KENYA HIGH SCHOOL MOCK 2020 MATHEMATICS PAPER 2

SECTION 1:

Answer all the questions in this section

1. Make n the subject of the formula

$$E = \sqrt{\frac{x(n-x)}{n-1}}$$ (3 marks)

2. Expand $(1 + {}^{1}/_{x})^{9}$ up to the term in x^3. Use your expansion to estimate $(1.05)^3$.Correct to 3 decimal places (4 marks)

3. Determine the centre and radius of a circle whose equation is
$x(x+6) + y^2 - 7 = 6y$ (3 marks)

4. Solve for X (3 marks)
$6^{2x+1} = 2^{2x+1}$

5. By using trapezoidal rule and 3 trapezia, find the area bounded by the curve $y = 3x^2 + 4$, the x-axis and lines $x = 2$ and $x = 5$ (3 marks)

6. Three points are such that A (4,8) B (8,7) and C (16,5) Show that the points are collinear
(3 marks)

7. Find the interqualtile range of the following data (3 marks)
2,5,3,2,2,4,7,3,3,6,3,6

8. The difference between the compound interest and simple interest of the same amount of money invested at the same rate of 10% is Ksh. 2400 over a period of 2 years, calculate the amount invested (3 marks)

9. Find the value of X if (3 marks)

$$\text{Det}\begin{Bmatrix} 1 & 3 \\ -2 & x \end{Bmatrix} = \det\begin{Bmatrix} x2 & 4 \\ 1 & 3 \end{Bmatrix}$$

10. Given that $\text{Log}_{10} 2 = a$ find in terms of a
$\text{Log}_{10}32 + \text{Log}_{10}5 - \text{Log}_{10}\{^{1}/_{8}\}$ (3mks)

11. If $\cos\theta^0 = {}^2/_3$ and $270^0 \leq \theta \leq 360^0$ find the value of $\tan\theta$ and $\sin\theta$ without using table
(3 marks)

12. Given the series $43 + 74 + 105 + \ldots\ldots\ldots + 415$ find
(i) The number of terms in the series (2 marks)

(ii) The sum of the series (2 marks)

13. Given that $\frac{5}{2\sqrt{2} - \sqrt{3}} = a\sqrt{2} + b\sqrt{3}$ where a and b are constants. Find the values of a and b
(3 marks)

14. If x = 33.5 and y = 33.1 both correct to one decimal place, calculate the percentage error in x- y
(3 marks)

15. Two places P and Q are on parallel of latitude 26^0N.The points lie on 10^0N and 30^0E longitude respectively. Find the distance between P and Q along parallel of latitude (take R = 6370km and $\pi = {}^{22}/_{7}$)

(i) In KM
(2 marks)

(ii) In nm
(2 marks)

16. A biased coin is weighted so that tails is twice as likely to appear as heads, Find the probability that two heads appear if the coin is tossed two times (2 marks)

SECTION II:
Answer five questions only

17. Income tax was charged at the rates shown below

Taxable in 4 £	Rate in Sh. / £
1 - 2000	2
2021- 4040	3
4041-6060	5
6061-8080	7
8081-10100	10
Over 10100	12

Mr. Kairu earns a basic salary of Sh. 24200 per month. He is housed by his employer and therefore 15% of his monthly salary is added to his basic salary as taxable income. He is entitled to a personal relief of Sh. 1160 Per month. Calculate how much income tax he pays per month
(10 marks)

18. Three quantities P,Q and R are such that P varies directly as the square of Q and inversely as the square root of R

(i) Given that Q increases by 5 % and R decreases by 36% Find the % change in P (5 marks)

(ii) If p =6 when Q= 12 and R =25 find

(a) The equation connecting P,Q and R (2 marks)

(b) The value of P when Q = 15 and R =8

19. The frequency distribution below shows the diameter of bolts made by rainbow building company

Diameter (cm)	F
18	2
20	3
22	3
24	4
26	6
28	7
30	9
32	10
34	5
36	1

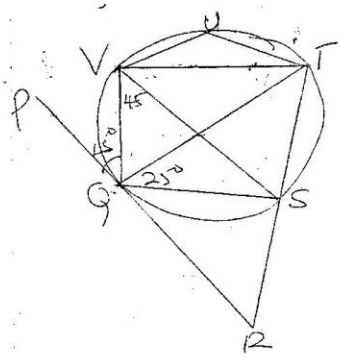
(i) State the modal frequency (1 mark)

(ii) Calculate the mean using a working mean of 28cm (3 marks)

(iii) The standard deviation using a working mean of 28cm. Give your answer to 4 significant figure (4 marks)

(iv) It was later found that the machine measuring the diameter had a mechanical fault. As a result, the measurement given was 3.2cm more than the actual diameter. Find the actual mean and standard deviation (2 marks)

20. In the figure below PQR is a tangent to the circle at Q. Angle PQV = 45^0 angle QVS = 45^0 and angles QT = 25^0



Find the following angles giving reasons for each answer

(a) SVT (2 marks)

(b) SQR (2 marks)

(c) VUT (2 marks)

(d) QRS (2 marks)

(e) VUT (2 marks)

21. A bag contains X red balls and Y yellow balls. Four times the number of red balls is equal to nine times the number of yellow balls and twice the total number of balls exceeds the number of yellow balls by 44

(a) How many balls of each colour does the bag contain (4 marks)

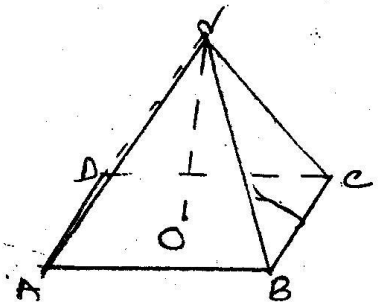
(b) If the balls are drawn out of the bag at random one at a time and without replacement, what is the probability of

(i) The first two balls drawn being red (2 marks)

(ii) One being red and the other being Yellow (2 marks)

(iii) The first two balls being of the same colour (2 marks)

22. The figure below shows a right pyramid ABCD on a rectangular base ABCD. The base is of length 10cm and width 8 cm. Each of the slant edge is length 20cm



Calculate

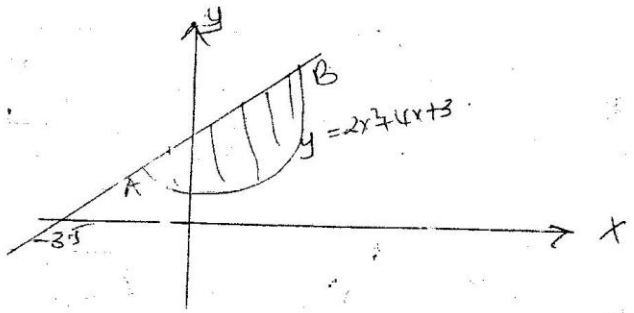
(a) The vertical height or of the pyramid given that O is the centre of the base (3 marks)

(b) The angle between VB and the base (2 marks)

(c) The angle between planes AB and the base ABCD (3 marks)

(d) The volume of the pyramid (2 marks)

23. The figure below shows curve of $y=2x^2+4x+3$ and the straight line intersecting the curves at A and B



If the X –intercepts is -3.5 and y intercept is 7 .Find

(a) The equation of the straight line (2 marks)

(b) The coordinates of A and B (4 marks)

(c) The area of the shaded region (4 marks)

24. The co-ordinates of the vertices of rectangle PQRS are (P1,1) Q(6,1) R(6,4) and S(1,4)

(a)(i) Find the coordinates of the vertices of the images P1Q1R1S1 under the transformation defined

By the matrix $\begin{Bmatrix} 1 & -2 \\ 0 & 1 \end{Bmatrix}$ (2 marks)

(ii) Draw the object and its image on the grid provided (2 marks)

(iii) On the same grid draw the image $P^{11}Q^{11}R^{11}S^{11}$ under the transformation given by

$\begin{Bmatrix} 0 & 1 \\ -1 & 0 \end{Bmatrix}$ (4 marks)

b) Find a single matrix which maps $P^{11}Q^{11}R^{11}S^{11}$ onto PQRS (2 marks)