

# The University of the West Indies, Mona

presents

## 2024-2025 Senior Mathematical Olympiad

Round One Examination (Grades 7 and 8)

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*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*

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1. Which of the following is largest?

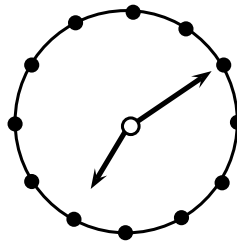
- (A)  $2 + 0 + 2 \times 5$       (B)  $2 \times 0 + 2 + 5$       (C)  $2 + 0 \times 2 + 5$       (D)  $2 + 0 + 2 + 5$   
(E)  $2 \times 0 \times 2 \times 5$

2. 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

3. Emily sits on a chair in a room. Behind her is a clock. In front of her is a mirror. In the mirror, she sees the following image of the clock.



The actual time is closest to

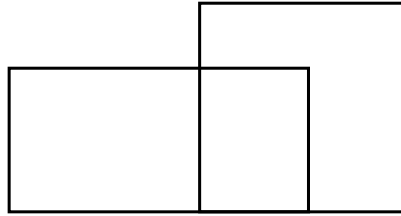
- (A) 4:10      (B) 4:50      (C) 5:10      (D) 6:50      (E) 7:10

4. A number is used to replace ★ in the following statement:

$$8 + \frac{7}{10} + \frac{3}{\star} = 8.7003$$

What is the number that makes the expression true?

- (A) 1      (B) 100      (C) 1000      (D) 10000      (E) 100000
5. How many quadrilaterals, of any size, are to be found in the diagram below?



- (A) 6      (B) 2      (C) 5      (D) 3      (E) 4
6. Fathers' Day in Jamaica is observed each year on the third Sunday of June. What is the latest possible date, in June, on which Fathers' Day can be observed?
- (A) June 14 th      (B) June 15 th      (C) June 20 th      (D) June 21 st      (E) June 22 nd
7. Mrs Parks buys four patties for each of the four members of her family and gets the discount offered, as advertised below:

**Special On Patties**

1 Patty \$200  
Every 6 th patty free

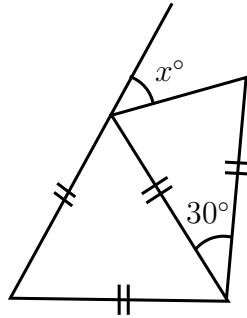
How much does Mrs Parks end up paying for the patties?

- (A) \$800      (B) \$1,200      (C) \$2,800      (D) \$3,200      (E) \$3,800
8. The weight limit for an elevator is 1500 kilograms. The average weight of the people in the elevator is 80 kilograms. If the combined weight of the people is 100 kilograms over the limit, how many people are in the elevator?
- (A) 14      (B) 17      (C) 16      (D) 20      (E) 13
9. The sum of Megan's age, her mother's age and her grandmother's age is 100. Each of the three ages is a power of 2. How old is Megan?
- (A) 16      (B) 1      (C) 2      (D) 8      (E) 4

10. JM's Prep School has three times as many students as MO's Primary School. The two schools have a total of 2600 students. How many students attend JM's Prep school?

(A) 600    (B) 650    (C) 1950    (D) 2000    (E) 2050

11. In the diagram below, what is the value of  $x$ ?



(A) 30    (B) 40    (C) 45    (D) 50    (E) 60

12. The digits 1, 2, 3 and 4 are to be placed in the  $4 \times 4$  square below. Each row, column, and diagonal should contain all four digits, 1, 2, 3, and 4. Some of the cells are filled in, where  $a$  and  $b$  are two of the digits.

1			
	2		$a$
		3	$b$
		1	

What is the value of  $a + b$ ?

(A) 3    (B) 4    (C) 5    (D) 6    (E) 7

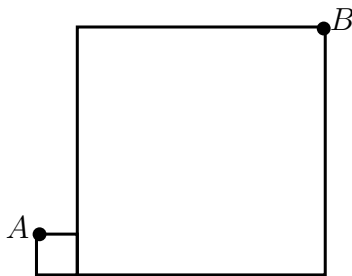
13. Sara had a 10:00 am appointment 60 km from her home. She averaged  $80 \text{ kmh}^{-1}$  for the trip and she arrived 20 minutes late for her appointment. At what time did she leave her home?

(A) 9:20 am    (B) 9:15 am    (C) 8:40 am    (D) 9:00 am    (E) 9:35 am

14. In a class, no two boys are born on the same day of the week, and no two girls are born in the same month. If another student were to join the class, this would no longer be true. How many students are there in the class?

(A) 18    (B) 19    (C) 20    (D) 24    (E) 25

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. 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
17. In three differently sized baskets there are 48 balls in total. Together the smallest and the biggest basket hold twice as many balls as the middle one. The smallest basket holds half as many balls as the middle one. How many balls are there in the biggest baskets?
- (A) 24      (B) 20      (C) 32      (D) 30      (E) 16
18. Two squares are positioned, as shown in the diagram below. The smaller square has side length 1 unit and the larger square has side length 7 units.



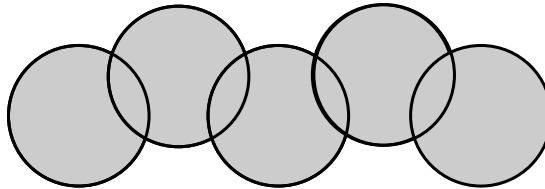
What is the length, in units, of the line segment  $AB$ ?

- (A) 10      (B)  $\sqrt{113}$       (C) 14      (D)  $\sqrt{85}$       (E)  $\sqrt{72}$
19.  $ABCD$  is a square that is made up of two identical rectangles and two non-identical squares. The areas of the two non-identical squares are  $4 \text{ cm}^2$  and  $16 \text{ cm}^2$ . What is the area, in  $\text{cm}^2$ , of the square  $ABCD$ ?
- (A) 20      (B) 25      (C) 36      (D) 49      (E) 64
20. Expressed as a power of 2, what is the value of

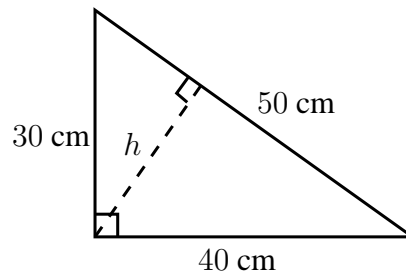
$$4^{15} + 8^{10}?$$

- (A)  $2^{10}$       (B)  $2^{25}$       (C)  $2^{20}$       (D)  $2^{30}$       (E)  $2^{31}$

21. 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
22. Five circles, each with an area of  $1 \text{ cm}^2$ , 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)  $4 \text{ cm}^2$       (B)  $\frac{9}{2} \text{ cm}^2$       (C)  $\frac{35}{8} \text{ cm}^2$       (D)  $\frac{39}{8} \text{ cm}^2$       (E)  $\frac{19}{4} \text{ cm}^2$
23. The chocolate cookies in a jar contain a total of 1000 chips of chocolate. All but one of these cookies contain the same number of chips; it contains one more chip than the others. The number of cookies in the jar is between one dozen and three dozen. What is the number of cookies in the jar?  
 (A) 15      (B) 18      (C) 24      (D) 27      (E) 32
24. Sixty-four white  $1 \times 1 \times 1$  cubes are used to form a  $4 \times 4 \times 4$  cube, which is then painted red on each of its six faces. This large cube is then broken up into its 64 unit cubes. How many of the 64 cubes have exactly 2 faces painted red?  
 (A) 6      (B) 8      (C) 12      (D) 18      (E) 24
25. The diagram below shows a right-angled triangle with sides of lengths 30 cm, 40 cm and 50 cm.



- What is the length of the shortest altitude, labeled  $h$ ?  
 (A) 20 cm      (B) 24 cm      (C) 25 cm      (D) 30 cm      (E) 40 cm