UMMUL-QURA HIGH SCHOOL

Arowona Bus-Stop, Amuloko, Ibadan, Oyo State

Second Term Examination, 2020/2021 Academic Session.

Subject: Mathematics ***Class:*** SSS 2 ***Time:*** 4 hours

Instructions: Answer ***all*** questions in Section A and ***ten*** in Section B.

PAPER I & II [Objective and Theory] Time: $1\frac{1}{2}$ hour

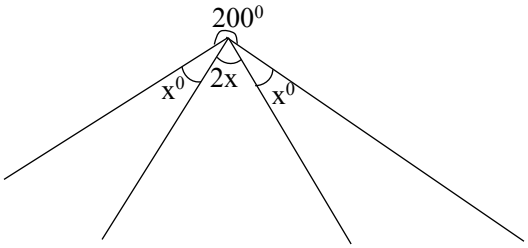
SECTION A: OBJECTIVE (50 marks).

1. Simplify $(0.2)^2 \times (1.1)^2$, leaving the answer in standard form.
   A. 4.84×10^2
   B. 4.84×10^{-1}
   C. 4.84×10^{-2}
   D. 4.84×10^{-4}
2. If $542_{six} - 411_{six} = y_{three}$, find the value of y.
   A. 121
   B. 200
   C. 1002
   D. 2001
3. Simplify: $(5\frac{1}{3} - 2\frac{7}{8}) + (2\frac{1}{3} + \frac{1}{6})$
   A. $2\frac{11}{24}$.
   B. $4\frac{23}{24}$.
   C. $\frac{59}{60}$.
   D. $\frac{6}{15}$.
4. Fi d the truth set of $x^2 + 5x = 14$.
   A. {-2, -7}
   B. {-2, 7}
   C. {2, -7}
   D. {2, 7}
5. If $\frac{1}{5}(25^n) = 25$, find n.
   A. 3
   B. 2
   C. $\frac{3}{2}$.
   D. $\frac{2}{3}$.
6. completely $b(a + b) + (a^2 - b^2)$.
   A. $(a + b)^2$
   B. $(a + b)(a + 2b)$
   C. $a(a + b)$
   D. $b(a + b)$
7. Given that $(y - 4)$ varies inversely as x and y = 6 when $x = \frac{1}{4}$, find x when y = 2.
   A. 4
   B. $\frac{1}{4}$.
   C. $-\frac{1}{4}$.
   D. - 4.
8. Consider the statements: p: "it is hot"; q: "it is raining". Which of these statements is the symbolic form of it is hot and raining?
   A. $p \wedge q$.
   B. $p \vee q$.
   C. $p \Rightarrow q$.
   D. $p \Leftrightarrow q$.

9. Given that p = -2, q = 5 and r = -3, evaluate: $\frac{10\ pq-6qr}{3pr-2q}$

   A. $11\frac{1}{4}$.
   B. $1\frac{1}{4}$.
   C. $-1\frac{1}{4}$.
   D. $-11\frac{1}{4}$.

10. Find the value of x in the diagram.

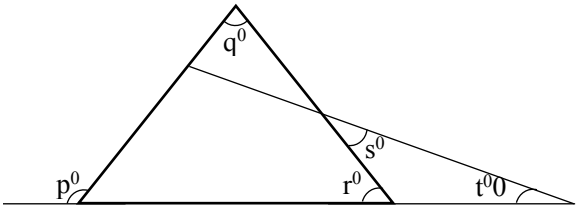


   A. 50^0
   B. 40^0
   C. 20^0
   D. 15^0

11. Simplify: $\frac{3x^2-6x+3}{x^2-x}$, x ≠ 0, 1.

   A. $\frac{3(1-x)}{x}$.
   B. $\frac{3(x-1)}{x}$.
   C. $\frac{3(1+x)}{x}$.
   D. $\frac{3+x}{x}$.

12. Using the diagram, find t in terms of p, q and s.



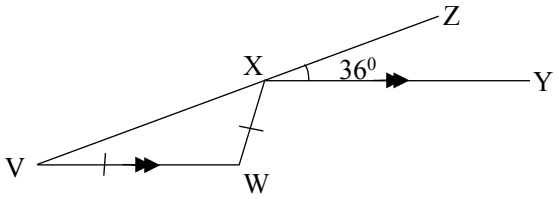
   A. t = p + q + s
   B. t = p + q - s
   C. t = p - q + s
   D. t = p - q – s

13. Simplify: $\tan 30^0 - 2\sin 60^0$.

   A. $-\frac{2\sqrt{3}}{3}$.
   B. $-\frac{\sqrt{3}}{3}$.
   C. $\frac{\sqrt{3}}{3}$.
   D. $\frac{2\sqrt{3}}{3}$.

14. In a group of 150 tourists, 70% speak English and the rest speak French only. If 20% of those who speak English also speak French, how many of the tourists speak French?

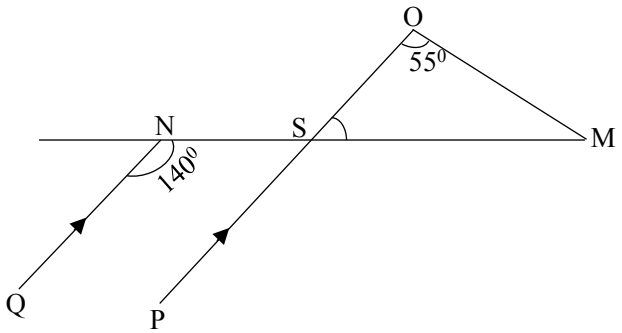
   A. 45
   B. 54
   C. 66
   D. 75



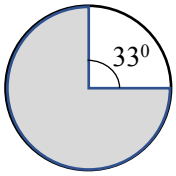
15. In the diagram, X is a point t on VZ, XY//VW, /VW/ = /WX/ and <YXZ =36. Find YXW.

   A. 144^0
   B. 118^0
   C. 108^0
   D. 36^0

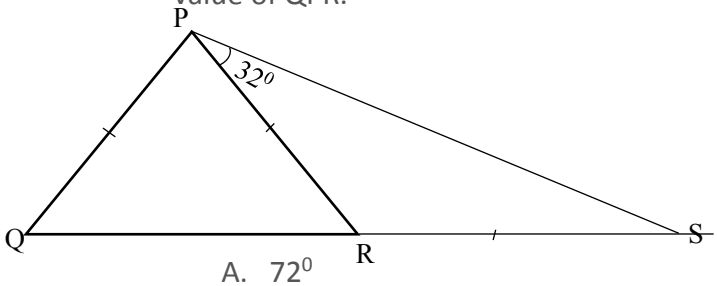
16. The minute hand of a clock is 2.5 cm long. Calculate, correct to two decimal places, the distance covered by the tip of the minute hand in a quarter of an hour. [Take ∏ = 3.142]
    A. 5.63 cm
    B. 5.32
    C. 4.84
    D. 3.93
17. Three of the exterior angles of a polygon are 30, 40 and 60. If each of the remaining angles is 46, what is the name of the polygon?
    A. Hexagon
    B. Octagon
    C. Nonagon
    D. Decagon
18. Find the median of 2, 1, 0, 3, 1, 1, 4, 0, 1 and 2.
    A. 0.0
    B. 0.5
    C. 1.0
    D. 1.5
19. The second day of the week is a market day in Time p on I village. How many market days are there in a period of 78 days starting from the first day of the week?
    A. 10
    B. 11
    C. 12
    D. 13
20. The curved surface area of a cylinder is 462 cm^2. If the radius of its base is 7 cm, calculate the height.
    [Take ∏ = $\frac{22}{7}$]
    A. 10.5 cm
    B. 6.0 cm
    C. 3.5 cm
    D. 3.0 cm
21. Make V the subject of the relation r = $\frac{VR}{E-V}$.
    A. V = $\frac{Er}{R+r}$.
    B. V = $\frac{R+r}{E}$.
    C. V = $\frac{rE-rV}{R}$.
    D. V = $\frac{Er}{R-V}$.
22. The vertical angle of a cone is 80. If the circumstance of its base is 88 cm, calculate its height. [Take ∏ = $\frac{22}{7}$]
    A. 11.7 cm
    B. 11.8 cm
    C. 16.7 cm
    D. 16.8 cm
23. P = {x:x ≤ 5} and Q = {x: -7 < x < 14} are subsets of M = {x:x € ***Z***}. Find P Q.
    A. {x: x ≥ 5}
    B. {x: x ≤ 5}
    C. {x: -6 ≤ x ≤ 5}
    D. {x: -6 ≤ x ≤ 13}



24. In the diagram, OP//NQ, <MOP =55^0, SNQ =140^0. Find <OMS.
    A. 42^0
    B. 55^0
    C. 85^0
    D. 130^0



25. The diagram above is a circle of radius 7 cm. Find, correct to the nearest whole number, the area of the shaded region. [Take $\prod = \frac{22}{7}$]
    A. 141 cm^2
    B. 140 cm^2
    C. 128 cm^2
    D. 14 cm^2
26. If 5x – 3y =21 and 4x + 5y = 2, find the value of y.
    A. -3
    B. -2
    C. 2
    D. 3
27. The volume of a cone with base radius 12 cm is 264 cm^2. Calculate the height of the cone. [Take $\prod = \frac{22}{7}$]
    A. 15.50 cm
    B. 10.50 cm
    C. 1.75 cm
    D. 1.20 cm
28. A vertical pole is held in position by a wire 5.5 cm long. If the wire slopes at 62^0 to the horizontal, find the distance from the foot of the pole to the point where the wire is fixed to the ground.
    A. 2.58 m
    B. 4.86 m
    C. 6.23 m
    D. 11.72 m
29. Each interior angle of a polygon is 165^0. How many sides has the polygon?
    A. 72^0
    B. 36^0
    C. 30^0
    D. 24^0
30. In the diagram, |PQ| = |PR| = |RS| and <SPR =32^0. Find the value of QPR.



    A. 72^0
    B. 64^0
    C. 52^0
    D. 32^0
31. If 5m – 2n = 3(m + n), find $\frac{m}{n}$, where n ≠ 0.
    A. $\frac{2}{5}$.
    B. $\frac{5}{8}$.
    C. $\frac{3}{2}$.

D. $\frac{5}{2}$.

32. Solve $2x^2 + 7x - 15 = 0$.
    A. $x = \frac{1}{2}, -5$.
    B. $x = -\frac{3}{2}, \frac{5}{2}$.
    C. $x = \frac{3}{2}, -5$.
    D. $x = -3, -5$.
33. For what values of x is
    $2 - \frac{x-1}{3} > \frac{x+2}{4}$
    A. $x > 3\frac{1}{7}$
    B. $x < 3\frac{1}{7}$
    C. $x > -3\frac{1}{7}$
    D. $x < -3\frac{1}{7}$
34. Express 10000800 in standard form.
    A. 1.00008×10^{-2}
    B. 1.00008×10^{-7}
    C. 1.00008×10^{7}
    D. 1.00008×10^{-6}
35. Express 0.0040752 to three significant figures.
    A. 0.00475
    B. 0.0041
    C. 0.00408
    D. 0.004075
36. Evaluate $11011_2 + 11110_2$.
    A. 111010_2
    B. 111001_2
    C. 110001_2
    D. 101001_2
37. Simplify: $\frac{\sqrt{32x^2y^{-2}}}{\sqrt{2x^2y^{-4}}}$
    A. $4y$
    B. $\frac{4x}{y}$.
    C. $\frac{8y}{x}$.
    D. $\frac{6y}{x}$.
38. The 11th and 13th terms of an A.P. are 35 and 41 respectively its common difference is -----?
    A. 6
    B. 3
    C. 38
    D. 32
39. Let u = {1, 2, 3, 4, ……, 10}, A = {odd numbers up to 9} and B = {number less than 7}.
    Find $A \cap B$
    A. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
    B. {1, 2, 3, 4, 5, 6, 7, 8, 9}
    C. {1, 3, 5}
    D. {1, 2, 3, 4, 5, 6}
40. Let u = {0, 1, 2, 3, 4, 5, 6, 7}, Y = {0, 1, 2, 3} and Z = {5, 6, 7}. Which of the following is correct?
    A. $Y^c = Z$
    B. $Y^c \cup Z^c = \mu$
    C. $n(Y \cap Z) = 1$
    D. $n(Y^c \cap Z^c) = 9$
41. If 41 + 29 (mod 8).
    A. 4
    B. 5
    C. 6
    D. 8
42. The sum of an arithmetic progression (A. P.) is 561. If the first and last terms are 2

and 100 respectively, find the number of terms.

A. 11
B. 13
C. 10
D. 6

43. Find the principal which amounts to ₦ 72, 800.00 at simple interest in 4 years at 3% per annum.

A. ₦ 68, 736
B. ₦ 67,800
C. ₦ 65,000
D. ₦ 8,736

44. Solve the simultaneous equations: $3x^2 – 5y = 5$, $x + 10y = 4$.

A. $x = \sqrt{2}, y = \frac{1}{5}$
B. $x = \sqrt{2}, y = 2$
C. $x = \sqrt{2}, y = -2$
D. $x = \sqrt{2}, y = -\frac{1}{5}$

45. For what value of k is the expression $4x^2 – 8x + k$ a perfect square?

A. 4
B. 32
C. 16
D. 8

46. Given the statements: x : “she is serious”, y: “she is brilliant’. Which of the following logical connectives describes the statement “She is neither serious nor brilliant “?

A. $\sim x \wedge y$
B. $x \Rightarrow y$
C. $x \wedge y$
D. $x \vee y$

47. Solve the equation $x^2 – 2x – 3 = 0$.

A. x = 1 or 3
B. x = -3 or 1
C. x = -3 or -1
D. x = -1 or 3

48. A man 25 m tall, observes that the angle of elevation of the top of a pole 20 m away is 25^0. Find the height of the pole.

A. 54.3 m
B. 44.3 m
C. 34.3 m
D. 15.3 m

49. Let p: Umar is brilliant, q: Umar is hardworking. Which of the symbolic forms represents the statement “Umar is brilliant then he is hardworking”?

A. $p \Rightarrow q$
B. $p \wedge q$
C. $p \vee q$
D. $q \Rightarrow p$

50. Factorize y2 – 6y – 7.

A. (y + 1) (y + 7)
B. (y + 1) (y - 7)
C. (y - 1) (y + 7)
D. (y - 1) (y - 7)

SECTION B: THEORY (100 marks).

PART A (40 marks) Time: $2\frac{1}{2}$ hour

Instructions: Answer ***all*** questions in this ***PART***.

1. (a) If A = {multiple of 2}, B = {multiple of 3} and C = {factors of 6} are subsets of u = {x: 1 ≤ x ≤ 10}, find A' ∩ B' ∩ C'.

(b) Tickets for movie perimeter come ***$*** 18.50 each while the bulk purchase price for 5 tickets is ***$*** 80.00. If 4 gentlemen decide to get a father person to join them so that they can share the bulk purchase price equally, how much would each person save?

2. (a) Given that P = $\left(\frac{rk}{Q} - ms\right)^{2/3}$
   i. Make Q the subject of the relation.
   ii. Find, correct to ***two*** decimal places, the value of Q when P = 3, m= 15, s = 0.2, k = 4 and x = 10.

   (b) Given that $\frac{x+2}{5}$ = x – 2y, find x, y.

3. (a) Use table of value to evaluate the expression below;

   (b) Given that tan x = 3, 0 ≤ x ≤ 90, evaluate

4. (a) The total surface area of a cone of slant height ***l cm*** and base radius ***r cm*** is 224 ***cm***. If ***r : l*** = 2:5 find;
   a. correct to ***one*** decimal place, the value of r,
   b. correct to the nearest whole number, and the volume of the cone. [Take $\pi = \frac{22}{7}$]
   c. If $321_n = 232_7$ find the value of n.

5. (a) A cone has a base radius of 6 ***cm*** and height of 9 ***cm***. Calculate its;
   a. volume
   b. curved surface area
   c. total surface area

(b)The four angles of a heptagon are equal and each of the other three is 20 greater than each of the first four. Find the angles of the heptagon.

PART B (60 marks)

Instructions: Answer ***five*** questions in this ***PART***.

6. (a) Copy and complete the table of value for the relationship = 3 sin 2x.

X	0	15	30	45	60	75	99	105	120	135	150
Y	0.0					1.5					-2.6

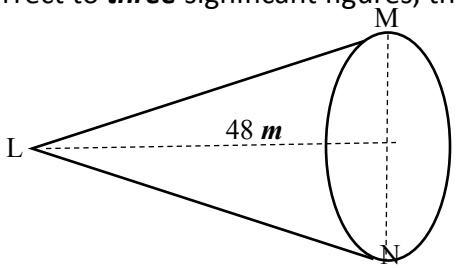
(b) Using a scale of 2 ***cm*** to 15^0 on the x-axis and 2 ***cm*** to 1 unit on the y-axis, and draw the graph of y = 3 sin 2x for $0 \leq x \leq 150$.

(c) Use the graph to find the truth set of;

i. 3 sin 2x + 2 = 0

ii. 3 sin 2x = 0.25

7. (a) The diagram shows a wooden structure in the form of a cone mounted on a hemispherical base. The vertical height of the cone is 48 m and the base radius is 14 ***m***. Calculate, correct to ***three*** significant figures, the surface area of the structure.



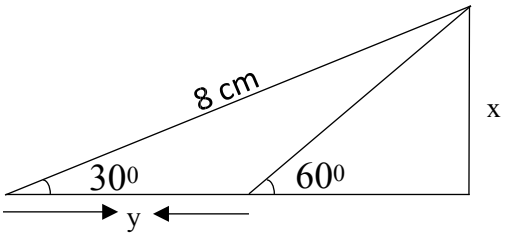
[Take $\pi = \frac{22}{7}$].

(b) Five years ago, Musah was twice as old as Sesay. If the sum of their ages is 100, find Sesay's present age.

8. (a) Given that sin x = 0.6, evaluate 2 cosx + 3 sinx.

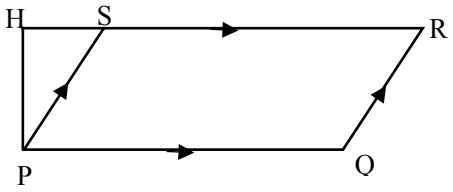
(b) Prove that ~ (p ˅ q ˅r) = ~p ^ ~ q ^ ~ r.

(c)Find the value of x in the diagram blow;



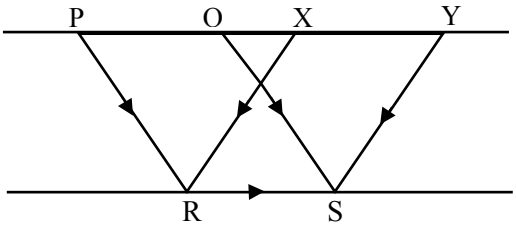
(d) If sin 3θ = cos (θ – 60), find θ.

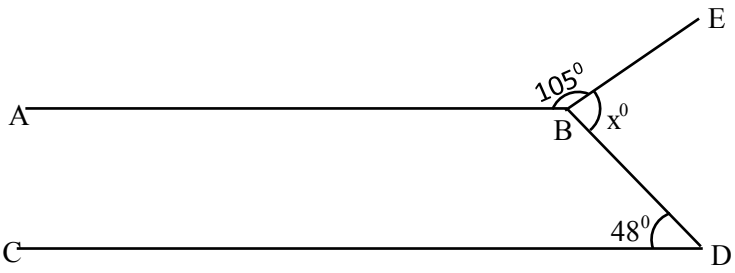
9. (a) The diagram below shows parallelogram PQRS. HSR is a straight line and HṖQ = 90^0. If |HQ| = 10 ***cm*** and |PQ| = 6 ***cm***. What is the area of the parallelogram?



(b) Using a ruler and a pair of compasses only. Construct the following:

i. a triangle PRQ, such that PR = 6cm, |QR| = 8cm and $Q\hat{R}P = 135^0$.
ii. the locust l_1 of equidistant from P and Q.
iii. the locust l_2 of points equidistant from |PQ| and |QR|.
iv. the locust l_3 of points at which QP sustains and angle of 90^0.
v. locate the point of intersection X of l_1 and l_2.
vi. locate the point of intersection Y of l_2 and l_3. Measure |XY|.





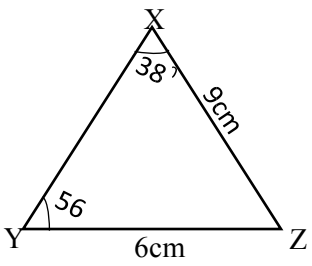
10. (a) In the diagram above PQRS and XYRS are parallelograms. If |PY| = 18 ***cm*** and |QX| = 4 ***cm***, find |RS|.

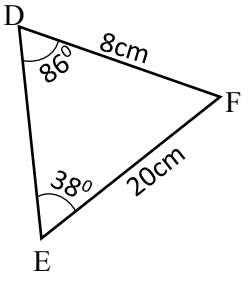
(b) In the diagram above, |AB| // |CD|, $A\dot{B}C = 105^0$, $C\dot{D}B = 48^0$ and $E\dot{B}D = x^0$. Find x.

(c) PQRST is a regular polygon. The sides |TS| and |QR| are produced to meet at X. Calculate the angles of triangle RXS.

11. (a) The four angles of a heptagon are equal and each of the other three is 20^0 greater than each of the first four. Find the angels.

(b) Triangle XYZ and DEF have their dimensions as shown below;





i. Show that triangles XYZ and DEF are similar.

ii. Find |XY| and |DE|.

(c) Show that the statement [~ p ^ (p ˅ q)] => q is a tautology.

12. (a) The 11th and 13th terms of an A.P. are 35 and 41 respectively. Find;

i. first term and the common difference.

ii. the seventh term.

(b) Solve: $2\left(\frac{1}{8}\right)^{x} = 32^{x-1}$

(c) If $log_{10}{}^{(3x-1)} - log_{10}{}^{2} = 3$. Find the value of x.