UGANDA NATIONAL EXAMINATIONS BOARD

PRIMARY LEAVING EXAMINATION

2022

MATHEMATICS

Time Allowed: 2 hours 30 minutes

	Random No.					Personal No.		

Candidate's Name: .... *GUIDE* ....

Candidate's Signature: .... *[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** questions. **All** the working for both sections **A** and **B** must be shown in the spaces provided.

4. **All** working **must** be done using a **blue** or **black** ball point pen or ink. Any work done in pencil other than on 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.

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Turn Over

SECTION A: 40 MARKS

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

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

1. Work out: $\dfrac{3}{5} + \dfrac{1}{5}$

$\dfrac{3+1}{5}$ ✓ m

$\dfrac{4}{5}$ A

2. Write 546 in Roman numerals.

$\overset{H}{5}\ \overset{T}{4}\ \overset{O}{6}$

$500 + 40 + 6$

$D + XL + VI$ ✓ m

$DXLVI$ A

546
$500 \rightarrow D$
$40 \rightarrow XL$ ✓ m
$6 \rightarrow VI$
$546 \Rightarrow DXLVI$ A

3. Work out: $\begin{array}{r} 127 \\ \times\ \ 3 \\ \hline 381 \end{array}$ ✓ m   A

m2

$\begin{array}{r} 1\ \ 2\ \ 7 \end{array}$

$100 + 20 + 7$ $\quad + \quad \begin{array}{r}300 \\ 60 \\ \times 1 \\ \hline 381\end{array}$ A

$300 + 60 + 21$ ✓ m

4. Given that PυQ = {1, 2, 3, 4, 5, 6, 7, 8}, PnQ = {1, 4, 7} and P' = {5, 6, 8}, list the elements of set P.

m1

$P = \{1, 2, 3, 4, 7\}$ A

m2

$PUQ = \{1, 2, 3, 4, 5, 6, 7, 8\}$

$PnQ = \{1, 4, 7\}$

$P' = \{5, 6, 8\}$

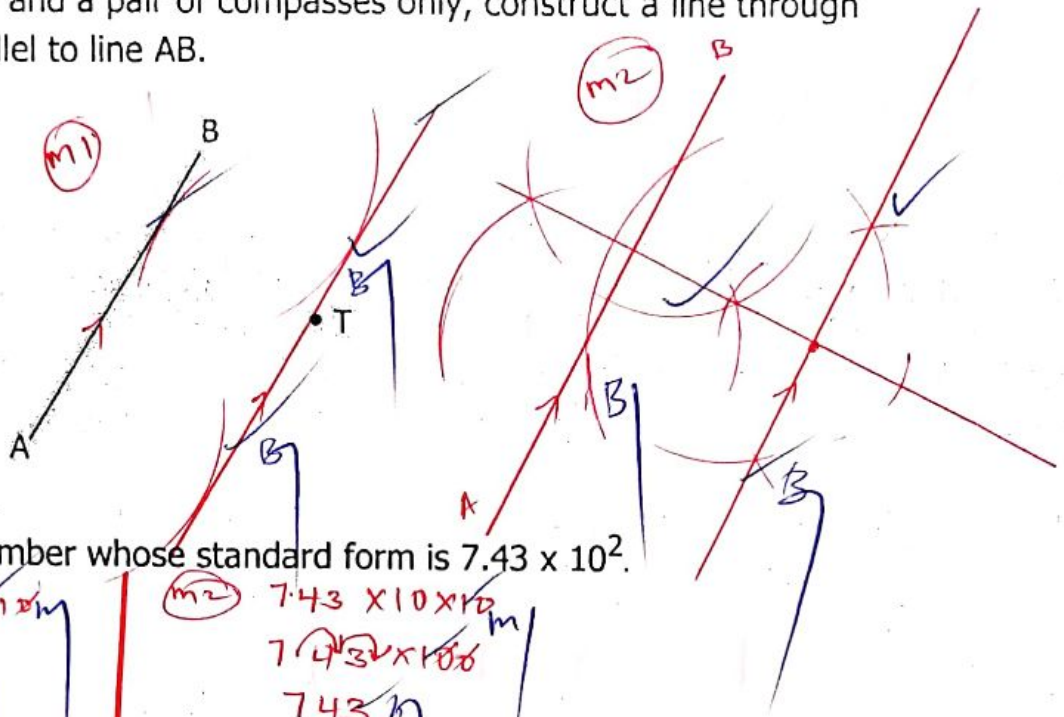$Q' = \{2, 3\}$ m

Set $P = Q' + PnQ$

$P = \{1, 2, 3, 4, 7\}$ A
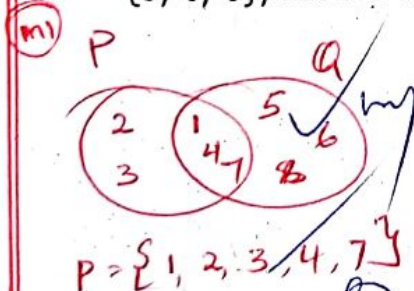
5. Find the next number in the sequence:

1, 3, 7, 13, 21, 31 A

+2 +4 +6 +8 +10 m

10

2

6. Using a ruler and a pair of compasses only, construct a line through point T parallel to line AB.

7. Write the number whose standard form is 7.43×10^2.

$\dfrac{743}{100} \times 10 \times 10 \ m$

$743 \ m$

$7.43 \times 10 \times 10 \ m$

7.43×100

$743 \ m$

8. Represent the number operation $^-5 + ^+7$ on the number line below.

$^-5 + (^+7)$

$^-5 + 7$

$^-5 + ^+7 = ^+2$
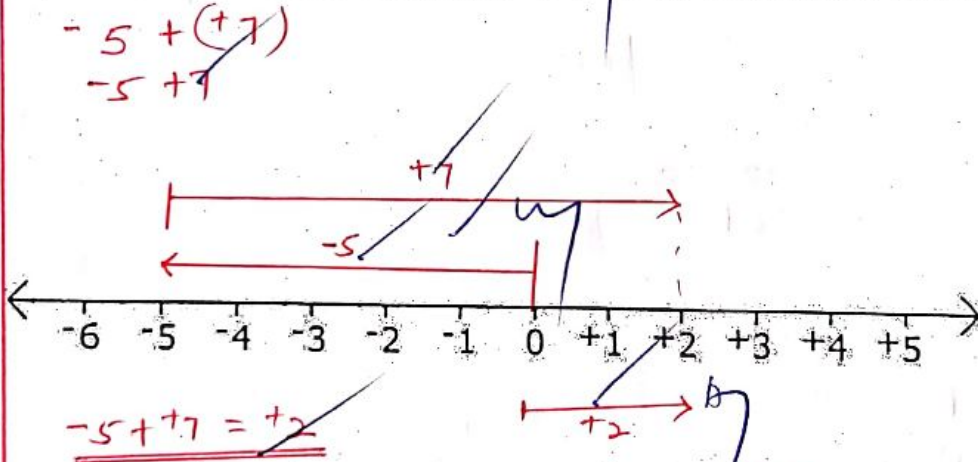
9. Solve: $2a - 6 = 10$

$2a - 6 = 10$
$2a - 6 + 6 = 10 + 6$
$2a = 16$
$\dfrac{2a}{2} = \dfrac{16}{2}$
$a = 8$

$2a - 6 = 10$
$2a = 10 + 6$
$2a = 16$
$\dfrac{2a}{2} = \dfrac{16}{2}$
$a = 8$

$2a - 6 = 10$
$-6 - 10 = -2a$
$-16 = -2a$
$+6 + 16 = -2a$
$8 = a$
$a = 8$

3   **Turn Over**

10. A packet of biscuits weighs 200 grammes. Calculate the total weight in kilogrammes of 30 packets of biscuits.

$1 \text{ Pct} = 200g$

$30 \text{ Pcts} = 30 \times 200g$

$= 6000g$

$1kg = 1000g$

$K = 6000g$

$K = \dfrac{6000g \times 1kg}{1000g}$

$K = 6kg.$

$\boxed{10}$

11. The drawings below show cards with numbers written on them.

| 4 | 5 | 6 | 7 | 8 | 9 |

The cards were then put in a bag. Find the probability that a card picked at random from the bag has a composite number.

$\boxed{4}$ $\boxed{5}$ $\boxed{6}$ $\boxed{7}$ $\boxed{8}$ $\boxed{9}$

Composite nos = 4, 6, 8, 9

$p = \dfrac{n(\Delta c)}{n(Tc)} = \dfrac{4}{6}$

12. Work out:

$$\begin{array}{r} 1\,0\,0\,1_{two} \\ -\ 1\,1\,1_{two} \\ \hline 0\,0\,1\,0_{two} \end{array}$$

$1+1 = \frac{2}{2} = 1 \text{ re } 0$

$1+1 = \frac{2}{2} = 1 \text{ re } 0$

$1+1 = \frac{2}{2} = 1 \text{ re } 0$

$1+1 = \frac{2}{2} = 1 \text{ re } 0$

13. A poultry farmer sells 30 eggs at sh 12,000. Find the cost of 25 eggs.

M1

$30 \text{ eggs} = sh12000$

$25 \text{ eggs} = y$

$y = \dfrac{25 \text{ eggs}}{30 \text{ eggs}} \times sh12000$

$y = sh10000$

M2

$30 \text{ eggs} = sh12000$

$1 \text{ egg} = \dfrac{sh12000}{30}$

$1 \text{ egg} = sh400$

$25 \text{ eggs} = 25 \times sh400$

$= sh10000$

14. Round off 2498 to the nearest hundreds.

M1

$$\begin{array}{r} 2\,4\,9\,8 \\ +\quad 1\,0\,0 \\ \hline 2\,5\,0\,0 \end{array}$$

M2

2400 2410 2420 2430 2440 2450 2460 2470 2480 2490 2500

$2498 \simeq 2500$ because it's nearer to 2500 than 2400

4
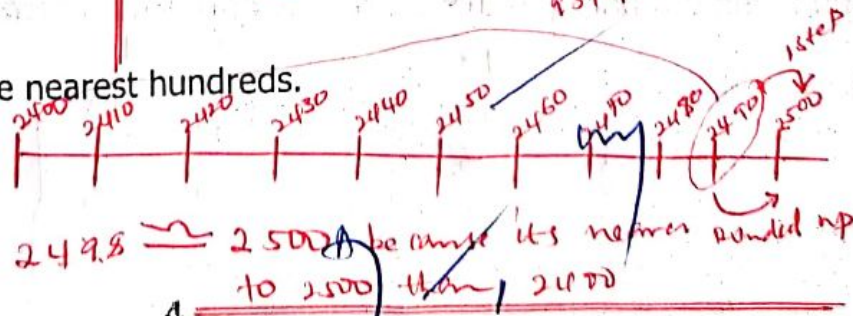
15. The weight of a teacher is 72 kg. The average weight of the teacher and three pupils is 50 kg. Calculate the total weight of the pupils.

M1

Teacher = 72 kg

Total of 4 = 4 × 50 kg
= 200 kg

Total of 3 pupils
= 200 kg − 72 kg
= 128 kg

M2

Teacher = 72 kg

3 pupils + Teacher

$A = \dfrac{Sum\ of\ data}{No.\ of\ data}$

$50\ kg = \dfrac{T}{4}$

$50\ kg \times 4 = \dfrac{T}{4} \times 4$

200 kg = T

Total of 4 = 200 kg

Weight of 3 pupils

200 kg
− 72 kg
128 kg

[10]

16. Town M is South East of town V. Find the bearing of town V from town M.

Bearing

0 1 0 1 0 1 0 1 0 D. taps
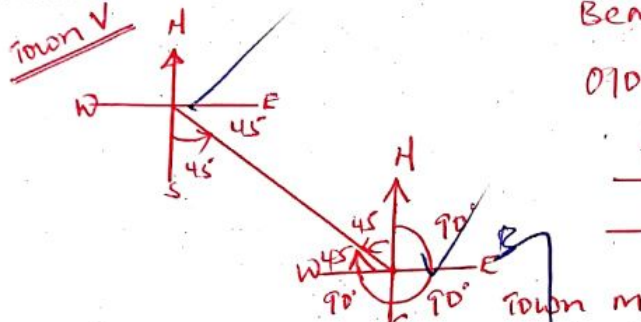
270
+ 045
315°

17. A businesswoman borrowed sh 100,000 from a savings group which charged her an interest rate of 3% per month. Calculate the interest she paid after a period of six months.

$SI = P \times R \times T$

$SI = sh\ 100,000 \times \dfrac{3\%}{month} \times 6\ month$

$SI = sh\ 100,000 \times \dfrac{3}{100} \times 6$

$SI = sh\ 18\ 000$

18. Peter walked a distance of 2 km in 20 minutes. Find his speed in kilometers per hour.

20 minutes to hrs

$T = \left(\dfrac{20\ min}{60\ min}\right) hrs$

$T = \dfrac{1}{3}\ hr$

$S = \dfrac{D}{T}$

$S = 2\ km \div \dfrac{1}{3}\ hr$
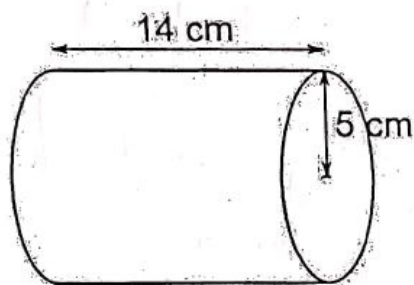
$S = 2\ km \times \dfrac{3}{1\ hr}$

$S = 6\ km/hr$

5

Turn Over

19. Given that $m = 8$ and $n = 6$, find the value of $\sqrt{mn + 1}$.

$\sqrt{m \times n + 1}$

$\sqrt{(8 \times 6) + 1}$

$\sqrt{48 + 1}$

$\sqrt{49}$

$\sqrt{7^2}$

7

20. Calculate the volume of the cylinder below. (Use $\pi = \dfrac{22}{7}$)

14 cm

5 cm

$V = \text{Base area} \times \text{Height}$

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

$V = \dfrac{22}{7} \times 5cm \times 5cm \times 14cm$

$V = 1100 cm^3$

10

6

21. In a village, 3 farmers grow both rice (R) and sunflower (S). 24 farmers grow rice and y farmers grow sunflower only. 2y + 9 farmers grow none of the two crops.

SET C
C
P-7

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

$R = 24$ S

$24 - 3$ 3 y

$2y+9$
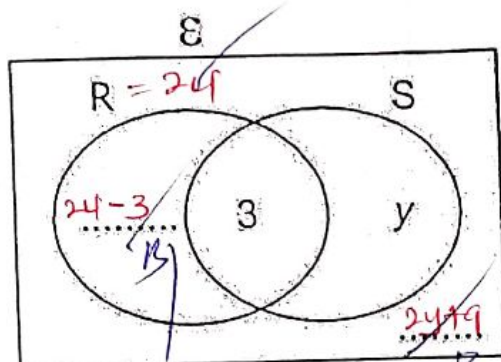
(b) Given that the number of farmers who grow rice only is equal to the number of farmers who grow none of the two crops, find the value of y.
(02 marks)

$2y + 9 = 24 - 3$
$2y + 9 = 21$
$2y = 21 - 9$
$2y = 12$

$\frac{2y}{2} = \frac{12}{2}$

$y = 6$

(c) How many farmers grow sunflower?
(01 mark)

$(24 - 3 + 3 + y + 2y + 9)$ farmers
$(21 + 3 + 6 + 2 \times 6 + 9)$ farmers
$(30 + 12 + 9)$ farmers
51 farmers

Sun-flower
$51 - (21 + 2y + 9)$
$51 - (21 + 2 \times 6 + 9)$
$51 - (21 + 12 + 9)$
$51 - 42$
9 farmers

Sun flower
$n(S) = y + 3$
$= 6 + 3$
$= 9$ farmers

Turn Over

22. A trader bought 500 mangoes at sh 250 each. The trader then sold 100 of the mangoes at sh 350 each and the rest at sh 300 each. Calculate the profit the trader made. *(05 marks)*

BP of 500 mangoes:
sh (500 × 250)
sh 125,000

SP of 100 mangoes:
sh 350 × 100
sh 35,000

Remaining mangoes:
500 mangoes
− 100 mangoes
400 mangoes

SP of 400 mangoes:
400 × sh 300
sh 120,000

Total S.P. of all mangoes
sh 35 000
+ sh 120 000
sh 155 000
sh 155,000

$P = SP - BP$
$P =$ sh 155 000
− sh 125 000
sh 30,000
sh 30,000

[10]

23. Work out: $\dfrac{0.75 + 0.25}{0.65 - 0.4}$ *(04 marks)*

$\dfrac{+0.75 \;\; 0.65}{+0.25 \;\; -0.4}$
$\dfrac{1.00 \;\; 0.25}$

$\dfrac{100}{100} \div \dfrac{25}{100}$

$\dfrac{100}{100} \times \dfrac{100}{25} = 4$

OR
$6 + \frac{2}{3}$
$6 + \frac{2}{3} \cdot 0$
$6 \div 3 - \frac{20}{18}$
$6 \times \frac{-13}{2}$
0.666

$\dfrac{+0.75 \;\; -0.65}{+0.25 \;\; 0.4}$
$\dfrac{1.00 \;\; 0.25}$

$1.00 \div 0.25$
$\dfrac{1.00 \times 100}{0.25 \times 100}$
$\dfrac{100}{25} = 4$

$\dfrac{+0.75 \;\; 0.65}{+0.25 \;\; 0.4}$
$\dfrac{1.00}{0.25}$

$1 \div 0.25$
$1 \div \dfrac{25}{100}$
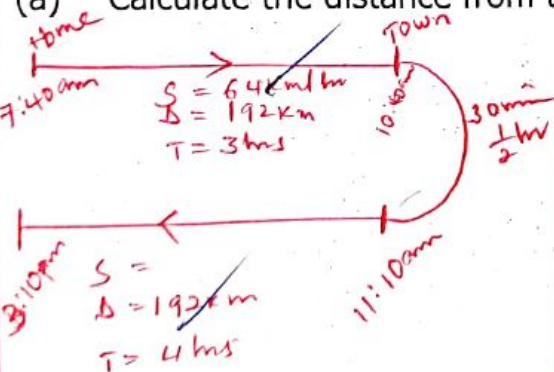$1 \times \dfrac{100}{25}$
$\dfrac{1 \times 4}{1 \times 1}$
4

24. A motorist left his home at 7:40 a.m. and travelled to town for 3 hours at an average speed of 64 km/h. He stayed in town for 30 minutes and then travelled back home.

(a) Calculate the distance from the motorist's home to the town. *(02 marks)*

home → town
7:40 am $S = 64$ km/h $D = 192$ km $T = 3$ hrs
30 mins = ½ hr   11:10 am

3:10 pm $S =$ $D = 192$ km $T = 4$ hrs

$A = S \times T$
$D_1 = 64\text{ km/hr} \times 3\text{ hrs}$
$D_1 = \dfrac{64\text{ km}}{\text{hr}} \times 3\text{ hrs}$
$D_1 = 192$ km

8

(b) At what time did the motorist leave the town? *(01 mark)*

Time to Reach Town

hrs	min
7	40
+ 3	00
10	40 am

Time of leaving Town

hrs	in
10	40
+	30
11	10 am

$\frac{70}{60} = 1 \text{ hr a.f} 10 \text{m}$

ST ⟶ ET
	1hr	8:40a
7:40a	1hr	9:40a
8:40a	1hr	10:40a
9:40a	20m	11:00a
10:40a	10	11:10a
11:00a		

(c) Calculate the speed at which the motorist travelled back if he reached home at 3:10 p.m. *(03 marks)*

m1

ST		ET
11:10a	1hr	12:10pm
12:10pm	1hr	1:10pm
1:10pm	1hr	2:10pm
2:10pm	1hr	3:10pm

D = (1+1+1+1) hr
D = 4 hrs.

Duration
hrs	min
15	10
- 11	10
04	00	= 4 hrs

m2 11:10a ⟶ 24

hrs	m
11	10
+ 00	00
11	00 hrs

3:10pm to 24

hrs	m
3	10
+ 12	00
15	10 hr

= 4 hrs

$S = \dfrac{D}{T}$

$S = \dfrac{192 \text{ km}}{4 \text{ hrs}}$

$S = 48 \text{ km/hr}$

10

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25. The sum of three consecutive counting numbers is 78. Find the largest number. *(04 marks)*

1st	2nd	3rd	Sum
P	P+1	P+2	78

$P + P+1 + P+2 = 78$

$3P + 3 = 78$

$3P = 78 - 3$

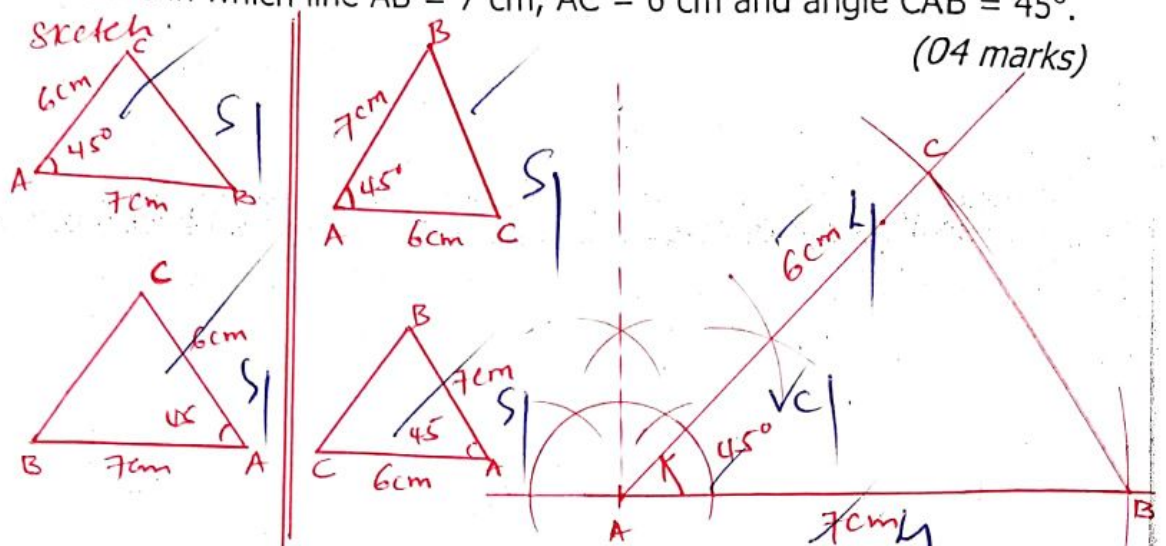$3P = 75$

$\dfrac{3P}{3} = \dfrac{75}{3}$

$P = 25$

Largest no

P+2
25+2
27

Turn Over

26. (a) Using a ruler and a pair of compasses only, construct triangle ABC in which line AB = 7 cm, AC = 6 cm and angle CAB = 45°.

(04 marks)

sketch.

(b) Measure angle ACB.

79°
78° B
77°

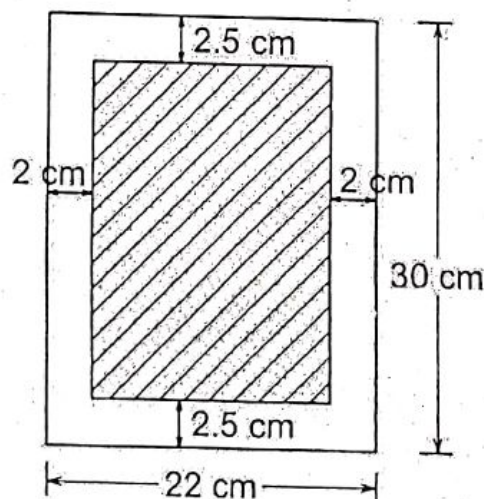*(01 mark)*

09

27. The figure below represents a photograph enclosed in a photo frame. The length of the photo frame is 30 cm and the width 22 cm. The area covered by the photograph is shaded. Study the figure and use it to answer the questions that follow.

2.5 cm
2 cm   2 cm
30 cm
2.5 cm
22 cm

(a) Find the length of the photograph. *(02 marks)*

$W = 30cm - (2.5 + 2.5)cm$ $L = 22a - (2cm + 2cm)$
$W = 30cm - 5cm$ $L = 22cm - 4cm$
$W = 25cm$ $L = 18cm$

(b) Calculate the area of the frame **not** covered by the photograph. (04 marks)

Width of photograph

$lt = 22cm - (2a + 2a)$

$l_2 = 22cm - 4cm$

$w = 18 cm$

Area of photo

$A = L \times w$

$A = 18cm \times 25cm$

$A = (18 \times 25) cm \times cm$

$A = 450 cm^2$

Area of the Frame

[square] 30

22
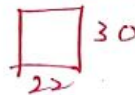
$A = L \times w$

$A = 22cm \times 30cm$

$A = 660 cm^2$

Area of space left

$\begin{array}{r} 660 cm^2 \\ - 450 cm^2 \\ \hline 210 cm^2 \end{array}$

$w = 30c - (2.5 + 2.5)c$

$w = 30c - 5c$

$w = 25cm$

28. A Mathematical set costs sh 2,000 more than an exercise book. The cost of two exercise books is the same as $\frac{2}{5}$ of the cost of a mathematical set. Find the cost of an exercise book. (04 marks)

ALG
A
P.7

Set	book
b + sh2000	b

$2b = \frac{2}{5} \text{ of } (b + sh2000)$

$2b \times 5 = 5 \times \frac{2}{5} (b + sh2000)$

$10b = 2b + sh4000$

$10b - 2b = sh4000$

$\frac{8b}{8} = \frac{sh4000}{8}$

$b = sh500$

Set	book
b + sh2000	b
sh500 + sh2000	sh500
sh 2500	

Set	book
b	b - sh2000

$\frac{2}{5} \times b = 2(b - sh2000)$

$\frac{2b}{5} = 2(b - sh2000)$

$\frac{2b}{5} \times 5 = 5 \times 2(b - sh2000)$

$2b = 10(b - sh2000)$
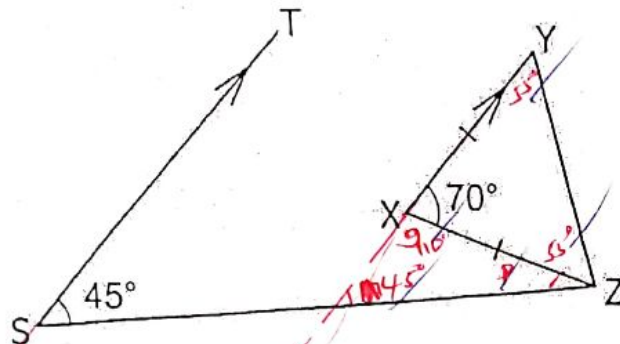
$2b = 10b - sh20,000$

$2b - 10b = -sh20,000$

$\frac{-8b}{-8} = \frac{-sh20,000}{-8}$

$b = sh2500$ [10]

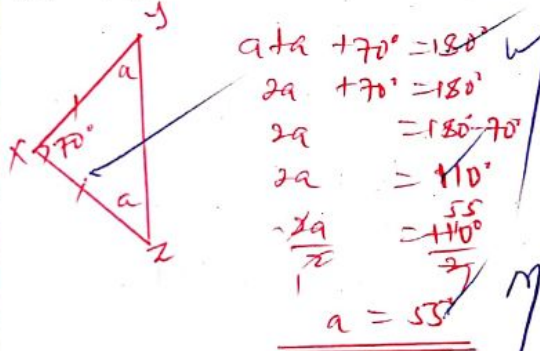| Set	book
sh2500	(b - sh2000)
	sh2500 - sh2000
	sh500

11

Turn Over

29. In the figure below, line XY = XZ and line TS is parallel to line XY.
Angle TSZ = 45° and angle YXZ = 70°. Study the figure and use it to
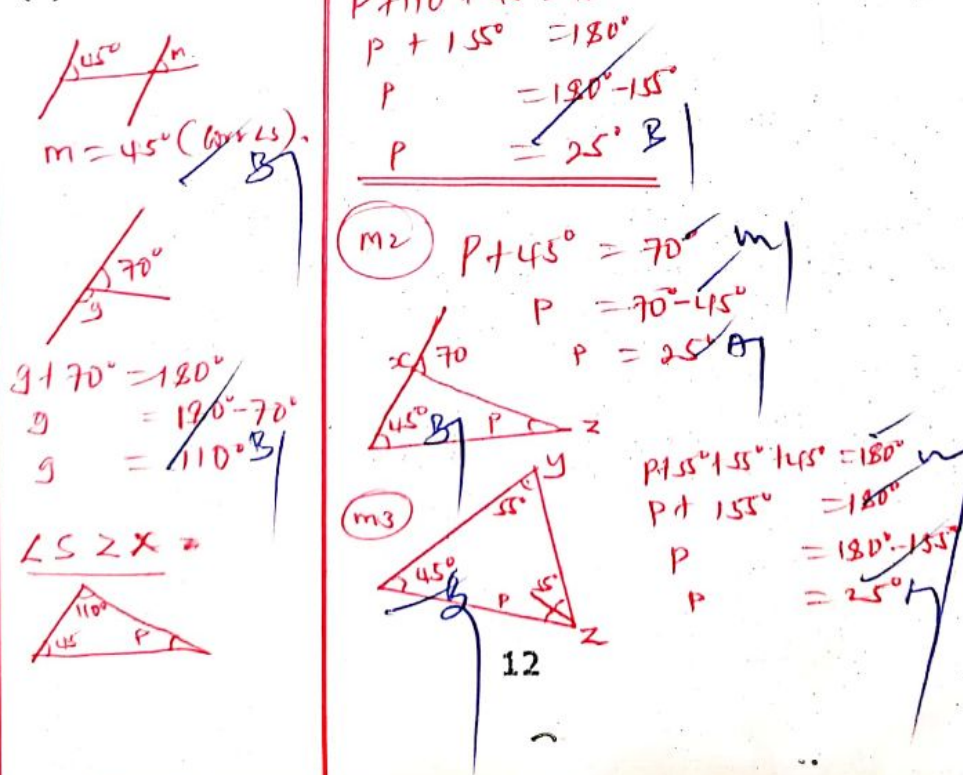answer the questions that follow.

Find the size of angle;

(a) XYZ *(02 marks)*

$$a + a + 70° = 180°$$
$$2a + 70° = 180°$$
$$2a = 180° - 70°$$
$$2a = 110°$$
$$\frac{2a}{2} = \frac{110°}{2}$$
$$a = 55°$$

(b) SZX *(03 marks)*

$$m = 45° \ (\text{corr } \angle s).$$

$$g + 70° = 180°$$
$$g = 180° - 70°$$
$$g = 110°$$

$$\angle SZX =$$

$$P + 110° + 45° = 180°$$
$$P + 155° = 180°$$
$$P = 180° - 155°$$
$$P = 25°$$

m2

$$P + 45° = 70°$$
$$P = 70° - 45°$$
$$P = 25°$$

m3

$$P + 55° + 55° + 45° = 180°$$
$$P + 155° = 180°$$
$$P = 180° - 155°$$
$$P = 25°$$
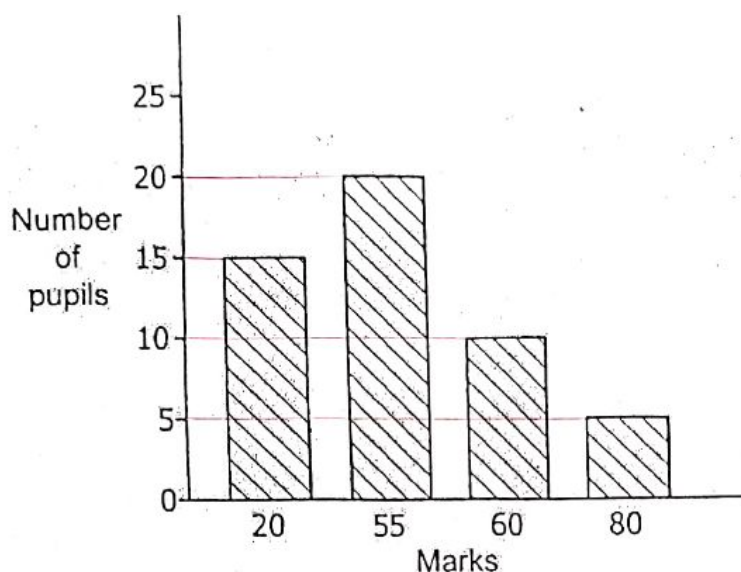
12

30. The bar graph below shows marks scored by pupils in a test. Study the graph and use it to answer the questions that follow.

(handwritten margin note: DATA H A P.6)

(a) Find the number of pupils who did the test.　　　(02 marks)

marks	20	55	60	80
No	15	20	10	5

No of pupils $= (15+20+10+5)$ pupils
$= 50$ pupils

(b) Calculate the mean mark of the pupils.　　　(03 marks)

$$\text{mean} = \frac{\text{Sum of data}}{\text{No of data}}$$

$$\bar{x} = \frac{(20 \times 15) + (55 \times 20) + (60 \times 10) + (80 \times 5)}{50} \text{ marks}$$

$$\bar{x} = \frac{(300 + 1100 + 600 + 400)}{50} \text{ marks}$$

$$\bar{x} = \frac{\overset{48}{2400}}{\underset{1}{50}}$$

$$\bar{x} = 48 \text{ marks}$$

10

13　　　　　　　　　　　　**Turn Over**

31. A company supplied text books to three schools; F, G and H in the ratio 4:6:5 respectively. School F received 72 books less than school G.

(a) Find the number of text books supplied by the company. *(03 marks)*

F	G	H	Diff	T
4	6	5	$\frac{6-4}{2}$	15
4P	6P	5P	2P	15P
			72	

$2P = 72$

$\frac{\cancel{2}P}{\cancel{2}} = \frac{72}{2}^{36}$

$P = 36$

Total
$15 \times P$
15×36
$540 \ T.books$

$F : G : H : Total : Diff$
$4 : 6 : 5 \quad 15 : \frac{6-4}{2}$

$\frac{2}{15} \times Total = 72$

$\cancel{15} \times \frac{\cancel{2}}{\cancel{2}} T = \frac{72}{\cancel{2}} \times \frac{15}{\cancel{15}}$

$Total = 36 \times 15$

$Total = 540 \ T \ books$

F	G	H	Total	Diff
4	6	5	15	$\frac{6-4}{2}$

72

$2 prts = 72 \ Tbks$

$1 prt = \frac{72}{2}^{36} \ bks$

$1 prt = 36 \ T \ books$

$15 prts = (36 \times 15) \ T \ bks$

$= 540 \ T \ books$

(b) Calculate the number of books school H got. *(02 marks)*

$H = 5P$

$H = 5 \times P$

$H = 5 \times 36$

$H = 180 \ T \ books.$

H

$\frac{1}{\cancel{15}} \times \cancel{540}^{\,180} \ T \ book$

$180 \ T \ books.$

$2 \ prts \Rightarrow 72 \ Tbks.$

$1 prt \Rightarrow \frac{72}{2}^{36} \ T \ books$

$1 prt = 36 \ T \ books$

$5 prts = 5 \times 36 \ T \ books$

$= 180 \ T \ books.$

32. The diagram below shows a tank full of water. The water leaks at a rate of 1.5 litres per hour. Study the diagram and use it to answer the questions that follow.

70 cm

66000 cm³

h
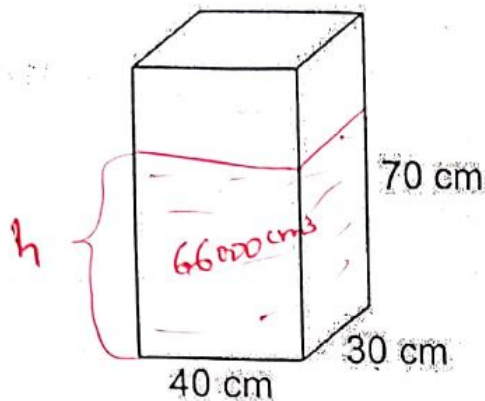
30 cm

40 cm

(a) Find the capacity of the tank in litres. *(02 marks)*

$V = BA \times H$

$V = L \times W \times H$

$V = 40\,cm \times 30\,cm \times 70\,cm$

$V = (40 \times 30 \times 70)\,cm \times cm \times cm$

$V = 84\,000\,cm^3$

$Capacity = \dfrac{volume}{1000\,cm^3} \times 1\,litre$

$C = \dfrac{84\,000\,cm^3}{1000\,cm^3} \times 1\,litre$

$C = 84\,litres$

(b) Calculate;

(i) the amount of water in litres that will leak out of the tank in 12 hours. *(01 mark)*

$1\,hr = 1.5\,litres$

$12\,hrs = 12 \times 1.5\,litres$

$= 12 \times 1.5$

$= 18\,litres$

(ii) the height of the water that remains in the tank after 12 hours. *(03 marks)*

Litres which remain

$\begin{array}{r} 84\ litres \\ -\ 18\ litres \\ \hline 66\ litres \end{array}$

Volume of the Remain

$1\,lt = 1000\,cm^3$

$66\,lt = 66 \times 1000\,cm^3$

$= 66\,000\,cm^3$

$V = L \times w \times h$

$66\,000\,cm^3 = 40\,cm \times 30\,cm \times h$

$\dfrac{66\,000\,cm \times cm \times cm}{40\,cm \times 30\,cm} = \dfrac{40\,cm \times 30\,cm \times h}{40\,cm \times 30\,cm}$

$\dfrac{\overset{55}{\cancel{66000}}\,cm}{\cancel{40}}$

$55\,cm = h$

Height = 55 cm

END