4. Evaluate and express your answer in index form

$$\frac{0.09 \text{ X } 1.21}{3.3 \text{ X } 0.00025}$$

5. Simplify $12x^2y^3 \div 3x^3y^2$

THE MATHEMATICAL

ASSOCIATION OF NIGERIA (MAN)

(LAGOS STATE CHAPTER)

2021 OLYMPIAD

CATEGORY: PRIMARY

DATE: SATURDAY, MARCH 27, 2021

TIME: 1HR 30MINUTES

1. This paper consists of two parts; Part A and Part B. Answer all the questions in each part.
2. The use of CALCULATOR or any ELECTRONIC DEVICES and STATISTICS TABLES are not allowed.
3. Make sure your invigilator signs your answer script.
4. There is no provision for any extra answer script, use your answer booklet wisely and do not tear any part of it.
5. Write your name, your school and your EXAMINATION NUMBER correctly on your answer booklet.
6. CLARITY, NEATNESS and ORDERLINESS are highly encouraged. Do all your rough calculations at the last page of your answer booklet and cancel it before submission.
7. Check your result with your Olympiad pin on www.manlagosstate.com from Monday, May 4, 2021.

DO NOT OPEN UNTIL YOU ARE TOLD TO DO SO

PART A

1a. Simplify: $4\frac{3}{5}\text{X}\left(\frac{3}{4}of\frac{4}{9}+15\frac{1}{2}\right)+\frac{19}{24}$

b. What is the 39th multiple of 19?

2a. Divide the LCM of 6, 9 and 12 by its HCF.

b. The perimeter of a square is 28cm. Find its area.

3a. An isosceles triangle has two long sides and one short side. The short side is half of the length of the long side. If the perimeter of the triangle is 15cm, find the length of the short side.

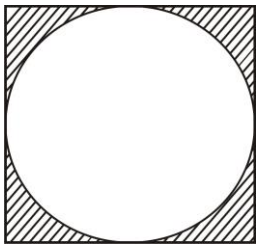
b. The ratio of two numbers is 9:7. If the larger number is 54. Find the smaller number.

4a. The average age of a mother and her three children is 10years. The last child is a year old, the second child is 3years older than the last child while the oldest child is 3years older than the second child. How old is their mother?

b. If A is divided by B the result is $\frac{2}{3}$, if B is divided by C the result is $\frac{4}{7}$. What will be the result if A is divided by C?

5a. A train travels for 3hrs 50minutes at an average speed of 70km/hr. What is the distance covered by the train.

b. Consider the square ABCD below, if the radius of the circle at centre O is 5cm. Find the area of the shaded portion.

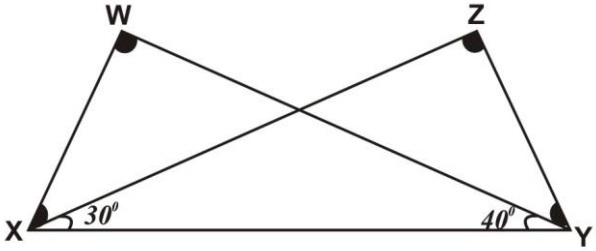


PART B

1. A radio which costs ₦6 000.00 was marked to give a profit of 30% on sale. However, at the point of sale, there was a discount of 10% of the marked price. Find the percentage profit.

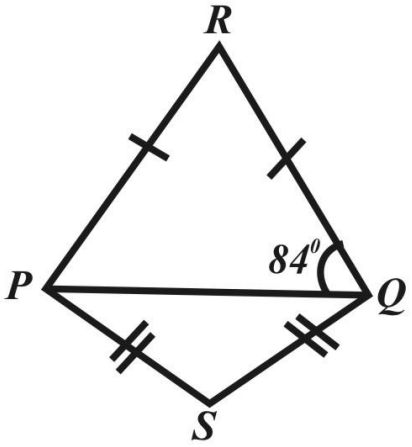
2. The mean of 2, 5, 6, 8, x and 7 is 6. Find the range.

3. In the diagram below, what is the sum of the four shaded angles?



4. A woman bought bars of key soap for ₦280.00. If a bar is ₦2.50 more expensive she would have bought 2 less. How many bars did she buy?

5. The isosceles triangles PQR and PQS are drawn on opposite sides of a common base $|PQ|$. If <PQR = 84^0 and <PSQ = 126^0. Find the value of the angles PRQ and RQS.



THE MATHEMATICAL

ASSOCIATION OF NIGERIA (MAN)

(LAGOS STATE CHAPTER)

2021 OLYMPIAD

CATEGORY: JUNIOR

DATE: SATURDAY, MARCH 27, 2021

TIME: 2HRS

1. This paper consists of two parts; Part A and Part B. Answer all the questions in each part.
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PART A

1a. Simplify $\frac{a(a-b)}{a^2-b^2}$

b. If $244_n = 1022_4$. Find the value of n

2a. When 2 is added to a certain number and the sum was doubled, the result was 36 less than the original number multiplied by 4. Find the number.

b. Find the square root of

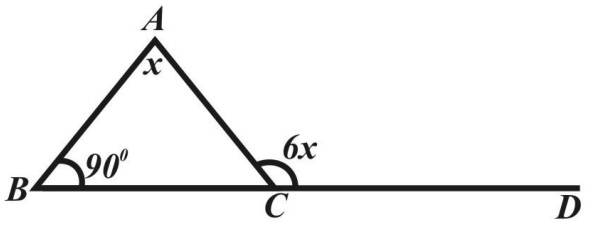
$$\frac{\sqrt{0.64}-\sqrt{1.21}+\sqrt{10.24}-\sqrt{0.16}}{\sqrt{36}+\sqrt{16}}$$

3a. Ten percent of a high school class participated in a Maths Olympiad and 95% of the senior that took part in the Maths Olympiad got into universities of their choice. Only 50% of the seniors who didn't participate get into the universities of their choice. What percentage of the senior from the high school got admitted into the universities of their choice?

b. Simplify; $(73.8)^2 - (26.2)^2$

4a. Solve for x in the equation: $(3 - \frac{4}{x})^2 - 6(3 - \frac{4}{x})=16$

b. Find the value of x in the diagram below;



5a. D is partly constant and partly varies with V, where V=40, D=150 and when V=54, D=192. Find the value of D when V=73.

b. Make "P" the subject of the formula if

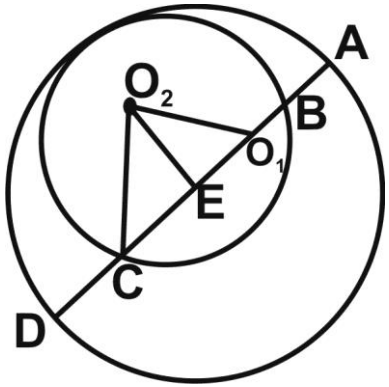
$$m = wp + \frac{1}{3}yp^2$$

PART B

1. The sum of four numbers is $1214_{(five)}$. What is the average expressed in base five?

2. A rectangle pool 20 meters wide and 60 meters long is surrounded by a walkway of uniform width. If the total area of the walkway is 516 square meters, how wide is the walkway in meters?

3. Two cylindrical candles of the same length but of different diameter are lit at the same time. The first is consumed in 4hrs and the second in 3hrs. Assuming that they burn at a constant rate, how long after being lit was the first candle twice the height of the second candle?



THE MATHEMATICAL

ASSOCIATION OF NIGERIA (MAN)

(LAGOS STATE CHAPTER)

2021 OLYMPIAD

CATEGORY: SENIOR

DATE: SATURDAY, MARCH 27, 2021

TIME: 2HRS

1. This paper consists of two parts; Part A and Part B. Answer all the questions in each part.
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PART A

1a. A number is picked at random from number 1 to 10. What is the probability that it is a perfect square?

b. Suppose that $\log_4 x = \frac{1}{3}$. What is the value of $\log_x 8$?.

2a. Solve the inequality $(sin\frac{x}{12})^{\sqrt{1-x}} > (sin\frac{x}{12})^{x}$.

b. Find the value of "p" if the graph of $y=2px^2 - p^2x - 14$ passed through the point (3,10)

3a. At a party, every two people shook hands once. How many people attended the party if there were 66 handshakes?

b. If a * b = $\pm\sqrt{ab}$. Evaluate 2 * (12 * 27)

4a. Solve the question $3^x + 9^x = 27^x$

b. Without using tables, evaluate

$$\frac{1+\tan 60^0 \tan 30^0}{\tan 60^0 + \tan 30^0}$$

5a. What is the sum of the digits of the decimal form of the product of $2^{2019} \times 5^{2021}$?

b. Find the value of the acute angle between the lines

$$3x-y+1=0 \text{ and } x-2y+1=0$$

PART B

1. The mean, mode and median of the data value 60, 100, x, 40, 50, 200 and 90 are all equal to x. Solve to show that the mean, the median and the mode are all 90.

2. The ratio of the coefficient of x^4 to that of x^3 in the binomial expansion of $(1+2x)^n$ is 3:1.Find the value of n.

3. A cubic curve C passes through the points P(-1,-9) and Q(2,6) and its gradient function is given as $\frac{dy}{dx} = 3x^2 + Kx + 7$ where K is a non-zero constant. Find the equation for C.

4. Mr. Abdus-Salam produced x articles at a cost of ₦$(200 - 48x + 3x^2)$, if each article is sold at ₦$\frac{3}{5}x$. Find the overall minimum profit for the minimum value of P.

5. In the diagram overleaf, two circles are internally tangent. A line passes through the center of the larger circle intersects it at the points A and D. The same line intersects the smaller circle at the points B and C. Given that $|AB|:|BC|:|CD| = 3:7:2$. Find the ratio of the radius of the circles.