SUREKEY EXAMINATIONS BOARD

PRE-PLE EXAMINATION SERIES TWO

2022

MATHEMATICS MARKING GUIDE

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"Don't speak for Quality, Let the Quality Speak for itself"

1.   Workout: $49 \div 7$.

```
      0 7
   7 | 4 9
     − 0 ↓
       4 9
     − 4 9
       0 0
```

49 ÷ 7 = 7

OR

$$\frac{49}{7} \; \frac{7}{1}$$

49 ÷ 7 = 7

2.   Write CDVIII in Hindu Arabic Numerals.

CD   -   400
VIII   -   +   8
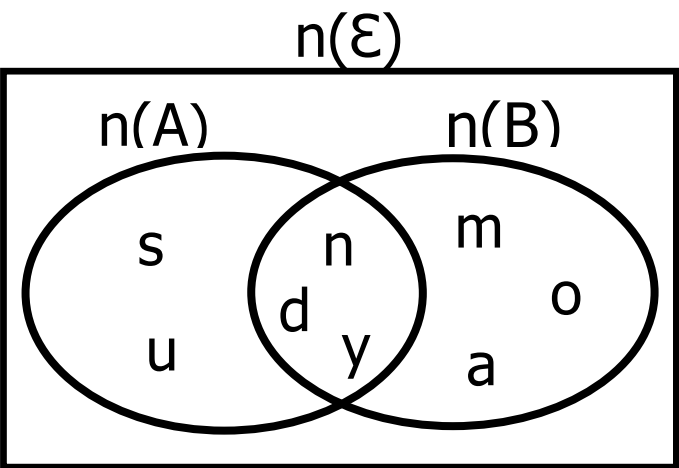**CDVIII**   -   408

3.   Given that; Set A = {s, u, n, d, y}, Set B = {m, o, n, d, a, y}.
       Represent the information on the Venn diagram below.

```
                    n(Ɛ)
        ┌─────────────────────────┐
        │  n(A)          n(B)      │
        │   ╭────╮    ╭────╮       │
        │  ╱   s  ╲ n ╱ m   ╲      │
        │ │      ╱ d ╲    o │      │
        │  ╲  u ╱  y  ╲  a ╱       │
        │   ╰────╯    ╰────╯       │
        └─────────────────────────┘
```

4.   How many groups of a hundred are there in the total value of digit 3
       in the number 973604?

H/TH	T/TH	TH	H	T	O
9	7	3	6	0	4

3 x 1000

= 3000
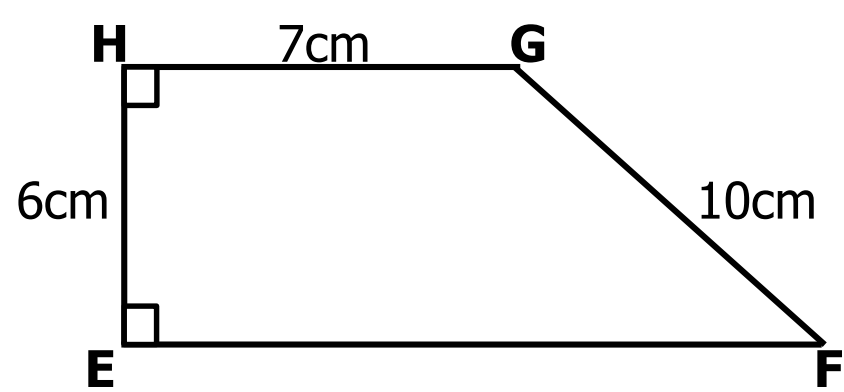
Number of groups

$$= \frac{\cancel{3000}^{30}}{\cancel{100}}$$

= **30 groups**

②

5. The area of the trapezium **EFGH** shown below is 66cm^2. What is the length of **EF**?

$$\frac{h\,(a+b)}{2} \quad = \quad \text{Area}$$

$$\frac{\overset{3}{\cancel{6}}\text{cm}\,(7\text{cm} + EF)}{\cancel{2}\,_1} \quad = \quad 66\text{cm}^2$$

$$21\text{cm}^2 + 3EF\text{cm} = 66\text{cm}^2$$

$$21\text{cm}^2 - 21\text{cm}^2 + 3EF\text{cm} = 66\text{cm}^2 - 21\text{cm}^2$$

$$\frac{3EF\text{cm}}{3\text{cm}} = \frac{\overset{15}{\cancel{45}\text{cm}} \times \text{cm}}{3\text{cm}}$$

$$\mathbf{EF} \quad = \quad \mathbf{15cm}$$

6. A football match started at 2:45 p.m. After 45 minutes, there was a 15 minutes break. It then took 50 minutes to end. At what time in 24 hour system did the match end?

Total time taken	**In 24 hour system**

Total time taken

= 45min + 15min + 50min

= 1hr and 50 min

Ending time

	HRS	MIN	
=	2	45	*1hr = 60 min*
+	1	50	*45 + 50 = 95*
	4	35 Pm	*95 ÷ 60 = 1 rem 35*

In 24 hour system

	HRS	MIN
	4	35
+	12	00
	16	35

= 1635HRS

7. What is the next number in the pattern below?

$$85,\ 66,\ 49,\ 36,\ \underline{\textbf{25}}$$

$$85 - 19 = 66$$

$$49 - 13 = 36$$

$$66 - 17 = 49$$

$$36 - 11 = 25$$

8. Maria bought 160 mangoes at sh.1,000 each. She paid sh.20,000 for transport to the market. She sold the mangoes and made a 60% profit. What was the selling price of each mango?

Buying price of mangoes

= sh. 1,000 x 160

= sh. 160,000

Buying price + Transport

= sh. 160,000 + sh. 20,000

= sh. 180,000

New percentage

= 100% + 60%

= 160%

Selling price of all mangoes

$$= \frac{160 \times \text{sh. } 180,\cancel{000}}{\cancel{100}}$$

= sh. 288,000

Selling price of each mango

$$= \frac{\overset{1800}{\cancel{\text{sh.288,000}}}}{\cancel{160}}$$

= sh. 1800

9. Round off 19.347 to the nearest hundredths.

= 1 9 . 3 4 ¦ 7

= 1 9 . 3 4

= 19 . 3 4

+ 0 . 0 1

19 . 3 5

10. Calculate the total length of all the edges in the figure below.

2(m−1)cm

8cm

6cm
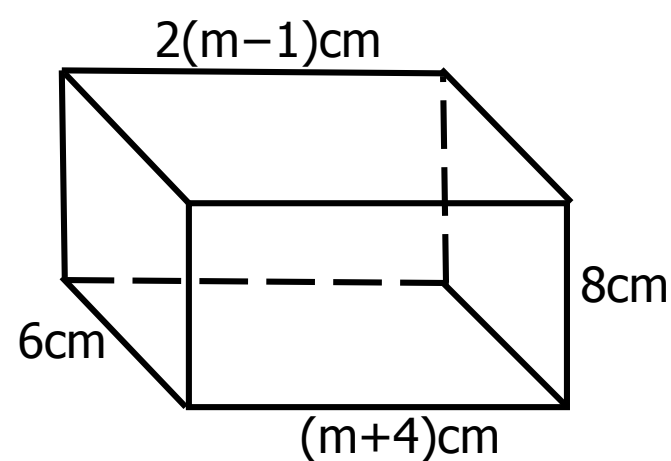
(m+4)cm

Value of m

$2(m - 1)\text{cm} = (m + 4)\text{cm}$

$2m - 2 = m + 4$

$2m - 2 + 2 = m + 4 + 2$

$2m = m + 6$

$2m - m = m - m + 6$

__**m** = **6**__

Actual length $= (m + 4)$ cm

$= (6 + 4)$ cm

$= 10$cm

Total length of all edges

$= 4l + 4w + 4h$

$= 4 \times 10\text{cm} + 4 \times 6\text{cm} + 4 \times 8\text{cm}$

$= 40\text{cm} + 24\text{cm} + 32\text{cm}$

$= 96\text{cm}$

---

11. Write the expanded number below as a single figure in base five.

$$(3 \times 5^2) + (2 \times 5^1) + (1 \times 5^0)$$

First change to decimal

$= (3 \times 5 \times 5) + (4 \times 5) + (1 \times 1)$

$= 75 + 20 + 1$

$= \underline{\mathbf{96}_{ten}}$

Change to base five

B	No	R
5	96	1
5	19	4
	3	

$= \underline{\mathbf{341}_{five}}$

12. Three bells ring at intervals of 30 minutes, 40 minutes and 48 minutes. The bells rang together at 1230HRS. What time in a.m./p.m. will they ring together again?

LCM =	2	30	40	48
	2	15	20	24
	2	15	10	12
	2	15	5	6
	3	15	5	3
	5	5	5	1
		1	1	1

$$= 2 \times 2 \times 2 \times 2 \times 3 \times 5$$

$$= 16 \times 15$$

= 240 minutes

<u>Change 240 minutes to hours</u>

60 min   =   1hr

240 min   = $\dfrac{240^{4}}{60}$

      =   **4hours**

<u>Next time of ringing together</u>

=   12 : 30

    + 4 : 00

      1 6 : 30

<u>In 12 hour clock system</u>

=   16 : 30

-    12 : 00

        4 : 30pm

13. In a certain school, the number of girls was 240 and the total number of pupils was 540. What was the ratio of boys to girls in the school?
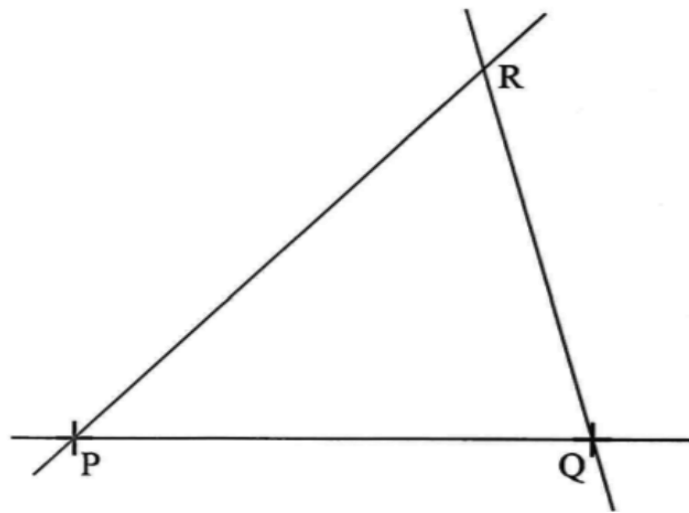
<u>Number of boys</u>

=   5 4 0

   - 2 4 0

     3 0 0

<u>Boys to girls</u>

= $\dfrac{300^{5}}{240^{4}}$

=   5 : 4

14. Triangle PQR below has been drawn accurately. Measure angle PQR.

Angle PQR = 75^0

15. A rectangular brick weighs 5kg 750g. how many such bricks can be loaded onto a lorry which carries 4.6 tonnes?

OR

Change 750g to kg

1000g = 1kg

750g = $\frac{\overset{3}{\cancel{750}}}{\underset{4}{\cancel{1000}}}$

= $\frac{3}{4}$ kg

Change 4.6 tonnes to kg

1 tonnes = 1000kg

4.6 tonnes = $\frac{46}{\cancel{10}}$ x $\overset{100}{\cancel{1000}}$

= 4600kg

Number of bricks

= 4600 ÷ 5$\frac{3}{4}$

= $\cancel{4600}$ ÷ $\frac{23}{4}$

= $\overset{200}{\cancel{4600}}$ x $\frac{4}{\underset{1}{\cancel{23}}}$

= 800 bricks

Change 5kg to grams

1 kg = 1000g

5kg = 1000 x 5

= 5000g

Change 4.6 tonnes to grams

1 tonne = 1,000,000g

4.6 tonnes = $\frac{46}{\cancel{10}}$ x 1,00000$\cancel{0}$

= 4,600,000g

Number of bricks

= $\frac{4,600,000g}{(5000 + 750)g}$
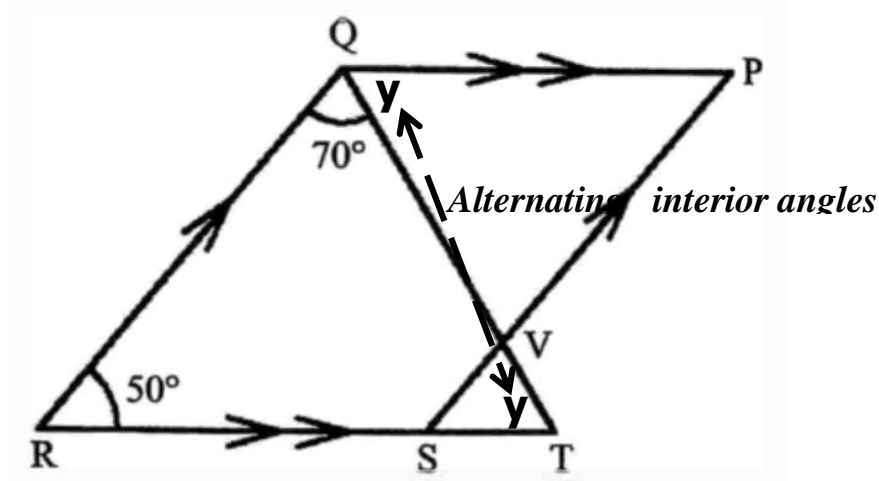
= $\frac{4,600,000}{5,750}$

= 800 bricks

16. Electricity poles are fixed at equal intervals of 50 metres apart. A total of 51 poles are used along one side of a street in a town. What is the total distance between the first and last pole?

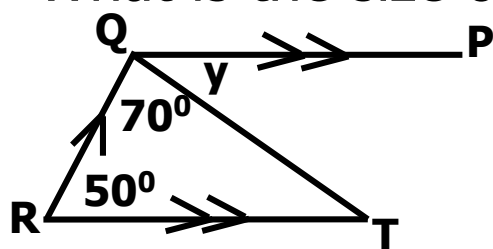**Distance** = Number of poles x interval

$$= (51 - 1) \times 50$$

$$= 50 \times 50$$

$$= 2500m$$

17. Workout: $7\frac{1}{2} + 1\frac{1}{4}$.

$$= \frac{15}{2} + \frac{5}{4} \qquad \textbf{LCD} = 4 \qquad\qquad = 8\frac{3}{4}$$

$$= \frac{30 + 5}{4}$$

$$= \frac{35}{4} \quad \textbf{8 rem 3}$$

18. In the figure below, PQRS is a parallelogram. Lines QR and PS are Parallel. Angle RQT = 70^0 and angle QRS = 50^0.

Alternating interior angles

What is the size of angle PQT?

OR

$$50^0 + 70^0 + y = 180^0 \quad (\textit{co-interior angles})$$
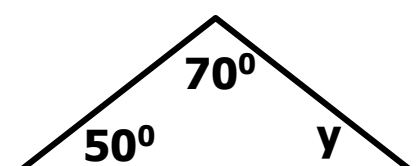
Interior angle sum of a triangle

$$120^0 + y = 180^0$$

$$120^0 - 120^0 + y = 180^0 - 120^0$$

$$y = 60^0$$

$$\underline{<PQT = 60^0}$$

(8)

19. 24 men working at the same rate can finish a job in 6 days. 8 men failed to turn up to do the job. How many more days will the remaining men working at the same rate take to finish the same job?

Remaining men $= 24 - 8$

$= 16$ men

24 men finish in 6 days

1 man finishes in 6×24

$= 144$ days

16 men finish in $\dfrac{\overset{9}{\cancel{144}}}{\cancel{16}}$

$= 9$ days

More days $= 9 - 6$

$= 3$ days

METHOD II

Remaining men $= 24 - 8$

$= 16$ men

6 days $= 24$ men

1 day $= 6 \times 24$

$= 144$ men

144 men $= 1$ day

16 men $= \dfrac{\overset{9}{\cancel{144}}}{\cancel{16}}$

$= 9$ days

More days $= 9 - 6$

$= 3$ days

---

20. Solve: $40 - 3(8 - 5x) = 46$.

$40 - 24 + 15x = 46$

$15x + 16 = 46$

$15x + 16 - 16 = 46 - 16$

$\dfrac{\overset{1}{\cancel{15}}x}{\cancel{15}_1} = \dfrac{\overset{2}{\cancel{30}}}{\cancel{15}_1}$

$x = 2$

SECTION B: 60 MARKS
Answer **all** questions in this section
Marks for each question are indicated in brackets

21. At a party, 26 guests took Chicken (C), some took Beer (B) while 4 guests took neither of the two dishes as shown in the Venn diagram.

n(Ɛ)

n(C)   n(B)

$4 + m$ $m+10$ $10 - m$

4
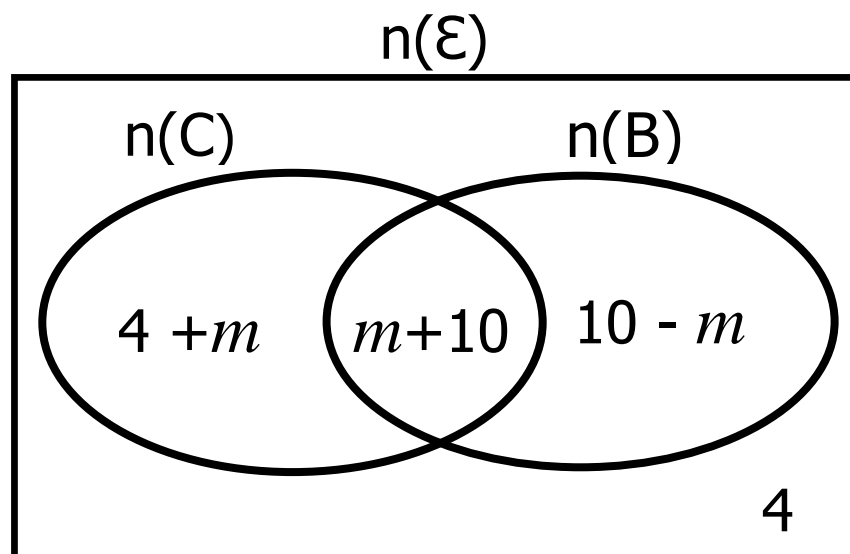
(a) How many guests took only one type of dish?   (03 Marks)

Value of m	**Guests who like only one type**
4 + m + m + 10 = 26	= (4 + m) + (10 − m)
4 + 10 + m + m = 26	= (4 + 6) + (10 − 6)
2m + 14 = 26	= 10 + 4
2m + 14 − 14 = 26 − 14	= 14 guests
$\frac{\overset{1}{\cancel{2}}m}{\underset{1}{\cancel{2}}}$ = $\frac{\overset{6}{\cancel{12}}}{\underset{1}{\cancel{2}}}$	
m = 6	

(b) Find the total number of guests that attended the party.
(02 arks)

= 26 + (10 − m) + 4

= 26 + (10 − 6) + 4

= 26 + 4 + 4

= 34 guests

22. **(a)** Fill in the missing numbers in the boxes to complete the addition statement below. (03 Marks)

$$
\begin{array}{r}
^1 \quad ^1 \\
\boxed{6}\ 7\ 7 \\
+\ 2\ 8\ \boxed{5} \\
\hline
9\ \boxed{6}\ 2
\end{array}
$$

$$
\begin{aligned}
7 - 2 &= 5 \\
7 + 5 &= 12 \\
1 + 7 + 8 &= 16 \\
1 + 2 &= 3 \\
9 - 3 &= 6
\end{aligned}
$$

(b) Simplify: $k^3 \times k^5 \div (k^2 \times k^4)$ (02 Marks)

$$
\begin{aligned}
&= k^{(3+5)} \div k^{(2+4)} \\
&= k^8 \div k^6 \\
&= k^{(8-6)} \\
&= k^2
\end{aligned}
$$

OR

$$
= \frac{k \times k \times \cancel{k \times k \times k \times k \times k \times k}}{\cancel{k \times k \times k \times k \times k \times k}}
$$

$$
= k \times k
$$

$$
= k^2
$$

23. Wudanga remained with sh.3,100 on the 20,000 shillings note she was sent with to the nearby shop to buy the items shown in the table below.

Complete the table. (05 Marks)

Item	Unit cost	Total cost
500grams of sugar	sh. 4,000 per kg	sh. **2,000**
2 bars of soap	sh. **6,550** a bar	sh. **13,100**
1½ litres of milk	sh. 1,200 per litre	sh. 1,800
Total Expenditure		sh. **16,900**

Sugar

$$= \frac{500}{1000} \times \text{sh.}\ \cancel{4,000}^{\,4}$$

$$= \text{sh. } 500 \times 4$$

$$= \text{sh. } 2,000$$

Milk

$$= \text{sh. } \cancel{1,800}^{\,3\ \text{rem }1}$$

$$\underbrace{\text{sh. } 1,200}_{\ _2\ _1}$$

$$= 1\frac{1}{2}\ \text{litres}$$

Total expenditure

$$= \text{sh. } \cancel{20,000}^{\,19}$$

$$\begin{array}{r} -\ \text{sh.}\ 3,100 \\ \hline \text{sh.} 16,900 \end{array}$$

Sugar + milk

$$\begin{array}{r} \text{sh. } 2,000 \\ +\ \text{sh. } 1,800 \\ \hline \text{sh. } 3,800 \end{array}$$

Total cost of Soap

$$\begin{array}{r} \text{sh. } 16,900 \\ -\ \text{sh. }\ 3,800 \\ \hline \text{sh. } 13,100 \end{array}$$

Unit cost of soap

$$= \text{sh. } \cancel{13100}^{\,6550}_{\ \ 2}$$

$$= \text{sh. } 6550$$

24. (a)   Workout: $0.63 + 45.4 - 0.07 + 0.2$.   (02 Marks)

$$
\begin{array}{r}
45 \;.\; 40 \\
00 \;.\; 63 \\
+\; 00 \;.\; 20 \\
\hline
46 \;.\; 23 \\
\hline
\end{array}
\qquad
\begin{array}{r}
46 \;.\; 23 \\
-\; 00 \;.\; 07 \\
\hline
46 \;.\; 16 \\
\hline\hline
\end{array}
$$

METHOD II

$$= \frac{63}{100} + \frac{454}{10} + \frac{2}{10} - \frac{7}{100} \quad \textbf{LCD} = 100 \qquad = \frac{4616}{100}$$

$$= \frac{63 + 4540 + 20 - 7}{100} \qquad\qquad = 46.16$$

$$= \frac{4623 - 7}{100}$$

(b)   There are 600 animals in a farm. 0.32 are cows, 0.11 are sheep and the rest are goats. How many goats are in the farm?

                    (03 Marks)

Fraction of cows and sheep	**Number of goats**
$= \quad 0\;.\;32$ $+\; 0\;.\;11$ $\overline{\quad 0\;.\;43\quad}$	$= \dfrac{57}{100} \times \overset{6}{\cancel{600}}$
Fraction of goats	$= 57 \times 6$
$= \quad 1\overset{9\;10}{.\cancel{00}}$ $-\; 0\;.\;43$ $\overline{\quad 0\;.\;57\quad}$	$= 342$ goats

25. The tractor below has a front wheel of circumference of 1.2m and a rear wheel of 1.6m. It is going to be used to dig a straight road of 0.768km.
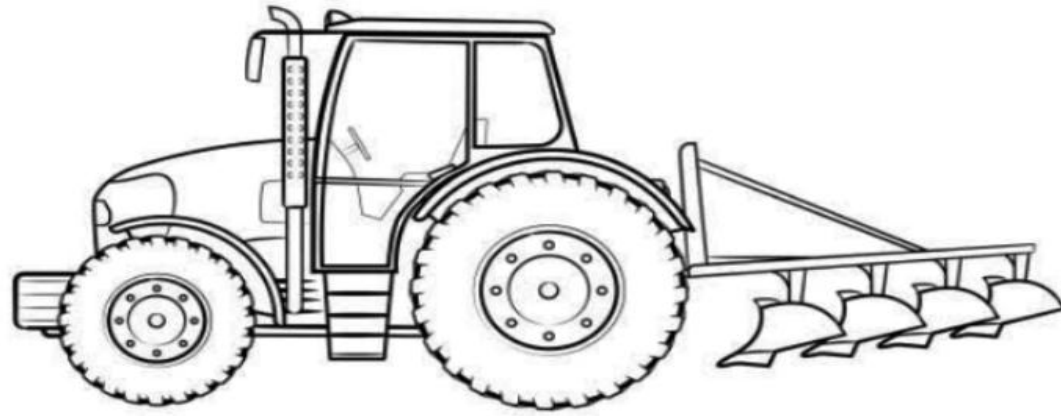
How many more revolutions will the front wheel make than the rear wheel?   (05 Marks)

Distance in metres

1km   =   1000m

0.768km   = $\dfrac{768}{1000}$ x 1000

               =   768m

Revolutions of front wheel

= $\dfrac{\text{Distance}}{\text{Circumference}}$

=   768m ÷ 1.2m

=   768   ÷ $\dfrac{12}{10}$

= $\overset{64}{\cancel{768}}$ x $\dfrac{10}{\cancel{12}_1}$

= 640 revolutions

Revolutions of rear wheel

= $\dfrac{\text{Distance}}{\text{Circumference}}$

=   768m ÷ 1.6m

=   768   ÷ $\dfrac{16}{10}$

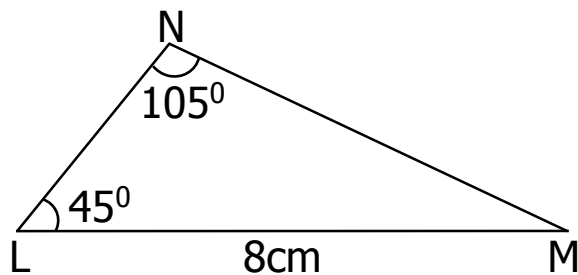= $\overset{48}{\cancel{768}}$ x $\dfrac{10}{\cancel{16}}$

=   480 revolutions

More revolutions

= 640 - 480

= 160 revolutions

26. (a) Using a pair of compasses, a ruler and a pencil only, construct triangle LMN where LM = 8cm, angle NLM = 45^0 and angle LNM = 105^0. Drop a perpendicular bisector from N to meet line LM at point O. (04 Marks)
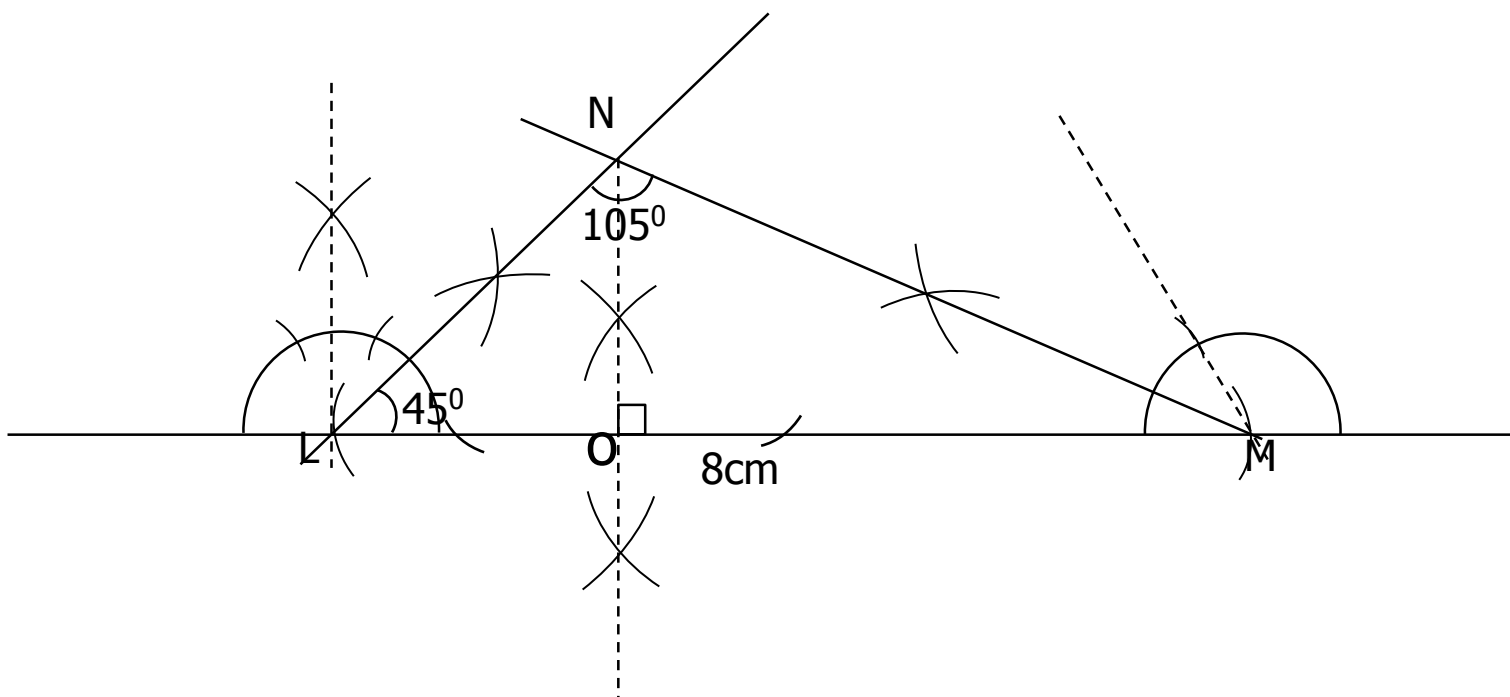
SKETCH

$105^0 + 45^0 = 150^0$

$< NML = 180^0 - 150^0$

$= 30^0$

ACCURATE DRAWING

(b) Find the area of the triangle LMN. (02 Marks)

Area $= \dfrac{B \times H}{2}$

$= \dfrac{8cm \times 2.9cm}{2}$

Note: Accept 2.8/3cm

$= 4cm \times 2.9cm$

$= 11.6cm^2$

27. The diagram below shows a semicircle enclosed in a rectangle ABCD. The area of the shaded area is 21m² and length AB is twice BC.
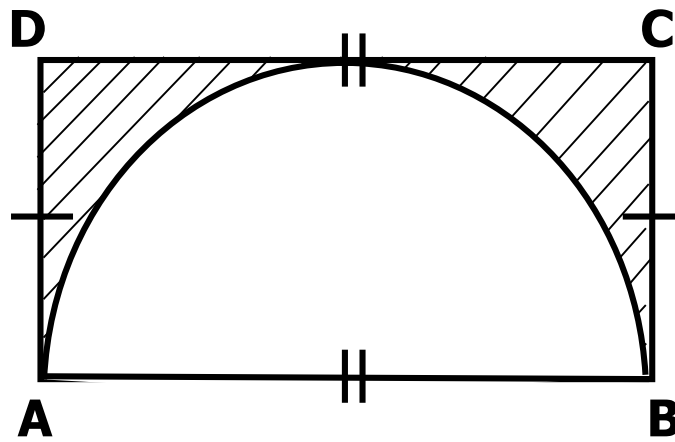
(a) Calculate the diameter of the semicircle.   (04 Marks)
(Use $\pi = \frac{22}{7}$)

Let length BC be y

AB = 2y

Area of rectangle

Area = L x W

  = 2y x y

  = 2y²

Area of semi circle

Area = $\frac{1}{2}$ π r²

  = $\frac{1}{2}$ x $\frac{\overset{11}{22}}{7}$ x $\frac{2y}{2}$ x $\frac{2y}{2}$

  = $\frac{11y^2}{7}$

Area of rectangle − Area of semi-circle = Area of shaded part

$2y^2 - \frac{11y^2}{7} = 21m^2$

$7 \times 2y^2 - {}^1\cancel{7} \times \frac{11y^2}{\cancel{7}_1} = 21m^2 \times 7$

$14y^2 - 11y^2 = 147m^2$

$\frac{\cancel{3}y^2}{\cancel{3}} = \frac{\overset{49}{\cancel{147}}m^2}{\cancel{3}}$

$y^2 = 49m^2$

$\sqrt{y^2} = \sqrt{49m^2}$

y = 7m

Diameter = 7m + 7m

  = 14m

(b) Find the area of the rectangle ABCD.   (02 Marks)

Area = L x W

  = 14m x 7m

  = 98m²

28. The table below shows the quantity of maize flour consumed in a school for one week. The quantity for Wednesday is not indicated.

Day	Mon	Tues	Wed	Thur	Fri	Sat	Sun
Mass in kg	40	55	___	30	47	30	48

The average mass of the flour consumed that week was 45kg. What was the quantity of flour consumed on Wednesday?

(04 Marks)

Let flour used on Wednesday be y

$$\frac{\text{Total sum}}{\text{Total number}} = \text{Average}$$

$$\frac{40 + 55 + 30 + 47 + 30 + 48 + y}{7} = 45$$

$$\cancel{7}_1 \times \frac{250 + y}{\cancel{7}_1} = 45 \times 7$$

$$250 + y = 315$$

$$250 - 250 + y = 315 - 250$$

$$y = 65\text{kg}$$

29. In a class of 126 candidates, $\frac{5}{9}$ of them are in Stream A and the rest are in Stream B. If $\frac{1}{5}$ of the candidates in Stream A are girls and 25% of the candidates in Stream B are boys. How many more boys than girls are in the class? (05 Marks)

Number of pupils in A

$= \frac{5}{9_1} \times \cancel{126}^{14}$

$= 70$ pupils

Number of pupils in B

$= 126 - 70$

$= 56$ pupils

Number of girls in A

$= \frac{1}{5} \times \cancel{70}^{14}$

$= 14$ girls

Number of boys in A

$= 70 - 14$

$= 56$ boys

Number of boys in B

$= \frac{^1\cancel{25}}{\cancel{100}_4} \times \cancel{56}^{14}_1$

$= 14$ boys

Number of girls in B

$= 56 - 14$

(16) $= 42$ girls

Girls in class

$= 14 + 42$
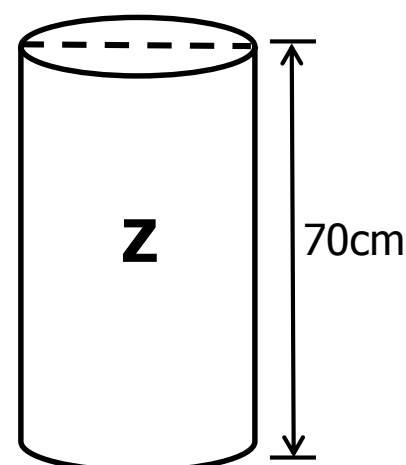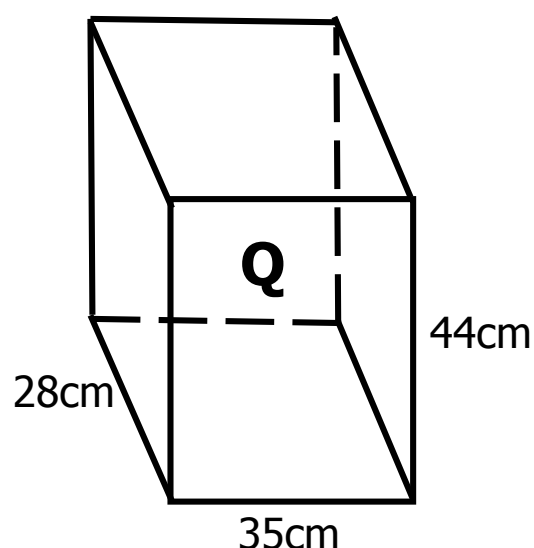
$= 56$

Boys in class

$= 56 + 14$

$= 70$

More boys

$= 70 - 56$

$= 14$

30. The petrol tanks below hold the same capacity when completely full. Use them to answer the questions that follow.

(a) Find the radius of tank **Z**. (03 Marks)

Volume of tank Q

Volume = Base area x height

= 35cm x 28cm x 44cm

= 43120cm^3

Volume of **Q** = Volume of **Z**

Z = 43120cm^3

Radius of tank Z

$\pi r^2 h$ = Volume

$\dfrac{22}{7_1}$ x r^2 x $\overset{10}{\cancel{70}}$cm = 43120cm^3

220cmr^2 = $\dfrac{\overset{196}{\cancel{43120}}\text{cm} \times \text{cm}^2}{\cancel{220}\text{cm}}$

$\dfrac{\cancel{220}\text{cm}}{}$

$\sqrt{r^2}$ = $\sqrt{196\text{cm}^2}$

r = 14cm

(b) How many litres does tank Q hold when half full? (02 Marks)

Capacity of tank Q

= $\dfrac{V}{1000\text{cm}^3}$

= $\dfrac{43120\cancel{\text{cm}^3}}{1000\cancel{\text{cm}^3}}$

= 43.12litres

litres held when half full

= $\dfrac{1}{2}$ x 43.12litres

= $\dfrac{1}{2_1}$ x $\dfrac{\overset{2156}{\cancel{4312}}}{100}$

= $\dfrac{2156}{100}$

= 21.56litres

31. The graph below represents a journey of a cyclist travelling from town **W** to town **P** through towns L, K and M.

CYCLIST'S JOURNEY
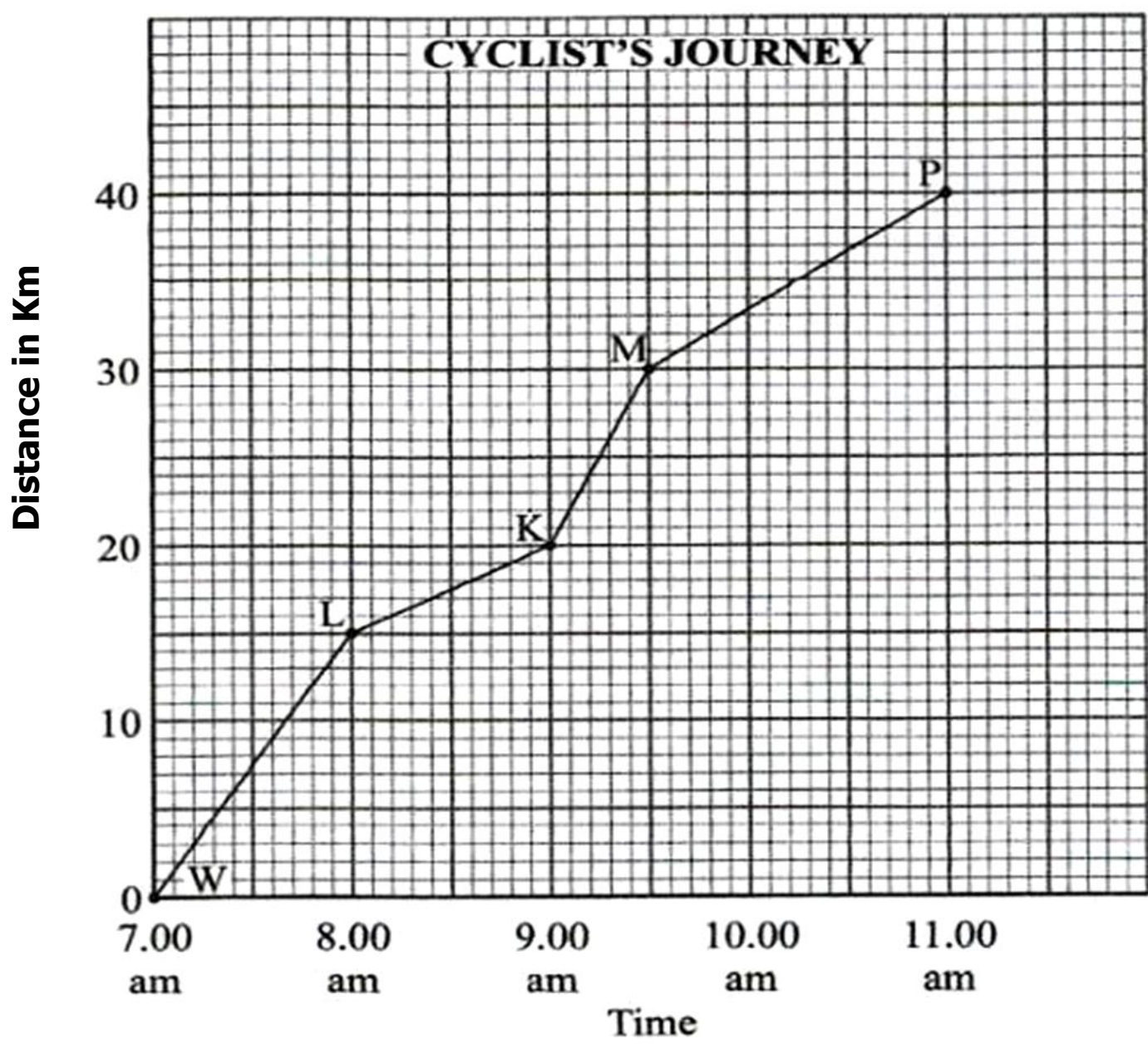
Between which two towns was the cyclist travelling at the highest speed? (05 Marks)

Speed between different towns

Between town W and L

Speed = Distance
Time
= 15km ÷ 1hr
= 15km/hr

Between town L and K

Speed = Distance
Time
= 5km ÷ 1hr
= 5km/hr

Between town K and M

Speed = Distance
Time
= $10km \div \frac{1}{2}$ hr
= $10km \times \frac{2}{1hr}$
= 20km/hr

Between town M and P

Speed = Distance
Time
= $10km \div 1\frac{1}{2}$ hr
= $10km \div \frac{3}{2}$
= $10km \times \frac{2}{3}$

6 rem 2
= $\frac{20}{3}$ ₁
= $6\frac{2}{3}$ km/hr

∴ the cyclist was travelling at the highest speed between town **K** and **M**

32. A book costs sh.P, a pen costs $\frac{1}{4}$ of the cost of a book and a ruler costs twice the cost of a pen. If Opio paid sh.1,050 for the three items, find the cost 3 books.   (04 Marks)

Book	Pen	Ruler	Total
sh. P	sh. $\frac{1}{4}P$	sh. $2(\frac{P}{4})$	sh.1050

$$sh.P + \frac{sh.P}{4} + \frac{sh.P}{2} = sh.\ 1050$$

$$sh.P \times 4 + \frac{sh.P}{4_1} \times 4^1 + \frac{sh.P}{2_1} \times 4^2 = sh.\ 1050 \times 4$$

$$sh.\ 4P + sh.\ P + sh.\ 2P = sh.\ 4200$$

$$\frac{sh.\ 7P}{sh.\ 7} = \frac{sh.\ 4200^{600}}{sh.\ 7}$$

$$P = \underline{\underline{600}}$$

Cost of 3 books

1 book costs sh. 600
3 books cost sh. 600 x 3
           = sh. 1800