



UGANDA NATIONAL EXAMINATIONS BOARD

PRIMARY LEAVING EXAMINATION

2023

MATHEMATICS

Time Allowed: 2 hours 30 minutes

| Random No. | Personal No. |
|------------|--------------|
| | |

Candidate's Name: TR. FRANCIS XERVIA

Candidate's Signature:

District ID No.

Read the following instructions carefully:

1. Do not write your **school or district name** anywhere on this paper.
2. This paper has **two** sections: **A** and **B**. Section **A** has **20** questions and section **B** has **12** questions. The paper has **15 printed pages**.
3. Answer **all** the questions. **All** the working for both sections **A** and **B** must be shown in the spaces provided.
4. **All** the working **must** be done using a **blue** or **black** ball point pen or ink. Any work done in pencil other than graphs and diagrams will **not** be marked.
5. **No calculators** are allowed in the examination room.
6. Unnecessary **changes** in your work and handwriting that cannot be read easily may lead to **loss of marks**.
7. Do not fill anything in the table indicated: "**FOR EXAMINERS' USE ONLY**" and boxes inside the question paper.

| FOR EXAMINERS' USE ONLY | | |
|----------------------------|-------|--------------|
| QN. NO. | MARKS | EXR'S NO. |
| 1 - 5 | | |
| 6 - 10 | | |
| 11 - 15 | | |
| 16 - 20 | | |
| 21 - 22 | | |
| 23 - 24 | | |
| 25 - 26 | | |
| 27 - 28 | | |
| 29 - 30 | | |
| 31 - 32 | | |
| TOTAL | | |

SECTION A: 40 MARKS

Answer all the questions in this section.

Questions 1 to 20 carry two marks each.

1. Work out:

$$\begin{array}{r} 6 \ 3 \\ + 5 \ 4 \\ \hline 1 \ 1 \ 7 \end{array}$$

$$63 + 54$$

OR.

$$60 + 3 + 50 + 4$$

$$(60 + 50) + (3 + 4)$$

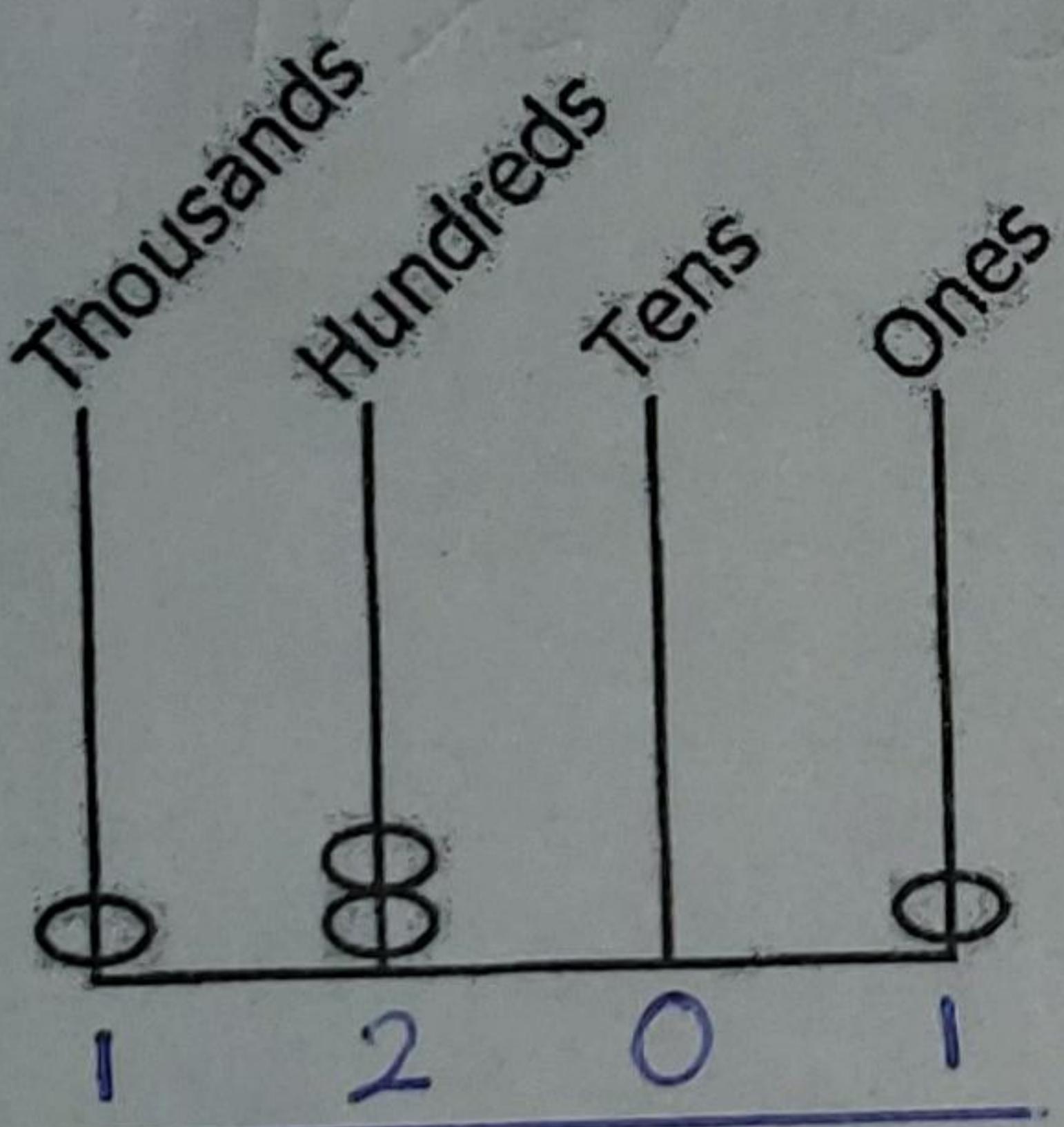
$$110 + 7$$

$$117$$

$$3+4=7$$

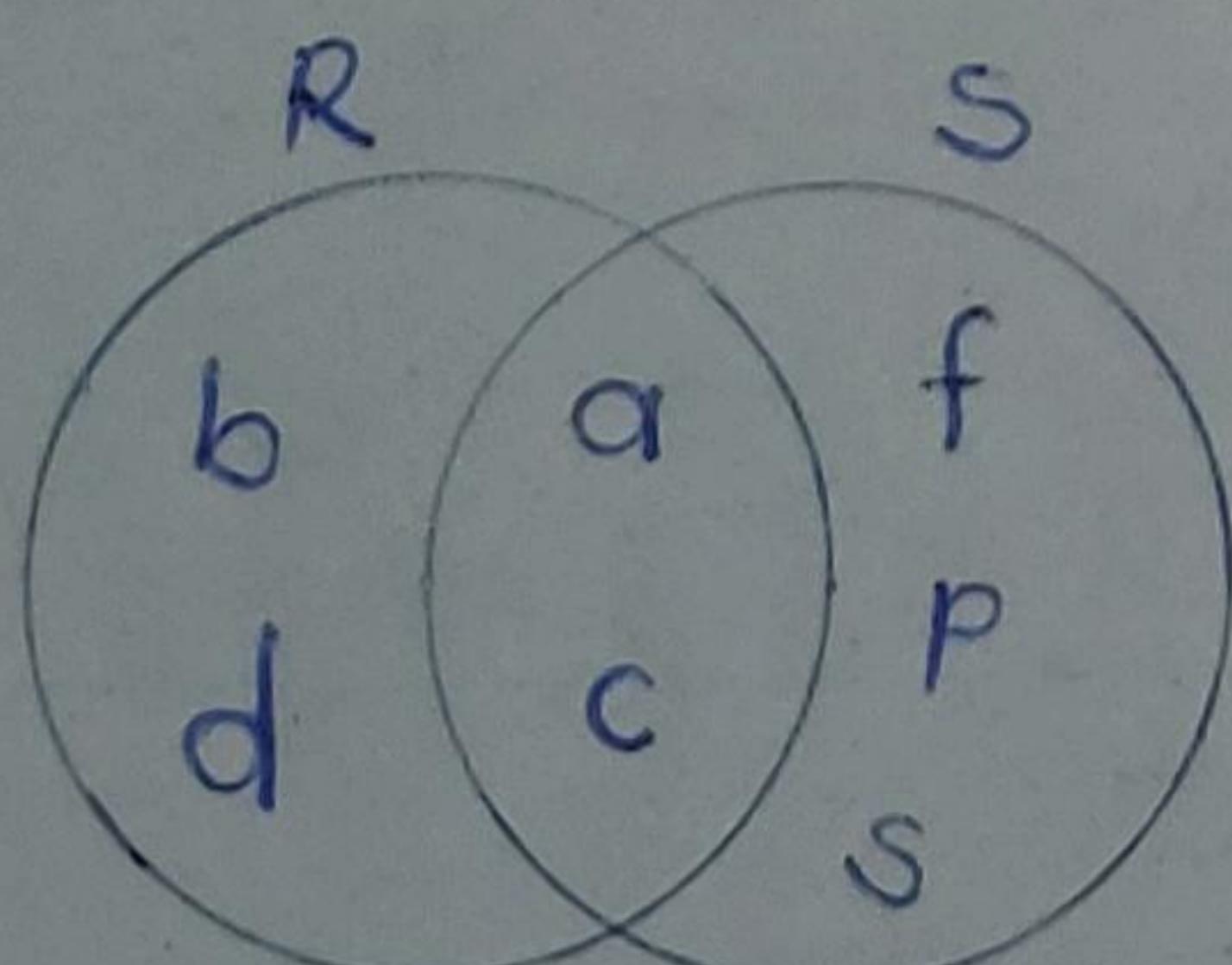
$$5+6=11$$

2. Write the base ten number shown on the abacus below.



$$1201_{\text{ten}}$$

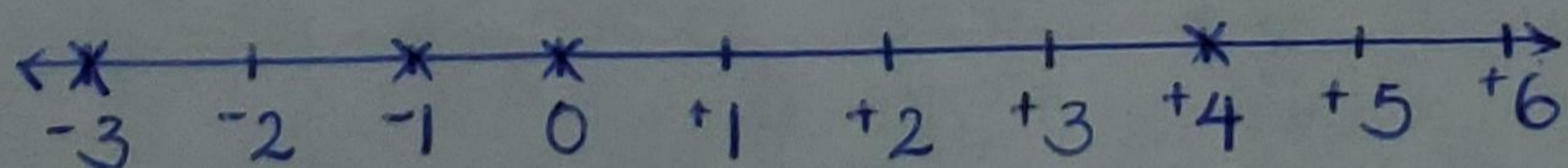
3. Given that $R = \{\textcircled{a}, b, \textcircled{c}, d\}$ and $S = \{\textcircled{a}, f, p, \textcircled{c}, s\}$, find $n(R \cup S)$.



$$R \cup S = \{a, b, c, d, f, p, s\}$$

$$n(R \cup S) = 7$$

4. Arrange the integers $-3, 4, 0$ and -1 in ascending order.



$$-3, -1, 0, 4$$

5. A training for scouts started on a Wednesday and took 30 days. Find the day of the week on which the training ended.

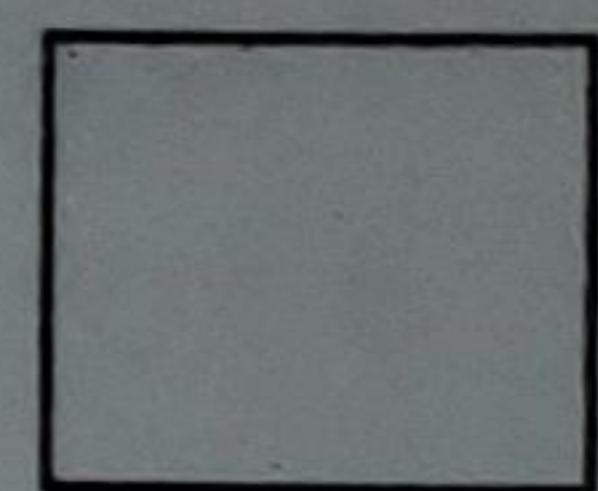
| S | M | T | W | T | F | S |
|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |

The training ended on Friday.

$$3 + 30 = \underline{\quad} \text{ (finite 7)}$$

$$\frac{33}{7} = \underline{\quad} \text{ (finite 7)}$$

$$\qquad\qquad\qquad 5 \text{ (finite 7)}$$



6. Change 750 millilitres into litres.

$$1000 \text{ ml} = 1 \text{ litre}$$

$$1 \text{ ml} = \frac{1}{1000} \text{ litres}$$

$$750 \text{ ml} = \left(\frac{1}{1000} \times 750\right) \text{ litres}$$

$$\begin{array}{r} \text{K H D L d c m} \\ \text{1 0 0 0} \\ = \frac{75}{100} \text{ litres} \\ = 0.75 \text{ litres} \end{array}$$

7. Find the value of $4^2 + 3^2 \times 9^0$.

$$4^2 + 3^2 \times 9^0$$

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

$$16 + (9 \times 1)$$

$$16 + 9$$

$$25$$

BODMAS
↑

8. A meeting that took 2 hours and 15 minutes ended at 1:20 p.m. At what time did the meeting begin?

$$E.T = 1:20 \text{ p.m.}$$

$$D = 2 \text{ hrs } 15 \text{ min}$$

Ending time to 24 hours

$$12:00 \text{ hrs}$$

$$+ 1:20 \text{ p.m.}$$

$$\hline 13:20 \text{ hrs}$$

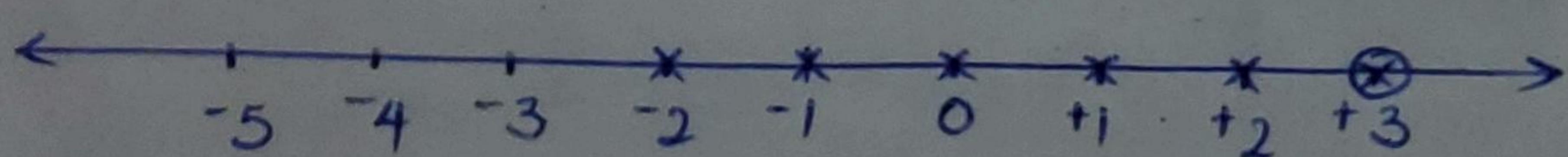
Starting time

$$13:20 \text{ hours}$$

$$- 2:15 \text{ p.m.}$$

$$\hline 11:05 \text{ a.m.}$$

9. Write the solution set for the inequality $P \leq 3$.



$$P = \{3, 2, 1, 0, -1, -2, \dots\}$$

$$\text{OR } P = \{\dots, -1, 0, 1, 2, 3\}$$

10. Find the next number in the sequence:

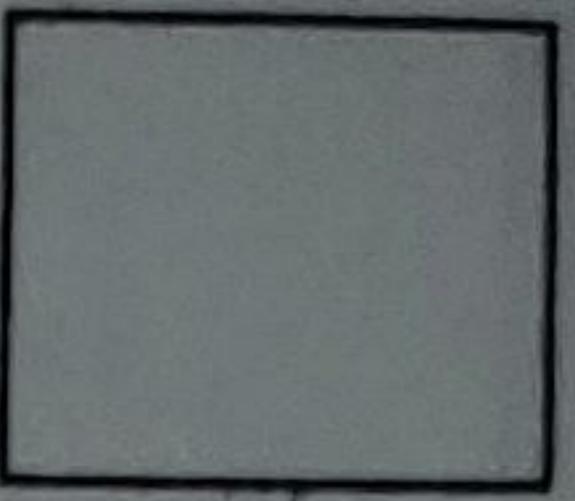
$$1, 8, 27, 64, \dots$$

$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$

$1^3 \quad 2^3 \quad 3^3 \quad 4^3 \quad 5^3$

$$\begin{aligned} 5^3 &= (5 \times 5) \times 5 \\ &= 25 \times 5 \\ &= 125 \end{aligned}$$

$$\begin{array}{r} 2 \\ 25 \\ \times 5 \\ \hline 125 \end{array}$$

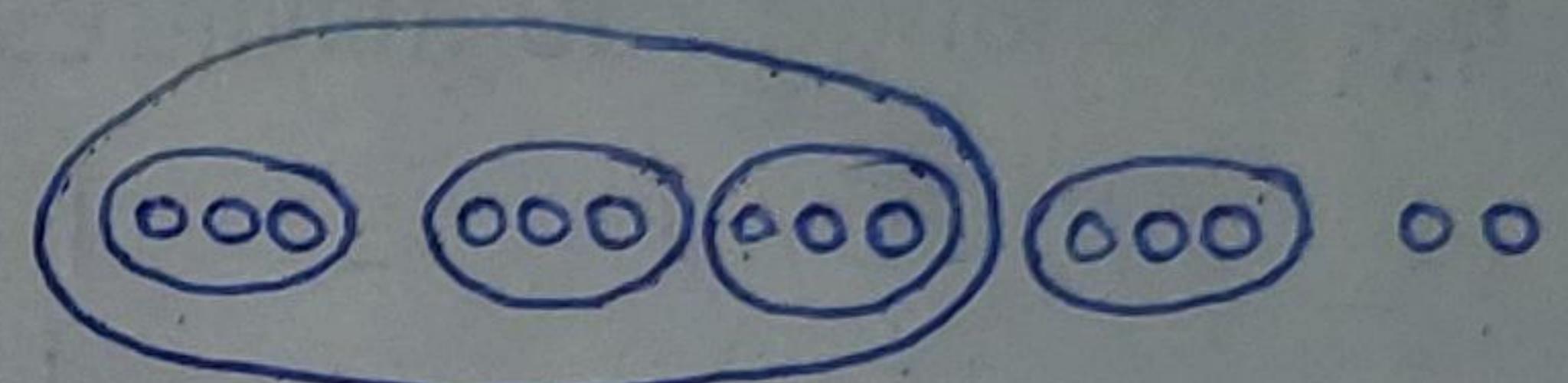


11. Change 14_{ten} to base three.

| R.B | No. | Rem |
|-----|-----|-----|
| 3 | 14 | 2 |
| 3 | 4 | 1 |
| 1 | | 1 |

$$14_{\text{ten}} = 112_{\text{three}}$$

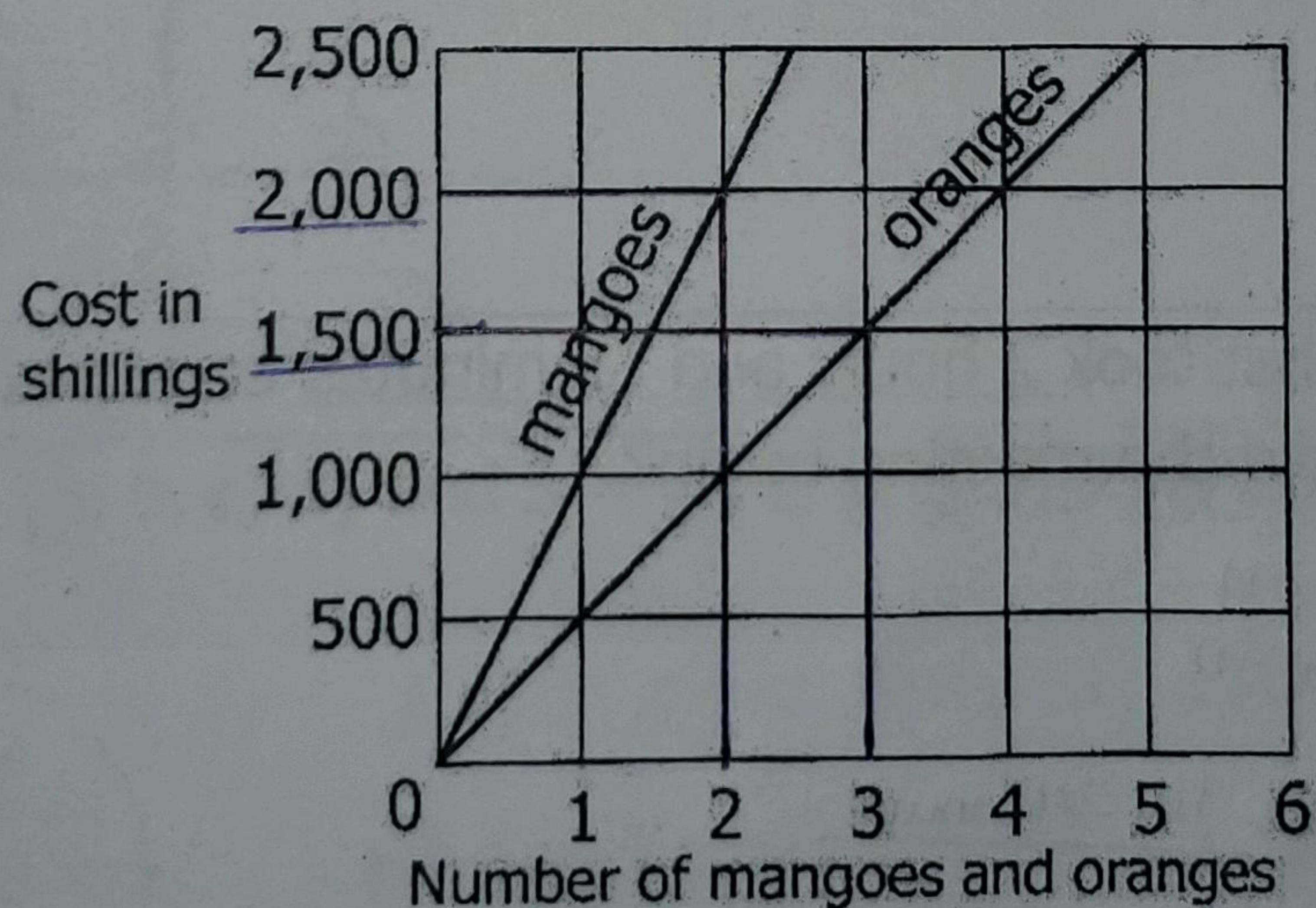
OR



1 group of three threes, one group of threes and 2 ones

$$112_{\text{three}}$$

12. The graph below shows the cost in shillings of mangoes and oranges. Study the graph and use it to answer the question that follows.



Find the total cost of 2 mangoes and 3 oranges.

$$\begin{aligned} 2 \text{ mangoes} &\rightarrow \text{sh. } 2000 \\ 3 \text{ oranges} &\rightarrow \text{sh. } 1500 \\ &\hline \text{sh. } 3500 \end{aligned}$$

13. Given that $78t$ is a three-digit number which is divisible by 9, find the digit represented by t .

$$7+8+t = 9$$

$$15+t = 9$$

$$15+t = (9+9)$$

$$15+t = 18$$

$$15-15+t = 18-15$$

$$0+t = 3$$

$$t = 3$$

OR

$$7+8+t = 9$$

$$15+t = 9$$

$$(1+5)+t = 9$$

$$6+t = 9$$

$$6-6+t = 9-6$$

$$0+t = 9-6$$

$$t = 3$$

$$M_9 = \{9, 18, 27, 36, \dots\}$$

$$7+8+t = 18$$

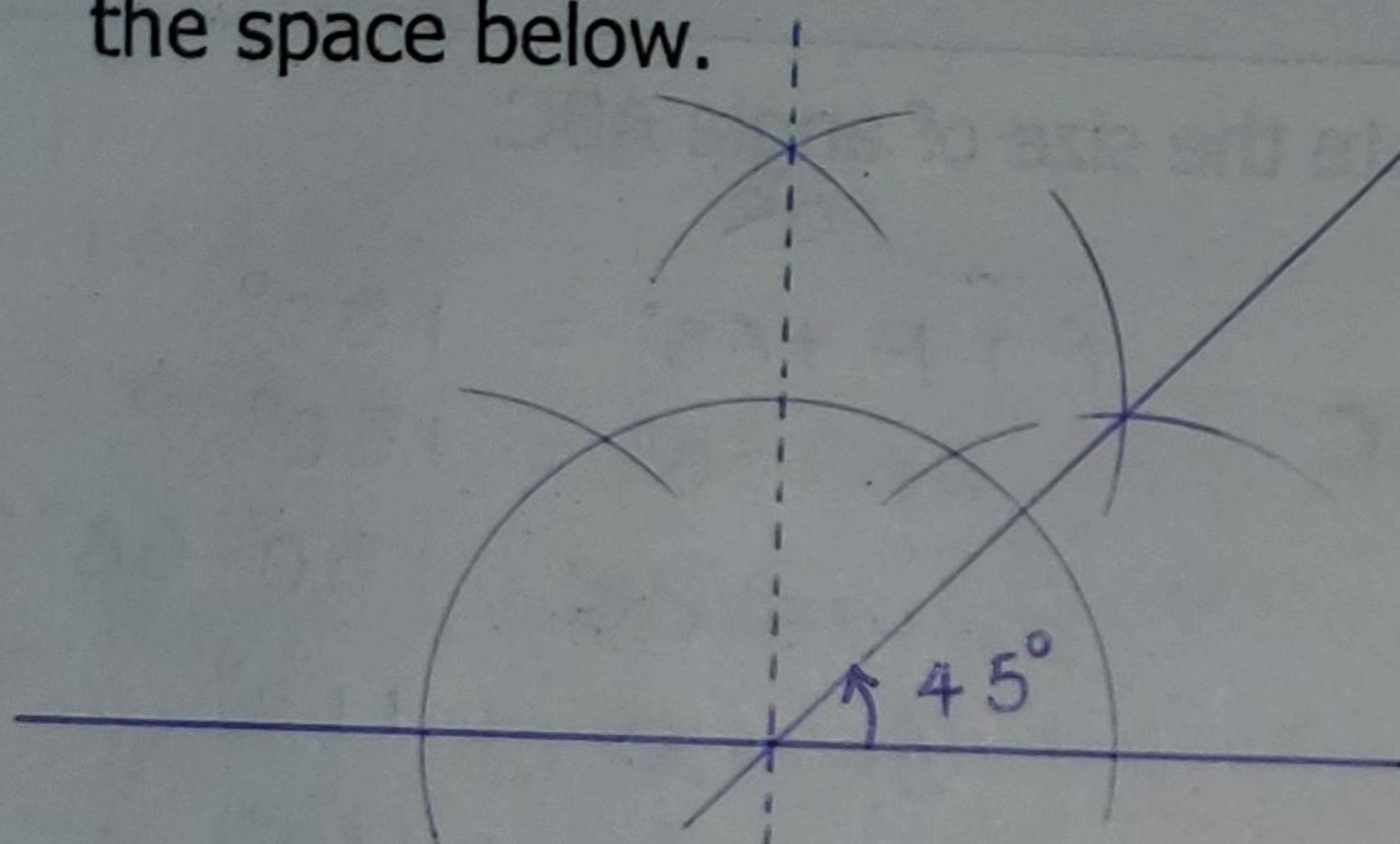
$$15+t = 18$$

$$15-15+t = 18-15$$

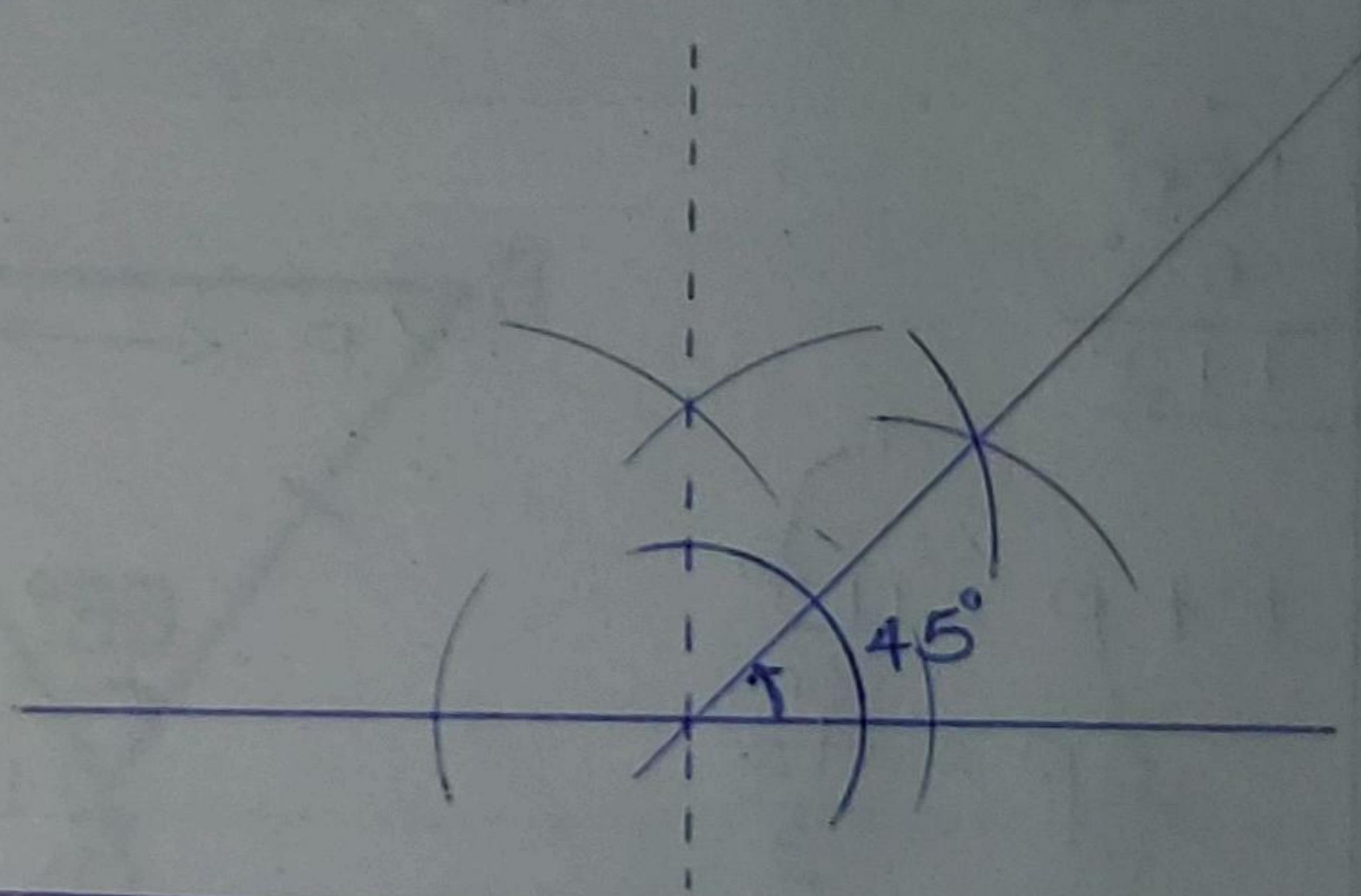
$$0+t = 3$$

$$t = 3$$

14. Using a ruler and a pair of compasses only, construct an angle of 45° in the space below.



OR

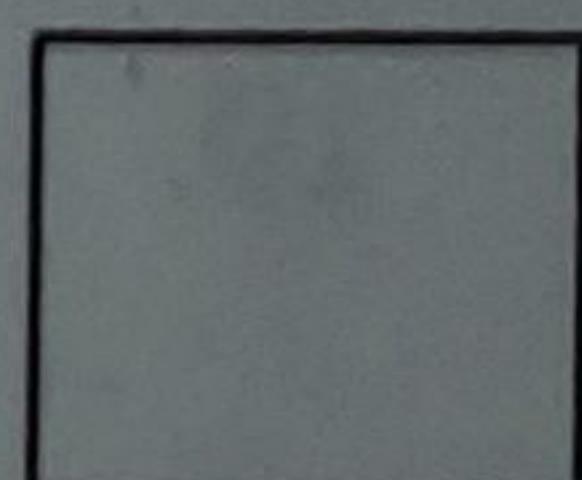


15. Simplify: $5q - 2r - 3q - r$.

$$5q - 3q - 2r - r$$

$$2q - 3r$$

| | | | |
|---|----|---|-------|
| + | | | 22222 |
| - | rr | r | 222 |



16. A farmer sold the following number of eggs in a period of three days; 62, 73 and 78. Calculate the average number of eggs the farmer sold in that period.

$$\text{Average} = \frac{\text{Sum of eggs}}{\text{Number of days}}$$

$$= \frac{(62+73)+78}{3}$$

$$= \frac{135+78}{3}$$

$$= \frac{213}{3}$$

$$= 71 \text{ eggs}$$

$$\begin{array}{r}
 62 \\
 + 73 \\
 \hline
 135 \\
 + 78 \\
 \hline
 213
 \end{array}$$

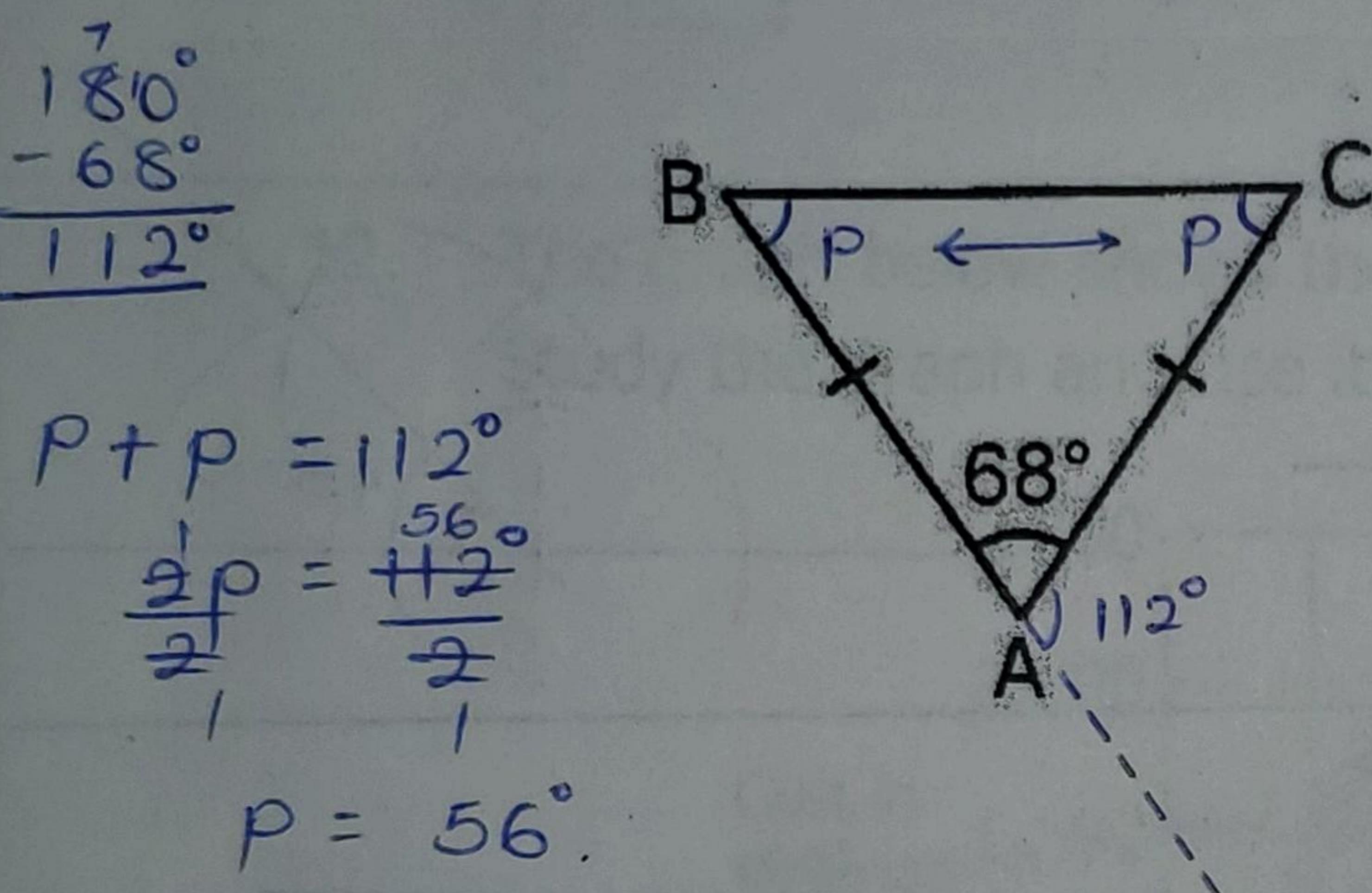
17. A businessman bought a watch at sh 45,000. He sold it and made a loss of sh 1,500. Find his selling price.

$$\begin{aligned}\text{Selling price} &= \text{Buying price} - \text{Loss.} \\ &= \text{sh. } 45,000 - \text{sh. } 1500 \\ &= \text{sh. } 43,500\end{aligned}$$

$$\begin{array}{r} 45000 \\ - 150 \\ \hline 43500 \\ - 1500 \\ \hline 43500 \end{array}$$

18. In the diagram below, calculate the size of angle ABC.

OR

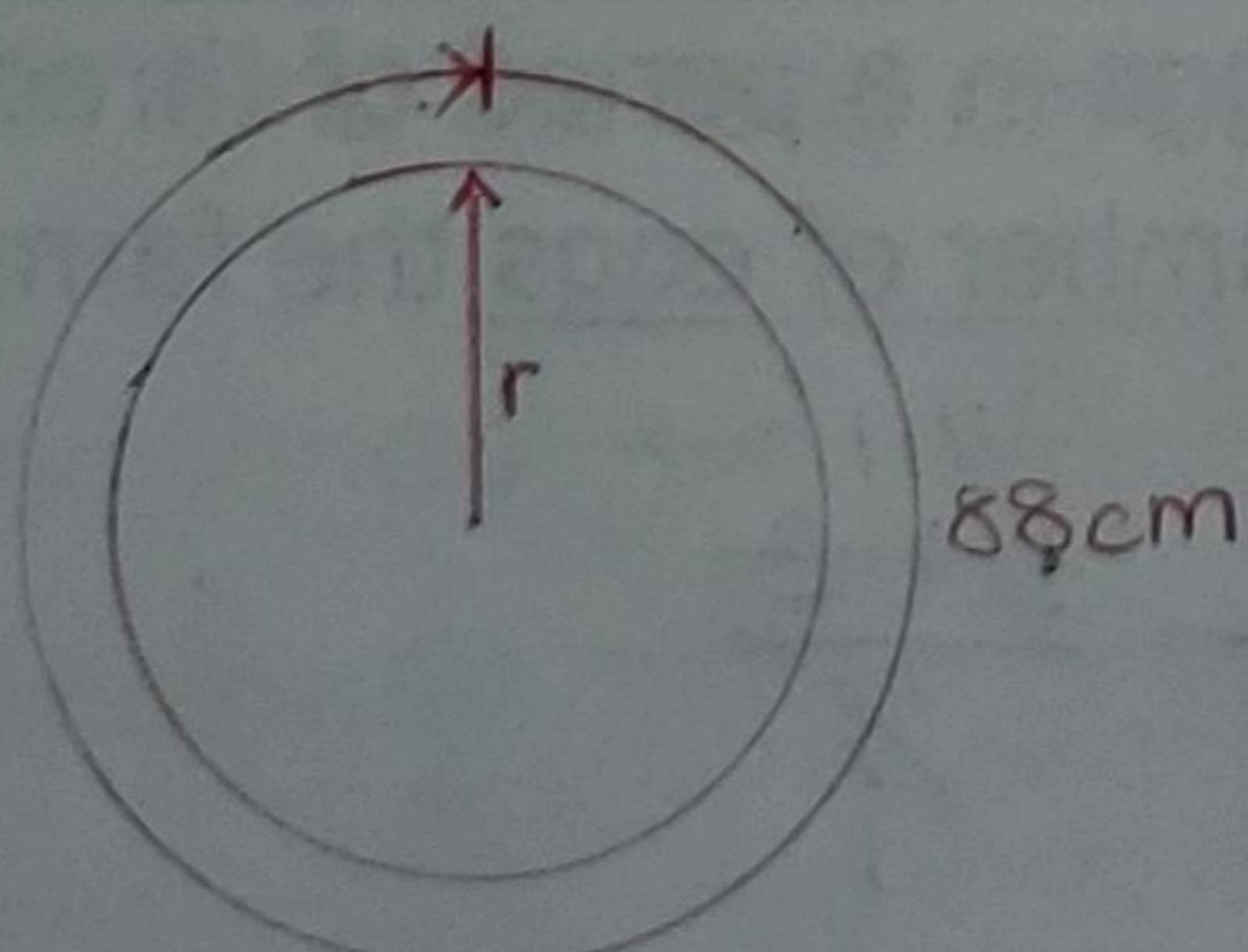


$$\begin{aligned}P + P + 68^\circ &= 180^\circ \\ 2P + 68^\circ &= 180^\circ \\ 2P + 68^\circ - 68^\circ &= 180^\circ - 68^\circ \\ 2P &= 112^\circ \\ \frac{1}{2}P &= \frac{56}{2} \\ P &= 56^\circ\end{aligned}$$

$$\therefore ABC = 56^\circ$$

$$\therefore ABC = 56^\circ$$

19. In one hour, the minute hand of a clock covers 88 cm. Calculate the length of the minute hand. (Use $\pi = \frac{22}{7}$)



$$2\pi r = c$$

$$2 \times \frac{22}{7} r = 88 \text{ cm}$$

$$\frac{44}{7} r = \frac{88 \text{ cm}}{\frac{44}{7}}$$

$$\frac{1}{4} \times \frac{44}{7} r = \frac{88 \text{ cm}}{\frac{44}{7}}$$

$$r = 2 \text{ cm} \times 7$$

$$r = 14 \text{ cm}$$

$$\text{Length} = r$$

$$\text{Length} = 14 \text{ cm}$$

20. A pupil scored $\frac{20}{25}$ in the first term Mathematics test and $\frac{18}{20}$ in the second term Mathematics test. In which test did the pupil perform better?

Fractions to percentages

$$\frac{20}{25} \times 100\%.$$

$$1 \\ 20 \times 4\%.$$

$$80\%.$$

$$\frac{18}{20} \times 100\%.$$

1

$$18 \times 5\%.$$

$$90\%.$$

The pupil performed better in second term Mathematics test.

L.C.M of 25 and 20

| | | |
|---|----|----|
| 2 | 25 | 20 |
| 2 | 25 | 10 |
| 5 | 25 | 5 |
| 5 | 5 | 1 |
| 1 | 1 | |

| | |
|------------------------------|------------------------------|
| $\frac{20}{25} \times 100\%$ | $\frac{18}{20} \times 100\%$ |
| 1 | 1 |
| 20×4 | 18×5 |
| 80 | 90 |

The pupil performed better in second term Mathematics test.

$$(2 \times 2) \times (5 \times 5)$$

$$4 \times 25$$

$$100$$

SECTION B: 60 MARKS

Answer all the questions in this section.

Marks for each question are indicated in brackets.

21. (a) Simplify:

BODMAS
 $\uparrow \uparrow$

$$\frac{1}{2} - \left(\frac{1}{4} \div \frac{4}{5} \right)$$

$$\frac{1}{2} - \left(\frac{1}{4} \times \frac{5}{4} \right)$$

$$\frac{1}{2} - \frac{5}{16}$$

$$\frac{1}{2} - \frac{1}{4} \div \frac{4}{5}$$

$$\begin{aligned} & \frac{1}{2} - \frac{5}{16} \\ & \frac{(8 \times 1) - (1 \times 5)}{16} \\ & \frac{8 - 5}{16} \end{aligned}$$

$$\frac{3}{16}$$

(03 marks)

| | | |
|---|---|----|
| 2 | 2 | 16 |
| 2 | 1 | 8 |
| 2 | 1 | 4 |
| 2 | 1 | 2 |
| 1 | 1 | 1 |

$(2 \times 2) \times (2 \times 2)$
 4×4
 16

- (b) Work out:

$$\frac{0.27 \times 1.2}{0.9}$$

$$\left(\frac{27}{100} \times \frac{12}{10} \right) \div \frac{9}{10}$$

$$\frac{3 \times 12}{100}$$

$$\frac{27}{100} \times \frac{12}{10} \times \frac{10}{9}$$

$$\frac{36}{100}$$

$$0.36$$

(02 marks)

22. An athlete covered 400 metres in 48 seconds. Calculate the speed of the athlete in kilometres per hour. (04 marks)

$$\text{Speed} = \frac{D}{T}$$

$$= \frac{(400 \div 1000) \text{ km}}{(48 \div 3600) \text{ hrs}}$$

$$= \frac{400 \text{ km}}{1000} \div \frac{48 \text{ hrs}}{3600}$$

$$= \frac{400 \text{ km}}{1000} \times \frac{\frac{3}{4000}}{\frac{1}{48 \text{ hrs}}}$$

$$= \frac{10}{400} \text{ km} \times \frac{\frac{3}{4}}{\frac{1}{\text{hrs}}}$$

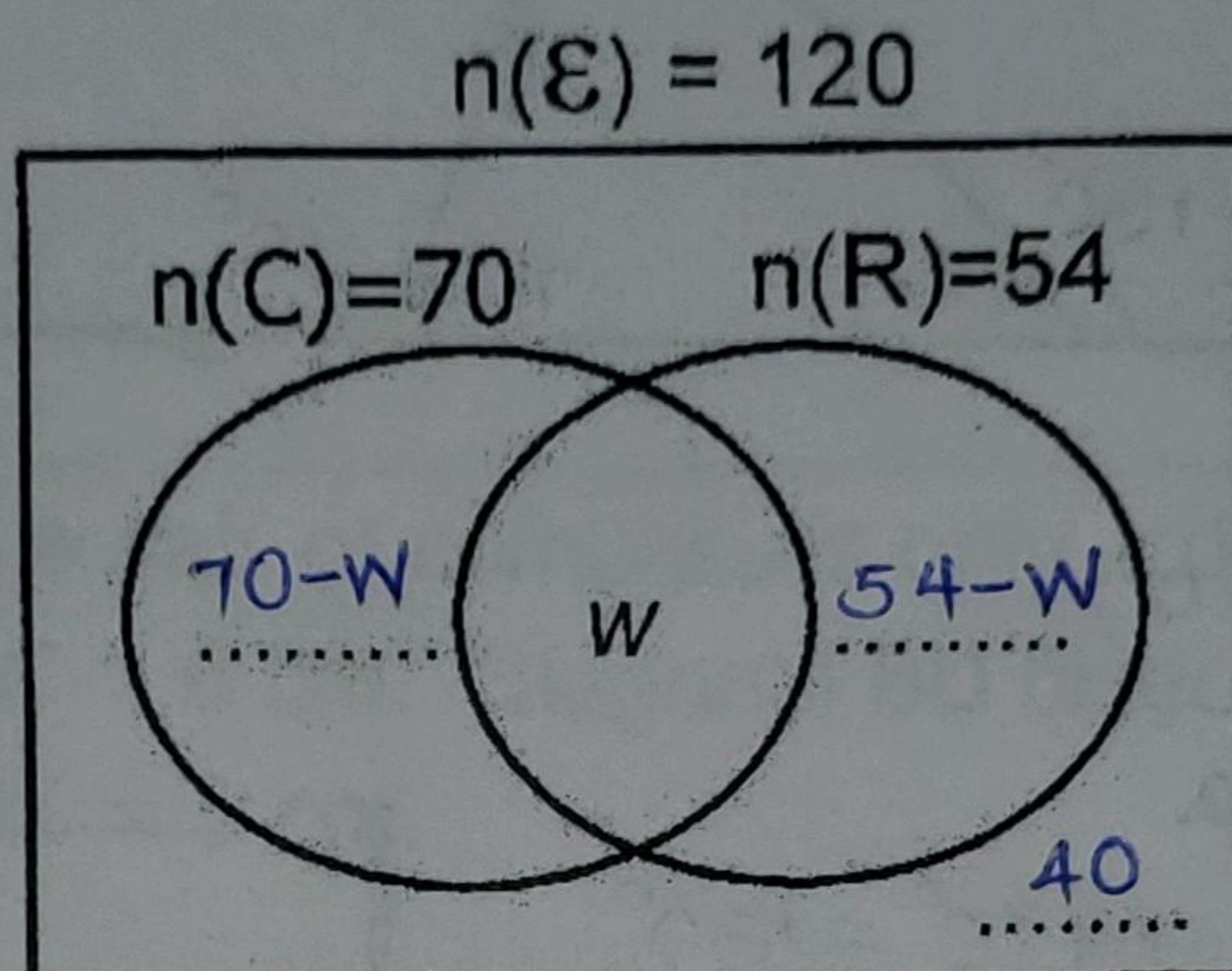
$$\frac{(10 \times 3) \text{ km}}{1 \text{ hr}}$$

$$30 \text{ km/hr}$$



23. A total of 120 guests were invited for a marriage ceremony. 70 guests attended the church service (C), 54 guests attended the reception (R) and w guests attended both the church service and the reception. 40 guests did not turn up for the marriage ceremony.

- (a) Use the given information to complete the Venn diagram below. (03 marks)



- (b) Calculate the number of guests who attended both the church service and reception. (02 marks)

$$54 + 70 - w + 40 = 120$$

$$54 + 70 + 40 - w = 120$$

$$164 - w = 120$$

$$164 - 164 - w = 120 - 164$$

$$0 - w = -44$$

$$-w = -44$$

$$\frac{-w}{-1} = \frac{-44}{-1}$$

$$w = 44$$

Number of guests who attended
both
(w) guests
44 guests

$$\begin{array}{r} 164 \\ -120 \\ \hline 044 \end{array}$$

24. In a certain school, there are 126, 90 and 72 pupils in Primary Five, Six and Seven respectively. In each class, groups with equal number of pupils were formed.

- (a) Find the largest number of pupils in each group. (03 marks)

GCF of 126, 90 and 72

| | | | |
|---|-----|----|----|
| 2 | 126 | 90 | 72 |
| 3 | 63 | 45 | 36 |
| 3 | 21 | 15 | 12 |
| 7 | 5 | 4 | |

$$(2 \times 3) \times 3$$

$$6 \times 3$$

18 pupils.

- (b) How many groups were formed in Primary Five? (02 marks)

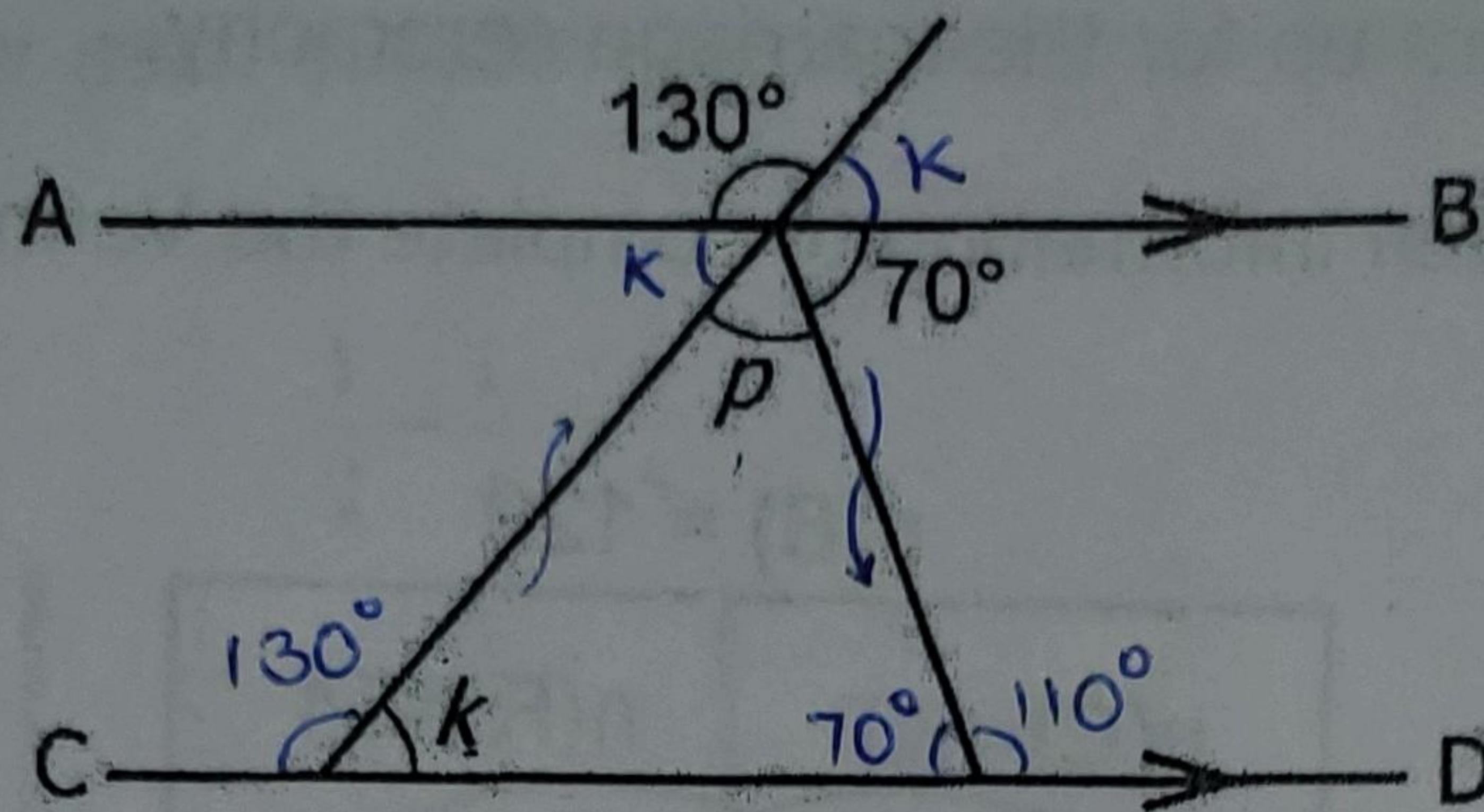
Primary five \rightarrow 126 pupils.

$$\left(\frac{63}{18} \text{ groups} \right) \text{ groups}$$

$$\frac{63}{9} \text{ groups}$$

7 groups

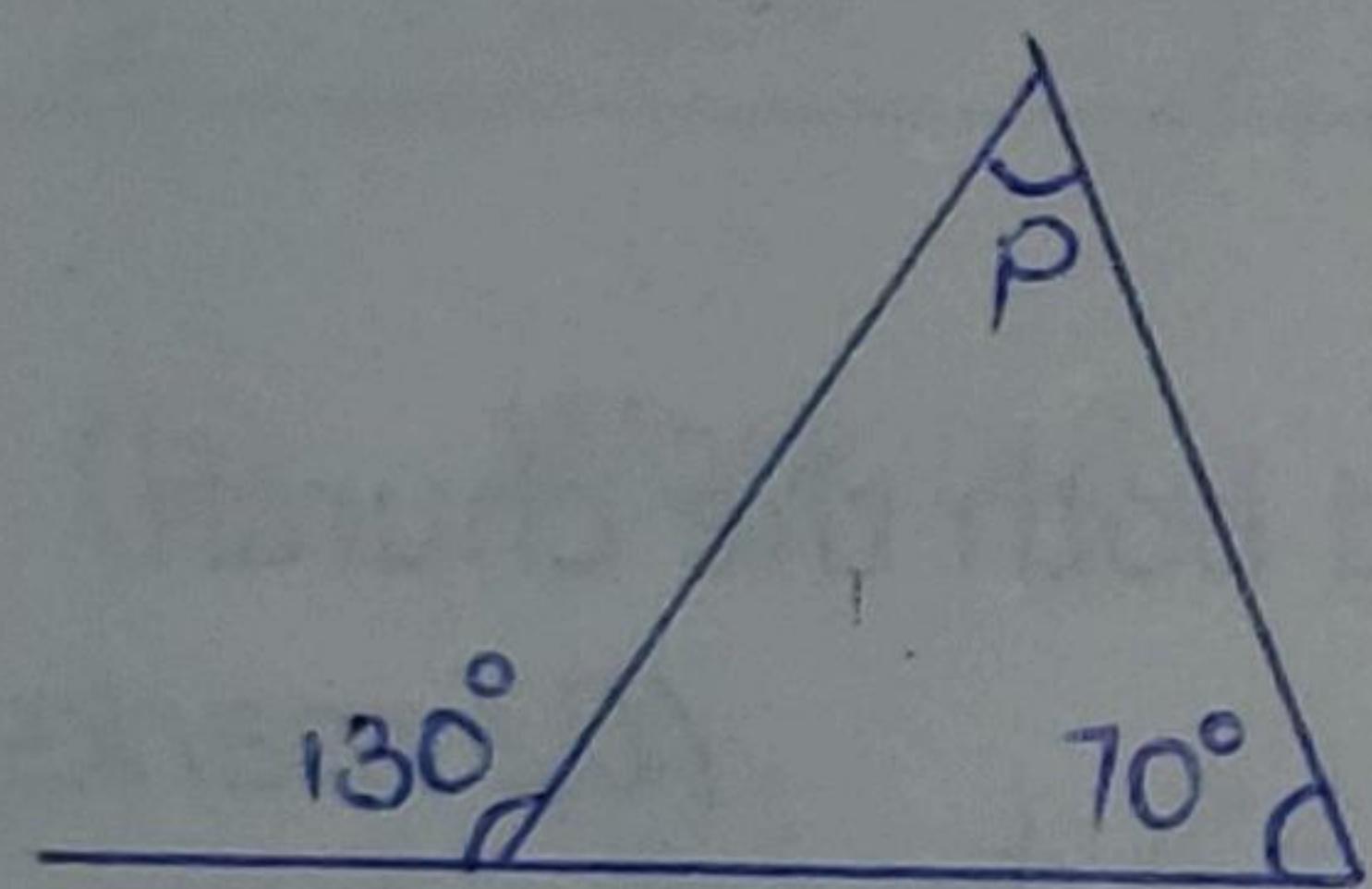
25. In the diagram below, line AB is parallel to line CD. Study the diagram and use it to answer the questions that follow.



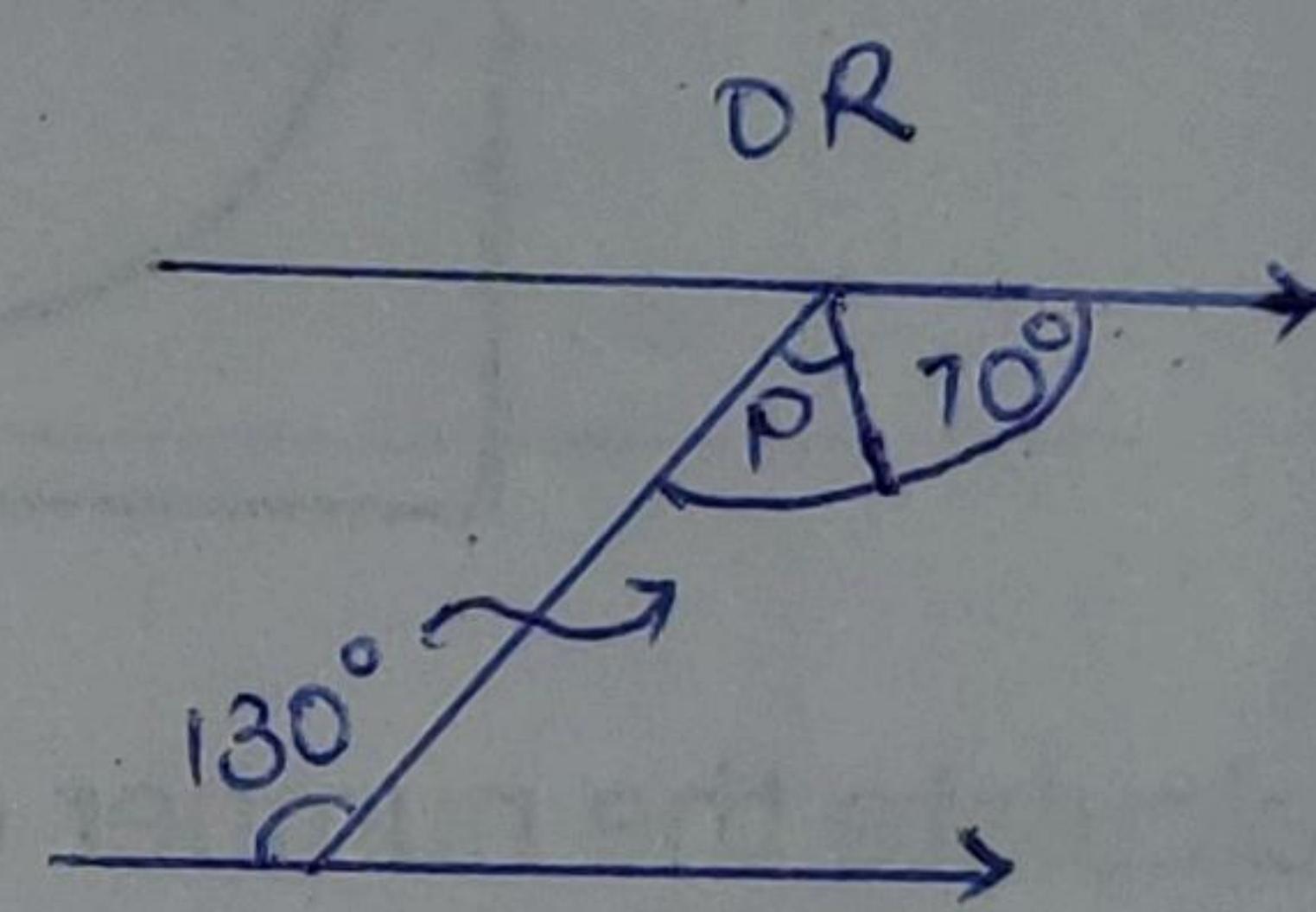
$$\begin{array}{r} 180^\circ \\ - 70^\circ \\ \hline 110^\circ \end{array}$$

Find the size of;

- (a) angle p.



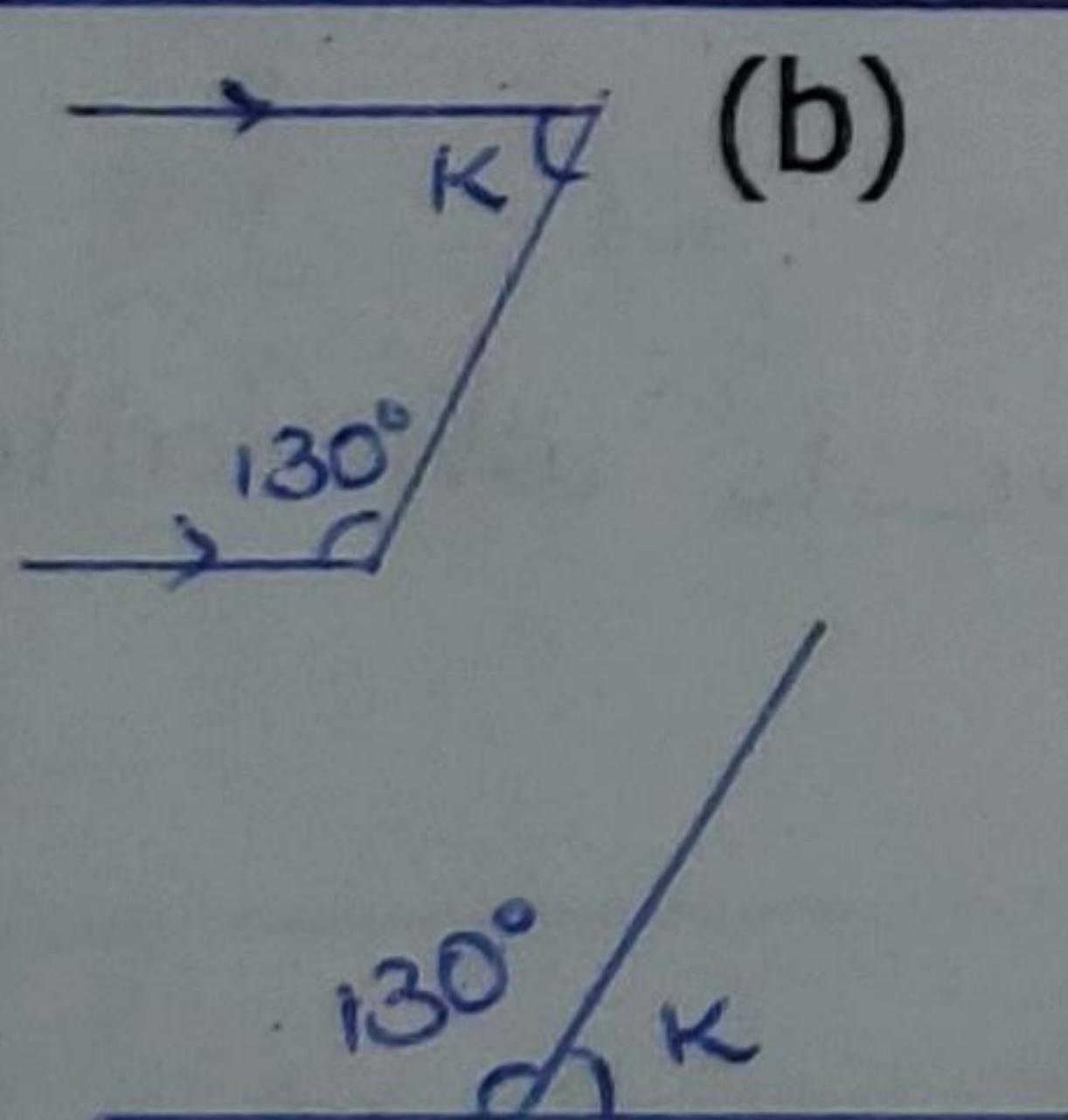
$$\begin{aligned} p + 70^\circ &= 130^\circ \\ p + 70^\circ - 70^\circ &= 130^\circ - 70^\circ \\ p + 0 &= 60^\circ \\ p &= 60^\circ \end{aligned}$$



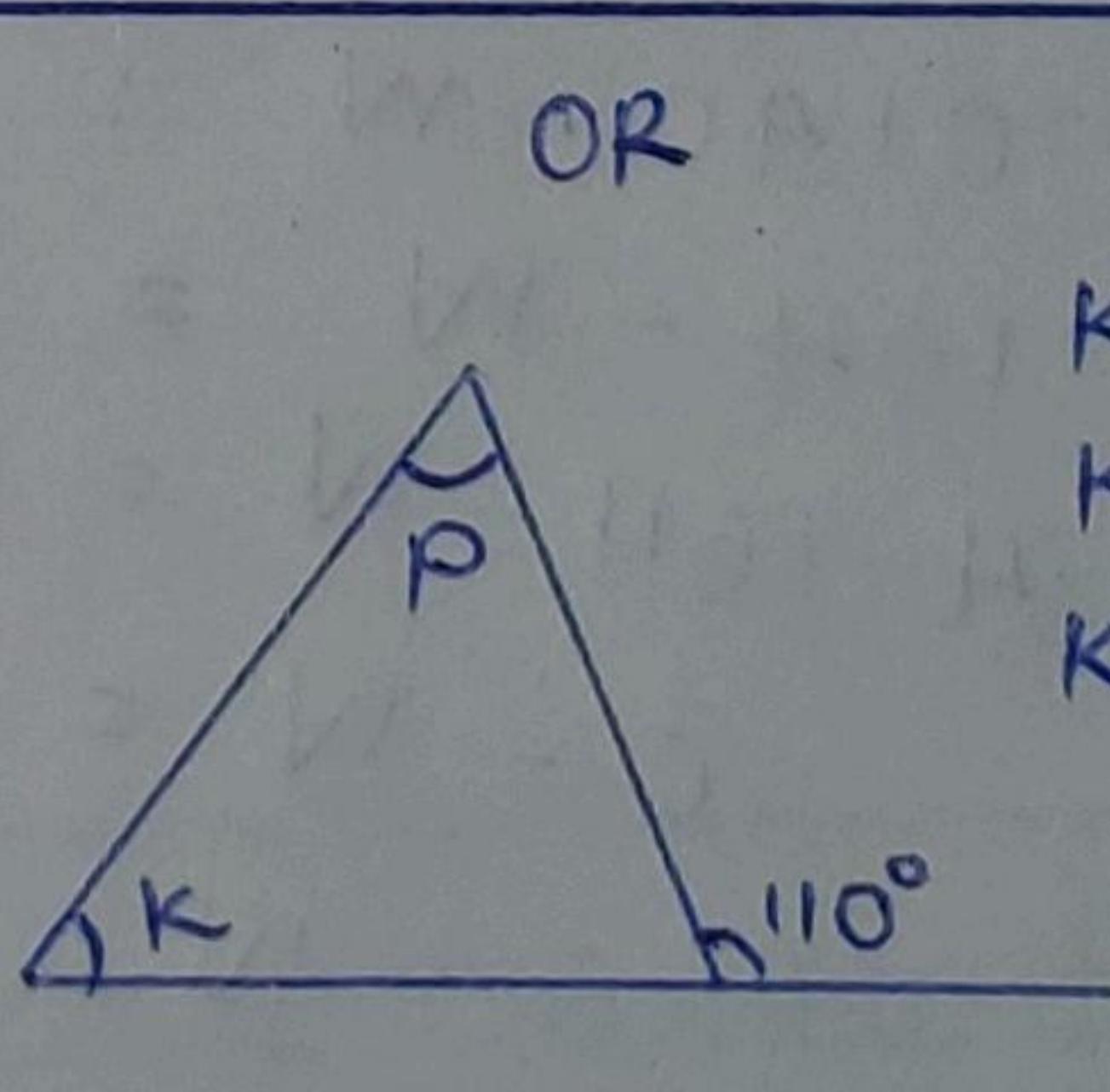
(02 marks)

$$\begin{aligned} p + 70^\circ &= 130^\circ \\ p + 70^\circ - 70^\circ &= 130^\circ - 70^\circ \\ p + 0 &= 60^\circ \\ p &= 60^\circ \end{aligned}$$

- (b) angle k.



$$\begin{aligned} k + 130^\circ &= 180^\circ \\ k + 130^\circ - 130^\circ &= 180^\circ - 130^\circ \\ k + 0 &= 50^\circ \\ k &= 50^\circ \end{aligned}$$



(02 marks)

$$\begin{aligned} k + p &= 110^\circ \\ k + 60^\circ &= 110^\circ \\ k + 60^\circ - 60^\circ &= 110^\circ - 60^\circ \\ k + 0 &= 50^\circ \\ k &= 50^\circ \end{aligned}$$

26. A carton of salt contains 40 packets. Each packet has a mass of 250 grammes.

- (a) Work out the mass in Kilogrammes, of all the packets of salt in the carton.

$$\begin{aligned} \text{Total mass} \\ 40 \times 250 \text{g} \\ 10,000 \text{g} \end{aligned}$$

$$\begin{aligned} 1000 \text{g} &= 1 \text{kg} \\ 1 \text{g} &= \frac{1}{1000} \text{kg} \\ 10,000 \text{g} &= \left(\frac{1}{1000} \times 10,000 \right) \text{kg} \\ &= \left(\frac{1}{1000} \times 10,000 \right) \text{kg} \\ &= 10 \text{kg} \end{aligned}$$

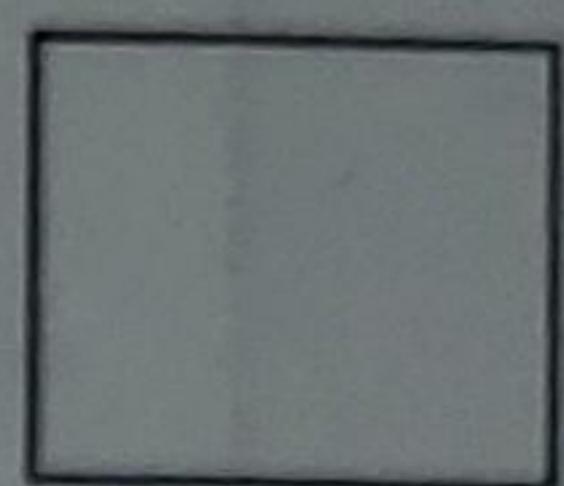
OR (02 marks)

$$\begin{aligned} 1000 \text{g} &= 1 \text{kg} \\ 1 \text{g} &= \frac{1}{1000} \text{kg} \\ 250 \text{g} &= \left(\frac{1}{1000} \times 250 \right) \text{kg} \\ &= \frac{1}{4} \text{kg} \end{aligned}$$

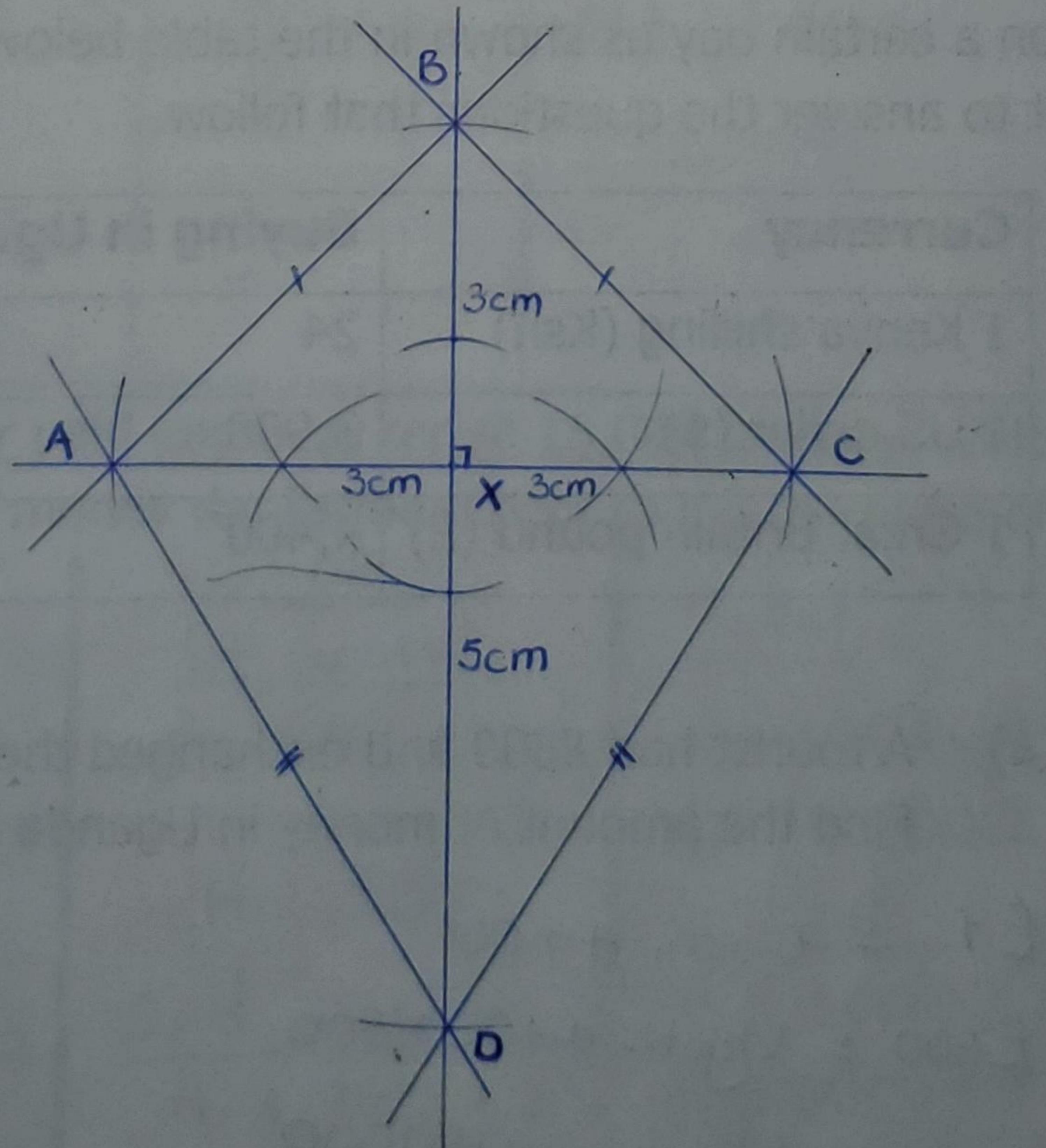
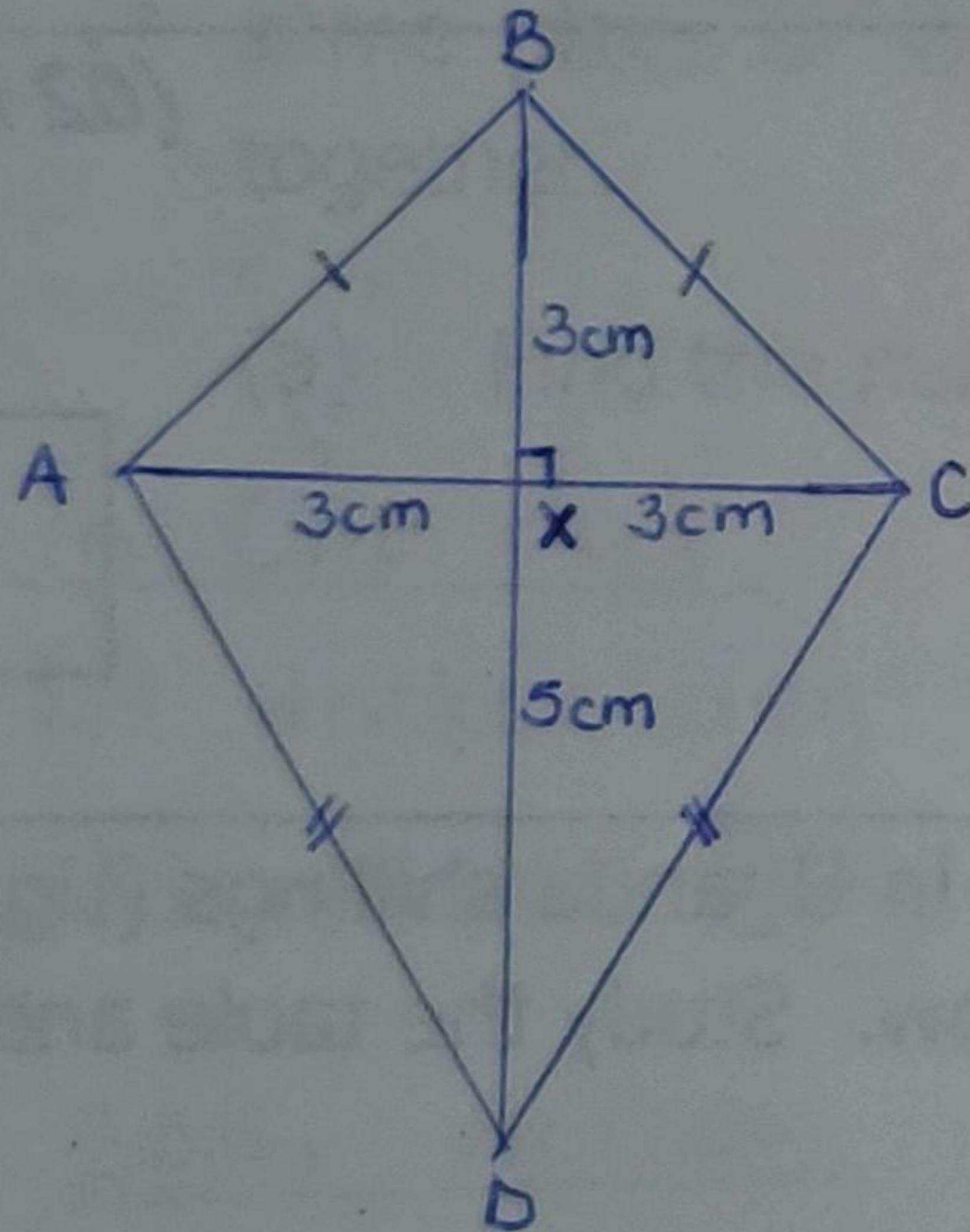
$$\begin{aligned} \text{Total mass} \\ \frac{1}{4} \text{kg} \times 40 \\ 10 \text{kg} \end{aligned}$$

- (b) A family uses a packet of salt every 5 days. Find the number of days the carton will last the family. (02 marks)

$$\begin{aligned}1 \text{ packet} &\rightarrow 5 \text{ days} \\40 \text{ packets} &\rightarrow (40 \times 5) \text{ days} \\&200 \text{ days}\end{aligned}$$



27. Using a ruler and a pair of compasses only, construct a kite ABCD in which diagonal AC = 6 cm. Diagonal BD bisects AC at X such that BX = 3 cm and DX = 5 cm. (05 marks).



28. A man is four times as old as his daughter. Six years ago, the sum of their age was 48 years.

Find;

- (a) the age of the daughter now.

Let the man's age be m

| | |
|-----|----------------|
| Man | daughter |
| m | $\frac{1}{4}m$ |

6 years ago

| Man | daughter | sum |
|-------|------------------|-----|
| $m-6$ | $\frac{1}{4}m-6$ | 48 |

$$(m-6) + \left(\frac{1}{4}m-6\right) = 48$$

$$m + \frac{1}{4}m - 6 - 6 = 48$$

$$m + \frac{m}{4} - 12 = 48$$

$$m + \frac{m}{4} - 12 + 12 = 48 + 12$$

$$m + \frac{m}{4} - 0 = 60$$

$$(m \times 4) + \left(\frac{m}{4} \times 4\right) = 60 \times 4$$

(03 marks)

$$\frac{4m+m}{5} = \frac{240}{48}$$

$$\frac{5m}{5} = \frac{240}{5}$$

$$m = 48$$

daughter

$$\frac{1}{4}m$$

$$\left(\frac{1}{4} \times 48\right) \text{ yrs}$$

12 years

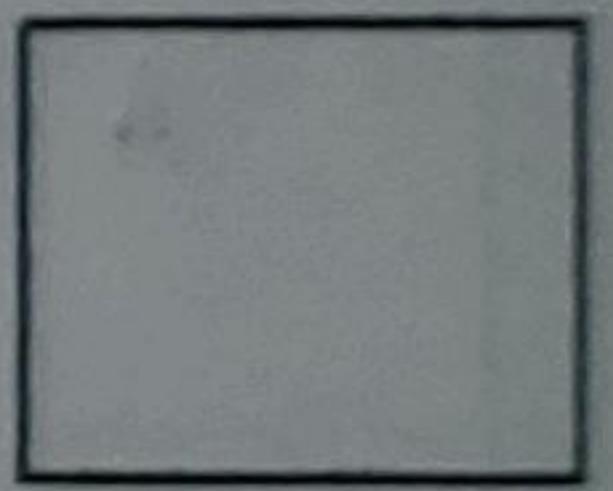
- (b) the age of the man six years ago.

(02 marks)

$$(m-6) \text{ years}$$

$$(48-6) \text{ years}$$

$$42 \text{ years}$$



29. A bank bought and sold foreign currencies in Uganda shillings (Ug.sh) on a certain day as shown in the table below. Study the table and use it to answer the questions that follow.

| Currency | Buying in Ug.sh | Selling in Ug.sh |
|---------------------------|-----------------|------------------|
| 1 Kenya shilling (Ksh) | 24 | 26 |
| 1 US dollar (\$) | 3,900 | 3,950 |
| 1 Great Britain pound (£) | 4,400 | 4,700 |

- (a) A tourist had £600 and exchanged them for Uganda shillings. Find the amount of money in Uganda shillings the tourist got.

$$\text{£1} = \text{Ugsh. } 4400$$

(02 marks)

$$\text{£600} = \text{Ugsh. } 4400 \times 600$$

$$\begin{array}{r} 2 \\ \times 4 \\ \hline 8 \end{array}$$

$$= \text{Ugsh. } 2,640,000$$

- (b) Moses had US dollars 200 to exchange for Kenya shillings. Find the amount of money in Kenya shillings he got from the bank.

US \$200 to Ugsh.

$$\$1 = \text{Ugsh. } 3900$$

$$\begin{aligned} \$200 &= \text{Ugsh. } 3900 \times 200 \\ &= \text{Ugsh. } 780,000 \end{aligned}$$

Ugsh. 780,000 to K.sh. (04 marks)

$$\begin{array}{r} 30\ 000 \\ (\text{Ugsh. } 780,000) \\ (\text{Ugsh. } 20) \end{array} \quad \begin{array}{r} 26-1 \\ +26-2 \\ 52 \\ +26-3 \\ \hline 78 \end{array}$$

K.sh. 30,000

30. A farmer employed two workers to dig a piece of land. The first worker could dig the land alone in 6 days. The second worker could dig the same piece of land alone in 3 days. The two workers dug the land together.

- (a) Find the number of days they took to dig the piece of land.

In One day

$$\text{1st worker dag } \frac{1}{6}$$

$$\text{2nd worker dag } \frac{1}{3}$$

Both Workers

$$\frac{1}{6} + \frac{1}{3}$$

$$\frac{1+2}{6}$$

$$\frac{3}{6}$$

$$\frac{1}{2}$$

Total number of (04 marks)
days

$$(1 \div \frac{1}{2}) \text{ days}$$

$$(1 \times \frac{2}{1}) \text{ days}$$

2 days

- (b) The farmer paid each worker sh 15,000 per day. Calculate the amount of money the farmer spent to dig the piece of land.

In one day

$$\text{sh. } 15,000 \times 2$$

$$\text{sh. } 30,000$$

In two days

$$\text{sh. } 30,000 \times 2$$

$$\text{sh. } 60,000$$

OR.
1st worker

$$\text{sh. } 15,000 \times 2$$

$$\text{sh. } 15,000 \times 2$$

$$\text{sh. } 30,000$$

2nd worker

$$\text{sh. } 15,000 \times 2$$

$$\text{sh. } 30,000$$

Total

$$\text{sh. } 30,000 \times 2$$

$$\text{sh. } 60,000$$

OR.

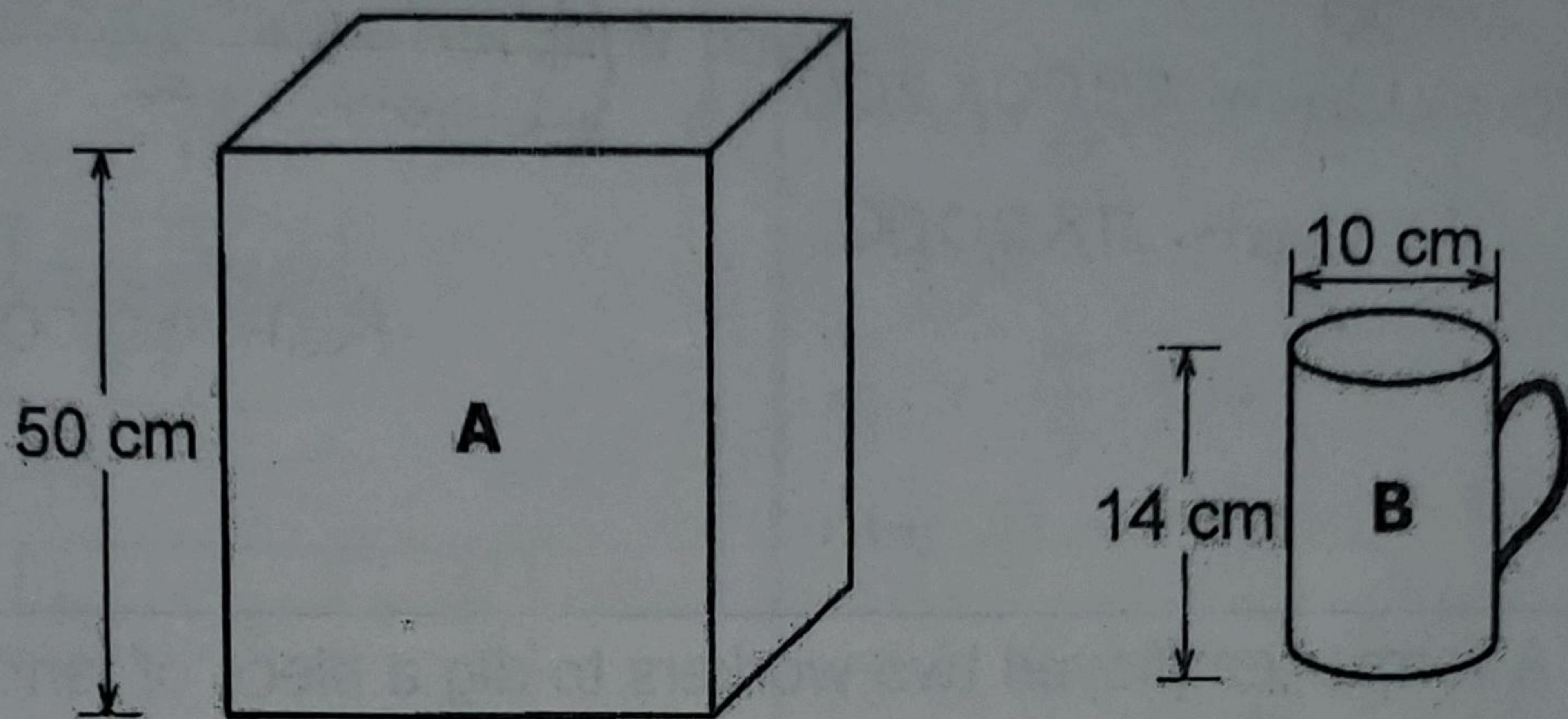
$$\text{sh. } 15,000 \times 2 \times 2$$

$$\text{sh. } 15,000 \times 4$$

$$\text{sh. } 60,000$$

(02 marks)

31. Forty full cups of water in cup B fill container A. Study the diagrams and answer the questions that follow.



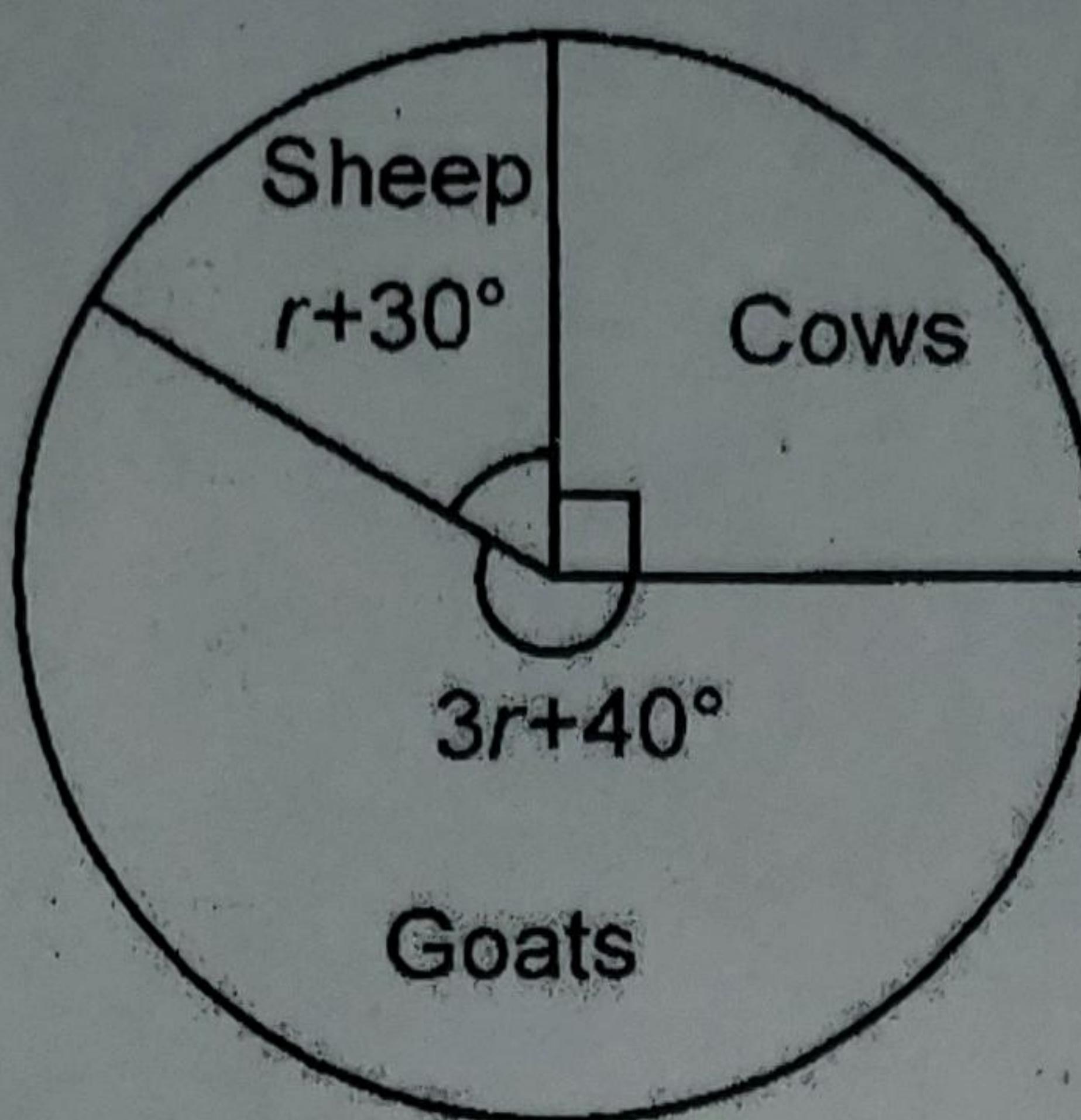
- (a) Find the volume of cup B. (Use $\pi = \frac{22}{7}$) (02 marks)

$$\begin{aligned} \text{Volume} &= \pi r^2 h \\ &= \frac{22}{7} \times \frac{10}{2} \times \frac{10}{2} \times 14 \\ &= 110 \text{ cm} \times 10 \text{ cm} \times \text{cm} \\ &= 1100 \text{ cm}^3 \end{aligned}$$

- (b) Calculate the base area of container A. (03 marks)

$$\begin{aligned} \text{Volume A} &= 40 \times \text{Volume B} \\ B \cdot A \times H &= 40 \times 1100 \text{ cm}^3 \\ \frac{B \cdot A \times 50 \text{ cm}}{50 \text{ cm}} &= \frac{40 \times 1100 \text{ cm} \times \text{cm} \times \text{cm}}{50 \text{ cm}} \\ B \cdot A &= (4 \times 220) \text{ cm}^2 \\ B \cdot A &= 880 \text{ cm}^2 \end{aligned}$$

32. The pie chart below represents the number of animals reared on Amany's farm. Study the pie chart and use it to answer the questions that follow.



- (a) Find the value of r .

$$\begin{aligned}
 3r + 40^\circ + r + 30^\circ + 90^\circ &= 360^\circ \\
 3r + r + 40^\circ + 30^\circ + 90^\circ &= 360^\circ \\
 4r + 160^\circ &= 360^\circ \\
 4r + 160^\circ - 160^\circ &= 360^\circ - 160^\circ \\
 4r + 0 &= 200^\circ \\
 4r &= 200^\circ
 \end{aligned}$$

$$\begin{aligned}
 \frac{1}{4}r &= \frac{50}{200} \\
 r &= 50^\circ
 \end{aligned}$$

(02 marks)

- (b) Given that there are 11 more goats than sheep on the farm, calculate the total number of animals on the farm. (04 marks)

| | |
|---|--|
| <u>Difference</u> Goats - Sheep. $(3r + 40^\circ) - (r + 30^\circ)$ $3r + 40^\circ - r - 30^\circ$ $3r - r + 40^\circ - 30^\circ$ $2r + 10^\circ$ $(2 \times 50^\circ) + 10^\circ$ $100^\circ + 10^\circ$ 110° | $110^\circ \rightarrow 11 \text{ animals}$ $1^\circ \rightarrow \frac{11}{110} \text{ animals}$ $360^\circ \rightarrow \left(\frac{+1}{+10} \times 360^\circ\right) \text{ animals}$ 36 animals |
|---|--|