UMMUL-QURAHIGH SCHOOL

Arowona Bus-Stop, Amuloko, Ibadan, Oyo State
SSS 3 MOCK Examination, 2020/2021 Academic Session.

Subject: Mathematics   **_Class:_** SSS 3   **_Time:_** 4 hours

Instructions: Answer **all** questions in _Section A_ and **three** in _Section B_.

PAPER I & II [Objective and Theory]

SECTION A: OBJECTIVE (50 marks).   **_Time:_** $1\frac{1}{2}$

1. Simplify: $\sqrt{108} + \sqrt{125} - \sqrt{75}$
    A. $\sqrt{3} + 5\sqrt{5}$
    B. $6\sqrt{3} - 5\sqrt{5}$
    C. $6\sqrt{3} + 5\sqrt{2}$
    D. $6\sqrt{3} - 5\sqrt{2}$

2. Evaluate: $\left(64^{\frac{1}{2}} + 125^{\frac{1}{3}}\right)^2$
    A. 121
    B. 144
    C. 169
    D. 196

3. Given that y varies inversely as the square of x. If x = 3 when y = 100, find the equation connecting x and y.
    A. $yx^2 = 300$
    B. $yx^2 = 900$
    C. $y = 900^2$
    D. $\frac{100x}{9}$

4. Find the value of x for which $32_4 = 22_x$.
    A. 3
    B. 5
    C. 6
    D. 7

5. Simplify: $2\frac{1}{4} \times 3\frac{1}{2} \div 4\frac{3}{8}$.
    A. $1\frac{1}{5}$
    B. $1\frac{1}{4}$
    C. $1\frac{4}{5}$
    D. $\frac{5}{9}$

6. If $log_{10}^{(6x-4)} - log_{10}^2 = 1$, solve for x.
    A. 2
    B. 3
    C. 4
    D. 5

7. If F = $\frac{9}{5}$ C + 32, find the value C when F = 98.6.
    A. 3
    B. 37
    C. 39
    D. 41

8. If x : y : z = 2 : 3 : 4, evaluate $\frac{9x+3y}{6z-2y}$.
    A. $1\frac{1}{2}$
    B. 2
    C. $2\frac{1}{2}$
    D. 3

9. Simplify: $\frac{2-18m^2}{1+3m}$.
    A. 2(1 + 3m)
    B. 2(2 + 3m²)
    C. 2(1 – 3m)
    D. 2(1 + 3m²)

10. A curve is such that when y = 0 , x = - 2 or x = 3. Find the equation of the curve.

A. $y = x^2 - 5x - 6$
B. $y = x^2 + x - 6$
C. $y = x^2 + 5x - 6$
D. $y = x^2 - x - 6$

11. The volume of a cylindrical tank, 10 *m* high is 385 *m*³. Find the diameter of the tank.   Take $\pi = \frac{22}{7}$.
   A. 14 *m*
   B. 10 *m*
   C. 7 *m*
   D. 5 *m*

12. The surface area of a sphere is $\frac{792}{7}$ *cm²*. Find correct to the **nearest whole number**, its volume. Take $\pi = \frac{22}{7}$.
   A. 113 *cm³*
   B. 131 *cm³*
   C. 311 *cm³*
   D. 414 *cm³*

13. A piece of thread of length 21.4 *cm* is used to form a sector of circle of radius 4.2 *cm* on a piece of cloth. Calculate, correct to the **nearest degree**, the angle of the sector.
   A. 170^0
   B. 177^0
   C. 182^0
   D. 192^0

14. If y + 2x = 4 and y − 3x = -1, find the value of (x + y).
   A. 3
   B. 2
   C. 1
   D. -1

15. There are 250 boys and 150 first in a school. If 60% of the boys and 40% of the first play football, what percentage of the school play football.
   A. 40.0%

B. 42.2%
C. 50.0%
D. 52.5%
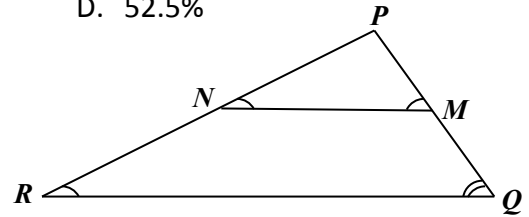
16. In the diagram, which of the following ratios is equal to $\frac{|PN|}{|PQ|}$?
   A. $\frac{|PN|}{|PR|}$
   B. $\frac{|PM|}{|PQ|}$
   C. $\frac{|PM|}{|PR|}$
   D. $\frac{|PR|}{|PQ|}$

17. The angels of a polygon are x, 2x, 2x (x − 30), (x − 20) and (x − 10). Find the value of x.
   A. 45^0
   B. 84^0
   C. 85^0
   D. 95^0

18. If **M** and **N** are the points (-3, 8) and (5, -7) respectively, find **MN**.
   A. 8 units
   B. 11 units
   C. 15 units
   D. 17 units

19. The equation of the line through the points (4, 2) and (-8, -2) is 3y = px + q, where p and q are constants. Find the value of p.
   A. 1
   B. 2
   C. 3
   D. 9

20. The angle of elevation of top of a tree from a point 27 *m* away and on the same horizontal ground as the

foot of the tree is 30^0. Find the height of the tree.

   A. 27 *m*

   B. $13.5\sqrt{3}$ *m*

   C. $13.5\sqrt{2}$ *m*

   D. $9\sqrt{3}$ *m*

21. If $\tan x = \dfrac{4}{3}, 0 < x < 90$, find the value of $\sin x - \cos x$.

   A. $\dfrac{1}{10}$

   B. $\dfrac{1}{5}$

   C. $\dfrac{5}{12}$

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

22. Given that *Y* is 20 *m* on a bearing of 300^0 from *X*, how far south of *Y* is *X*?

   A. 10 *m*

   B. 15 *m*

   C. 25 *m*

   D. 30 *m*

23. The mean of 1, 3, 5, 7 and x is 4. Find x.

   A. 2

   B. 4

   C. 6

   D. 8

24. Find the media of 2, 1, 0, 3, 1, 1, 4, 0, 1 and 2.

   A. 0.0

   B. 0.5

   C. 1.0

   D. 1.5

Number of goods	1	2	3	4	5	6	7
Number of teams	3	1	6	6	4	2	3

The table above show the distribution of goals scored by 25 teams in a football competition. Use it to answer questions 25 and 26.

25. Calculate the probability that a team selected at random scored *at most* 3 goals.

   A. $\dfrac{3}{25}$

   B. $\dfrac{1}{5}$

   C. $\dfrac{6}{25}$

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

26. Find the probability that a team selected scored either 4 or 7 goals.

   A. $\dfrac{9}{25}$

   B. $\dfrac{11}{25}$

   C. $\dfrac{3}{5}$

   D. $\dfrac{18}{25}$

In the diagram, *WXYZ* is a rectangle with dimensions 8 *cm* by 6 *cm*. *P, Q, R* and *S* are the midpoint of the sides of the rectangle as shown. Use this information to answer questions *27* and *28*.
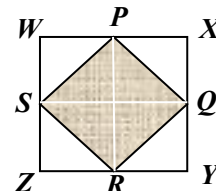
27. What type of quadrilateral is the shaded region?

   A. Trapezium

   B. Prism

   C. Rectangle

   D. Rhombus

28. Calculate the area of the rectangle that is *not* shaded.

   A. 24 *cm²*

   B. 25 *cm²*

   C. 16 *cm²*

   D. 12 *cm²*

29. The total surface area of a hemisphere is 75π *cm²*. Find the radius.
   A. 5.0 *cm*
   B. 7.0 *cm*
   C. 8.5 *cm*
   D. 12.0 *cm*

30. Find the value of x for which is $\frac{x-5}{x(x-1)}$ undefined.
   A. 0 or 5
   B. -5 or 5
   C. -1 or 5
   D. 0 or 1

31. Solve the equation $2x^2 - x - 6 = 0$. x is;
   A. -3 or 2
   B. 3 or 2
   C. $\frac{-3}{2}$ or 2
   D. $\frac{3}{2}$ or -2

32. Factories completely the expression $(x-2)^2 - (x-1)^2$.
   A. $-(2x-3)$
   B. $(3x-2)(1-x)$
   C. $3(x-1)(1-x)$
   D. $(3x-2)(2x-1)$

33. Find the nth term of the sequence 2 x 3, 4 x 6, 8 x 9 x 12... .
   A. 2^n x $3(n-1)$
   B. 2^n x 3^n
   C. 2 x 3
   D. 2 x 3

34. If $3x = 4$ (mod 5), find the least value of x.
   A. 1
   B. 2
   C. 3
   D. 4

35. The solution of $x - 2 \geq 2x - 1$ is illustrated on the number line as;
   A. $x \geq -1$
   B. $x \leq -1$
   C. $x \leq 1$
   D. $x \geq 1$

36. If p and q are two statements, under what condition would p Λ q be false?
   A. If p is true and q is true
   B. If p is true and q is false
   C. If both p and q are both false
   D. If p is false and q is true
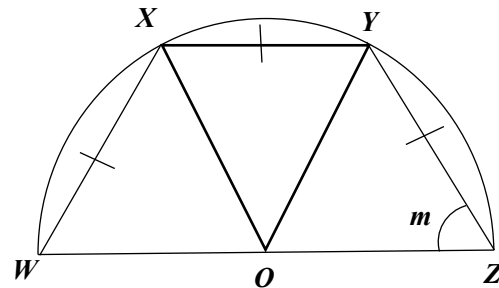
37. The diagram shows a trapezium inscribed in a semi-circle. If **O** is the mid-point of **WZ** and **WX** = **XY** = **YZ**, calculate the value of m.
   A. 90^0
   B. 60^0
   C. 45^0
   D. 30^0

38. Find the inter-quartile range of 1, 3, 4, 5, 8, 9, 10, 11, 12, 14, 16.
   A. 6
   B. 7
   C. 8

D. 9

39. Donations during the lunching of a church project were sent in sealed envelopes. The table shows the distribution of the amount of money in the envelope.

No of envelopes	4	7	20	9	4	5	3	1	2
Amount (₦)	5000	2000	1000	700	500	100	50	2	10

How much was the total donation?

  B. ₦62,792

  C. ₦62,97
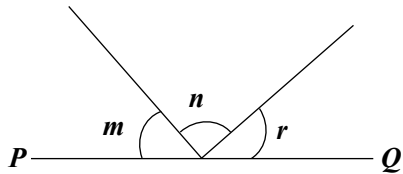
40. In the diagram, **PQ** is a straight line. $(m - r) = 110^0$, $(n - r) = 130^0$ and $(m - r) = 120^0$. Find the ratio of m : n : r.
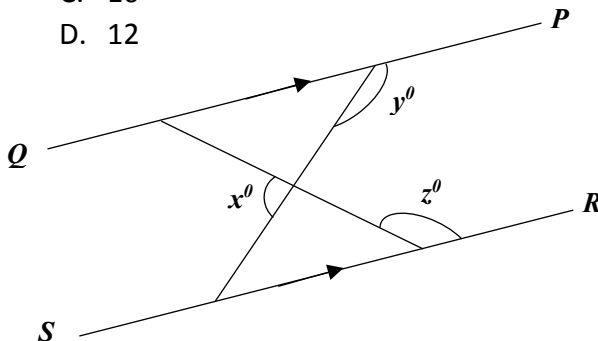
  A. 2 : 3 : 4

  B. 3 : 4 : 5

  C. 4 : 5 : 6

  D. 5 : 6 : 7

41. If $x : y = \frac{1}{4} : \frac{3}{8}$ and $y : z = \frac{1}{3} : \frac{4}{9}$, find x : z.

  A. 2:3

  B. 3:4

  C. 3:8

  D. 1:2

42. Find the mean deviation of 20, 30, 25, 40, 35, 50, 45, 40, 20 and 45.

  A. 8

  B. 9

  C. 10

  D. 12

A. ₦ 26,972

D. ₦26, 792

43. M and N are two subsets of the universal set (μ). If n (μ) = 48, n (M) = 20, n (N) = 30 and n (M ∪ N) I = 40. Find n (M ∩ N).

  A. 18

  B. 20

  C. 30

  D. 38

44. Express 0.612 in the form $\frac{x}{y}$ where x and y are integers and y ≠ 0.

  A. $\frac{153}{250}$

  B. $\frac{68}{111}$

  C. $\frac{61}{100}$

  D. $\frac{21}{33}$

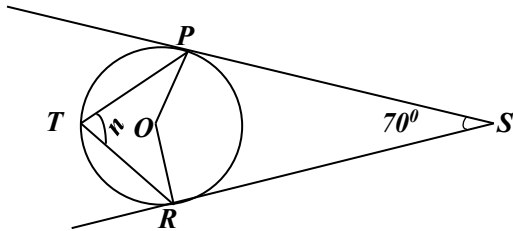45. In the diagram, **PQ//RS**. Find x intermediate of y and z. Then x is

  A. 240 – y – z

  B. 180 – y – z

  C. 360 + y – z

  D. 360 – y – z

46. The diagonal of a rhombus WXYZ intersect at M. If MW = 5 **cm** and MX = 12 **cm**, calculate it perimeter.

  A. 42

  B. 48

  C. 60

  D. 52

47. The graphs of $y = x^2$ and $y = x$ intersect at which of these points?
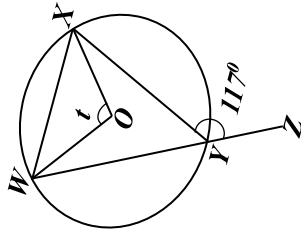   A. (0, 0) (1, 1)
   B. (0, 0) (0, 1)
   C. (1, 0) (0, 0)
   D. (0, 0) (0, 0)

48. In the diagram, **PS** and **RS** are tangents to the circle of center **O**. **PSR** = 70^0, **POR** = m and **PQR** = n. Find (m + n).
   A. 110^0
   B. 135^0
   C. 165^0

D. 225^0

49. Find the value of the t in the diagram.
   A. 63^0
   B. 117^0
   C. 126^0
   D. 234^0
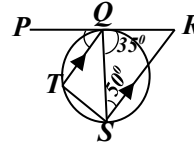
50. In the diagram, **PR** is a tangent to the circle at **O**, **QT//RS**, **SQ̂R** = 35^0 and **RŜQ** = 50^0. Find the value of **QŜT**.
   A. 40^0
   B. 65^0
   C. 85^0
   D. 95^0

Instructions: Answer *ten* questions from all, all from PART *I* and any *five* in PART *II*.

PART *I*

1. A used car was purchased at ₦900,000.00. Its value depreciated by 30% in the first year. In each subsequent year, the depreciation was 22% of its value at beginning of the year. If the car was bought on 1st March 2011, calculate, correct to the *nearest hundred naira*, the value of the car on 28th February 2015.

2. (a) The graph of y = 2px^2 - p – x, 14 passes through the point (3, 10). Find the value of p
    (b) Two lines, 3y – 2x = 21 and 4y + 5x = 5, intersect at the point Q. Find the coordinates of Q.

3. The diagonals of a rhombus are 10.2 *cm* and 9.3 *cm* long. Calculate correct to *one decimal place* the perimeter of the rhombus.
    (b) Given that sin x = $\frac{3}{5}$, 0 < x < 90^0. Find 5 cos x – 4 tan x.

4. (a) In the diagram, *QOS* is a diameter. *RQS* = x and *QST* = (3x + 15). Find;
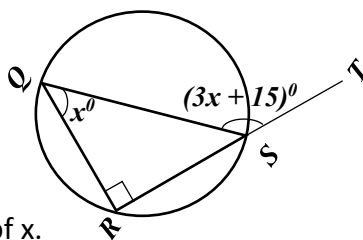
    i.   the value of x.
    ii.   *RŜQ*
    (b) If 2N4$_{seven}$ = 15N$_{nine}$. Find the value of N.

5. (a) If the mean of m, n, s, p and q is 12. Calculate the mean of (m – 4), (m – 3), (s – 6), (p – 2) and (q – 8).
    (b) In a community of 500 people, the 75th percentile age is 65 years while the 25th percentile age is 15 years. How many of the people are between 15 and 65 years?

PART *II*.

6. In a road worthiness test on 240 cars, 60% passed. The number that failed had fault in clutch, breaks and steering as follows: clutch only 28, clutch and steering 14, clutch, steering and breaks 8, clutch and breaks 20 and steering only 6. The number of cars and with faults in steering only is twice the number of cars with faults in breaks only.
    (a) Draw a Venn diagram to illustrate this information.
    (b) How many cars had;
        i.   faulty break?
        ii.   one fault only

7. (a) Find the equation of the line passing through the points (2, 5) and (-4, -7).
    (b) Three ships *P*, *Q* and *R* are at sea. The bearing of *Q* from *P* is 030^0 and the bearing of *P* from *R* is 300^0. If |*PQ*| = 5 *km* and |*PR*| = 8 *km*.
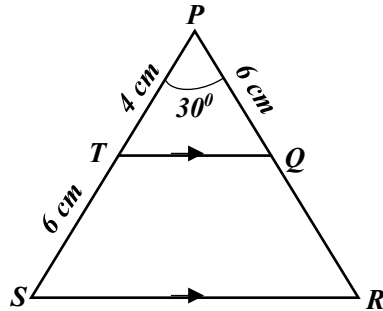
     i.   illustrate the information in a diagram.

    ii.   calculate, correct to **three** significant figures, the

         i.   distance between **Q** and **R**.

        ii.   bearing of **R** from **Q**.

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

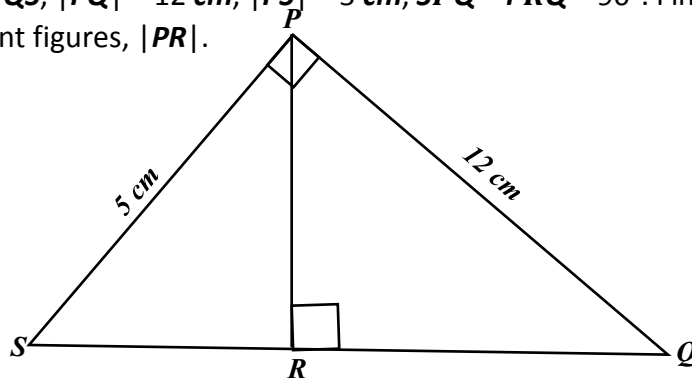   (b) Prove that $\sim (p \lor q \lor r) = \sim p \land \sim q \land \sim r$.

   (c) Find the value of x and y in the diagram blow;
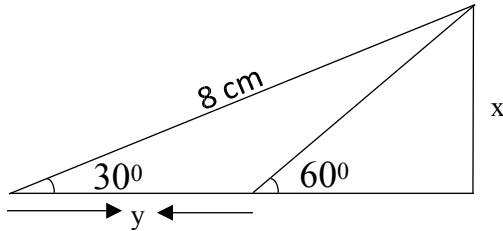
   (d) Find the range of values of x which satisfies the inequality 3x − 2 < 10 + x < 2 < + 5x.

9. In the diagram, $|PT|$ = 4 **cm**, $|TS|$ = 6 **cm**, $|PQ|$ = 6 **cm** and $\Delta S\widehat{P}R$ = 30⁰. Calculate, correct to the **nearest** whole number;

    (a) $|SR|$

    (b) area of **TQRS**.

10. (a) In ΔPQS, $|PQ|$ = 12 **cm**, $|PS|$ = 5 **cm**, $S\widehat{P}Q = P\widehat{R}Q$ = 90⁰. Find, correct to **three** significant figures, $|PR|$.

(b) The lengths of two ladders **L** and **M** are 10 **m** and 12 **m** respectively. They are placed against a wall such that each ladder makes the same angle with the horizontal ground. If the foot of L is 8 **m** from the foot of the wall.

i.   draw a diagram to illustrate the information
ii. calculate the height at which **M** torches the wall.

11. (a) I Copy and complete the table of values for $2x^2 + x - 10$ for $-5 \le x \le 4$.

x	-5	-4	-3	-2	-1	0	1	2	3	4
y			5		-9	-10		0		

(b) Using scales of 2 **cm** to 1 unit on the x-axis and 2 **cm** to 5 units on the y-axis, draw the graph of $y = 2x^2 + x - 10$ for $-5 \le x \le 4$.

(c) Use the graph to find the solution of;

i. $2x^2 + x = 10$
ii. $2x^2 + x - 10 = 2x$

12. The data show the marks obtained by students in Biology test;

52 56 25 56 68 73 66 64 56 48 20 39 9 50 46 54 54 40 50 96 36 44 18 97 65 21 60 44 54 32 92 49 37 94 72 88 89 35 59 34 15 88 53 16 84 52 72 46 60 42.

(a) Construct a frequency distribution table using the class interval: 0 – 9, 10 – 19, 20 – 29 …… .

(b) Draw a cumulative frequency curve for the distribution.

(c) Use the graph to estimate the:

i.   median
ii.   lower quartile
iii. upper quartile
iv.   interquartile
v.   percentage of students who scored at **least** 66 marks, correct to the **nearest** whole number.
vi.   50 percentiles
vii. d decile
viii. comment on (i, vi and vii)

Marks	10	20	30	40	50	60	70	80	90
frequency	1	1	x	5	y	1	4	3	1

13. The frequency table shows the mark distribution of a class of 30 students in an examination. The mean mark of the distribution is 52.

(a) Find the values of x and y.
(b) Construct a group frequency distribution table starting with a low-class limit of 1 and class interval of 10.
(c) Draw a histogram for the distribution.
(d) Use the histogram to estimate the mode.

14. **(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.

(d) if $3 \log^{1.2} + 2 \log \frac{1}{3} \sqrt{10}$ - log 20 = log n. What is n?