**STEPHJOY GIRLS HIGH SCHOOL**

**FORM THREE MATHEMATICS HOLIDAY ASSIGNMENT**

**NAME................................................................... ADM..........................CLASS....................**

1. Use logarithms, correct to 4 decimal places, to evaluate (4marks)

 

2. Find the rate per annum at which a certain amount doubles after being invested for a period of 5 years compounded semi-annually. (3 marks)

3. The sum of the interior angles of a regular polygon is 40 times the size of the exterior angle.

 (a) Find the number of sides of the polygon. (3 marks)

 (b) Name the polygon (1 mark)

4. Find the value of x given that $\left[\begin{matrix}2x-1&1\\x^{2}&1\end{matrix}\right]$ is a singular matrix (3 marks)

5. Make b the subject of the formula T =  (3marks)

6. Simplify the expression  (3marks)

7. Twenty four men each working 10 hours a day take 4 days to complete a piece of work. How many more days will it take 15 men each working 8 hours a day to complete the same piece of work. (3 marks)

8. Solve the following inequalities and represent the solution on a single number line. (3 marks)



 

9 i) Expand (2 – ¼ x)5 (2 marks)

 ii) Use your expansion to find the value of (1.96)5 correct to 3 decimal places (2marks)

10. Evaluate without using tables or a calculator the value of $\frac{1.33×0.51}{0.19×0.0017}$ (3marks)

11. Find all the integral values of $x$ which satisfy the inequalities. (3marks)

 $20-x>5+2x\geq x+5$

12When a certain number is divided by 48, 72 or 100 the remainder is 3 in each case. Find the number. (3marks)

13 Factorize fully the expression;  hence simplify. (3mks)

14.Solve for *m* in the equation; 23*m*+1 − 23(*m*−1) = 120. (3maks)

15. Given that **p** = 2**i** − 3**j** + **k**, **q** = 3**i** − 4**j** − 3**k** and **r** = 3**p** + 2**q**, find the magnitude of **r** to 2 significant figures. (3maks)

16. State the system of linear inequalities defining the unshaded region R given below (3maks)



17 Given that Cos (90-β) = $\frac{\sqrt{3}}{2}$, determine without using trigonometric tables the value of Cos β (2mks)

18 The interior angles of a regular polygon are one and a half time the size of exterior angles. Find the number of sides of the polygon. (3 marks)

19. The straight line joining the points P (a, 7) and Q (13, a) is parallel to the line whose equation is

 3y + 2x = 9. Find the value of a. (3 marks )

20. The figure below shows a histogram. (3mks)

Frequency

Density

2.0

1.6

1.2

0.8

0.4

 0

0

 7.5 9.5 11.5 15.5 21.5

 Length in x cm

Fill in the table below the missing frequencies.

|  |  |
| --- | --- |
| Length in x cm | Frequency |
| 7.5≤ x ≤ 9.5 | 12 |
| 9.5≤ x ≤ 11.5 |  |
| 11.5≤ x ≤ 15.5 |  |
| 15.5≤ x ≤ 21.5 |  |

21. Solve for x in the equation. (3 marks)

 $\frac{81^{2x} x 27^{x}}{9^{x}}$ = 729

22. The GCD of 6480, 7200 and a third number is 144. The L.C.M of the three numbers

is 25 x 35 x 52 x 73. Find the smallest third number. (3 marks )

23. A bus left Malaba town at 6.00am and travelled at an average speed of 80km/h towards Nairobi which is 510km away. At 6.30am a salon car left Nairobi the same day following the same route and travelled at average speed of 100km/h towards Malaba. After 1 hour, the car had a puncture which took 15minutes to repair before proceeding with the journey;

Determine

1. The distance covered by the bus in 30minutes (1mks)
2. The time of the day when car met the bus. (6mks)

24 The diagonals of a rectangle P, Q, R, S intersect at (5, 3). Given that the equation of line PQ is 4y - 9x =13 and that of line PS is y -4x =5

1. The co-ordinators of P (3mks)
2. The co-ordinates of R (2mks)
3. The equation of line RQ (2mks)
4. The equation of a perpendicular line drawn to meet PR at (5,3) (3mks)

25. A Kenyan bank buys and sells currencies at the exchange rates below

|  |  |  |
| --- | --- | --- |
| Currency  | Buying (ksh) | Selling (ksh) |
|  1 euro 1 us dollar  | 147.8774.22 | 148.0074.50 |

An American tourist arrived in Kenya with 24,000 Euros. He converted all the euros to Kenya shillings at the bank. He spent a total sh. 200,000 while in Kenya and converted the rest into US dollars at the bank. Find the amount in dollars that he received. (3mks)

26. The income tax rates in a certain year are as shown below.

|  |  |
| --- | --- |
| Income (k₤ – p.a | Rate (KSh. per ₤) |
| 1 – 4200 | 2 |
| 4201 – 8000 | 3 |
| 8001 – 12600 | 5 |
| 12601 – 16800 | 6 |
| 16801 and above  | 7 |

 Omar pays Sh. 4000 as P.A.Y.E per month. He has a monthly house allowance of KSh.10800 and is entitled to a personal relief of KSh. 1,100 per month. Determine:

(i) his gross tax per annum in Kshs (2 Marks)

(ii) his taxable income in K₤ per annum (2 marks)

(iii) his basic salary in Ksh. per month. (2marks)

(iv) his net salary per month (2 marks)

27. (a) (i) Fill the table below for the function.

 y = 2x2 + 5x – 12 for -8≤ x ≤ 4 (2 marks)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| x | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| 2x2 | 98 |  |  |  | 18 |  |  |  | 2 |  |  | 32 |
| 5x | -35 |  |  |  | -15 |  |  |  | 5 |  |  | 20 |
| -12 | -12 |  |  |  | -12 |  |  |  | -12 |  |  | -12 |
| y | 51 |  |  |  | -9 |  |  |  | -5 |  |  | 40 |

(ii) Using the table, draw the graph of the function y = 2x2 + 5x – 12. Use the scale 1cm to 1 unit on the x-axis and 1cm for 10 units for the y – axis (4 marks)



 (b) Use the graph drawn above to solve the following equations.

 (i) 2x2 + 5x – 12 = 0 (2 marks)

 (ii) 3 – 7x – 3x2 = 0 (2 marks)

28. In the figure below, K,L,M and N are points on the circumference of the circle centre O. The points K,

 O, M and P are on a straight line. PN is tangent to the circle at N. ∠KOL = 1300 and ∠MKN = 400.

1300

400

P

L

N

Q

O

M

K

 Stating the reason in each case, find the values of the following angles,

1. MLN (2 marks)
2. OLN (2 marks)
3. LNP (2 marks)
4. MPN (2 marks)
5. KNQ (2 marks)

29. The figure below shows a model of a solid in the shape of a frustum of a cone with a hemispherical top.

60cm

28cm

70cm

 The diameter of the hemispherical top is 70cm and is equal to the diameter of the top of the frustum. The frustum has a base diameter of 28cm and a slant height of 60cm.

1. Calculate the area of the hemispherical surface. (3mark)

1. Calculate the slant height of the cone from which the frustum was cut. (4marks)
2. Calculate the total surface area of the mode. (5 mark)

30. The figure below shows triangle OPQ in which OS = $\frac{1}{ 3}$ OP and OR = $\frac{1}{3}$ OQ. T is a point on QS such that QT = $\frac{3}{4}$ QS

P

S

O

Q

R

T

1. Given that OP = p and OQ = q, express the following vectors in terms of p and q.

̃

̃

 (i) SR (1 Mark)

̃

(ii) QS (2 Marks)

̃

(iii) PT (2 Marks)

̃

(iv) TR (2 Marks)

̃

1. Hence or otherwise show that the points P, T and R are collinear. (3 Marks)

31 The figure shows triangle ABC inscribed in a circle where AC = 10cm, BC = 7cm and AB =11cm



Calculate correct 1 d p ( $use π =\frac{22}{7}$ )

1. The size of the angle CAB (4mks)
2. The radius of the circle (2mks)
3. Hence, find the area of the shaded region (4mks)

32. ABCDEFGA is a belt tied around two wheels whose centres are O and Q forming a pulley system. Given that Q =36cm, AO = 5cm BQ = 7cm. calculate correct 1 d.p $(Take π =\frac{22}{7}$ )



a) Angle AOQ (3mks)

b) The length of the belt in contact with

i) The wheel whose centre is O (2mks)

1. The wheel whose centre is Q (2mks

c) The length of AB, hence the total length of the belt (3mks)

33. The probability that John misses lunch at school is ¾ . If he misses lunch , the probability that he dozes off during the afternoon lessons is 4/7 . Otherwise his probability of dozing off in the afternoon is ½ .

1. Illustrate the probabilities using a tree diagram. (1mk)
2. Calculate the probability that John does not doze off during the afternoon lessons. (2mks)

34. The first 4 terms of a G.P are 4,8,16,32

1. Find the common ratio (1mk)
2. Calculate the sum of the first 8 terms of the G.P (2mks)

35. Two quantities M and N are such that M varies partly as N and partly as the square of N. Determine the relationship between M and N given that when M is 1050, N = 10 and when M = 2200, N = 20. (3mks)

36 A dealer has two types of grades of tea, A and B. Grade A costs shs. 140 per kg while grade B costs shs.160 per kg. If the dealer mixes A and B in the ratio 3:5 to make a brand of tea which he sells at shs.180 per kg, calculate his percentage profit. (3mks)

37 The position vectors of A and B are given as a = 2i -3j + 4k and b = -2i – j + 2k respectively. Find to 2 decimal places, the length of the vector AB. (3mks)

38. Find the equation of a circle whose radius is 0.75 units and centre coordinates (0.75, -0.5). Leave your answer in the form;

x2 + y2 + ax + by + c = 0 (3mks)

39 Solve for the exact value of x in the equation. (3mks)

2log10x + log105 = 1 + 2log104

40 Using a ruler and a pair of compass only, construct common tangents from the point P to the circle below. (3mks)

**P**

41 In the figure below angle CBD = 370, angle BCD = 200 and ABC is a tangent to the circle at B.

 E

 D

 A

 B

 C

1. Find:
2. Angle BED (2mks)
3. Angle ABE (2mks)

42 Income tax rate were charged as follows in a given year.

|  |  |
| --- | --- |
| **Income in ksh. p.m** | **Rate of tax in each sh.** |
| 1 – 11, 180 | 10% |
| 11, 181, - 21, 714 | 15% |
| 21, 715 – 32, 248 | 20% |
| 32, 249 – 42, 781 | 25% |
| 42, 782 and above  | 30% |

A teacher earns a basic salary of Ksh. 48, 000. He is housed by the employer and pays a rent of Ksh. 3,000 per month. His allowances are: Commuter Ksh. 2, 500 and medical Ksh. 3,500. He is entitled to a family relief of Ksh. 1,648 per month.

Determine his:

1. Taxable income per month (2mks)
2. Net tax per month (4mks)
3. In addition the following deductions are also made

NHIF Ksh. 1,250

WCPS Ksh. 1,200

Co – operative shares Ksh. 3,000

 Calculate the net salary. (3mks)

43 (a) The first term of an Arthmetric progression (AP) is 2. The sum of the first 8 terms of the AP is 156

1. Find the common difference of the AP (2mks)
2. Given that the sum of the first **n** terms of the AP is 416, find **n** (2mks)

(b) The 3rd, 5th and 8th terms of another AP form the first three terms of a Geometric Progression (GP). If the common difference of the AP is 3, find;

* 1. The first term of the GP; (4mks)
	2. The sum of the first 9 terms of the GP, to 4 significant figures. (2mks)

44. A married couple intends to have 3 children. They consult an expert who tells them that the probability of a male birth is 0.55.

1. Draw a tree diagram to represent this occurrence (2mks)
2. Find the probability that
	1. All the three children will be female (2mks)
	2. At least a male is born (2mks)
	3. At least 2 will be females, giving your answer to 3 s.f. (4mks)