UGANDA NATIONAL EXAMINATIONS BOARD

PRIMARY LEAVING EXAMINATION

2023

MATHEMATICS

Time Allowed: 2 hours 30 minutes

Random No.						Personal No.		

Candidate's Name: TR. Emmanuel Ekeya

Candidate's Signature: 0789344546

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		

Turn Over

SECTION A: 40 MARKS

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

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

1. Work out: 63 + 54

Solution

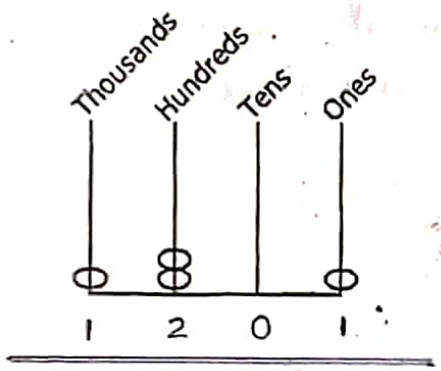
$$\begin{array}{r} 6\ 3 \\ +\ 5\ 4 \\ \hline 1\ 1\ 7 \end{array}$$

Side work

3 + 4 = 7

6 + 5 = 11

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



Solution

∴ 1 2 0 1 is the number shown.

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

Solution

R = {a, b, c, d}

S = {a, f, p, c, s}

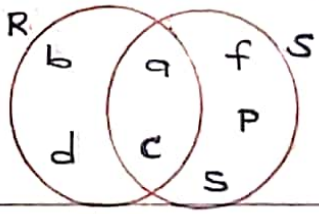
R ∪ S = {a, b, c, d, f, p, s}

∴ n(R ∪ S) = 7

OR

R = {a, b, c, d}

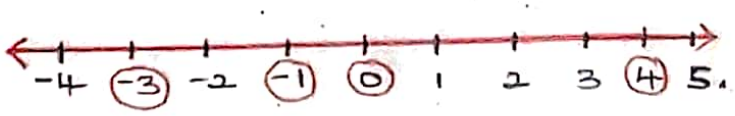
S = {a, f, p, c, s}



∴ n(R∪S) = 7

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

Solution



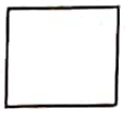
∴ The order is -3, -1, 0, 4

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

Solution

Wed. + 30 = – (finite 7)
3 + 30 = – (finite 7)
33 ÷ 7 = 4 rem. 5
= 5 (finite 7)
5 stands for Friday

∴ The training ended on Friday



6. Change 750 millilitres into litres.

Solution

ml (÷) to litres

1000 ml = 1 litre.
750 ml = $\frac{750 ml}{1000 ml}$ litres

0.75 litres.

∴ 750 millilitres = 0.75 litres

OR ml to litres

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

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

750 ml = 0.75 litres

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

Solution

BODMAS
$4^2 + (3^2 \times 9^0)$
$4^2 + (3 \times 3 \times 1)$
$4^2 + (9 \times 1)$

$4^2 + 9$
$(4 \times 4) + 9$
16 + 9
25

∴ $4^2 + 3^2 \times 9^0 = 25$

Side work

1
16
+ 9
25

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

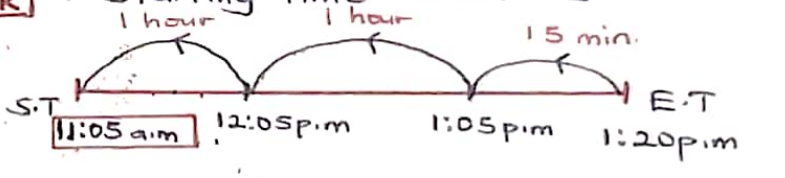
Solution

Starting Time = E.T – D

HRS		MIN
12	:	00
+ 1	:	20
13	:	10
– 2	:	15
11	:	05 a.m

∴ At 11:05 a.m, the meeting began.

OR Starting time = E.T – D

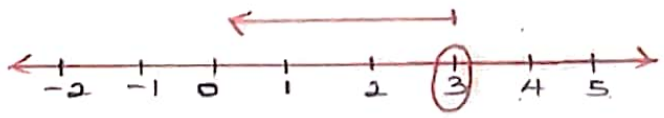


∴ At 11:05 a.m, the meeting began

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

Solution

$P \leq 3$



∴ $P = \{3, 2, 1, 0, -1, ---\}$

OR

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

Turn Over

10. Find the next number in the sequence:

1, 8, 27, 64, ...

Solution

1 ; 8 , 27 , 64 125

↓ ↓ ↓ ↓ ↓

(1x1x1) (2x2x2) (3x3x3) (4x4x4) (5x5x5)

5x5x5 = 5 5 / 25 / 125

OR

1, 8, 27, 64, 125

(consecutive cube numbers)

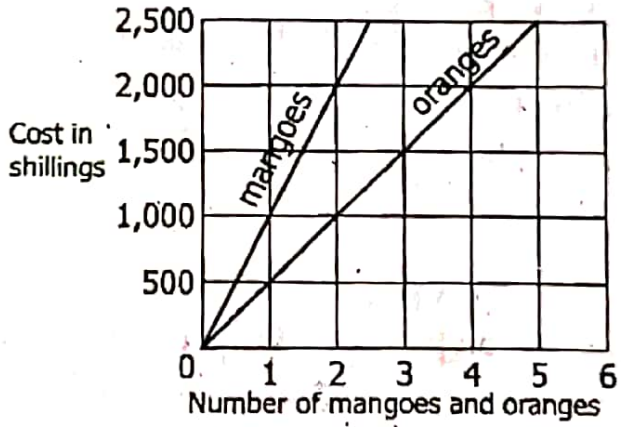
11. Change 14_{ten} to base three.

Solution

B	N	R
3	14	2
3	4	1
3	1	1
	0	

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

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.

Solution

The cost of two mangoes

1 mango costs sh 1000

2 mangoes cost sh. 1,000 x 2 = sh 2,000

The cost of three oranges

1 orange costs sh 500

3 oranges cost sh 500 x 3 = Sh. 1,500

Total cost

sh. 2,000

+ sh. 1,500

sh 3,500

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

Solution

$M_9 = \{9, (18), 27, 36, 45, \ldots\}$

Sum of digits = 18

$7 + 8 + t = 18$

$15 + t = 18$

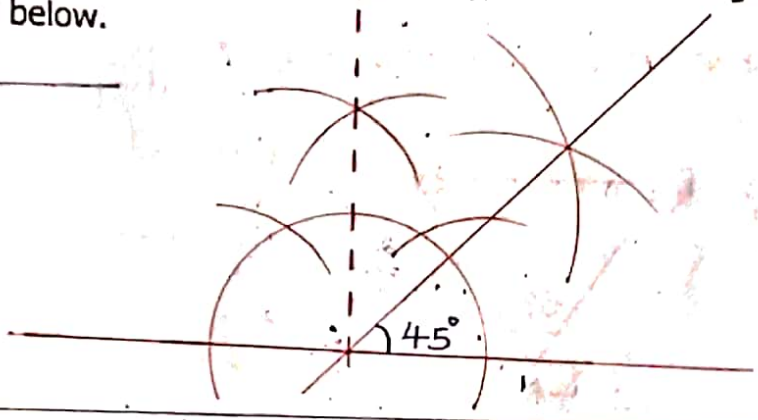
$15 - 15 + t = 18 + 15$

$t = 3$

$t = 3$

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

Solution



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

Solution

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

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

$2q - 3r$

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.

Solution

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

$\text{Average} = \left(\frac{62 + 73 + 78}{3}\right)$ eggs

$\text{Average} = \left(\frac{135 + 78}{3}\right)^{5}$ eggs

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

$\text{Average} = 71$ eggs

∴ Average number of eggs is 71 sold in that period

Turn Over

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.

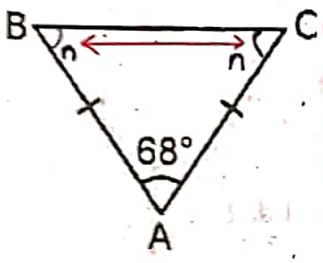
Solution

Selling Price = Buying Price − Loss

sh.	4	$\cancel{5}^{4}$,	1	0	0
− sh.		1,	5	0	0
sh	4	3,	5	0	0

∴ Sh. 43,500 is his selling price

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



Solution

let n be ∠ABC

$n + n + 68° = 180°$

$2n + 68° = 180°$

$2n + 68° - 68° = 180° - 68°$

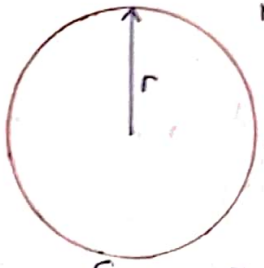
$\frac{2n}{2} = \frac{112°}{2}$ (56)

$n = 56°$

∴ Angle ABC = 56°

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

Solution



r = length of a minute hand.

88cm = circumference

Circumference = 88cm

$2\pi r = 88cm$

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

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

$r = 2cm \times 7$

$r = 14cm$.

∴ 14cm is the length of a 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?

Solution

First term test	Second term test
$\left(\frac{20}{25} \times \frac{4}{100}\right)\%$	$\left(\frac{18}{20} \times 100\right)\%$
$(20 \times 4)\%$	$18 \times 5\%$
80%	$(18 \times 5)\%$
	90%

∴ In the Second term test, the pupil performed better.

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)*

Solution

BODMAS

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

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

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

$\frac{(8 \times 1) - (1 \times 5)}{16}$

$\frac{8-5}{16} = \frac{3}{16}$

$\therefore \frac{1}{2} - \frac{1}{4} \div \frac{4}{5} = \frac{3}{16}$

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

Solution

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

$(0.27 \times 1.2) \div 0.9$

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

$\frac{3}{100} \times \frac{12}{10} \times \frac{10}{9}$ 1

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

$\frac{36}{100} = 0.36$

$\therefore \frac{0.27 \times 1.2}{0.9} = 0.36$

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

Solution

$\left(\frac{M \times 3600}{T \times 1000}\right)$ kmlh

$\left(\frac{10}{400} \times \frac{3}{3600} \times \frac{}{48} \times \frac{}{1000}\right)$ kmlh

4 1

10×3 kmlh

30 kmlh.

∴ His speed was 30 kmlh.

OR

400 m | 48 sec to kmlh.

m to km (÷)

1000 m = 1 km

400 m = $\frac{400}{1000}$ km

Sec to hrs. (÷)

3600 sec = 1 hr.

48 sec = $\frac{48}{3600}$ hr

$\left(\frac{400}{1000} \div \frac{48}{3600}\right)$ kmlh

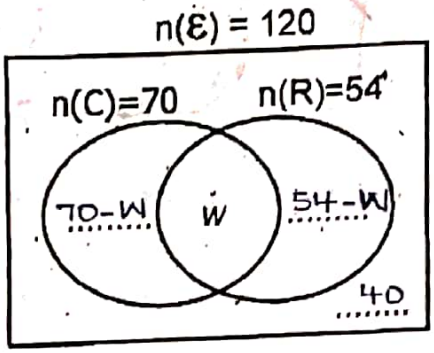
$\left(\frac{400}{1000} \times \frac{30}{3600} \times \frac{}{48}\right)$ kmlh

4 1

30 kmlh.

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)*

Solution

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

$70 + 54 + 40 - W = 120$

$164 - W = 120$

$164 - 164 - W = 120 - 164$

$-W = -44$

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

$W = 44$

∴ 44 guests attended both the reception and church service

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)*

Solution

GCF of 126, 90 and 72

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

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

18 pupils.

∴ 18 pupils were in each group.

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

Solution

~~63~~ 7

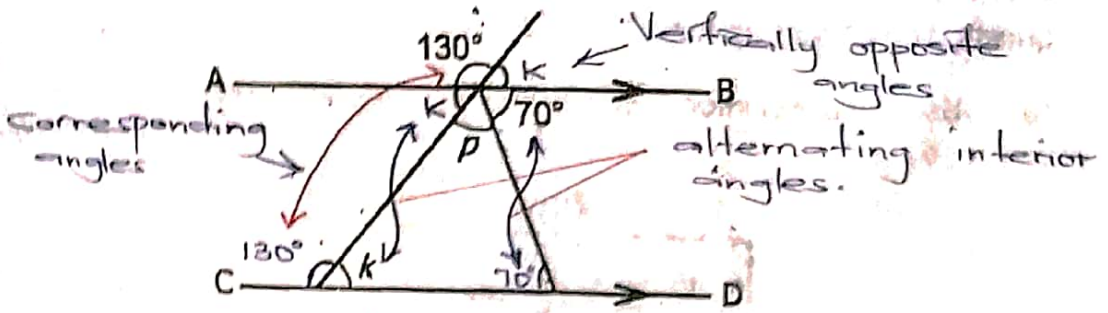
~~126~~ groups

~~18~~ ~~4~~ 1

7 groups.

∴ 7 groups were formed in Primary Five

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



Find the size of;

(a) angle p. *(02 marks)*

Solution

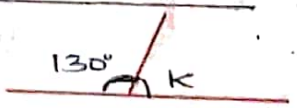
$P + 70° = 130°$

$P + 70° - 70° = 130° - 70°$

$P = 60°$

(b) angle k. *(02 marks)*

Solution



$k + 130° = 180°$ (∠s on straight line)

$k + 130° - 130° = 180° - 130°$

$k = 50°$

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)*

Solution

Total mass in grammes

40 × 250 grammes

10,000 grammes

Mass in Kilogrammes

1000g = 1 kg

10,000 g = (10,000 / 1000) kg

1000g = 10kg

∴ 10 kg is the mass of all the packets of salt in the carton.

10

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

Solution

1 packet takes 5 days

40 packets will take (40×5) days

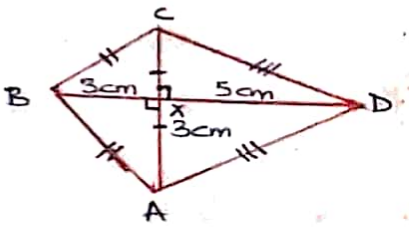
200 days

∴ A carton will take 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).*

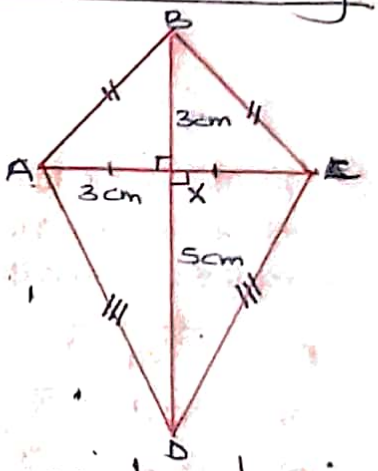
Solution

Sketch drawing

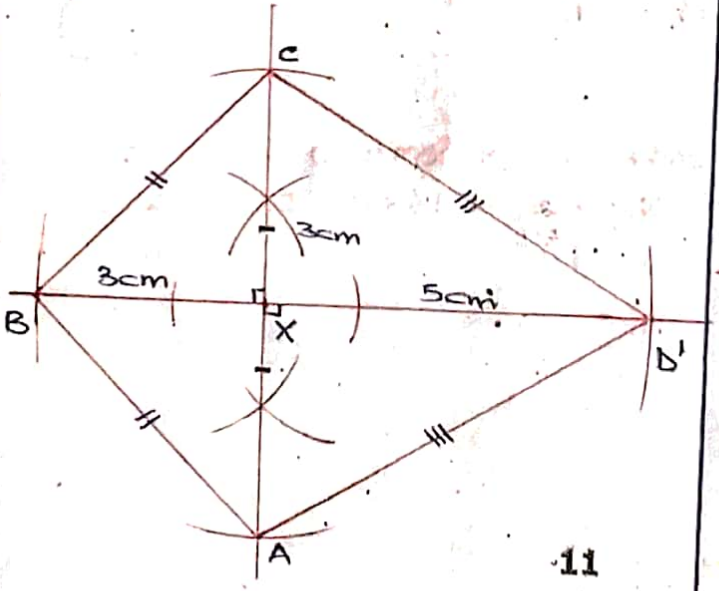


OR

Sketch drawing

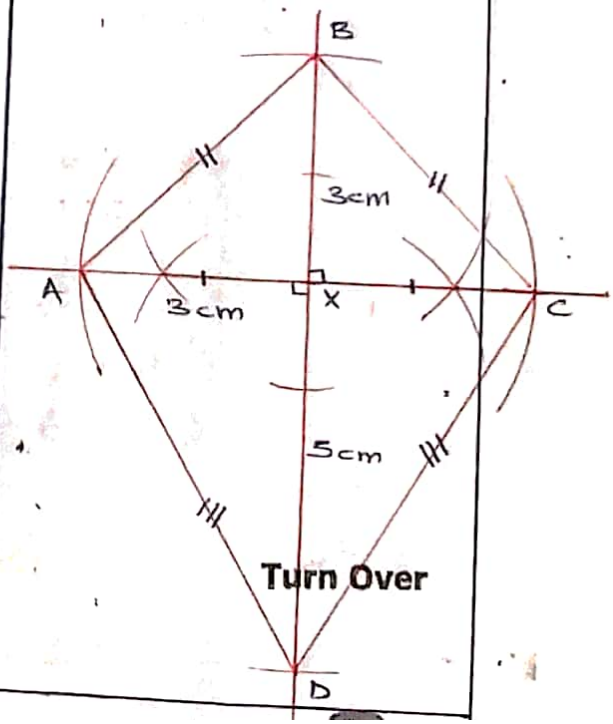


Accurate drawing



OR

Accurate drawing



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. *(03 marks)*

Solution

let m be the daughters now age.

Name	Daughter	Man	Sum
Now age	m	4m	—
6 years ago	m−6	4m−6	48

$m-6+4m-6 = 48$

$m+4m-6-6 = 48$

$5m-12+12 = 48+12$

$\frac{5m}{5} = \frac{60}{5}$

$m = 12$ years.

∴ Daughter is 12 years old now.

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

Solution

$4m-6$

$(4\times12)-6$

$(48-6)$ years.

42 years.

∴ 42 years was the age of the man six years ago.

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)*

Solution

pounds $\xrightarrow[B.R]{(x)}$ Ug.sh

B.R	(x)
S.R	(÷)

£1 = Ug.sh 4,400

£600 = Ug.sh 4400×600

£600 = Ug.sh. 2,640,000

The tourist got Ug.sh 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.

(04 marks)

Solution

US dollars $\xrightarrow[(B.R)]{(\times)}$ Ug.sh $\xrightarrow[(S.R)]{(\div)}$ K.sh.

US dollars to Ug.sh

$1 = Ug.sh 3900

$200 = Ug sh 3900 x 200

$200 = Ug Sh 780,000

Ugsh to K.sh.

Ug.sh 26 = K.sh 1

Ug.sh 780,000 = K.sh $\frac{780,000}{26}$ = K.sh 30,000

Ugsh 780,000 = K.sh 30,000

∴ He got K.sh 30,000 from the bank.

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)

Solution

In one day

First worker digs $\frac{1}{6}$

Second worker digs $\frac{1}{3}$

Two workers dig $\frac{1}{6} + \frac{1}{3}$

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

$\frac{1}{2}$

Number of days

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

$\frac{1}{1} \times \frac{2}{1} = \frac{2}{1}$

= 2 days

∴ They took 2 days to dig the land.

(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)

Solution

Amount spend in one day

1 worker takes sh. 15000

2 workers take sh 15000 x 2

sh 30,000

Amount spent in two days

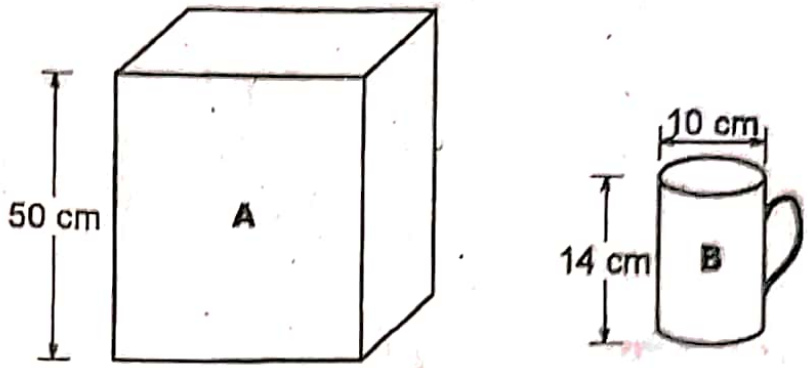
1 day takes sh 30,000

2 days take sh 30,000 x 2

sh 60000

∴ He spent sh 60,000 to dig the piece of land.

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)*

Solution

Volume $= \pi r^2 \times h$

Volume $= \frac{22}{7} \times \frac{10\text{cm}}{2} \times \frac{10\text{cm}}{2} \times 14\text{cm}$

Volume $= 11\text{cm} \times 100\text{cm}^2$

Volume $= 1100\text{cm}^3$

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

Solution

Volume of A = Volume of cup B × 40

Volume of A $= 1100\text{cm}^3 \times 40$

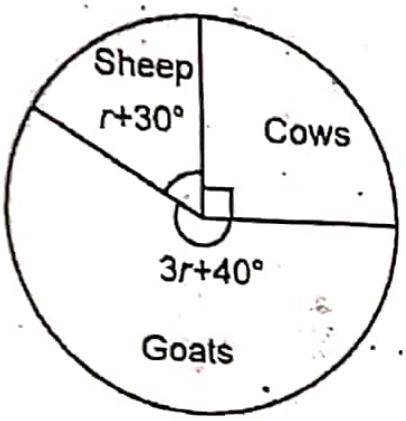
Volume of A $= 44000\text{cm}^3$.

Base area $\times h = 44000\text{cm}^3$

$\frac{\text{Base area} \times 50\text{cm}}{50\text{cm}} = \frac{44000\text{cm}^3}{50\text{cm}}$ (880 cm^2)

Base area of A $= 880\text{cm}^2$

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)*

Solution

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

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

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

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

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

$r = 50^\circ$

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

Solution

Sector for goats	Sector for sheep	Difference
$3r + 40^\circ$	$r + 30^\circ$	190°
$3 \times 50^\circ + 40^\circ$	$50^\circ + 30^\circ$	$-\ 80^\circ$
$150^\circ + 40^\circ$	80°	110°
190°		

110° rep. 11 animals

1° reps. $\frac{11}{110}$ animals

360° rep $\left(\frac{11}{110} \times 360\right)$ animals

360° rep 36 animals

∴ 36 animals are on the farm.

END