

The University of the West Indies, Mona

presents

2024-2025 Senior Mathematical Olympiad

Round One Examination (Grades 9, 10 and 11)

For each question, determine the letter corresponding to the correct or best response; along with the question number, indicate this letter by shading it on the answer sheet

1. What is the value of the expression

$$\frac{1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8}{1 + 2 + 3 + 4 + 5 + 6 + 7 + 8}?$$

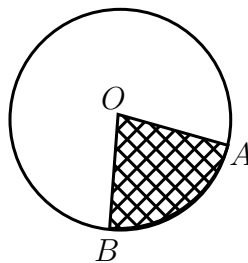
- (A) 1020 (B) 1120 (C) 1220 (D) 2240 (E) 3360

2. What number should be placed in the box to make the following true?

$$10^4 \times 100^\square = 1000^6$$

- (A) 7 (B) 5 (C) 2 (D) 3/2 (E) 10

3. In the circle with centre O , the shaded sector represents 20% of the area of the circle.



What is the size of $\angle AOB$?

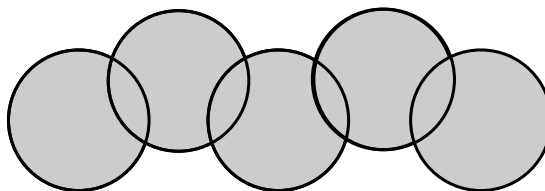
- (A) 36° (B) 72° (C) 90° (D) 80° (E) 70°

4. The degree measures of the angles of a triangle are in the ratio 3 : 3 : 4. What is the degree measure of the largest angle of the triangle?

- (A) 18 (B) 36 (C) 60 (D) 72 (E) 90

5. Tuesday's high temperature was 1°C warmer than that of Monday's. Wednesday's high temperature was 3°C cooler than that of Monday's. If Tuesday's high temperature was 32°C , what was Wednesday's high temperature?
- (A) 28°C (B) 29°C (C) 30°C (D) 31°C (E) 33°C
6. When 0.00031 is multiplied by 7,928,564 the product is closest to which of the following?
- (A) 210 (B) 240 (C) 2,100 (D) 2,400 (E) 24,000
7. Expressed as a power of 2, what is the value of
- $$4^{15} + 8^{10}?$$
- (A) 2^{10} (B) 2^{25} (C) 2^{20} (D) 2^{30} (E) 2^{31}
8. A jug that is $\frac{1}{2}$ full with lemonade, has enough to fill exactly three identical glasses (with no lemonade left in the jug). How full must the jug be if it has lemonade to exactly fill four of the same glasses (with no lemonade left in the jug)?
- (A) $\frac{2}{3}$ (B) $\frac{7}{12}$ (C) $\frac{4}{7}$ (D) $\frac{6}{7}$ (E) $\frac{3}{4}$
9. Mr Rich is stacking his empty safe with 10 bundles each of \$500, \$1000 and \$2000 bills. Each bundle has 100 bills in it. When Mr Rich is finished stacking the safe, how much money is in the safe?
- (A) \$3,000,000 (B) \$2,500,000 (C) \$3,500,000 (D) \$4,000,000 (E) \$4,500,000
10. Shari's age is one-ninth of her father's age. One year from now, Shari's father's age will be seven times Shari's age. What is the difference between Shari's father's age and Shari's age?
- (A) 24 (B) 25 (C) 26 (D) 27 (E) 28
11. Pablo buys popsicles for his friends. The store sells single popsicles for \$1 each, 3-popsicle boxes for \$2, and 5-popsicle boxes for \$3. What is the greatest number of popsicles that Pablo can buy with \$8?
- (A) 6 (B) 11 (C) 12 (D) 13 (E) 15
12. Two pieces of rope have lengths 1 m and 2 m. Alexia cuts the pieces of rope into several parts all of the same length. Which of the following could not be the total number of parts she obtains?
- (A) 6 (B) 8 (C) 9 (D) 12 (E) 15

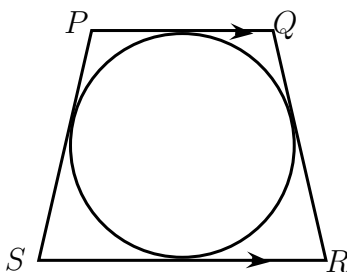
13. Five circles each with an area of 1 cm^2 overlap to form the figure in the diagram below. The sections where two circles overlap, each have an area of $\frac{1}{8} \text{ cm}^2$.



What is the area that is completely covered (shaded) by the figure?

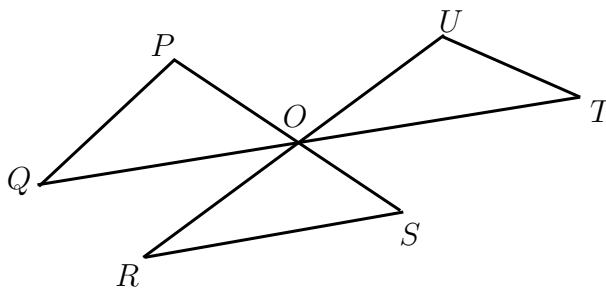
- (A) 4 cm^2 (B) $\frac{9}{2} \text{ cm}^2$ (C) $\frac{35}{8} \text{ cm}^2$ (D) $\frac{39}{8} \text{ cm}^2$ (E) $\frac{19}{4} \text{ cm}^2$
14. What is the value of the expression
- $$\sqrt{16\sqrt{8\sqrt{4}}}$$
- (A) 16 (B) $4\sqrt{2}$ (C) 4 (D) $8\sqrt{2}$ (E) 8
15. A *mixed number* takes the form $a\frac{b}{c}$ where a, b and c are positive integers with $b < c$. An example is $8\frac{7}{11}$. Josh picks three different digits from the set $\{1, 2, 3, 4, 5\}$ to form a mixed number. What is the difference between the largest and the smallest possible mixed number that Josh can form?
- (A) $4\frac{3}{5}$ (B) $4\frac{9}{20}$ (C) $4\frac{3}{10}$ (D) $4\frac{4}{15}$ (E) $4\frac{7}{20}$
16. How many ways can 315 be written as a product of two positive integers?
- Note:** $1 \times 315 = 315 \times 1$ is counted as 1.
- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6
17. A cyclist rides at 15 metres per second. The wheels of his bicycle have a circumference of 300 cm. How many complete turns does each wheel make in 6 seconds?
- (A) 5 (B) 10 (C) 25 (D) 30 (E) 35
18. Which of the following is largest in value?
- (A) $20 \times \sqrt{13}$ (B) $\sqrt{20} \times 13$ (C) $\sqrt{20} \times \sqrt{13}$ (D) $\sqrt{201} \times 3$ (E) $\sqrt{2013}$
19. The number n is the biggest natural number for which $4n$ is a 3-digit number and m is the smallest natural number for which $4m$ is a 3-digit number. What is the value of $n - m$?
- (A) 225 (B) 224 (C) 223 (D) 222 (E) 221

20. A circle is inscribed in the trapezium $PQRS$ where $PS = QR = 25$ cm, $PQ = 18$ cm and $SR = 32$ cm.



What is the length of the diameter of the circle?

- (A) 14 cm (B) 24 cm (C) 25 cm (D) $\sqrt{544}$ cm (E) $\sqrt{674}$ cm
21. A square-shaped floor is covered with congruent square tiles (tiles of the same size). The total number of tiles that lie on the two diagonals is 37. How many tiles cover the floor?
- (A) 148 (B) 324 (C) 361 (D) 1296 (E) 1369
22. Captain Sparrow and his pirates loot some gold coins. They share the coins equally amongst themselves. If there were four less pirates, they would each get 10 coins more. If the number of coins were 50 less, they would each get 5 coins less. How many coins did they share amongst themselves?
- (A) 80 (B) 100 (C) 120 (D) 150 (E) 250
23. Let a, b, c be positive digits. Which of the following is a factor of the 6-digit number $abcabc$?
- (A) 10 (B) 19 (C) 101 (D) 111 (E) 1001
24. The lines PS, QT and RU intersect at a common point O , as shown. P is joined to Q, R to S , and T to U , to form triangles.



What is the value of $\angle P + \angle Q + \angle R + \angle S + \angle T + \angle U$?

- (A) 450° (B) 270° (C) 360° (D) 540° (E) 720°

25. A class has written a test. If every boy had obtained 3 more points, the points average would be 1.2 points higher than it presently is. Which percentage of the children in this class are girls?
- (A) 20% (B) 30% (C) 40% (D) 60% (E) More information is needed