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MATHEMATICS
Paper 1
2024



UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Certificate of Education

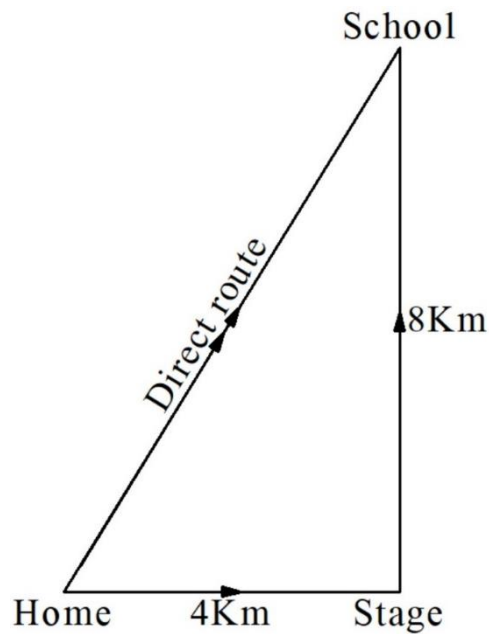
MATHEMATICS

Paper 1

New Lower Secondary Curriculum

SCORING GUIDE

1(a) Distance from home to school using the direct route.



$$(\text{Direct distance})^2 = 4^2 + 8^2$$

$$\begin{aligned} \text{Direct distance} &= \sqrt{4^2 + 8^2} \\ &= \sqrt{16 + 64} \\ &= \sqrt{80} \\ &= 8.94\text{km} \end{aligned}$$

$$\begin{aligned} \text{(b)(i) school fees} &= \frac{100-60}{100} \times 900,000/= \\ &= \frac{40}{100} \times 900,000/= \\ &= 360,000/= \end{aligned}$$

$$\begin{aligned} \text{Uniform} &= 350,000 - 87,500 \\ &= 262,500/= \end{aligned}$$

$$\begin{aligned} \text{Total amount to be paid} &= 360,000 + 262,500 \\ &= 622,500/= \end{aligned}$$

(b)(ii) Conclusion: yes, the guardian will afford the school since the total amount to be paid is less than the 700,000/= s/he has budgeted for school expenses.

(c)(i) Payment plan 1

$$\begin{aligned}\text{First instalment} &= \frac{2}{3} \times 900,000/= \\ &= 600,000/= \end{aligned}$$

$$\begin{aligned}\text{Second instalment} &= 900,000 - 600,000 \\ &= 300,000/= \end{aligned}$$

Payment plan 2

$$\begin{aligned}\text{Each instalment} &= \frac{1}{3} \times 900,000/= \\ &= 300,000/= \end{aligned}$$

(c)(ii) Recommended payment plan:

Reason:

2. Let x be the number of cows to be sold and y the number of goats to be sold.

$$x \geq 0, y \geq 0$$

$$x \leq 10$$

$$y \geq 8$$

$$x + y \leq 20$$

$$y < 2x$$

$$\text{Sales} = 1,500,000x + 200,000y$$

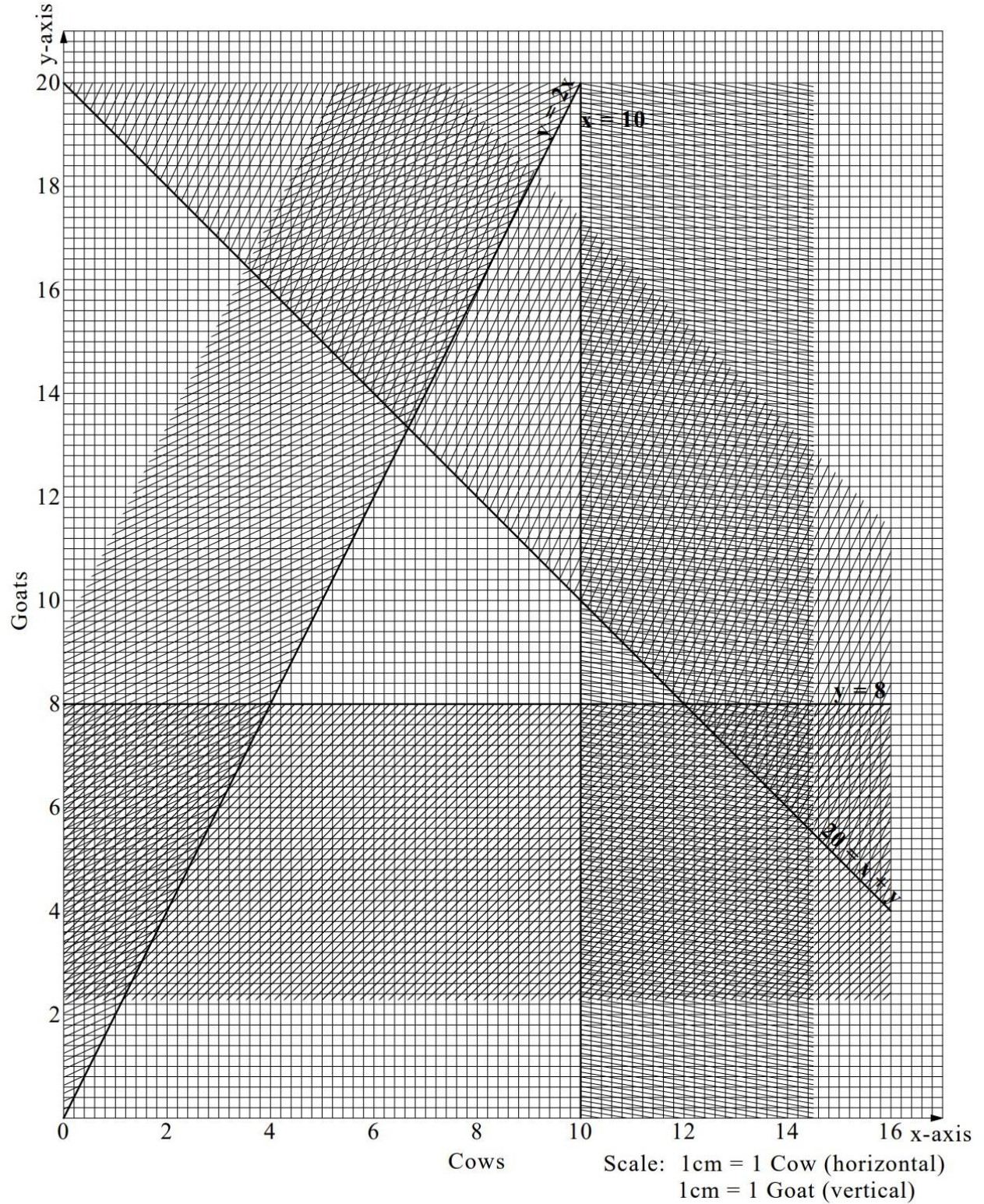
$$\text{For } y = 2x$$

x	0	1
y	0	2

$$\text{For } x + y = 20$$

x	0	20
y	20	0

A graph showing the feasible region



Maximisation of sales

Optimal points (x,y)	Sales =1,500,000x + 200,000y
(10,10)	17,000,000
(9,11)	15,700,000
(8,12)	14,000,000
(7,13)	13,100,000

(any other point(s) within the feasible region)

Conclusion: Chooses a combination that maximises sales (a combination that gives the highest amount of money).

That is, they should sell ten cows and ten goats to maximise sales and they will make 17,000,000/=.

OR

Accept any other correct method.

Qtn3.

Time(Min)	Tallies	Freq (f)	Cumm freq	Class boundary	Mid-point (x)	fx
15-19	///	3	3	14.5-19.5	17	51
20-24	////	4	7	19.5-24.5	22	88
25-29	### ///	10	17	24.5-29.5	27	270
30-34	### ///	11	28	29.5-34.5	32	352
35-39	### ///	9	37	34.5-39.5	37	333
40-44	### /	6	43	39.5-44.5	42	252
45-49	### //	7	50	44.5-49.5	47	329
50-54	###	5	55	49.5-54.5	52	260
55-59	###	5	60	54.5-59.5	57	285
		Σf=60				Σfx=2220

(a) Mean time = $\frac{\sum fx}{\sum f} = \frac{2220}{60} = 37$ minutes

The assemble start time should be 37 minutes from 7:30AM since the average time of arrival of the students after 7:30 AM is 37 minutes. That is, the assembly should start at 8:07 AM.

Note: Accept calculation of any measure of central tendency followed by a relevant/appropriate explanation.

(b) EITHER

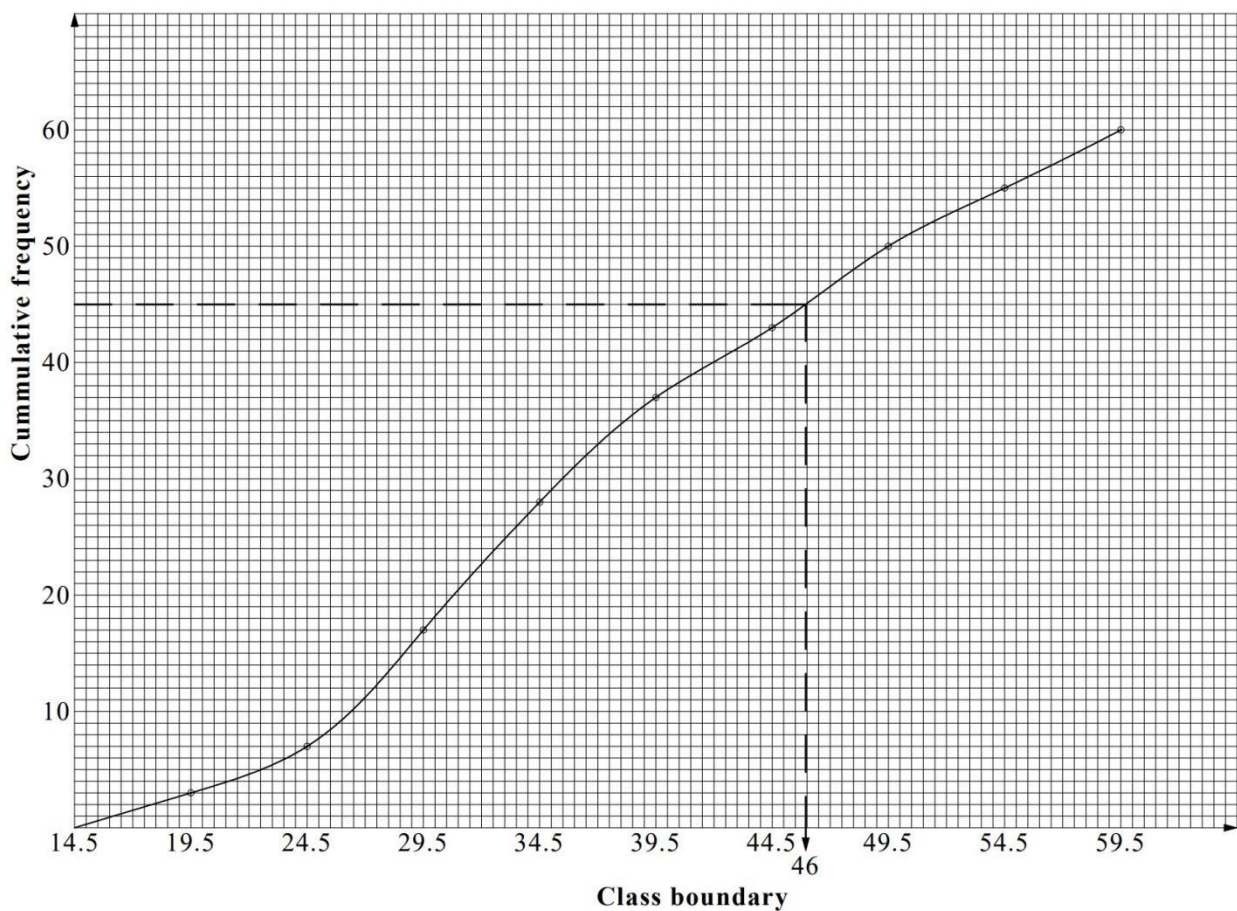
75% = 75th percentile, given by $(\frac{75}{100} \times N)^{\text{th}}$ position of cumulative frequency.

= $(\frac{75}{100} \times 60)^{\text{th}}$ position of cumulative frequency

= 45th position of cumulative frequency

From the Ogive, 75th percentile = 46 minutes. (see Ogive)

The assemble start time should be 46 minutes from 7:30AM since the arrival time of 75% of the students after 7:30AM is 46 minutes. That is, the assembly should start at 8:16AM.



OR

Note: Accept calculation of the 75th percentile using a formula.

SAMPLE

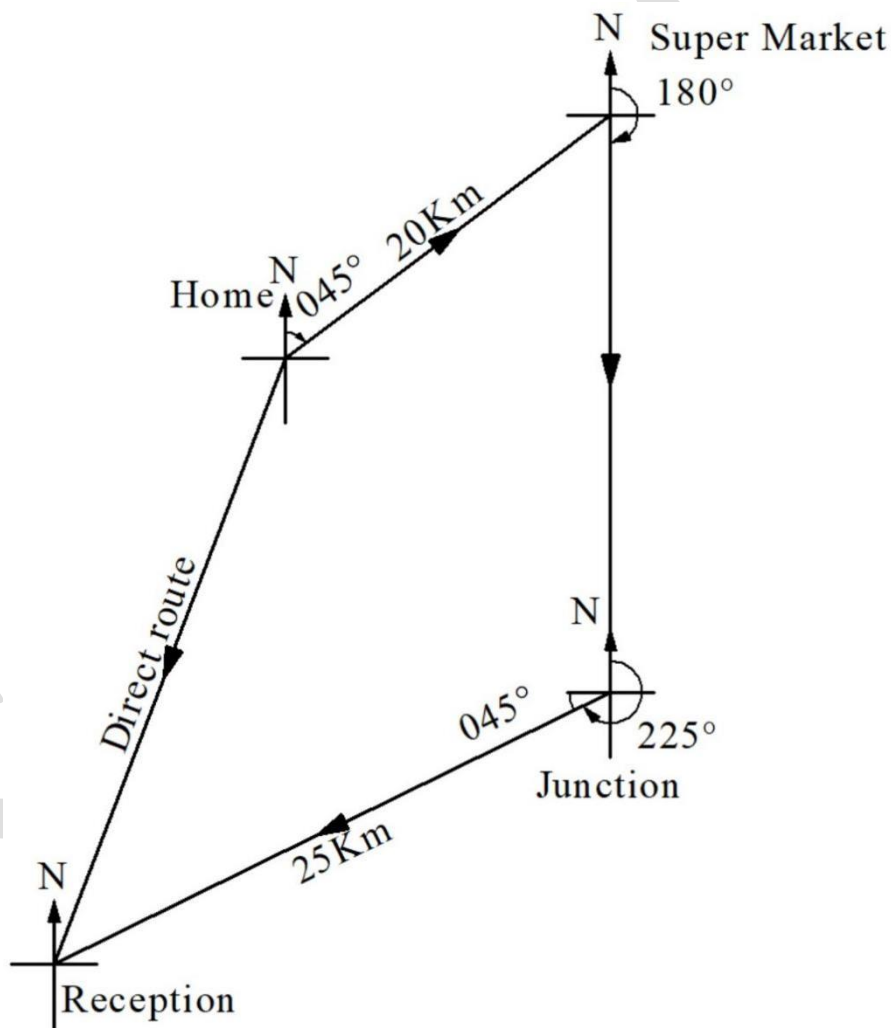
The number of people who visited at least one district and tested positive is given by;
 $60 + 25 + (10 - x) + 20 = 115 - x = 115 - 5 = 110$

The sample that was purposively selected $n(\epsilon) = 110 + 40 = 150$

Therefore the chance of testing positive for malaria having visited at least one district is given by;
 $P(\text{positive having visited at least one district}) = \frac{110}{150} = 0.733 = 73.3\%$

The ministry should come up with interventions since the chance of testing positive having visited at least one district is high (73.3%).

5. Sketch drawing



Distance (D) from super market to junction?

Speed = 50km/h

Time = 45minutes

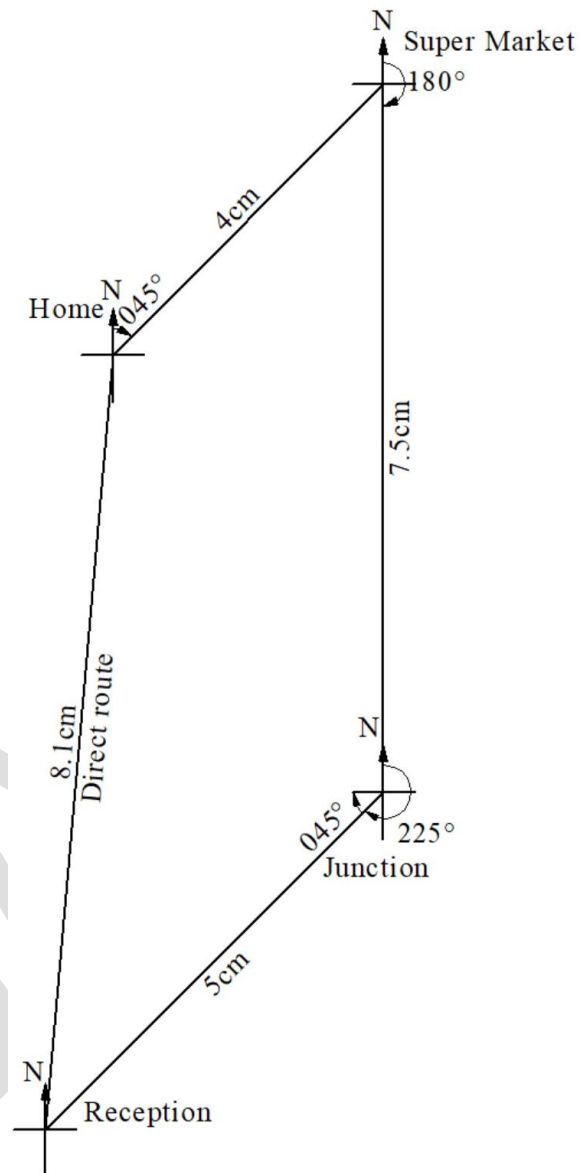
$$= \frac{45}{60} \text{ hours} \quad \text{or} \quad \text{Time} = \frac{3}{4} \text{ hours} \quad \text{or} \quad \text{Time} = 0.75 \text{ hours}$$

$$D = \text{Speed} \times \text{Time}$$

$$D = 50 \times 0.75$$

$$D = 37.5\text{km}$$

Accurate drawing



(a)(i) State the bearing of the Home from the Reception.

(a)(ii) Direct route distance = 8.1 cm

$$= (8.1 \times 5) \text{ km}$$

$$= 40.5 \text{ km}$$

(ii) Distance = 40.5 km

Speed = 50 km/h

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

$$\text{Time} = \frac{40.5}{50}$$

Time = 0.81 hours

Time = (0.81 × 60) minutes

Time = 48.6 minutes

Time ≈ 49 minutes

We will leave home 49 minutes to 2:00 PM to reach the party venue on time.

OR

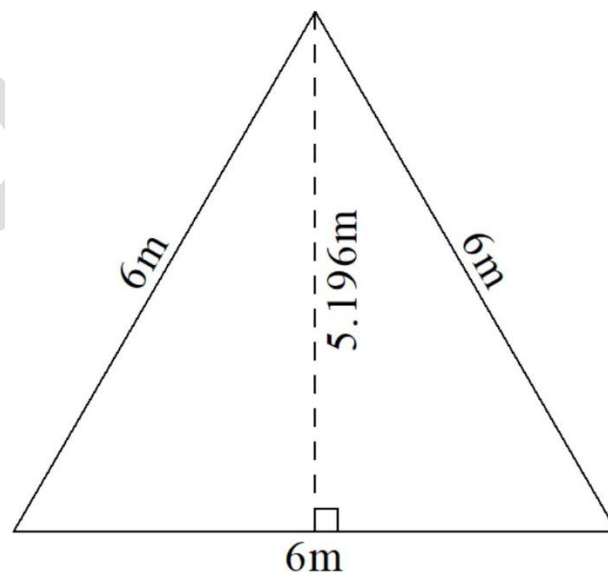
We will leave home at 1:11 PM = (2:00 PM – 49 Minute) to reach the party venue on time.

QUESTION 6

Area of the triangular sides

$$\text{Height (h) of the triangular side} = \sqrt{6^2 - 3^2}$$

$$= 5.196\text{m or } (\sqrt{27})\text{m or } (3\sqrt{3})\text{m}$$

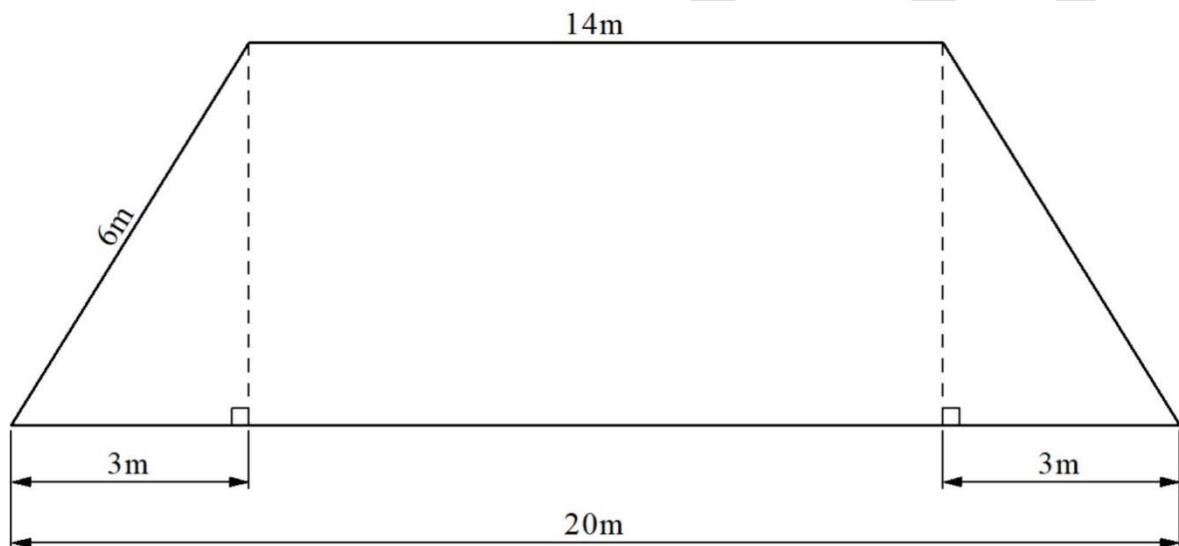


$$\begin{aligned}
 \text{Area of one triangular side} &= \frac{1}{2} \times \text{base} \times \text{height} \\
 &= \frac{1}{2} \times 6 \times 5.196 \\
 &= 15.588\text{m}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of the two triangular sides} &= 2 \times 15.588 \\
 &= 31.176\text{m}^2
 \end{aligned}$$

Note: Accept any method of finding the area of the triangular side.

Area of the trapezium sides



$$\begin{aligned}
 \text{Height(h) of the trapezium} &= \sqrt{(6^2 - 3^2)} \\
 &= 5.196\text{m or } (\sqrt{27})\text{m or } (3\sqrt{3})\text{m}
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of one trapezium side} &= \frac{1}{2} \times h (a + b) \\
 &= \frac{1}{2} \times 5.196 (14 + 20) \\
 &= 88.332\text{m}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of the two trapezium sides} &= 2 \times 88.332 \\
 &= 176.664\text{m}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Total area of the roof} &= 31.176 + 176.664 \\
 &= 207.84\text{m}^2
 \end{aligned}$$

Usable area of each iron sheet = $(10 \times 0.3) \times (2.623 \times 0.3)$

$$= 2.3607 \text{m}^2$$

Number of iron sheets = $\frac{10000 \times 10000 \times 10000 \times 10000 \times 10000}{1000000 \times 1000000 \times 1000000 \times 1000000 \times 1000000}$

$$= \frac{207.84}{2.3607}$$

$$= 88.042$$

≈ 89

Cost of iron sheets

Type A	Type B
A discount of 6% on every 50 iron sheets	A discount of 10% on every 70 iron sheets
$\left(\frac{100-6}{100} \times 33,000 \times 50\right) + (89-50) \times 33,000$ $= 2,838,000/=$	$\left(\frac{100-10}{100} \times 42,000 \times 70\right) + (89-70) \times 42,000$ $= 3,444,000/=$

Advise: My neighbour should buy Type A iron sheets.

Reason: They are cheaper and she will minimise costs.

OR

Advise: My neighbour should buy Type B iron sheets.

Reason: Since they are expensive, they are likely to be of a better quality than Type A.

			SCORE
1	TOTAL AREA OF THE ROOF		
(a)	Area of the triangular side		Subtotal- 04
(i)	Height		01
(ii)	Substitution for Area		01
(iii)	Area	value	01
		unit	01
(b)	Area of the trapezium side		Subtotal-04
	Height		02
	Area	Use of formula	01
		Value	01
(c)	Total area of the roof	operation	01
		Correct value	01
2	Usable area of the iron sheet	Correct Value	01
3	Conversion of units	Correct value	01
4	Number of iron sheets	operation	01
		Correct value	01
		Actual number	01
5	Cost of the iron sheets		Subtotal-03
	Correct total cost without discount		01
	Discounted cost	operation	01
		Correct value (for either)	01
			Subtotal-02
6	Advice/Justification	Type of iron sheet	01
		Reason	01
TOTAL SCORE			20