

2022-2023 Junior Mathematical Olympiad  
Round One Examination (Grades 5 and 6) - 10:00am

*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

$$\frac{1}{2} + \frac{2}{4} + \frac{4}{8} + \frac{8}{16}?$$

- (A) 1/4    (B) 1/2    (C) 0    (D) 4    (E) 2

2. Starting at 72, Sydoni counts down by 11s:

$$72, 61, 50, \dots$$

What is the last number greater than 0 that Sydoni will count?

- (A) 4    (B) 5    (C) 6    (D) 7    (E) 8

3. John is walking. He walked at 52 steps in 60 seconds. Walking at the same rate, how many steps will John make in 75 seconds?

- (A) 66    (B) 52    (C) 65    (D) 67    (E) 73

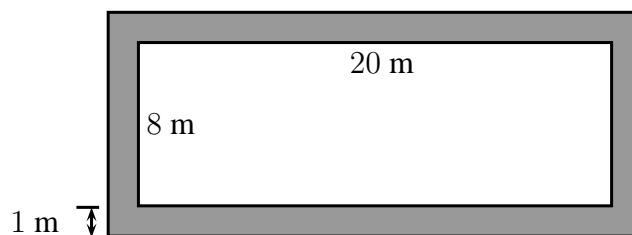
4. Four young boys have \$150, \$200, \$250 and \$400 respectively. The boys decided to combine the moneys and divide it equally among themselves. After dividing, how much money do they each now have?

- (A) \$50    (B) \$100    (C) \$150    (D) \$200    (E) \$250

5. Marcus has a sack of coins worth \$2.00, consisting of 10 cents coins and 25 cents coins. \$1.00 worth is 10 cents coins and \$1.00 worth is 25 cents coins. What is the ratio the number of 10 cents coins to the total number of coins in the sack?

- (A) 1 to 10    (B) 2 to 7    (C) 10 to 11    (D) 2 to 5    (E) 5 to 7

6. A rectangular pool measures 20 metres by 8 metres. There is a 1 metre wide walkway around the outside of the pool, as shown by the shaded region.



In square metres, what is the area of the walkway?

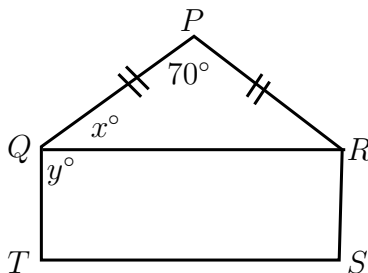
- (A) 56    (B) 60    (C) 29    (D) 52    (E) 50

7. A lemonade recipe calls for 4 times as much water as sugar and twice as much sugar as lemon juice. If 3 cups of lemon juice was used, how many cups of water was used?  
(A) 6 (B) 8 (C) 12 (D) 18 (E) 24
8. A rectangular garden measures 6 metres by 8 metres. The entire garden is planted with tomato plants with 4 tomato plants per square metre. On average, each plant yields 10 tomatoes. How many tomatoes should be expected to harvest from the garden?  
(A) 560 (B) 960 (C) 1120 (D) 1920 (E) 3840
9. The number of dots in diagram  $n$  is

$$1 + 3n(n - 1).$$

How many dots are in diagram 4?

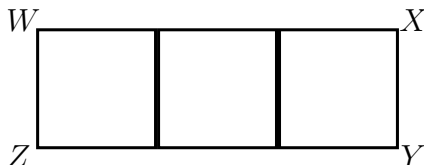
- (A) 37 (B) 31 (C) 25 (D) 13 (E) 7
10. Three quarters ( $3/4$ ) of a jug is filled with orange juice. The jug is emptied by pouring an equal amount of juice into each of 5 cups. What fraction of the total capacity of the jug did each cup receive?  
(A)  $1/20$  (B)  $1/10$  (C)  $3/20$  (D)  $1/5$  (E)  $1/4$
11. What is the sum of all the (positive) factors of 42?  
(A) 13 (B) 43 (C) 53 (D) 95 (E) 96
12. In the diagram, triangle  $PQR$  is isosceles with  $PQ = PR$ , and  $QRST$  is a rectangle. Also,  $\angle QPR = 70^\circ$ ,  $\angle PQR = x^\circ$ , and  $\angle RQT = y^\circ$ .



The value of  $x + y$  is

- (A) 70 (B) 90 (C) 160 (D) 145 (E) 60
13. How many two-digit numbers have at least one digit that is a 7?  
(A) 17 (B) 11 (C) 18 (D) 10 (E) 19

14. Salt is sold at a fixed price per gram. 250 grams of salt is sold for \$7.50. What mass of salt sells for \$1.80?
- (A) 6 grams      (B) 54 grams      (C) 60 grams      (D) 120 grams      (E) 190 grams
15.  $WXYZ$  is a rectangle formed from three identical squares as shown.



- Given that the perimeter of  $WXYZ$  is 56 m, what is the area (in  $\text{m}^2$ ) of the rectangle  $WXYZ$ ?
- (A) 66      (B) 147      (C) 168      (D) 196      (E) 348
16. A public holiday is on the third Wednesday of a certain month. In that month, the holiday **cannot** occur on which of the following days?
- (A) 16th      (B) 22nd      (C) 18th      (D) 19th      (E) 21st
17. In the sequence shown, Figure 1 is formed using 7 squares. Each figure after Figure 1 has 5 more squares than in the previous figure.

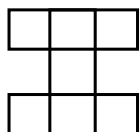


Figure 1

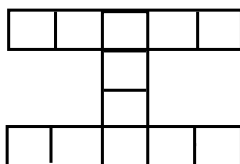


Figure 2

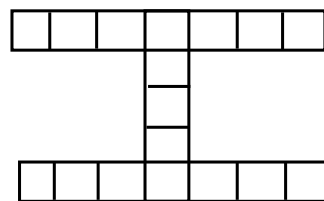


Figure 3

- Figure  $\ell$  has 2022 squares. What number does  $\ell$  represent?
- (A) 400      (B) 402      (C) 404      (D) 406      (E) 408
18. Maxwell's 300 km trip from Port Antonio to Negril passed through Falmouth. Maxwell started in Port Antonio at 7 a.m. and drove until stopping for a 40 minutes break in Falmouth. Maxwell arrived in Negril at 11 a.m. Not including the break, what was Maxwell's average speed for the trip?
- (A) 83 km/h      (B) 94 km/h      (C) 90 km/h      (D) 95 km/h      (E) 64 km/h

19. The 26 letters of the English alphabet are listed in an infinite, repeating loop:

$$ABCDEFGHIJKLMN OPQRSTUVWXYZ ABC \dots$$

What is the 128th letter in this sequence?

- (A)  $V$     (B)  $W$     (C)  $X$     (D)  $Y$     (E)  $Z$
20. A package of 8 greeting cards comes with 10 envelopes. Kimmone has 7 cards but no envelopes. What is the smallest number of packages that Kimmone needs to buy to have more envelopes than cards?
- (A) 3    (B) 4    (C) 5    (D) 6    (E) 7
21. Ray has 2022 coins, some of which are \$1 coins and the rest are \$5 coins. He has at least one \$1 coin and at least one \$5 coin. What is the difference in dollars between the *greatest possible* and *least possible* amounts of money that Ray can have?
- (A) 8068    (B) 8072    (C) 8080    (D) 8082    (E) 8088
22. A rectangle has sides with lengths that are positive integers (counting numbers). If the area of the rectangle is 24, which of the following **cannot** be the perimeter of the rectangle?
- (A) 20    (B) 22    (C) 28    (D) 50    (E) 36
23. Alexis, Bobbi, Canute, Dorian and Ellie sat on a bench that seats 5 persons. Dorian sat to the extreme right. Alexis sat directly to the right of Ellie. Bobbi sat somewhere to the left of Alexis and at least one person sat between Canute and Bobbi. Who sat in the middle?
- (A) Alexis    (B) Bobbi    (C) Canute    (D) Dorian    (E) Ellie
24. How many integers (whole numbers) between 2022 and 2400 have four distinct digits arranged in increasing order? (For example, 2357 is one such integer.)
- (A) 9    (B) 10    (C) 15    (D) 21    (E) 28
25. Given that  $P, Q, R$  represent three of the digits from 1 to 9, if

$$QR + PPP + PPP = 2022,$$

what is the value of  $P + Q + R$ ?

- (A) 13    (B) 14    (C) 15    (D) 16    (E) 17