KOLFRAM EDUCATIONAL SERVICES KAMPALA

POWERED BY: TRUST HIGH SCHOOL GAYAZA
NATIONAL MOCK EXAMINATION CHAMPIONSHIP

2024

MATHEMATICS GUIDES

Time allowed: 2hours 30minutes

THE KOLFRAM EXAMINATIONS BOARD

Index Number:	Random Number						Personal No.		

Candidate's Name: .....

Candidate's Signature:.....

School Name: .....

District Name: .....

DO NOT OPEN THIS BOOKLET UNLESS YOU ARE TOLD TO DO SO

Read and follow these instructions carefully

1. This paper has **two** sections: **A** and **B**. Section **A** has **20** questions and section **B** has **12** questions. The paper has **8** printed pages.
2. Answer **all** questions. **All** answers to both sections A and B must be shown in the spaces provided.
3. All answers **must** be written using a **blue** or **black** ball point pen or ink. Any answer written in pencils other than on graphs and diagrams will **not** be marked.
4. No calculators or **electronic** pens are allowed in the examination room.
5. Unnecessary **changes** in your work and handwriting that cannot be read easily may lead to **loss of marks**.
6. Do not fill anything in the table indicated: "**FOR EXAMINERS' USE ONLY**" and boxes inside the question paper.

FOR EXAMINER'S 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)

(Question **1** to **20** carries **1** mark each)

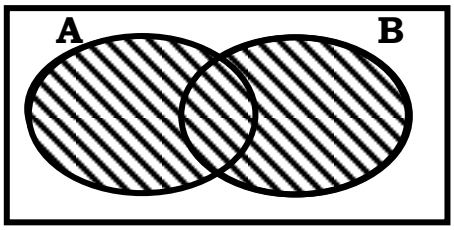
1. Work out: $\square \div 5 = 25$

$\square \div 5 = 25$

$\square = 25 \times 5$

$\square = 125$

2. Describe the shaded region on the Venn diagram below.



A U B

3. Write in figures: One hundred forty two thousand, sixty one.

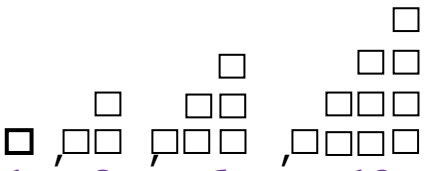
142,000
60
\+ 1
142, 061

4. Simplify: $\frac{5}{12} + \frac{1}{12}$

$\frac{5+1}{12}$

$= \frac{6}{12}$ $= \frac{1}{6}$

5. How many squares are in the next grouping in the pattern?



1, 3, 6, 10

, $\frac{1+2+3+4+5 = \mathbf{15}}{\mathbf{15}}$

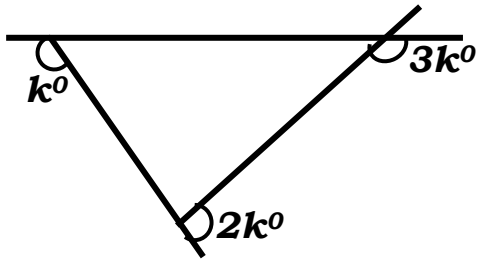
6. A church was built in **MDCCLXVII** Write this year in Hindu Arabic numeral.

M= 1000
DCC= 700
LX =70
VII=7
1000+ 700 + 70 + 7
=1777

7. Maria will celebrate her birthday next week. What is the probability that she will celebrate it on the weekend?

Sample space= 2
Possible outcome= 7
Probability= $\frac{\text{sample space}}{\text{Possible outcome}}$
$= \frac{2}{7}$

8. Find the value of k in the diagram below.



$k + 2k + 3k = 180^0$

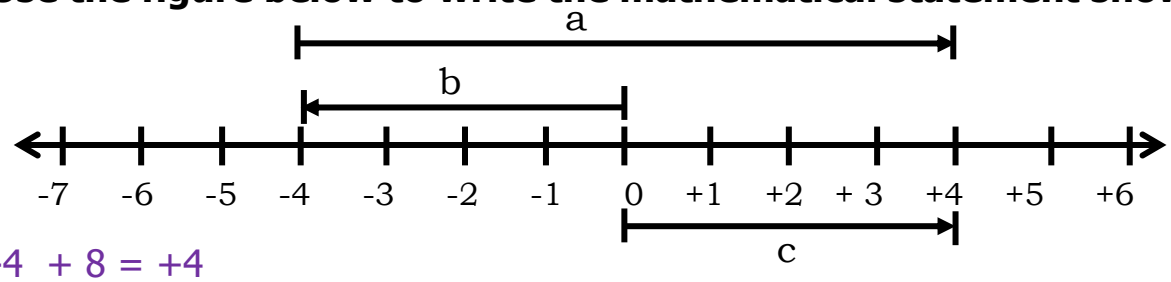
$\frac{6k}{6} = \frac{180^0}{6}$

$x = 30^0$

9. Ritah had a debt of Sh. 17,000 from each of her 3 friends. She received Sh. 53,000/= as her salary and paid all the debts. Find Ritah's financial stand after paying off her debts.

Total debts= 17,000 x 3
=51,000
Amount of salary = 53,000
Financial stand = salary - expense
= 53,000 - 51,000
= Sh. 2,000

10. **Use the figure below to write the mathematical statement shown.**



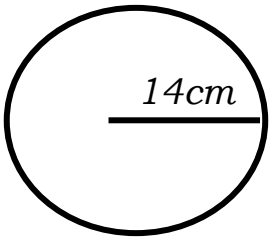
-4 + 8 = +4

11. The number of children at Praise Primary School- Hoima increased from 525 in 2023 to 1575 in 2024. In which ratio did the number increase?

Number in 2023	:	Number in 2024
525	:	1575
535	:	535
1	**:**	**3**

The number increased in the ratio of 1:3

12. Find the circumference of the figure shown below. (use π as 3.14)



Circumference = $2\pi r$
= 2 x 3.14 x 14 cm
= 6.28 x 14 cm
= 87.92cm

13. Given that set A= {14, 8, 5, 6, 6, 8, 9}, find the median of the set A.

{5, 6, 6, 8, 8, 9, 14}

The median = 8

14. Doreen deposited Sh. 60,000 for 8 months in Kesk Bank which gives a rate of 10% per year. Calculate her simple interest.

Principal =Shs. 60,000 Rate= 10%
Time = 8 months
But 1 year = 12 months
8 months = $\frac{8}{12}$ year

$SI = \frac{P \times T \times R}{100}$

$SI = Shs.\ \frac{^{200}\cancel{60,000} \times 10 \times \cancel{8}^{2}}{\cancel{100} \quad \cancel{12}^{3}}$

200 X 10 X 2 =Sh. **4,000**

15. The LCM of two numbers is 72. If one of the numbers is 6 and their HCF is 3, find the second number.

$Second\ number = \frac{LCM \times HCF}{Given\ number}$

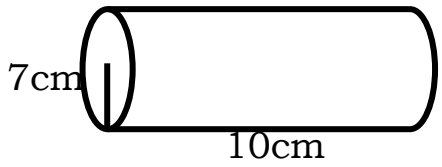
$Second\ number = \frac{72 \times \cancel{3}^{1}}{\cancel{6}^{2}}$

$\frac{72}{2}$

$= 36$

The second number is 36.

16. Find the volume of the cylinder given below.



Radius (r) = 7cm, Height (h) = 10cm
Volume of a cylinder = $\pi r^2 h$
$\frac{22}{7} \times \cancel{7} \times 7 \times 10$ =
= 22 x 7 x 10
=1540 cm^3

17. Solve for x: $\frac{3}{x} = 4 \pmod 5$

$\frac{3}{x} = 4 \pmod 5$
$\cancel{x} \times \frac{3}{x} = 4x \times \pmod 5$
$\cancel{x}$
$3 = 4x \pmod 5$
$3 + 5 = 4x \pmod 5$
$\frac{8}{4} = \frac{4x}{4} \pmod 5$
$x = 2 \pmod 5$

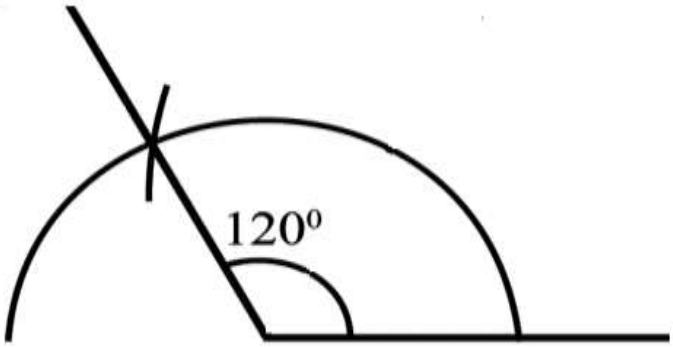
18. If a= 7, find the value of $a^2 + a$

a = 7
$a^2 + a = 7^2 + 7$
= 49 +7
= 56

19. Express 15 hours as a ratio of a day.

A day has 24 hours
Ratio of Hours to Day
$\frac{15}{3} : \frac{24}{3}$
= **3** : **8**

20. With a help of a well sharpened pencil and a protractor, draw an angle of 120^0.



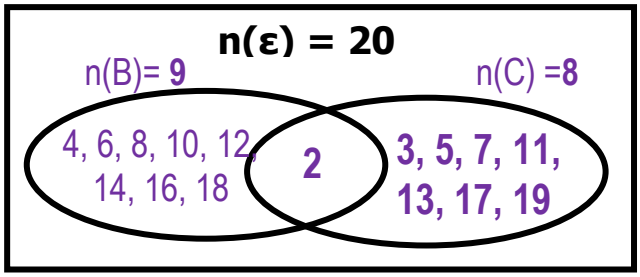
SECTION B (60 MARKS)

21. Given that ε = {All natural numbers from 0 to 20}
Set B = {Even numbers between 1 and 20}
Set C = {Prime numbers between 0 and 20}

(a) Draw a Venn diagram to show the above information. (3 marks)

Set B= {even numbers between 1 and 20}
Set B= {**2**, 4, 6, 8, 10, 12, 14, 16, 18}

Set C= {prime numbers between 0 and 20}
Set C= {**2**, 3, 5, 7, 11, 13, 17, 19}



(b) Find n(B∪C) (2 marks)
(B∪C) = {2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 16, 17, 18, 19}
n(B∪C)= **16**

(c) Find n(B∩C) (1 mark)
$(B \cap C) = 2$
$n(B \cap C) = 1$

22. Below is a calendar of **May** for a certain year. Use it to answer the questions that follow.

SUN	MON	TUE	WED	THUR	FRI	SAT
			1.	2.	3.	4.
5.	6.	7.	8.	9.	10.	11.
12.	13.	14.	15.	16.	17.	18.
19.	20.	21.	22.	23.	24.	25.
26.	27.	28.	29.	30.	31.	

a) If all the dates with prime numbers were rainy day find the probability that the farmer planted his seeds on rainy day in that month. (*2 Marks*)

Prime numbers from the calendar
Set C= {**2**, 3, 5, 7, 11, 13, 17, 19, 23, 29}
Sample space =10
Possible outcomes = 31
Probability = Sample space / Possible outcomes

Probability = Sample space / Possible outcomes
Probability = $\frac{10}{31}$

b) Using the formula **n(n+ 1)** to obtain rectangular numbers, circle all the rectangular numbers from the calendar above. (*2 Marks*)

n(n+1)	n (n+1)	n (n+1)	n (n+1)	n (n+1)
1 (1+1)	2 (2+1)	3 (3+1)	4 (4+1)	5 (5+1)
1x2	2 x 3	3 x4	4 x5	5 x 6
=2	=6	=12	=20	=30

Rectangular numbers are: 2, 6, 12, 20, 30

23. Tr. Ojok grouped his learners in nines and seven learners remained without a group but when he grouped them in eights, 4 learners didn't have group.

(a) How many learners are in his class altogether? (*2 Marks*)

7 (finite 9)= {7, 16, 25, 34, 43, (52)..}
4 (finite 8)= {4, 12, 20, 28, 36, 44, (52)..}

:. There are 52 learners in the class

b) If the learners were grouped in fours, how many groups were formed? (*2 marks*)

52 learners are grouped in **4** groups
$= \frac{52^{13}}{4^{1}}$
= 52 learners will form 13 groups

24. (a) workout $\sqrt{0.64} + \sqrt{0.36}$ (*3 Marks*)

$\sqrt{0.64} + \sqrt{0.36}$
$0.8 + 0.6$
$= 0.14$

$\frac{14}{100} = \mathbf{0.14}$

b) Express $33\frac{1}{3}\%$ as a decimal fraction. (*2 Marks*)

$\frac{33 \times 3 + 1}{3} = \frac{100}{3}\%$

$\frac{100}{3} \div \frac{100}{1}$

$\frac{\cancel{100}}{3} \times \frac{1}{\cancel{100}} = \frac{1}{3}$

$3\overline{)10}$ = 0.333...
-9
10
-9
10

25. The table below shows how a man spends his monthly income. Use it to answer the questions that follow.

Feeding	Others	Rent
Sh. 300,000	240,000	25%

(a) How much money does he spend on rent? (*2 Marks*)

% of feeding and others= (100- 25%)
= 75%
75% = feeding and others
75% = 300,000 + 240,000
75% = 540,000%
1% = $\frac{540,000}{75}$
1% = Sh. 7,200
100% of salary = 100 x 72,000
=Sh. 720,000

For the rent
25% of salary
= $\frac{25}{100}$ x 720,000
= 25 x 7200
=Sh. 180,000

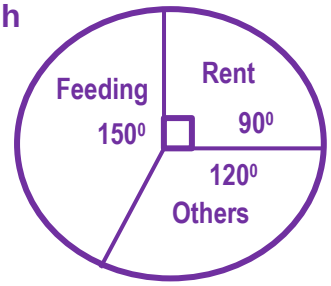
b) Show the above information in a circle of radius 3cm. (*3 Marks*)

Feeding
$\frac{300,000}{2720,000} \times \frac{3601}{}$
$\frac{300}{2} = 150^0$

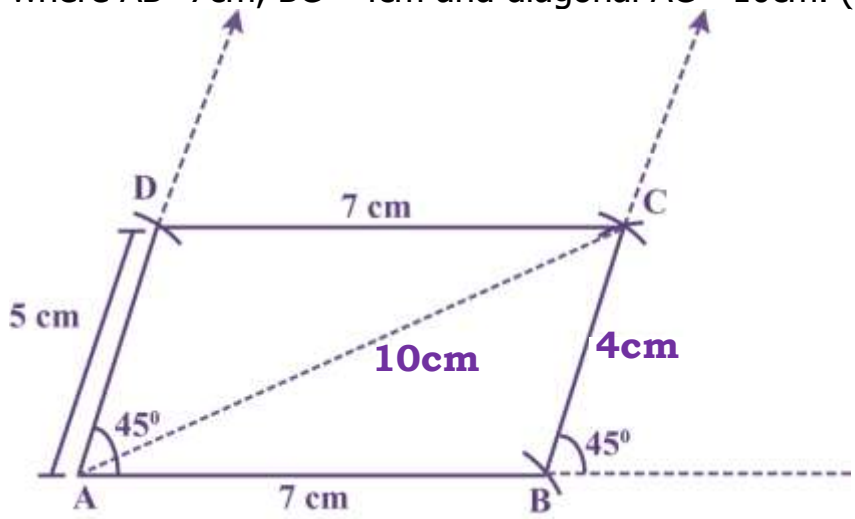
Others
$\frac{240,000}{2720,000} \times \frac{3601}{}$
$\frac{240}{2} = 120^0$

Rent
$\frac{180,000}{2720,000} \times \frac{3601}{}$
$\frac{180}{2} = 90^0$

Circle graph



26. Using a pair of compasses, a ruler and a pencil only, construct a parallelogram ABCD where AB=7cm, BC= 4cm and diagonal AC= 10cm. (*4 Marks*)



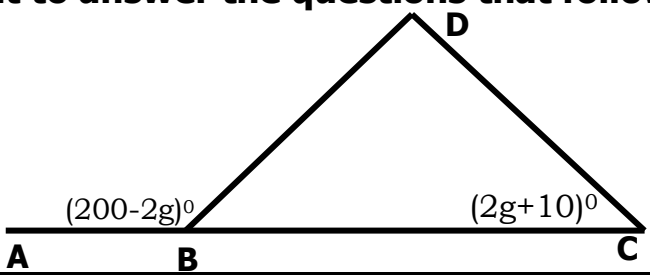
(b) (i) Measure the length of the diagonal BD. (*1 Mark*)

Length of diagonal BD= 8cm

(ii) Measure the angle DAC. (*1 Mark*)

Angle DAC = 45^0

27. **In the figure below, angle BCD is twice angle DBC. Study it carefully and use it to answer the questions that follow.**



(a) Calculate the value of g. (*3 marks*)

½ (2g+10) + 2g+10 = 200 -2g

*(½ x 2g) +(½ **x** 10) + 2g+10 = 200 -2g*

g + 5 + 2g+10 = 200 -2g

3g + 15 = 200- 2g

3g+ 2g = 200- 15

$\frac{5g}{5} = \frac{185}{5}$

g = 37⁰

b) Find the size of angle BDC. (*2 marks*)

For angle DBC

½ (2g+10)

½ (2x 37) + (1/2 x10)

37 + 5 = 42⁰

For angle BCD

(2g+10)

(2x 37) + (10)

74 + 10 = 84⁰

180⁰ – (42⁰ +84⁰)

180⁰ – 126⁰

= **54⁰**

28. At Motherwell Junior School, the bell for lower classes rings in the interval of 30 and that of upper primary rings in the interval of 40 minutes respectively.

(a) After how many hours will the two bells be rung again? (*3 marks*)

LCM of 30 and 40

2	30	40
2	15	20
2	15	10
3	15	5
5	5	5
	1	1

LCM= 2 x 2 x2 x 3 x 5

= 8 x 15 = 120 minutes

60 minutes = 1 hour

I minute = $\frac{1}{60}$hr

120 minutes = $\frac{120}{60}$ hr = 2 hours

The two bells will be rung after 2 hours

b) If the bells were first rung together at 10:30 a.m. At what time will they be rung together again? (*2 marks*)

10:30 a.m

+ 2:00 hours

12: 30 p.m

The bell will ring again at 12:30 p.m

29. **Bernard bought the following items for Easter Day celebration**.

2 broilers for sh. 7500 each.

3 kg of rice for sh. 3000 per kg.

24 bottles of soda for sh. 18000

1 ½ litres of cooking oil for sh. 4000 per litre

(a) **Work out his total expenditure**. (*4 marks*)

Broilers

2 x Sh. 7500

= Sh. 15,000

Rice

3kg x Sh. 3,000

= Sh. 9,000

24 bottles of Soda

= Sh. 18,000

Cooking oil

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

= 3 x Sh. ~~4,000~~

~~2~~= 3x 2,000

= Shs. 6,000

Total expenditure

= 15,000 + 9,000 +18,000+ 6,000= **Sh.48,000**

(b) If he used one note and was given a change of sh. 2000, what denomination of the note did he give to the trader? (*1 mark*)

Amount =Total expenditure + change

= Sh.48, 000 + Sh. 2,000

= sh. 50.000

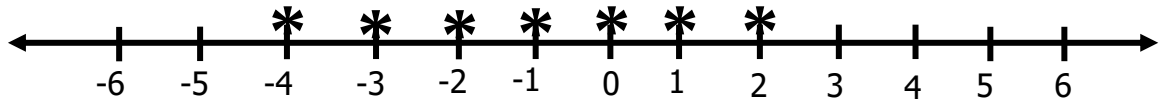
She went with a denomination of **Sh. 50,000**

30. Solve for h: ½ (4h + 7) + ¼ (4h-6) = 20 (*3 Marks*)

½ (4h + 7) + ¼ (4h -6) = 20
½ x 4h + ½ x 7 + ¼ x 4h -½ x 6 = 20
$2h + \frac{7}{2} + h - \frac{1}{2} \times 3 = 20$
$2h + h + \frac{7}{2} - \frac{3}{2} = 20$
$2h + h + \frac{4}{2} = 20$

$2h + h + \frac{4}{2} = 20$
$3h + 2 = 20$
$3h + 2 - 2 = 20 - 2$
$\frac{3h}{3} = \frac{18}{3}$
h= 6

(b) Write an inequality whose solution set has been shown on the number line below. (*1 mark*)



$-4 \leq x < 2$

31. **The diatance all round a costructed regular hexagon in a circle is 42cm**

(a) (i) Find the: Diameter of a circle (*1 mark*)

Perimeter (P) = πd
42cm = $\frac{22}{7}$ x d
7x 42cm = $\frac{22d}{7}$ x 7

$\frac{7 \times 42cm^{21}}{22\ 11} = \frac{22d}{22}$
$\frac{7 \times 21}{11} = d$
d=**13.36cm**

(ii) Area of the circle. (*2 marks*)

Area =πr^2
r= $\frac{d}{2}$
R= $\frac{13.36}{2}$
R =6. 68 cm

Area =πr^2
A= 3.14x 6.68 x 6.68
=138.44cm^2

b) Workout the ratio of exterior angle to interior angle of the constructed polygon. (*3 marks*)

Each exterior angle = $\frac{360^0}{6}$
Each exterior angle = 60^0
Each interior angle = 180^0 – exterior angle
= $180^0 - 60^0$
= 120^0

Ratio of Exterior to Interior angle
$\frac{60}{60} : \frac{120}{60}$
1 : 2

The ration of exterior to interior angle = **1:2**

32. A trader bought a gross of apples at Sh. 1,000 each apple and he later sold half of apple bought at Sh. 2,500 a pair of apples. The remaining apples were sold at Sh. 1,500 each apple. Calculate the trader's percentage profits. (*5 Marks*)

A gross= 144 items
1 gross =144apples x Sh. 1000
=144,000
Buying price = **Shs. 144,000**
$\frac{144}{2}$ = 72 apples were sold in pairs
$\frac{72}{2}$ pairs = 36pairs x Sh. 2,500
36 pairs were sold at **Shs. 90,000**
Half of the apples were sold at 1,500
$\frac{144}{2}$ = 72 apples were sold at 1,500
72apples **X** Sh. 1,500

72 apples were sold at **Shs. 108,000**
Total selling price= 108,000+ 90,000
= 198,000
Profit = Selling Price – Buying Price
=198,000-144,000
= 54,000
Percentage profit=$\frac{\text{Profit}}{\text{Cost price}}$ x 100
Percentage profit=$\frac{54,000}{144,000}$ x 100
Percentage profit= **37.5%**