2) + 3(7^1) + 2(7^0) \\
 &= 1715 + 294 + 21 + 2 \\
 &= 2032 \quad \text{M1}
 \end{aligned}$$

In base 10

$$\begin{aligned}
 \Rightarrow & 242 - 47 + 2032 \\
 &= 2227_{10}
 \end{aligned}$$

Now convert 2227_{10} to base 6

$$\begin{aligned}
 2227 \div 6 &= 371 \text{ r } 1 \\
 371 \div 6 &= 61 \text{ r } 5 \\
 61 \div 6 &= 10 \text{ r } 1 \\
 10 \div 6 &= 1 \text{ r } 4 \quad \text{M1} \\
 1 \div 6 &= 0 \text{ r } 1
 \end{aligned}$$

Bottom up

$$2227_{10} = 14151_6 \text{ A1}$$

[5 marks]



2. Two sets A and B are such that;

Set A = {odd numbers between 1 and 10} and

Set B = {prime numbers between 1 and 10}

a) Represent the information on a Venn diagram

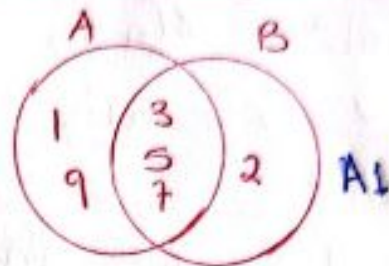
Set A = {odd numbers from 1 to 10}

A = {1, 3, 5, 7, 9} M₁

Set B = {prime numbers from 1 to 10}

B = {2, 3, 5, 7} M₁

Venn Diagram



[3 marks]

b) Calculate the number of subsets for the intersection

Intersection $\Rightarrow A \cap B = 3$ M₁

$\therefore$ Number of subsets $\Rightarrow 2^3 = 8$ A1

There are 8 subsets from the Intersection [2 marks]

3. a. Make d subject of the formula given that $y = x(a + 2\frac{n}{d})$

$$y = x(a + 2\frac{n}{d})$$

$$y = x(a + \frac{2n}{d})$$

$$y = ax + \frac{2nx}{d}$$

$$d(y - ax) = \frac{2nx}{d} \times d \quad M_1$$

$$\frac{d(y - ax)}{(y - ax)} = \frac{2nx}{(y - ax)} \quad M_1$$

$$\therefore d = \frac{2nx}{y - ax} \quad A1$$

[3 marks]

b. Simplify the expression $\frac{2a-2b}{8ab^2} \div \frac{5a-5b}{-20a^3b}$

$$\frac{2a-2b}{8ab^2} \div \frac{5a-5b}{-20a^3b}$$

$$\frac{2(a-b)}{8ab^2} \times \frac{-20a^3b}{5(a-b)} \quad M_1$$

$$\frac{\cancel{2}}{8ab^2} \times -4a^3b$$

$$\frac{1}{4ab^2} \times -4a^3b \quad M_1$$

$$-\frac{\cancel{4}a^3b}{4ab^2} \quad M_1$$

$$-\frac{a^2}{b} \quad A_1$$

[4 marks]

4. For the AP 17, 13, 9 ... Find

a. The formula for the n^{th} term

AP: 17, 13, 9, ...

$$a = 17$$

$$d = 13 - 17$$

$$d = -4 \quad M_1$$

Formular for n^{th} term

$$T_n = a + (n-1)d \quad M_1$$

$$T_n = 17 + (n-1)(-4)$$

$$T_n = 17 - 4n + 4 \quad M_1$$

$$T_n = 21 - 4n \quad A_1$$

[4 marks]

b. The 5th term

5th term

$$T_n = 21 - 4n$$

$$T_5 = 21 - 4(5) \quad M_1$$

$$T_5 = 21 - 20 \quad M_1$$

$$T_5 = 1 \quad A_1$$

[3 marks]

5. Hilla puts 6 Green marbles, 4 Pink marbles, and 8 Red marbles in a container and he picks one marble at random. Calculate the probability that he did not pick a Red and a Pink marble.

$$\text{Total marbles} = 6 + 4 + 8 = 18$$

Did not pick a Red and Pink marbles = Pick a Green marble only
Favorable outcome (Green) = 6

$$P(\text{Green}) = \frac{6}{18} = \frac{1}{3}$$

$\therefore$ The probability of picking Green = $\frac{1}{3}$

[3 marks]

6. Lalla works as a financial controller and earns K500,000 per month. She is allowed K80,000 tax free per month. If she pays 35% income tax per month on the remaining amount. Calculate the total amount of money she gets after tax in a year.

Step 1: Calculate the taxable income/month

Taxable income = Monthly Salary - Tax free

$$\text{Taxable income} = \text{K}500,000 - \text{K}80,000$$

$$\text{Taxable Income} = \text{K}420,000$$

Step 2: Calculate the tax per month

$$\text{Tax} = 35\% \times \text{K}420,000$$

$$\text{Tax} = \text{K}147,000$$

$$\Rightarrow \text{Monthly Tax} = \text{K}147,000$$

Step 3: Calculate Monthly Income after tax

$\Rightarrow$ Monthly Salary - Tax

$$\text{K}500,000 - \text{K}147,000$$

$$\Rightarrow \text{K}353,000$$

Step 4: Calculate Yearly Income after tax

$$\text{K}353,000 \times 12 \text{ months (a year)}$$

$$\text{K}4,236,000$$

$\therefore$ After tax, Lalla gets K4,236,000 in a year.

[4 marks]

NB: This paper contains 14 printed pages...Hjt



b. Simplify the expression $\frac{2a-2b}{8ab^2} \div \frac{5a-5b}{-20a^3b}$

$$\frac{2a-2b}{8ab^2} \div \frac{5a-5b}{-20a^3b}$$

$$\frac{2(a-b)}{8ab^2} \times \frac{-20a^3b}{5(a-b)} \quad M_1$$

$$\frac{2}{8ab^2} \times -4a^3b$$

$$\frac{1}{4ab^2} \times -4a^3b \quad M_1$$

$$-\frac{4a^3b}{4ab^2} \quad M_1$$

$$-a^2/b \quad A_1$$

[4 marks]

4. For the AP 17, 13, 9 ... Find

a. The formula for the n^{th} term

AP: 17, 13, 9, ...

$$a = 17$$

$$d = 13 - 17$$

$$d = -4 \quad M_1$$

Formular for n^{th} term

$$T_n = a + (n-1)d \quad M_1$$

$$T_n = 17 + (n-1)(-4)$$

$$T_n = 17 - 4n + 4 \quad M_1$$

$$T_n = 21 - 4n \quad A_1$$

[4 marks]

b. The 5th term

5th term

$$T_n = 21 - 4n$$

$$T_5 = 21 - 4(5) \quad M_1$$

$$T_5 = 21 - 20 \quad M_1$$

$$T_5 = 1 \quad A_1$$

[3 marks]

5. Hilla puts 6 Green marbles, 4 Pink marbles, and 8 Red marbles in a container and he picks one marble at random. Calculate the probability that he did not pick a Red and a Pink marble.

$$\text{Total marbles} = 6 + 4 + 8 = 18$$

Did not pick a Red and Pink marbles = Pick a Green marble only
Favorable outcome (Green) = 6

$$P(\text{Green}) = \frac{6}{18} = \frac{1}{3}$$

∴ The probability of picking Green = $\frac{1}{3}$

[3 marks]

6. Lalla works as a financial controller and earns K500,000 per month. She is allowed K80,000 tax free per month. If she pays 35% income tax per month on the remaining amount. Calculate the total amount of money she gets after tax in a year.

Step 1: Calculate the taxable income/month

$$\text{Taxable income} = \text{Monthly Salary} - \text{Tax free}$$

$$\text{Taxable income} = \text{K}500,000 - \text{K}80,000$$

$$\text{Taxable Income} = \text{K}420,000$$

Step 2: Calculate the tax per month

$$\text{Tax} = 35\% \times \text{K}420,000$$

$$\text{Tax} = \text{K}147,000$$

$$\Rightarrow \text{Monthly Tax} = \text{K}147,000$$

Step 3: Calculate Monthly Income after tax

$$\Rightarrow \text{Monthly Salary} - \text{Tax}$$

$$\text{K}500,000 - \text{K}147,000$$

$$\Rightarrow \text{K}353,000$$

Step 4: Calculate Yearly Income after tax

$$\text{K}353,000 \times 12 \text{ months (a year)}$$

$$\text{K}4,236,000$$

∴ After tax, Lalla gets K4,236,000 in a year.

[4 marks]

NB: This paper contains 14 printed pages...Hjt



7. The difference between the square of x times 9 and 42 times the ~~number~~ ^{x} is -49. Find the ~~number~~ ^{x} in fraction form.

Step 1: Translation into an equation

Square of $x = x^2$ times 9 = $9x^2$ M1

42 times the number = $42x$ M1

The difference is -49

$\Rightarrow 9x^2 - 42x = -49$ M1

Step 2: Move all terms to one side

$9x^2 - 42x + 49 = 0$

$(3x-7)(3x-7) = 0$ M1

$\sqrt{(3x-7)^2} = 0$ M1

$\frac{3x}{3} = \frac{7}{3}$

$x = \frac{7}{3}$ A1

$\therefore$ The value of x in fraction form is $\frac{7}{3}$

[6 marks]

8. Two angles x and y are such that their sum makes a complementary angle and the sum of x and ~~three~~ ^{six} times y give a supplementary angle. Find the angles given by variables x and y .

This is a Simultaneous Equation

$x + y = 90^\circ$ (complementary angle) ... (i)

$x + 6y = 180^\circ$ (Supplementary angle) ... (ii)

M1

Students will use Substitution or Elimination

$x = 90^\circ - y$... (iii)

Sub. x for $90 - y$ in eqn ii

Eqn ii $\Rightarrow x + 6y = 180^\circ$

$(90^\circ - y) + 6y = 180^\circ$ M1

$90^\circ - y + 6y = 180^\circ$

$+ 5y = 180^\circ - 90^\circ$

$\frac{5y}{5} = \frac{90^\circ}{5}$

$y = 18^\circ$

$y = 18^\circ$ M1

Sub y for 18° in eqn iii

Eqn iii $\Rightarrow x = 90^\circ - y$

$x = 90^\circ - 18^\circ$

$x = 72^\circ$ M1

$\therefore x = 72^\circ$

$y = 18^\circ$

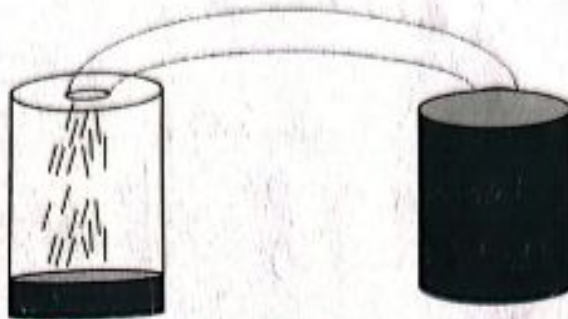
A1

[5 marks]

NB: This paper contains 14 printed pages...Hjt



9. Figure 1 shows a 4m long pipe with a diameter of 140cm being used to draw water from one drum to the other. Find the area of the pipe in metres, to 3sf
(Take π as $\frac{22}{7}$)



Students should know that a pipe is a cylinder open at both ends and $A = 2\pi rh$ M1
where r = radius
 h = height

In metres, $140\text{cm} = \frac{140}{100} = 1.4\text{m}$ M1

but $1.4\text{m} = \text{diameter}$

$$\Rightarrow r = \frac{1.4\text{m}}{2} \text{ M1}$$

$$r = 0.7\text{m}$$

10. The interior angle of a regular polygon is $6\frac{1}{2}$ times the exterior angle. How many sides has the polygon?

$$\text{Interior} = 6\frac{1}{2} \times \text{exterior}$$

For a regular polygon

$$\text{Each Interior angle} = \frac{(n-2) \times 180^\circ}{n}$$

$$\text{Exterior angle} = \frac{360^\circ}{n} \text{ M1}$$

$$\Rightarrow \text{Interior} = \frac{13}{2} \text{ exterior means}$$

$$n \times \left[\frac{180^\circ(n-2)}{n} \right] = \frac{13}{2} \left(\frac{360^\circ}{n} \right) \times n \text{ M1}$$

$\Rightarrow$ Area of the pipe will be given as

$$A = 2\pi rh$$

$$A = 2 \times \frac{22}{7} \times 0.7 \times 4 \text{ M1}$$

$$A = \frac{44}{7} \times 2.8 \text{ m}^2$$

$$A = 2 \times 8.8 \text{ m}^2$$

$$A = 17.6 \text{ m}^2 \text{ A1}$$

$\therefore$ The area of the pipe is 17.6 m^2 [5 marks]

$$180^\circ(n-2) = 13(180^\circ)$$

$$180^\circ(n-2) = 4140^\circ$$

$$180^\circ(n-2) = 13(180^\circ)$$

$$\frac{180^\circ(n-2)}{180^\circ} = \frac{2340^\circ}{180^\circ} \text{ M1}$$

$$n-2 = 13$$

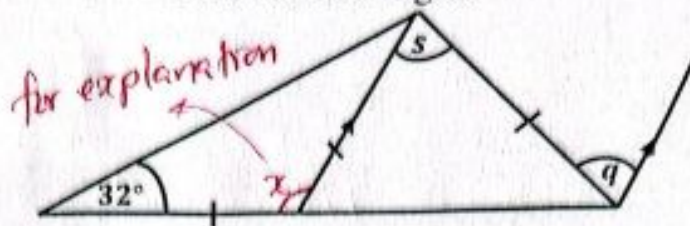
$$n = 13 + 2$$

$$\therefore n = 15 \text{ A1}$$

$\Rightarrow$ The polygon has 15 sides.

[4 marks]

11. Figure 2 shows a diagram of two triangles and an angle outside these triangles. Find the sizes of the marked angles.



Base angles of isosceles Δ
 $32^\circ + 32^\circ + x = 180^\circ$ ($\angle$ sum of Δ)

$$x = 180^\circ - 64^\circ$$

$$x = 116^\circ \text{ M1}$$

$$180^\circ - 116^\circ = 64^\circ$$

$\angle s$ appears in another isosceles Δ

$$\Rightarrow 64^\circ + 64^\circ + s = 180^\circ \text{ M1}$$

$$s = 180^\circ - 128^\circ$$

$$s = 52^\circ$$

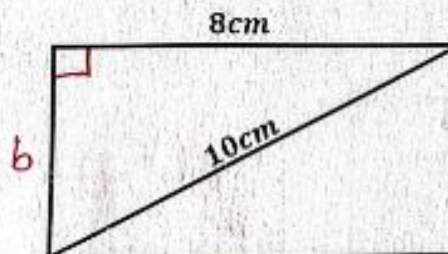
$$s = q \text{ (alt. } \angle s) \text{ M1}$$

$$\therefore s = 52^\circ$$

$$q = 52^\circ \text{ A1}$$

[4 marks]

12. Figure 3 is a rectangle whose length is 8cm and its diagonal is 10cm. Find the difference between the area and the perimeter of the rectangle.



$$b^2 = (10\text{cm})^2 - (8\text{cm})^2$$

$$b^2 = 100\text{cm}^2 - 64\text{cm}^2$$

$$b^2 = 36\text{cm}^2$$

$$b = 6\text{cm} \text{ M1}$$

$$A = lb$$

$$A = 8\text{cm} \times 6\text{cm}$$

$$A = 48\text{cm}^2 \text{ M1}$$

$$P = 2(l+b)$$

$$P = 2(8\text{cm} + 6\text{cm})$$

$$P = 2(14\text{cm})$$

$$P = 28\text{cm} \text{ M1}$$

The difference

Area - Perimeter

$$48 - 28$$

The difference is 20 A1

[4 marks]

NB: This paper contains 14 printed pages...Hjt

13. Given that $\log 3 = 0.4771$ without using a calculator, find $\log 3^2$

$$\begin{array}{l|l|l} \log 3^2 & 2(0.4771) & \therefore \log 3^2 = 1.4313 \\ 2 \log 3 \text{ M1} & 1.4313 & \text{A1} \end{array}$$

[2 marks]

14. If the mean for the set of data given by 3, 5, 2x, 6, 7 and 9 is 6.
Find the mode.

$$\text{Mean} \Rightarrow \frac{3+5+2x+6+7+9}{6} = 6 \quad \text{M1}$$

$$6 \times (2x+30) = 6 \times 6$$

$$2x+30 = 36$$

$$2x = 36 - 30$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$x = 3 \text{ M1}$$

Set of data 3, 5, 2x, 6, 7, 9 becomes

$$3, 5, 2(3), 6, 7, 9 \text{ M1}$$

$$3, 5, 6, 6, 7, 9$$

$$\Rightarrow \text{The mode} = 6 \text{ A1}$$

[4 marks]

15. Desire wants to buy a sneaker, she goes into a shop, the seller tells her that each sneaker costs x . She asks for a discount and the seller replies to say; for a discount, you take away 5 from two-thirds of the original price per sneaker. Desire notices that after the discount the final price per sneaker is less than 7. Find the possible original price

$$\frac{2}{3}x - 5 < 7 \text{ M1}$$

$$\frac{2}{3}x < 5 + 7 \text{ M1}$$

$$2 \times \frac{2}{3}x < 12 \times 3 \text{ M1}$$

$$\frac{4x}{2} < \frac{36}{2} \text{ M1}$$

$$x < 18 \text{ A1}$$

$\therefore$ The possible ^{original} price is less than 18

[5 marks]

16. Lille insured her car at a cost of K4, 000,000 at 70% premium in case of accident. After an accident Lille claimed her compensation which she was given. She then invested the money at 35% simple interest p.a. How much money will she make from the compensation in 4 years?

Compensation = 70% of K4,000,000

Compensation = K2,800,000 M1

Compensation was invested @ 35% simple interest p.a.

$$A = \frac{PTR}{100} \quad M1$$

Principal = K2,800,000

Time = 4 year M1

Rate = 35%

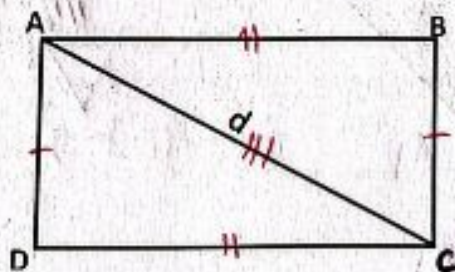
$$A = \frac{K2,800,000 \times 4 \times 35\%}{100\%} \quad M1$$

$$A = K3,920,000 \quad A1$$

∴ Lille will make K3,920,000 from her compensation in 4 years after she invests it.

[5 marks]

17. Figure 4 shows a rectangle with two triangles. Show that the two triangles are equal and right angles.



Triangle ABC and Triangle ADC

Step 1 Equality

$$AB = DC \quad \left\{ \begin{array}{l} \text{sides of a rectangle} \end{array} \right\} \quad M1$$

$$BC = AD$$

$$AC = AC \text{ (common)}$$

$$\therefore \triangle ABC \equiv \triangle ADC \text{ (SSS)} \quad M1$$

Step 2: Right angles

$$\text{In } \triangle ABC, \angle ABC = 90^\circ \text{ (}\angle \text{ in a rectangle)}$$

$$\text{In } \triangle ADC, \angle ADC = 90^\circ \text{ (} \parallel \text{)} \quad M1$$

⇒ In $\triangle ABC$

$$d^2 = (AB)^2 + (BC)^2$$

In $\triangle ADC$

$$d^2 = (AD)^2 + (DC)^2$$

Since $d^2 = d^2$ (Equal side) M1

⇒ $\triangle ABC$ and ADC are right $\angle$ s

[5 marks]

18. By taking 2cm to represent 1 unit on the x -axis and 2cm to represent 2 units on the y -axis. Solve the simultaneous equation given by $3x + y = 6$ and $6x - y = 3$ by graphical method.

$$3x + y = 6$$

x	0	2
y	6	0

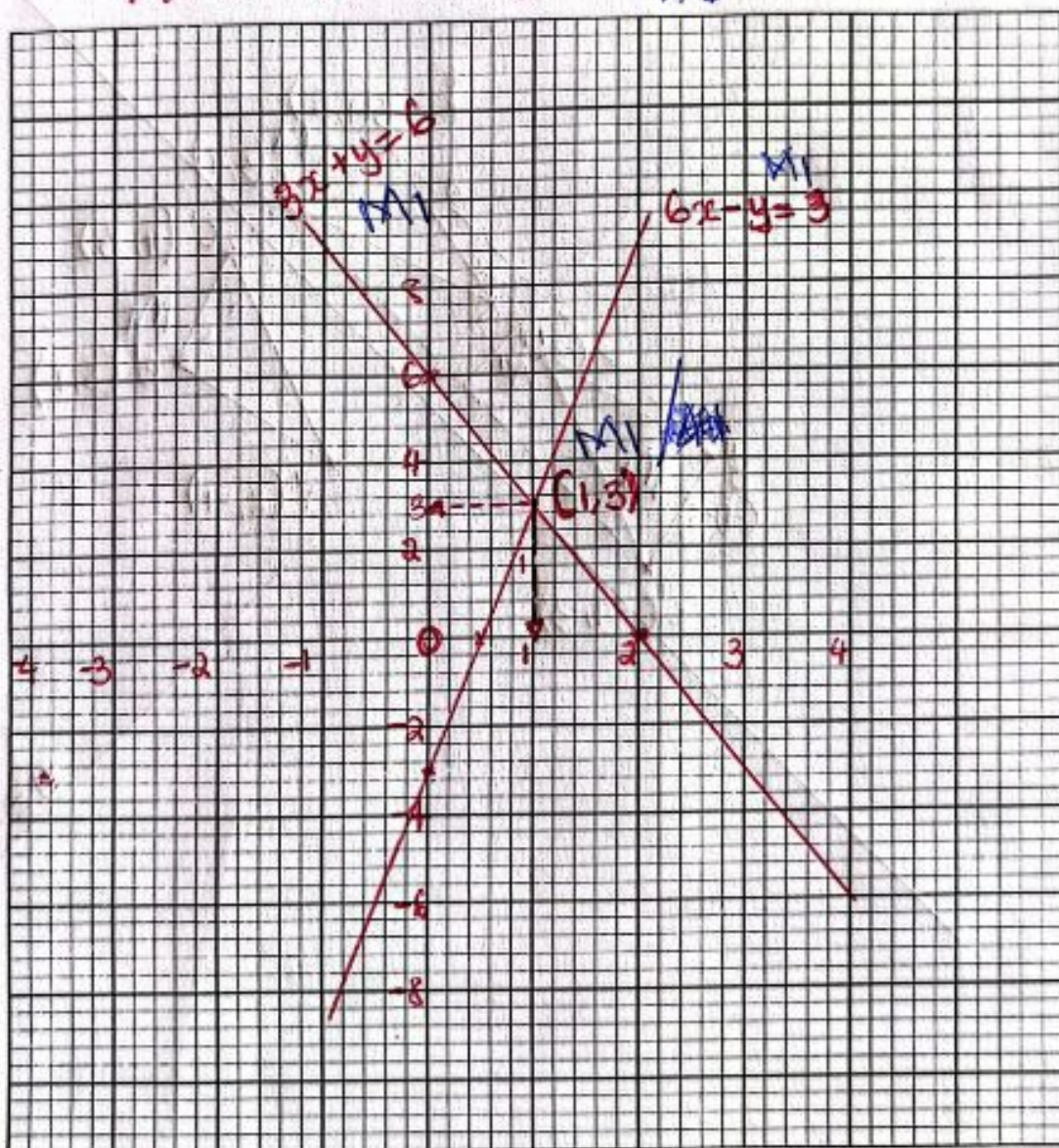
 M_1

$$6x - y = 3$$

x	0	$\frac{1}{2}$
y	-3	0

 M_1

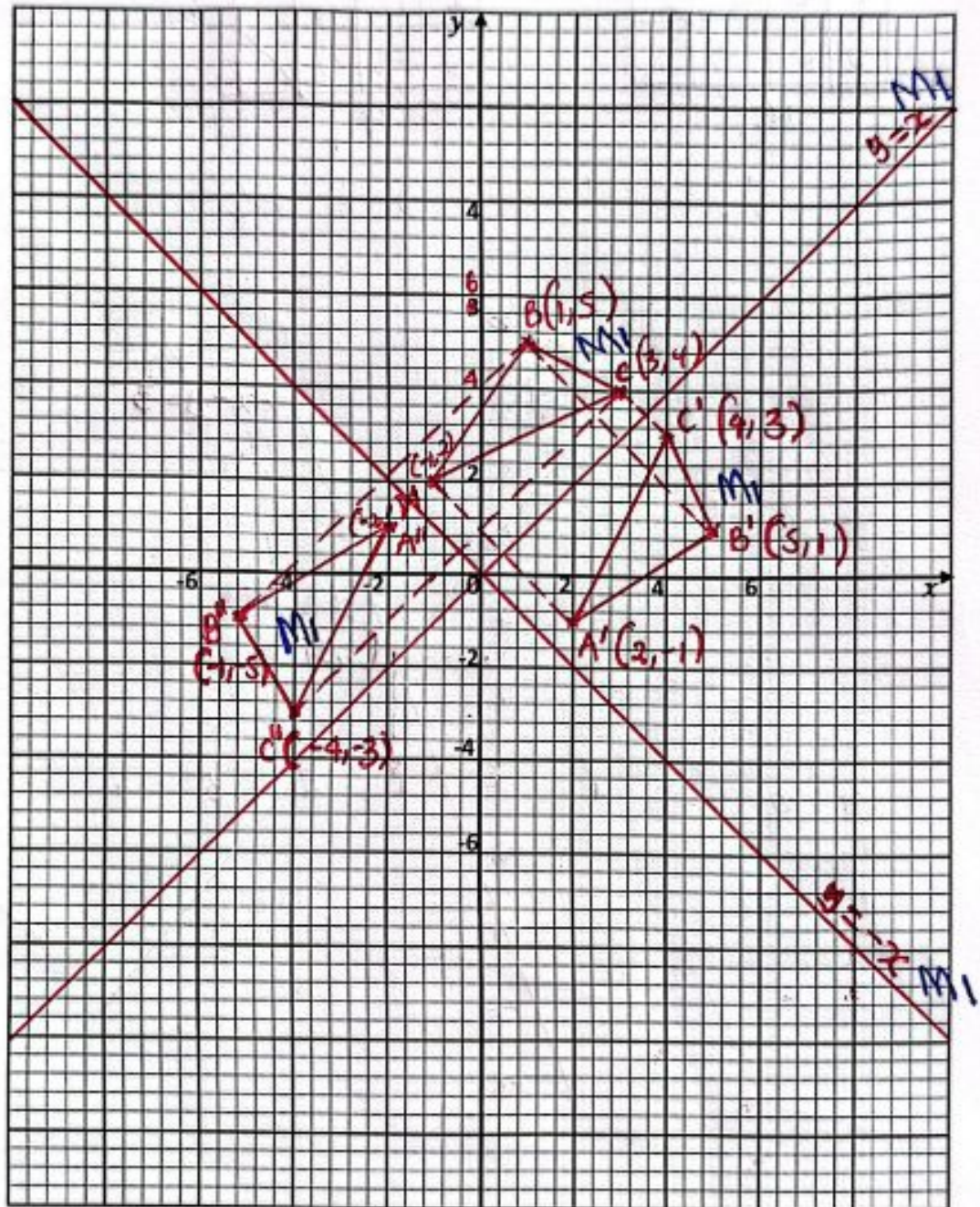
$$\therefore x = 1 \text{ and } y = 3 \quad A_1$$



[6 marks]

19. On the graph below draw a triangle with vertices $A(-1, 2)$, $B(1, 5)$ and $C(3, 4)$. Reflect the triangle in the mirror lines

- $y = x$
- $y = -x$

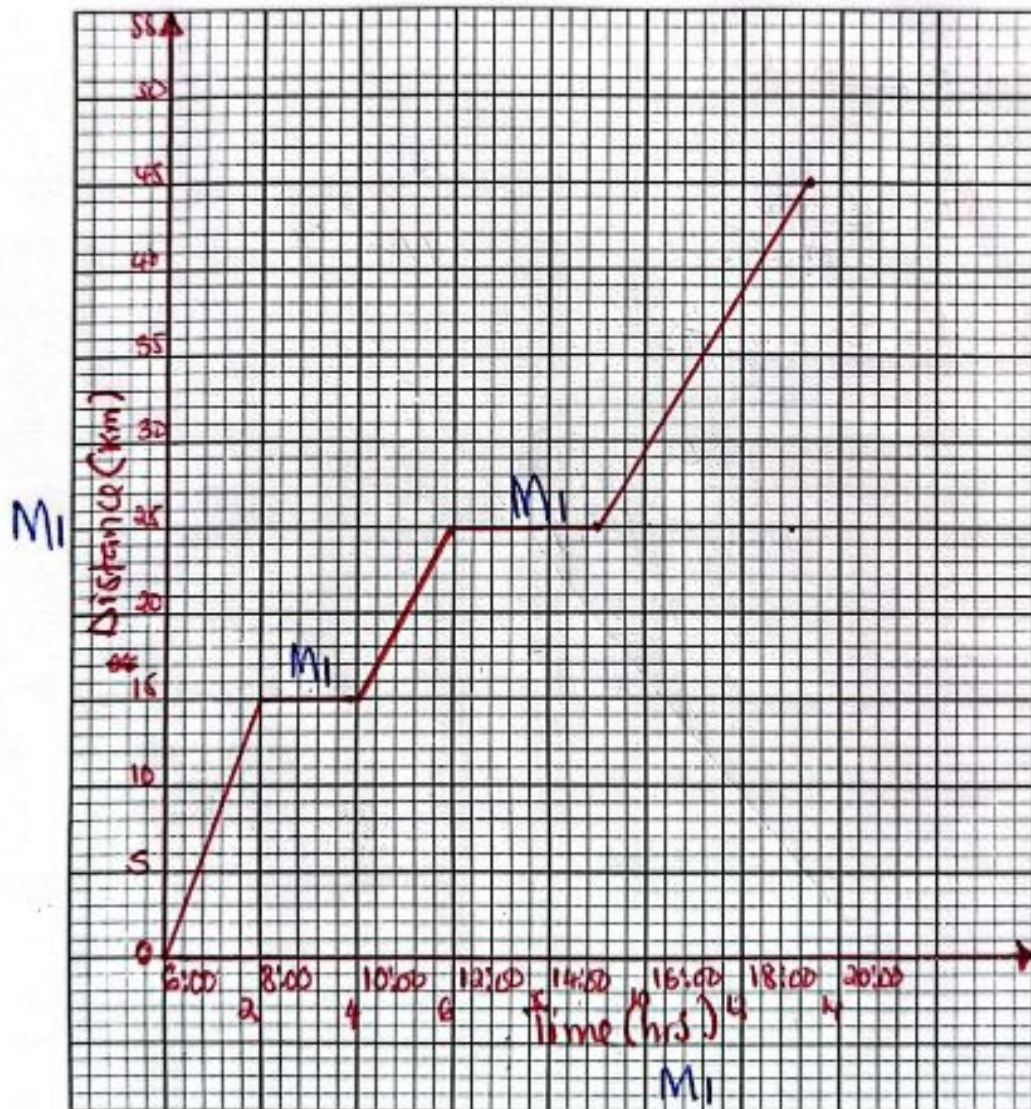


[5 marks]

NB: This paper contains 14 printed pages...Hjt

20. Mr Solobala left home at 6:00am for Lilongwe, he boarded a bus that travelled a distance of 15km for 2 hours, it then had a breakdown for 2 hours and it continued its journey after the breakdown for another 2 hours for a 10km more, again it had another breakdown which lasted for 3 hours and it proceeded its journey to Lilongwe after the breakdown for 4 hours covering another distance of 20km. By taking 2cm to represent 2 units on the x - axis and 2cm to represent 5 units on the y - axis.

i. Draw a Distance-Time graph



[4 marks]

NB: This paper contains 14 printed pages...Hjt

- ii. Find its speed after the final breakdown.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

After the breakdown:

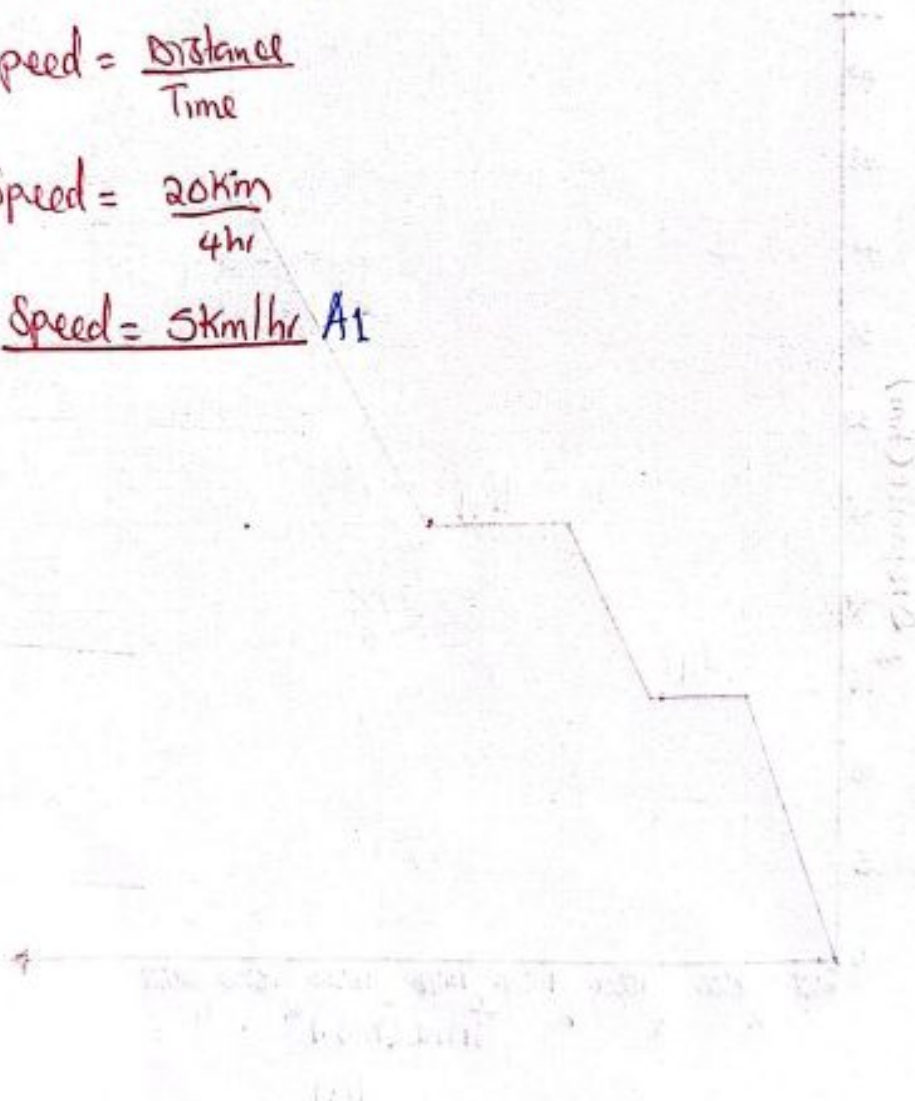
Distance covered = 20km

Time = 4hrs M1

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed} = \frac{20\text{km}}{4\text{hr}}$$

$$\text{Speed} = 5\text{km/hr} \text{ A1}$$



[2 marks]

END OF QUESTION PAPER

NB: This paper contains 14 printed pages...Hjt