

2022 Senior Mathematical Olympiad

Qualifying Round Examination (Grades 7 and 8)

NAME_____

GRADE_____

SCHOOL_____

STUDENT CONTACT NUMBER_____

- EACH entry MUST be accompanied by a nominal entry fee of **J\$500**
- Be sure to staple ALL pages (including this one) together
- All entries must reach the Mathematics Department, U.W.I by **Wednesday 14 December**
- You may deliver by (a) Hand (b) Courier (c) Local Mail

- The Courier address is
Mathematics Department, UWI
Mona
Kingston 7

- The Mailing address is
Senior Mathematical Olympiad
P.O. Box 94
Mona Post Office
Kingston 7

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

1. A small bug crawls along a number line, starting at -2 . It crawls to -6 , then turns around and crawls to 5 . How many units does the bug crawl altogether?

(A) 9 (B) 11 (C) 13 (D) 14 (E) 15

2. In this problem, each digit is used once and only once.

From the digits

3, 5, 6, 7, 8

a two digit number is subtracted from a three digit number. What is the smallest difference?

(A) 269 (B) 278 (C) 484 (D) 271 (E) 261

3. The pattern of figures ♠, □, ★, ◇ and ■ is repeated in the sequence

♠, □, ★, ◇, ■, ♠, □, ★, ◇, ■, . . .

Which figure is the 2022nd?

(A) ♠ (B) □ (C) ★ (D) ◇ (E) ■

4. Given that April 23rd falls on a Tuesday, then the 23rd of March of the same year was a

(A) Saturday (B) Sunday (C) Monday (D) Wednesday (E) Thursday

5. Each year a sum of money loses 10% of its value. In how many years will the sum be worth less than one-half its original value?

(A) 5 (B) 6 (C) 7 (D) 8 (E) 9

6. Jimmy and Marty play a two-person game in which the winner gains 2 points and the loser loses 1 point. If Jimmy won exactly 3 games and Marty had a final score of 5 points, how many games did they play?

(A) 4 (B) 5 (C) 7 (D) 8 (E) 11

7. Mother can frost a cupcake every 20 seconds and Father can frost a cupcake every 30 seconds. Working together, how many cupcakes can Mother and Father frost in 5 minutes?

(A) 10 (B) 15 (C) 20 (D) 25 (E) 30

8. 100 adult cats, half of whom were female, were brought into a Cat shelter. Half of the adult female cats were accompanied by a litter of kittens. The average number of kittens per litter was 4. What was the total number of cats and kittens received by the shelter?
- (A) 150 (B) 200 (C) 250 (D) 300 (E) 400
9. The product of two positive numbers is 9. The reciprocal of one of these numbers is 4 times the reciprocal of the other number. What is the sum of the two numbers?
- (A) $\frac{10}{3}$ (B) $\frac{20}{3}$ (C) 7 (D) $\frac{15}{2}$ (E) 8
10. After adding 15 litres of gas in a partially filled fuel tank, the tank was 75% full. Given that the capacity of the tank is 28 litres, what is the number of litres in the tank before addition of the gas?
- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7
11. In a bag of marbles, $\frac{3}{5}$ of the marbles are blue and the rest are red. If the number of red marbles is doubled and the number of blue marbles stays the same, what fraction of the marbles will be red?
- (A) $\frac{2}{5}$ (B) $\frac{3}{7}$ (C) $\frac{4}{7}$ (D) $\frac{3}{5}$ (E) $\frac{4}{5}$
12. In a group of 50 persons each person is classified as being tall or short. Given that there are 14 tall men, 31 women and 18 are short persons, how many of the women are short?
- (A) 5 (B) 7 (C) 9 (D) 13 (E) 18
13. In a line of persons entering a sporting arena, x persons are behind Allie who is y persons in front of Bob. Given that there are z persons in front of Bob, how many persons are in the line?
- (A) $z - x + y + 2$ (B) $z + x - y$ (C) $z - x + y - 1$ (D) $z + x - y + 1$ (E) $z - x + y$
14. A packet of drink mix when diluted with water in the ratio 1 : 4 (respectively), makes 60 cups of drinks. If the same packet is diluted with water in the ratio 1 : 5, how many cups of drink would it make?
- (A) 48 (B) 60 (C) 72 (D) 75 (E) 80

15. A multiple choice examination consists of 20 questions. The scoring is +5 for each correct answer, -2 for each incorrect answer and 0 for questions unanswered. Pete scored a total of 48 on the examination. What is the **maximum** number of correct answers Pete could have had?

- (A) 8 (B) 10 (C) 12 (D) 14 (E) 16

16. Circular pizzas (of equal thickness) are sold, according to their diameter lengths, as 8-inch, 10-inch, 12-inch or 14-inch. 8-inch pizza are cut into 3 equal slices, 6-inch pizza are cut into 4 equal slices, 10-inch pizza are cut into 6 equal slices and 14-inch pizza are cut into 8 equal slices. From what size pizza, should you choose a slice if you want as much pizza as possible in a slice?

- (A) 8-inch (B) 10-inch (C) 12-inch (D) 14-inch (E)
Does not matter

17. Thirty dollars is divided among 8 persons according to the following rules

- Each person gets at least \$1
- At least one person gets more than \$5
- At least four persons get more than \$1
- Each person gets an exact amount of dollars.

What is the **largest** amount that a person can receive?

- (A) \$13 (B) \$15 (C) \$17 (D) \$19 (E) \$23

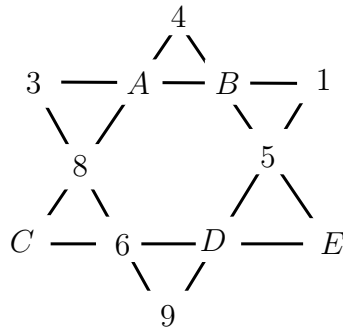
18. A sum of money is to be divided between Alyah, Byron and Cecil. Alyah receives \$1 plus one-third of what is left. Byron then receives \$6 plus one-third of what remains. Cecil receives the rest, which amounts to \$40. How much did Byron receive?

- (A) \$26 (B) \$28 (C) \$30 (D) \$32 (E) \$34

19. The interior angles of a triangle are x° , y° and z° where $x \leq y \leq z$. If the angles are all multiples of 20, how many triples $(x^\circ, y^\circ, z^\circ)$ are there?

- (A) 6 (B) 7 (C) 9 (D) 27 (E) 28

20. The numbers 1 to 12 are to be placed on the figure shown, in such a way that the sum of the 4 numbers along the six straight lines are all equal.



Where on the diagram should the 7 be placed?

- (A) *A* (B) *B* (C) *C* (D) *D* (E) *E*
21. At the Centre for High Achievers, there are 100 students of which 99% are females. Of the students living on campus, 98% are females. How many of the students live off campus?
- (A) 1 (B) 2 (C) 49 (D) 50 (E) 98
22. Three car washers can wash 4 cars in 5 hours. To the nearest whole number of hours, how long would it take 7 car washers to wash 18 cars, if all are working at the same rate all the time
- (A) 3 (B) 4 (C) 7 (D) 10 (E) 18
23. On planet ZeeZee, the number of days in a week is the same as the number of weeks in a month and the number of months in a year is twice the number of days in a month. On ZeeZee there are 1,250 days in a year. How many months are there on ZeeZee?
- (A) 50 (B) 25 (C) 20 (D) 10 (E) 5

24. A **proper divisor** of the number n is a number that divides n (without a remainder), excluding n . For example, the proper divisors of 12 are 1, 2, 3, 4, 6.

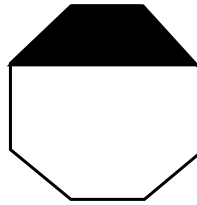
An *interesting number* is one where the sum of its proper factors exceeds it. As an example, 12 is an *interesting number* because

$$1 + 2 + 3 + 4 + 6 = 16 > 12$$

Another example of an *interesting number* is

- (A) 13 (B) 16 (C) 30 (D) 44 (E) 50

25. In the figure to the right, what fraction of the total area of the regular octagon is shaded?



- (A) 1/3 (B) 1/4 (C) 1/5 (D) 1/6 (E) 3/8

Please write your name here _____