UGANDA NATIONAL EXAMINATIONS BOARD

PRIMARY LEAVING EXAMINATION

2023

MATHEMATICS

Time Allowed: 2 hours 30 minutes

Random No.						Personal No.		

Candidate's Name: MATHEMATICS TEACHER.

Candidate's Signature: .....

District ID No. | | | | |

Possible Solutions.

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		

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SECTION A: 40 MARKS

*Answer **all** the questions in this section.*

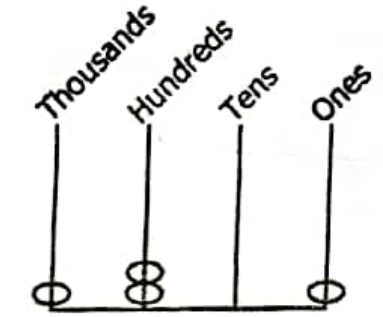
*Questions **1** to **20** carry two marks each.*

1. Work out: 63 + 54

$$\begin{array}{r} 63 \\ +54 \\ \hline 117 \\ \hline \end{array}$$

$\therefore 63 + 54 = 117$

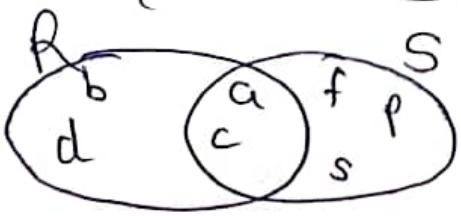
2. Write the base ten number shown on the abacus below.



1 2 0 1 = 1201

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

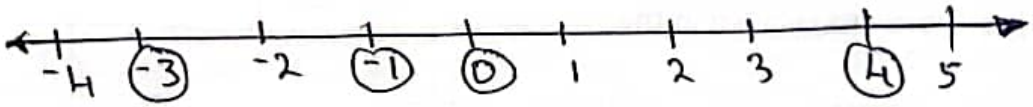
$R = \{a, b, c, d\}$ $S = \{a, f, p, c, s\}$



$RUS = \{b, d, a, c, f, p, s\}$.

$\therefore n(RUS) = 7$.

4. Arrange the integers $\bar{3}$, 4, 0 and $\bar{1}$ in ascending order.



Ascending order is -3, -1, 0, 4

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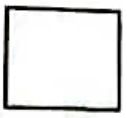
5. A training for scouts started on a Wednesday and took 30 days. Find the day of the week on which the training ended.

Wednesday = 3

3 + 30 = ___ (finite 7).
33 = ___ (finite 7).
33 = 5 (finite 7).
5 ≡ Friday.
∴ The training ended on Friday.

33 ÷ 7 = 4 rem 5.



6. Change 750 millilitres into litres.

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

750ml = $\left(\frac{1}{1000} \times 750\right)$ litres
= $\frac{75}{100}$.
∴ 750ml = 0.75 litres.

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 × 1).
= 16 + 9
∴ $4^2 + 3^2 \times 9^0$ = 25.

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

1:20 pm = 01 20
+ 12 00
13 20

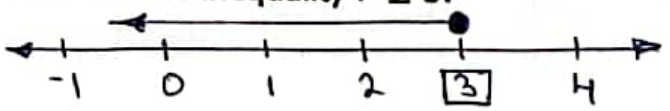
Starting time = Ending time − duration

hrs min
13 20
− 02 15
11 05 hrs.

11 05
− 00 00
11:05
∴ It began at 11:05 am.

9. Write the solution set for the inequality P ≤ 3.

P ≤ 3



P = {3, 2, 1, 0, -1, -2, ---}.

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10. Find the next number in the sequence:

1, 8, 27, 64, 125 .....

1^3 2^3 3^3 4^3 5^3.

$5^3 = 5 \times 5 \times 5$.

$= 25 \times 5$.

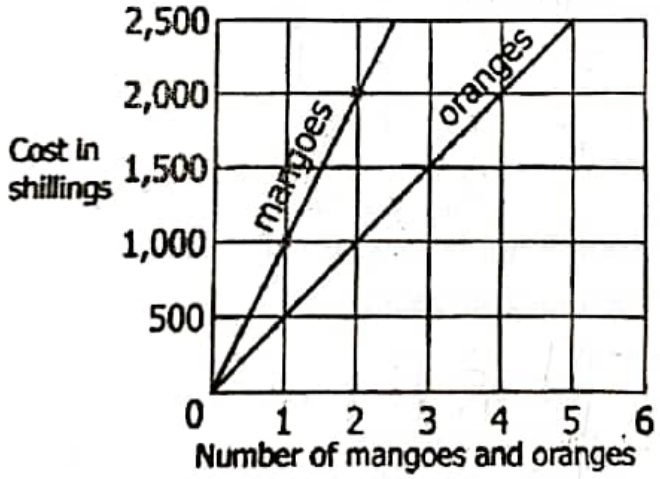
$= 125$

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

Base	No	Rem
3	14	2
3	4	1
	1	

$\therefore 14_{ten} = 112_{three}$.

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.

2 mangoes cost sh. 2000

3 Oranges cost sh. +1500

Total cost = sh. 3500

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

$(7+8+t) \div 9$ gives no remainder.

$(15+t) \div 9$ gives no remainder.

$(15+t) = 9 \times 2$.

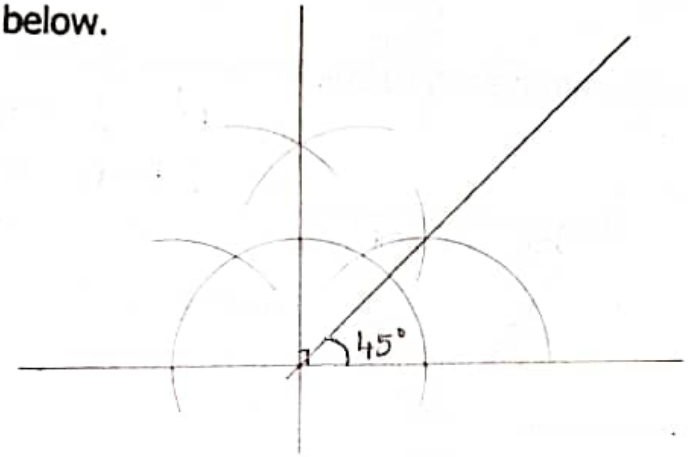
$15+t = 18$.

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

$0+t = 3$.

$t = 3$.

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



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

$5q - 2r - 3q - r = 5q - 3q - 2r - r$.

$= 2q - 3r$.

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.

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

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

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

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

$= 71$ eggs.

SW

62
73
+78
213

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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.

Selling Price = Buying Price − Loss.

= sh. 45,000 − sh. 1,500

Selling Price = sh. 43,500

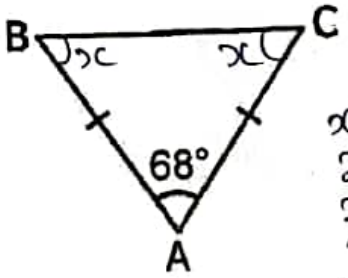
S.W.

Sh. 45,000

− Sh. 1500

Sh. 43,500

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



Let ∠ABC be x.

∠ACB = x since two base angles are equal.

$x + x + 68^\circ = 180^\circ$

$2x + 68^\circ = 180^\circ$

$2x + 68^\circ - 68^\circ = 180^\circ - 68^\circ$

$2x + 0 = 112^\circ$

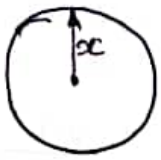
$2x = 112^\circ$

$\frac{2x}{2} = \frac{112^\circ}{2}$

$x = 56^\circ$

∴ ∠ABC $= 56^\circ$.

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



Let the length be x.

$C = 2\pi R$.

$2\pi R = 88$ cm.

$2 \times \frac{22}{7} \times x = 88$ cm.

$\frac{2 \times 22 \times x}{2 \times 22} = \frac{(88 \times 7)}{2 \times 22}$ cm.

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

$= 2 \times 7$ cm.

$x = 14$ cm.

∴ 14 cm is the length of the minute hand.

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?

$\frac{18}{20}$, $\frac{18}{20}$, Lets convert to Percentage.

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

$= \frac{18}{25} \times 100^{5}\%$.

$= 18 \times 5\%$.

$\frac{18}{20} = 90\%$.

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

$= \frac{20}{25} \times 100^{4}\%$.

$= 20 \times 4\%$.

$\frac{20}{25} = 80\%$.

$90\% > 80\%$.

∴ The pupil performed better in the second term Mathematics test.

SECTION B: 60 MARKS

*Answer **all** the questions in this section.*

Marks for each question are indicated in brackets.

21. (a) Simplify: $\frac{1}{2} - \frac{1}{4} \div \frac{4}{5}$ *(03 marks)*

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

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

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

$= \frac{8-5}{16}$

$= \frac{3}{16}$

(b) Work out: $\frac{0.27 \times 1.2}{0.9}$ *(02 marks)*

$\frac{0.27 \times 1.2}{0.9} = \frac{27}{100} \times \frac{12}{10} \div \frac{9}{10}$

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

$= \frac{3 \cancel{27} \times 12 \times \cancel{10}}{100 \times \cancel{10}_{1} \times \cancel{9}_{1}}$

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

$= \frac{36}{100}$

$= 0.36$

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

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

$= \frac{400\text{m}}{48\text{ sec}}$

$= \frac{400 \times \frac{1}{1000}\text{ km}}{48 \times \frac{1}{3600}\text{ hr}}$

$= \left(\frac{400}{1000} \div \frac{48}{3600}\right)$ km/hr

Speed $= \frac{400}{1000} \times \frac{3600}{48}$

$= \frac{400 \times 3600}{1000 \times 48}$

$= \frac{40 \times 36^{3}}{48_{4}}$

$= 10 \times 3$

Speed $= 30$ km/hr.

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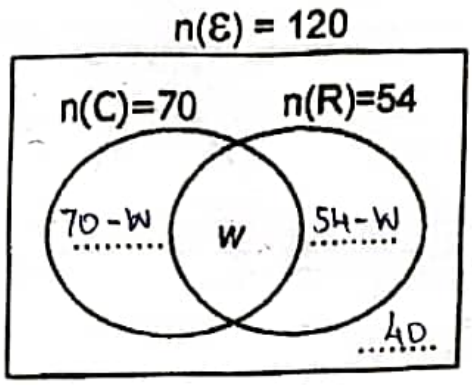
23. A total of 120 guests were invited for a marriage ceremony. 70 guests attended the church service (C), 54 guests attended the reception (R) and w guests attended both the church service and the reception. 40 guests did not turn up for the marriage ceremony.

(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)

$70 - w + w + 54 - w + 40 = 120$.
$70 + 0 + 54 - w + 40 = 120$.
$70 + 54 + 40 - w = 120$
$124 + 40 - w = 120$.
$164 - w = 120$
$164 - 164 - w = 120 - 164$
$0 - w = -44$
$-(-w) = -(-44)$.
$w = 44$.
∴ 44 guests attended both.

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)

HCF:

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

HCF $= 2 \times 3 \times 3$
$= 6 \times 3$

HCF $= 18$.
∴ Largest in each group was 18.

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

(02 marks)

Primary five has 126.

$\frac{126}{18} = \frac{\cancel{126}^{14}}{\cancel{18}_{2}} = \frac{14}{2} = 7$ groups.

Turn Over

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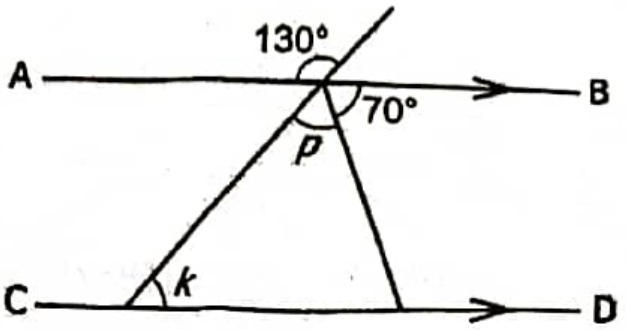
25. In the diagram below, line AB is parallel to line CD. Study the diagrar and use it to answer the questions that follow.



Find the size of;

(a) angle p. *(02 marks*

$p + 70^\circ = 130^\circ$ (Opposite angles).

$p + 70^\circ - 70^\circ = 130^\circ - 70^\circ$.

$p + 0 = 60^\circ$.

$p = 60^\circ$.

(b) angle k. *(02 marks*

$k + p + 70^\circ = 180^\circ$ (Co-Interior angles.

$k + 130^\circ = 180^\circ$.

$k = 180^\circ - 130^\circ$.

$\therefore k = 50^\circ$.

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. *(02 marks)*

1 carton contains 40 packets.

$= (40 \times 250)\,g$.

$= 10000$

$= \left(\frac{10000}{1000}\right) kg$.

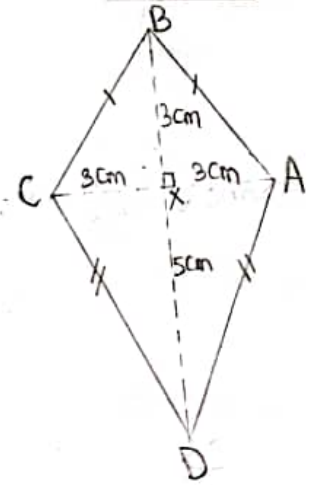
1 carton contains. = 10 kg.

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

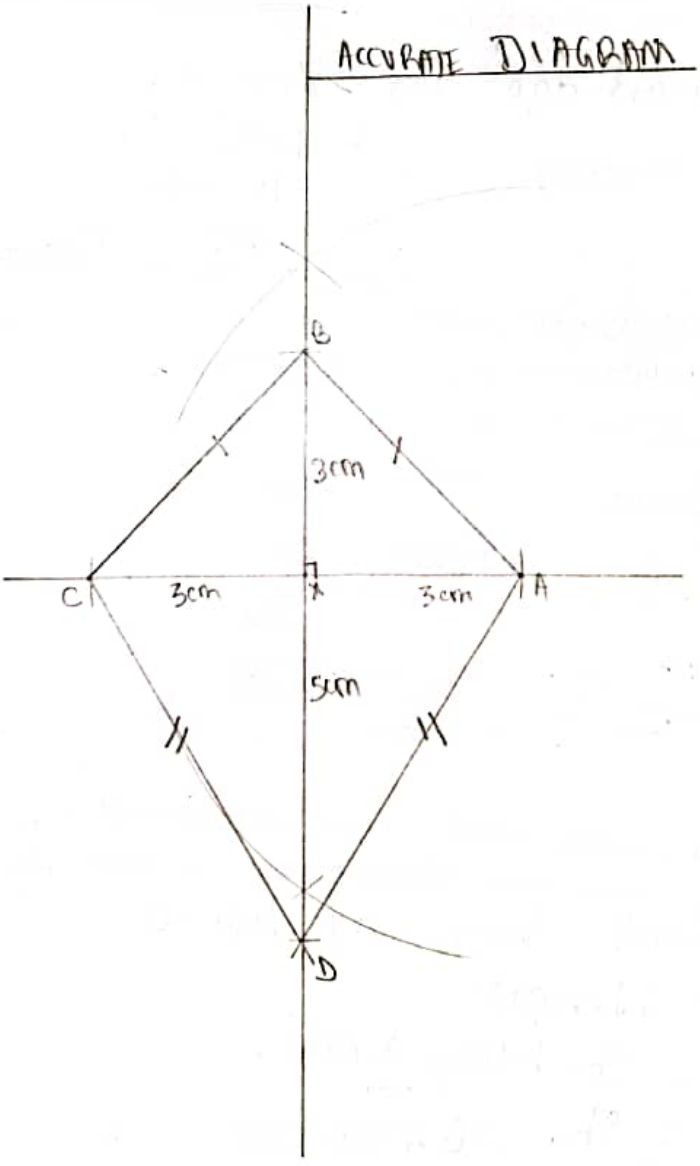
~~1 carton~~
1 packet takes 5 days.
40 packets take (5 × 40) days.
= 200 days.

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).*

SKETCH:



ACCURATE DIAGRAM



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

Find; Let the daughter's age now be x.

(a) the age of the daughter now. *(03 marks)*

	Now	6 years ago.
Man	$4x$	$4x-6$
daughter	x	$x-6$

$4x-6+x-6 = 48$.
$4x+x-6-6 = 48$.
$5x-12 = 48$
$5x-12+12 = 48+12$
$5x+0 = 60$

$\frac{5x}{5} = \frac{60}{5}$
$x = 12$ years.
∴ 12 years is the daughters age now

(b) the age of the man six years ago. *(02 marks)*

Man 6 years ago was $4x-6$.
$= (4\times12)-6$.
$= 48-6$.
$= 42$ 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. *(02 marks)*

Bank buys at 4,400

£1 = Sh 4400
£600 = Sh. 4400 × 600.
= Sh. 2,640,000

∴ The tourist got Sh. 2,640,000

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

(04 marks)

$1 = Ush. 3900.
$200 = Ush. 3900X200.
Ksh.1 = Ush. 26.
Ush.26 = Ksh.1.
Ush.1 = Ksh. 1/26.
Ush.3900X200 = Ksh. 3900X200/26.

= Ksh. 3900/26 X 200/1.
= Ksh. 300X100.
= Ksh. 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.

(04 marks)

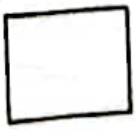
Worker 1 digs the land in 6 days.
In one day, worker 1 digs 1/6.
In one day worker 2 digs 1/3.
In one day, both dig 1/6 + 1/3.
= (1+2)/6
= 3/6 = 1/2.

1/2 is dug in one day.
1/2 X 2 is dug in 1X2.
1 is dug in 2 days.
∴ Together, they took 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.

(02 marks)

1 day is paid Sh. 15000 X2.
2 days is paid Sh. 15000 X2X2.
= Sh. 15000 X4.
= Sh. 60,000.



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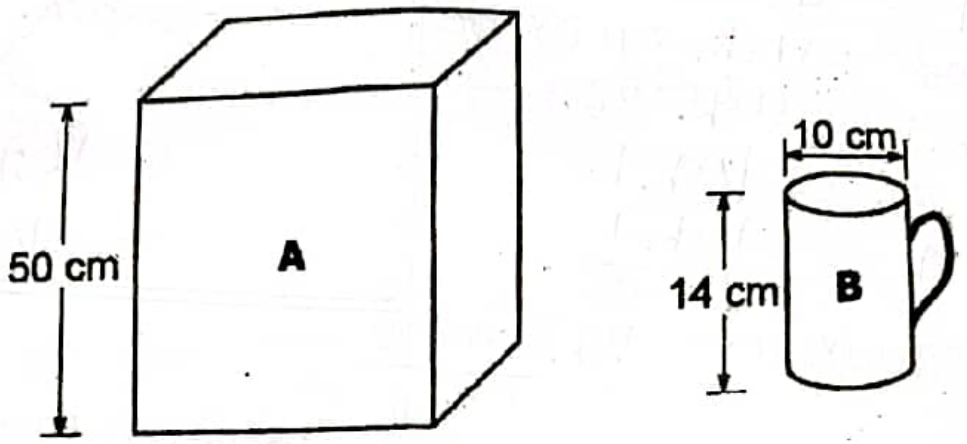
31. Forty full cups of water in cup **B** fill container **A**. Study the diagrams and answer the questions that follow.



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

Volume $= \pi R^2 H$.

$= \left(\frac{22}{7} \times \left(\frac{10}{2}\right)^2 \times 14\right) cm^3$.

$= \frac{22}{7} \times 5 \times 5 \times 14^2 \ cm^3$

$= 22 \times 5 \times 5 \times 2 \ cm^3$.

Volume $= 110 \times 10 \ cm^3$.

$= 1100 \ cm^3$.

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

Volume of A $=$ 40 X Volume of B.

$= 40 \times 1100 \ cm^3$.

Base area x height $= 40 \times 1100 cm^3$.

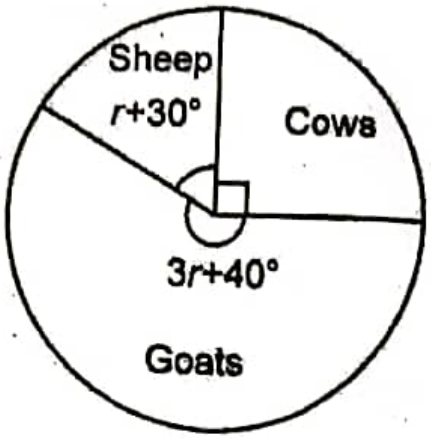
Base area $\times 50 cm = 40 \times 1100 \ cm^3$.

$50 cm \quad 50 cm$

Base area $= 4 \times 220 \ cm^2$.

$\therefore$ Base area $= 880 \ cm^2$.

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



(a) Find the value of r. *(02 marks)*

$r + 30^\circ + 3r + 40^\circ + 90^\circ = 360^\circ$.

$4r + 70^\circ + 90^\circ = 360^\circ$.

$4r + 160^\circ = 360^\circ$.

$4r + 160^\circ - 160^\circ = 360^\circ - 160^\circ$

$4r + 0 = 200^\circ$.

$4r = 200^\circ$.

$\frac{4r}{4} = \frac{200^\circ}{4}$

$r = 50^\circ$.

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

Goats sector $= 3r + 40^\circ$

$= 3 \times 50^\circ + 40^\circ$.

$= 150^\circ + 40^\circ$.

$= 190^\circ$.

Sheep sector $= r + 30^\circ$.

$= 50 + 30^\circ$.

$= 80^\circ$.

Difference in sectors $= 190^\circ - 80^\circ$.

$= 110^\circ$.

$110^\circ \equiv 11$ animals.

$1^\circ \equiv \frac{11}{110}$ animals.

$360^\circ \equiv \left(\frac{11}{110} \times 360\right)$ animals.

$= \frac{1}{10} \times 360^{36}$ animals.

$= 36$ animals.

END

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