



ST. MARY'S GIRLS' SCHOOL –RUNDA

Name.....

Class.....

Adm. No

Date

MATHEMATICS FORM 4 2024

APRIL HOLIDAY ASSIGNMENT

Attempt all the questions. Kindly be thorough in your revision

1. The gradient function of a curve is given by the expression $2x + 1$. If the curve passes through the point $(-4, 6)$; find the equation of the curve. (3 marks)

2. (a) Find the equation of the normal to the curve $y = x^3 - 2x - 1$ at $(1, -2)$ (3marks)

b. Determine the nature of the turning points to the curve $y = x^3 - 3x + 2$; Hence in the space provided below, sketch the curve (3 marks)

3. The latitude and longitude of two stations **P** and **Q** are (47°N, 25°W) and (47°N, 70°W) respectively. Calculate the distance in nautical miles between **P** and **Q** along the latitude 47°N. (3 marks)

4. Solve for θ if $-\frac{1}{4} \sin (2x + 30) = 0.1607$, $0 \leq \theta \leq 360^\circ$ (3mks)

5. Solve for x for $0^\circ < X < 180^\circ$ (4 marks)

$$-8 \sin^2 x - 2 \cos x = -5.$$

6. The table below shows the number of defective bolts from a sample of 40

No of bolts	0	1	2	3	4	5
Frequency	20	8	6	4	1	1

Calculate the standard deviation of the data above (4 mks)

9. The equation of a circle is $x^2 + y^2 + 6x - 10y - 2 = 0$. Determine the co-ordinates of the centre of the circle and state its radius (4 marks)

10. (a) Expand and simplify the binominal expression $(1 + \frac{1}{2}x)^8$

(b) Use the expansion up to the fourth term to evaluate $(1.05)^8$ to 2 decimal places

10. Sketch the curve of the function $y = x^3 - 3x + 2$ showing clearly minimum and maximum points and the y – intercept. (3 marks)

12. Ashanti is a saleswoman and earns a commission on sales based on the monthly rates shown in the table below:-

Sales (Kshs)	Commission rate % of sales
The first 5000	10%
The next 3000	15%
Sales above 8000	20%

In addition, she earns a basic monthly pay of Kshs.6700. During a certain month, she earned a total salary amounting to Kshs.8368. How much worth of sales did she make?
(4marks)

13. A certain amount of money was invested at compound interest of 10% compounded every two years for ten years. Given that the investor invested a total of 500,000/= at the end of the ten years, find the amount of money invested to the nearest shillings (3 marks)

14. The cash price of a T.V set is Ksh. 26,000. Linda bought the set on hire purchase terms by paying a deposit of Ksh. 6,000 and the balance by 24 equal monthly installments of Ksh. 1,045.30. Find the compound rate of interest per year. (3 marks)

15. Naliaka bought maize and beans from a wholesaler. She mixed the maize and beans in the ratio 5:3. She had bought the maize at sh.30 per kg and the beans at sh.60 per kg. If she was to make a profit of 30%, what should be the selling price of 1kg of the mixture? (3 mks)

16. Two variables R and P are connected by a function $R = KP^n$ where K and n are constants. The table below shows data involving the two variables

P	3	3.5	4	4.5	5
R	36	49	64	81	100

(a) Express $R = KP^n$ in a linear form

(b) Draw a line graph to represent the information above

2.

(a) Find the values of constants **K** and **n**

(b) Write down the law connecting **R** and **P**

(c) Find the value of **P** when **R = 900**

17, (a) Complete the table below for the equation of the curve given by $y = 2x^3 - 3x^2 + 1$

X	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5	3
$2x^3$	-16		-2		0		2		16		
$-3x^2$	-12			0.75	0	-0.75					-27
1	1				1						
y	-27	-12.5			1						13.5

(b) Use the table to draw the graph of the function $y = 2x^3 - 3x^2 + 1$

a) Use your graph to find the values of x for: -

(i) $y > 0$

(ii) The roots of the equation $2x^3 - 3x^2 + 1 = 0$

(iii) $2x^3 - 3x^2 = 9$

18 A cupboard has 7 white cups and 5 brown cups all identical in size and shape.

There is a blackout in the town and Mrs. Bett has to select three cups one after another without replacing the previous ones.

(a) Draw a tree diagram for the information

(b) Calculate the probability that she chooses;

(i) Two white cups and one brown cup

(ii) Two brown cups and one white cup

(iii) At least one white cup

(iv) three cups of the same colour

19. Points **R** and **S** are two points on the surface on a latitude 48°S . The two points lie on longitudes 30°W and 150°E respectively. By taking the earth's radius to be 6370km , calculate:

(a) The distance from **R** to **S** along a parallel of latitude. (3 marks)

(b) An aeroplane flies at an average speed of 280km/h from **R** to **S** along a great circle through the South Pole. Calculate the total time taken. (3 marks)

(c) The local time of **R** when the local time of **S** is 2.15m . (2 marks)

(d) Another point **Q** is 600Nm North of **R** .Find the location of **Q** (3 marks)

20. a) (i) Paint **A** costs shs.150 per litre while **B** costs shs.160 per litre. In what proportion must **A** be mixed with **B** to produce a mixture costing shs.156 per litre (3 marks)

(ii) What must be the selling price of the mixture if a profit of 12% is to be realized?
(2 marks)

(b) A cylindrical water tank can be filled to a depth of 2.1m by a pipe **P** in 2 hours. Pipe **Q** takes 7 hours to fill the tank to the same level. Pipe **R** can empty this amount of water in 6hours. Initially, the tank is empty. Pipes **P** and **Q** are turned on at 8.45a.m and pipe **R** at 9.45a.m. Find the depth of water in the tank at 11.45a.m.
(5 marks)

21. The table below shows some paired values of X and Y for a known curve.

X	0.0	0.2	0.4	0.6	0.8	1.0
Y	0.0	0.4	1.6	3.6	6.4	10.0

Estimate the area under the curve for the interval $0 < X < 1$ using

a. the mid ordinate rule with five mid- ordinates

b. The trapezia rule with five trapezia (2marks)

c. If the exact area is $\frac{10}{3}$ square units. Calculate the percentage error in the two estimates. (4mks)

22.. A particle P moves in a straight line such that t seconds after passing a fixed point Q, its velocity is given by the equation

$$2t^2 - 10t + 12.$$

a. The values of t when p is instantaneously at rest (2 marks)

b. An expression for the distance moved by P after t seconds. (2 marks)

c. The total distance traveled by P in the first 3 seconds after passing point O. (3 marks)

d. The distance of P from O when the acceleration is zero. (3 marks)

23. The table below shows the rate at which income tax is charged for all taxable income.

INCOME	RATE IN EXCH TWENTY SHILLINGS
On the first shs.116 160	10%
On the next shs.109 440	15%
On the next shs.109 440	20%
On the next shs.109 440	25%
On all income over shs.444 480	30%

Mr. Nyongesa earns a basic salary of sh.54, 450 per month. He is housed by the company and therefore 15% of his monthly salary is added to the basic salary as a taxable income. He is also given taxable medical and transport allowances of shs. 4,000 and shs. 2,000 per month respectively. He is entitled to a family relief of sh.1, 100 per month.

(a) Calculate Nyongesa's annual taxable income (3 mks)

(b) Calculate his monthly P.A.Y.E after the relief (5 mks)

(c) If 20% of his basic salary goes towards deductions, determine his monthly income.

23. The ages of 100 people who attended a wedding were recorded in the distribution table below

Age	0-19	20-39	40-59	60-79	80-99
Frequency	7	21	38	27	7

a) Draw the cumulative frequency. (3 marks)

b) From the curve determine: i) Median. (2 marks)

ii) Inter quartile range (2 marks)

iii) 7th Decile (2 marks)

iv) 60th Percentile. (2 marks)

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