UMMUL-QURA HIGH SCHOOL

Arowona Bus-Stop, Akanran Road, Oyo State, Ibadan.

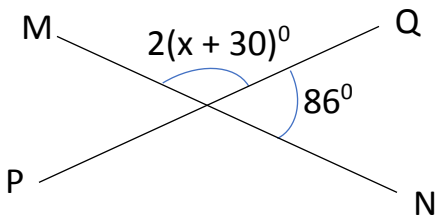
First-Term Examination, 2020/2021 Session.

SUBJECT: Mathematics. CLASS: SSS 2

PART I: ***OBJECTIVES*** ***Time:*** $1\frac{3}{4}$ hours.

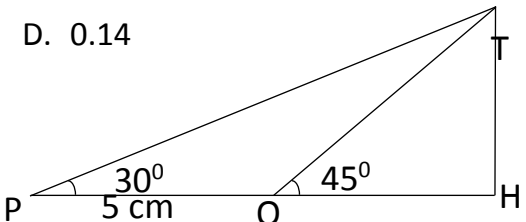
Instructions: Answer ***all*** questions in this part.

1. Find $(101_2)^2$, expressing the answer in base 2.
   A. 10101.
   B. 11001.
   C. 10010.
   D. 11101.
2. If $8^{x/2} = (2^{3/8})\,(4^{3/4})$, find x.
   A. $\frac{3}{8}$.
   B. $\frac{3}{4}$.
   C. $\frac{4}{5}$.
   D. $\frac{5}{4}$
3. Evaluate $\frac{xy^2 - x^2y}{x^2 - xy}$ when x = -2 and y = 3.
   A. -3.
   B. 3.
   C. $\frac{-3}{2}$
   D. $\frac{3}{5}$



4. In the diagram above, PQ and MN are straight lines. Find the value of x.
   A. 13^0.
   B. 17^0
   C. 28^0.
   D. 30^0.
5. Evaluate $\frac{1}{3} + [\frac{5}{7}(\frac{9}{10} - 1 + \frac{1}{3})]$
   A. $\frac{67}{84}$.
   B. $\frac{13}{84}$.
   C. $\frac{39}{28}$.
   D. $\frac{84}{13}$.
6. Evaluate $\frac{0.36 \text{ X } 5.4 \text{ X } 0.63}{4.\ 2 \text{ X } 9.0 \text{ X } 2.4}$

   Correct to 2 significant figures.
   A. 0.013
   B. 0.014
   C. 0.13
   D. 0.14



7. From the figure above, calculate |TH| in centimeter.
   A. $\frac{5}{\sqrt{3}+1}$
   B. $\frac{5}{\sqrt{3}-1}$
   C. $\frac{5}{\sqrt{3}}$

D. $\frac{\sqrt{3}}{5}$

8. Given that p varies as the square of q and q varies as inversely as the square root of r. how does p varies with r?
   A. p varies as the square of r.
   B. p varies as the root of r.
   C. p varies as the inverse of r.
   D. p varies as inverse of root r.
9. If the universal set U = {x:x is a natural number and $1 \leq x \leq 9$}. P = {x: $1 \leq x \leq 4$} and Q = {2, 4, 6, 8}. Find (P ∪ Q).
   A. {1, 2, 3, 4, 5, 6, 7, 8, 9}
   B. {1, 2, 3, 4, 6, 8}
   C. {1, 5, 6, 7}
   D. {5, 7, 9}
10. Find the range of values that satisfy the inequality $x^2 - x \leq 6$.
   A. $x \leq 3$
   B. $x \leq -2$
   C. $-2 \leq x \leq 3$
   D. $3 \leq x \leq -2$
11. Make f the subject of the formula;

$$t = \frac{v}{\frac{1}{f} + \frac{1}{g}}$$

A. $\frac{gv - t^2}{gt^2}$ B. $\frac{gt^2}{gv - t^2}$

C. $\frac{v}{1/t^2 - \frac{1}{e}}$ D. $\frac{gv}{t^2 - g}$

12. In a youth club of 94 members. 60 like modern music and 50 like traditional music. The number of the members who like both traditional and modern music is three times those who do not like any type of music. How many members like only one type of music?
   A. 8
   B. 24
   C. 62
   D. 86
13. Evaluate; $\frac{\tan 45^0 + \cos 60^0}{\sin 150^0}$
   A. -3
   B. 3
   C. -(√2 + 1)
   D. √2 + 1
14. The angle of elevation of the top of a tower from a point on the horizontal ground 80m from the foot of the tower is 60^0. Find the height of the tower.
   A. 80√3m
   B. 80m
   C. $80\frac{\sqrt{3}}{3}$m
   D. 40√3m
15. A trader bought goat for ₦400 each. He sold them for ₦180,000 at a loss of 25%. How many goats did he bought?
   A. 60
   B. 50
   C. 45
   D. 36
16. x varies directly as the product of u and inversely as their sum. If x

= 3 when u = 3 and y = 1. What is the value of x when u = y = 3?

A. 3
B. 4
C. 6
D. 9

17. A trapezium has two parallel sides of length 5cm and 9cm. If the area is 21cm^2. Find the distance between the parallel sides.

A. 3cm
B. 4cm
C. 6cm
D. 7cm

18. If x is the addition of prime numbers between 1 and 6 and y is the HCF of 6, 9, 15. Find the product of x and y.

A. 27
B. 30
C. 33
D. 90

19. Three boys shared some oranges. The first gets $\frac{1}{3}$ of the oranges, the second gets $\frac{2}{3}$ of the remainder. If the third boy gets the remaining 12 oranges, how many oranges ware shared among them?

A. 60
B. 54
C. 48
D. 42

20. If $2^{(x + y)} = 32$ and $3^{(3y - x)} = 27$. Solve the system of the equation.

A. (3, 2)
B. (-3, 2)
C. (3, -2)
D. (-3, -2)

21. Given a rectangular hexagon, calculate each interior angle of the hexagon.

A. 60^0
B. 30^0
C. 20^0
D. 45^0

22. Solve the following equations $4x – 3 = 3x + y = 2y + 5x – 12$. (x, y) is;

A. 5, 2
B. 2, 5
C. -2, -5
D. 5, -2

23. Find the quadratic equation which has the following roots; $-\frac{3}{4}$ and $\frac{4}{3}$.

A. $12m^2 + 7m – 12 = 0$
B. $2m^2 - 9m – 12 = 0$
C. $12m^2 - 7m – 12 = 0$
D. $12m^2 + 9m – 12 = 0$

24. Given that (2x - 1) (x + 5) = - mx - 5. What is the value of m?

A. 11
B. 3
C. -9
D. -10

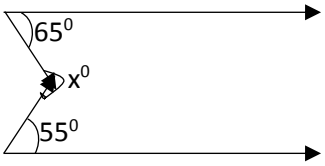
25. Correct each of these numbers; 59.81798 and 0.0746829 to three significant figures and multiply them and leave your answer to three significant figures.

A. 4.46
B. 4.48
C. 4.47
D. 4.49

26. What is the size of an exterior angle of a regular pentagon?
A. 36^0
B. 60^0
C. 72^0
D. 120^0

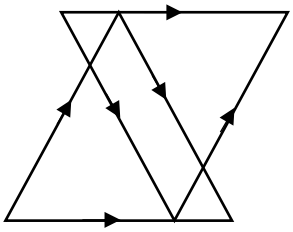
27. The number 25 when converted from the tens and units base to the binary base (base two) in one of the following;
A. 10011
B. 111011
C. 111000
D. 11001

28. The value of x in the diagram below is;



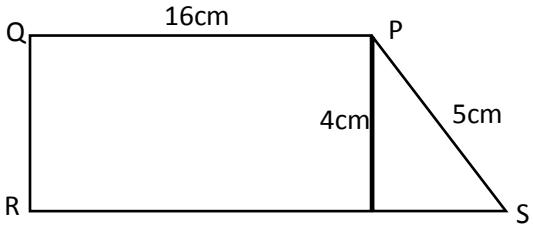
A. 250
B. 260
C. 240
D. 120

29. How many parallelograms are there in figure below?



A. 2
B. 3
C. 5
D. 4

30. Calculate the perimeter of the trapezium PQRS.



A. 33cm
B. 44cm
C. 54cm
D. 34cm

31. The length of a rectangle is three times its width. If the perimeter is 72cm, calculate the width of the rectangle.
A. 7cm
B. 8cm
C. 9cm
D. 10cm

32. Which of the following is a parallelogram?
A. Kite
B. Rhombus
C. Triangle
D. Hexagon

33. If $\sin \theta = \cos 40^0$; find the value of θ.
A. 40^0
B. 50^0
C. 60^0
D. 70^0

34. If sin θ = cos (θ + 10); find θ.
    A. 40^0
    B. 50^0
    C. 60^0
    D. 70^0
35. A rectangle has sides 8cm and 5cm with an angle of 90^0 between them. Calculate the smallest angle of the triangle.
    A. 30^0
    B. 35^0
    C. 32^0
    D. 40^0
36. An isosceles triangle is such that the vertical angle is four times the size of a base angle. What is the size of the base angle?
    A. 20^0
    B. 30^0
    C. 40^0
    D. 35^0
37. The sides of a rectangular floor are xm and (x + 7)m. The diagonal is (x + 8). Calculate the diagonal in meters.
    A. 13m
    B. 12√2m
    C. 12m
    D. 16m

38. Express 132_{six} in base five.

    A. 211
    B. 112
    C. 210
    D. 201

39. If (x + 5) varies inversely as y and x = 2, when y = 9, what is the value of x when y = 7?

    A. -4
    B. $-\frac{1}{4}$
    C. 4
    D. 14

40. If tan θ = $\frac{4011}{1000}$

    A. 22
    B. 76
    C. 66
    D. 67

41. If -3 is one of the roots of the $x^2 – kx -12 = 0$, quadratic equation, what is the value of k?

    A. 3
    B. 4
    C. 1
    D. 2

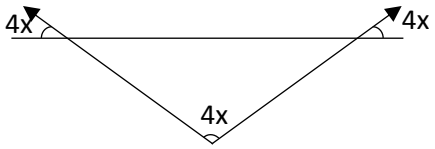
42. Solve the equation (3a + 6) (4a - 12) = 0.

    A. -2, 3
    B. -2, 0
    C. 2, -3
    D. 2, 3

43. Each exterior angle of a polygon is 30^0. What is sum of interior angles?

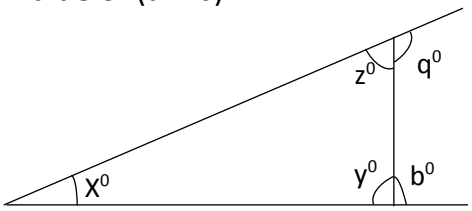
    A. 540^0
    B. 720^0
    C. 1080^0
    D. 1800^0

44. Calculate the value of 2x in the diagram below.



A. 18^0
B. 24^0
C. 60^0
D. 36^0

45. From the diagram below, find the value of (a + b).



A. 2x + 2y + 2z
B. 2x + y + z
C. x + y + 2z
D. x + y + z

Let p: I study hard.

q: I pass physics.

r: I am happy.

46. Translate p (q r) into statement. I am happy but I pass physics.

A. If I study hard, then AI pass physics or I am happy.
B. I do not study hard, then I pass physics and I am happy.
C. If I study hard, then AI pass physics and I am happy.

Let p: I like bread with egg.

q: I like ginger in tea.

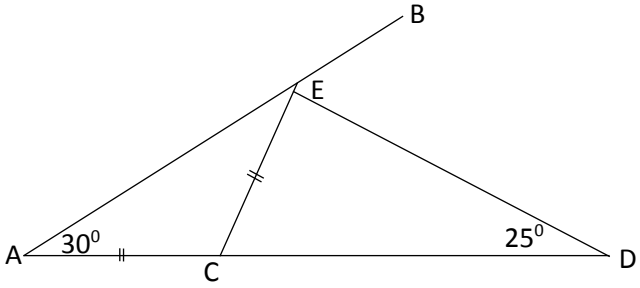
47. Translate "I like ginger in tea but not bread with egg. " into symbol

A. q ᵛ p
B. q ^ p
C. q ᵛ ~ p
D. q ^ ~ p

48. Given that (12x - 1) (x + 5) = mx - 5. Find the value of m.

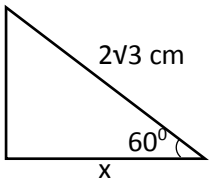
A. 11
B. 5
C. -5
D. -9

49. In the figure below, QBC is an isosceles triangle. Calculate BED.



A. 105^0
B. 100^0
C. 95^0
D. 85^0

50. Find the value of x in the figure below.



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

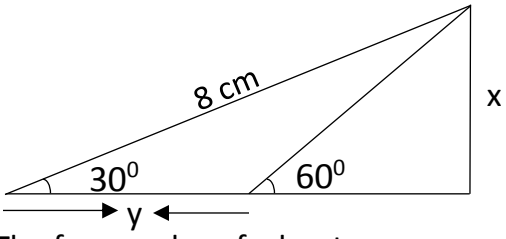
PART II: ***THEORY*** ***Time:*** 2 hours

Instructions: Answer any ***four*** questions in this part.

1a. Given that sin x = 0.6, evaluate 2cosx + 3sinx.

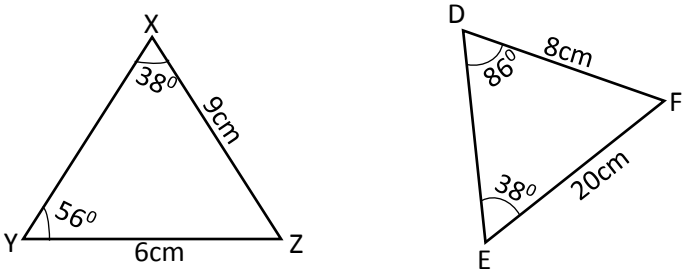
1b. i. Prove that ~ (p ˅ q ˅r) = ~p ^ ~ q ^ ~ r. ii. If sin 3θ = cos (θ - 60). Find θ.

1c. Find the value of x in the diagram blow;



2a. 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.

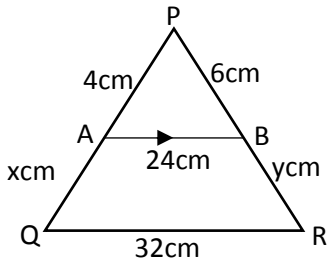
2b. Triangle XYZ and DEF have their dimensions as shown below;



i. Show that triangles XYZ and DEF are similar.

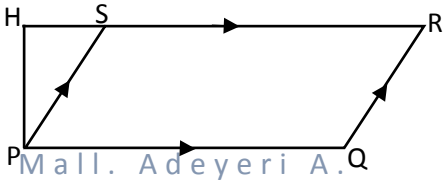
ii. Find |XY| and |DE|.

2c. In the diagram below find the values of x and y.



2c. Show that the statement [~ p ^ (p ˅ q)] => q is a tautology.

3a. The diagram below shows parallelogram PQRS. HSR is a straight line and HṖQ = 90^0. If |HQ| = 10cm and |PQ| = 6cm. What is the area of the parallelogram?



3b. 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|.

4a. Given that $\tan x = \sqrt{3}$, $0^0 \leq x \leq 90^0$. Evaluate:

$$\frac{(\cos x)^2 - \sin x}{(\sin x)2 + \cos x}$$

4b. Copy and complete the table of values for the relation $y = 3\sin 2x$.

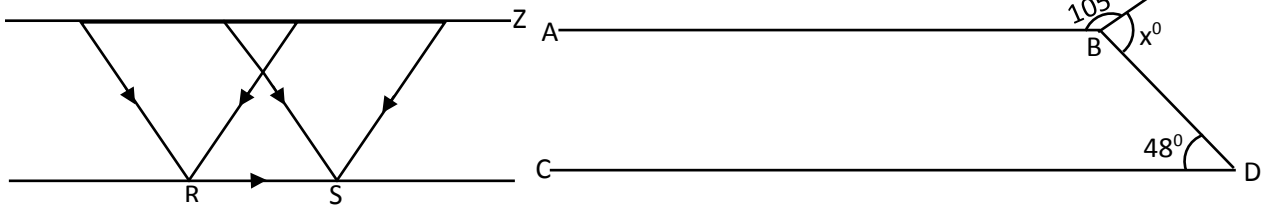
X	0^0	15^0	30^0	45^0	60^0	75^0	90^0	105^0	120^0	135^0	150^0
Y	0.0					1.5					-2.6

4ci. Using a scale of 2cm to 15^0 on the x-axis and 2cm to 1 unit on the y axis. Draw the graph of $y = 0^0 \leq x \leq 150^0$.

4cii. Use the graph to find the truth set of;

a) $3\sin 2x + 2 = 0$.
b) $\frac{3}{2}\sin 2x = 0.25$.

5a. In the diagram below PQRS and XYRS are parallelograms. If PY = 18cm and |QX| = 4cm. Find |RS|.



5b. 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.

5c. PQRST is a regular polygon. The sides |GS| and |QR| are produced to meet at x. Calculate the angle of triangle $R\ddot{X}S$.