



International  
**EN-LINE** **M**ath **Challenge**

**Only challengers can make a change!**

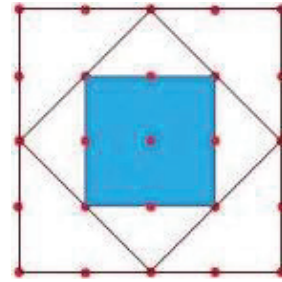
**Past Papers 2022**

Category 3

**Category-3 IMC 2022**

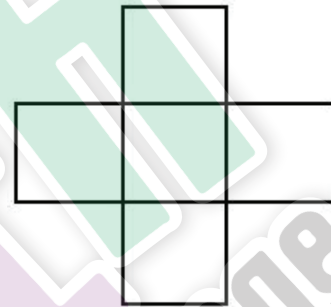
1. What percentage of the figure is white?

- A) 75%
- B) 25%
- C) 55%
- D) 20%



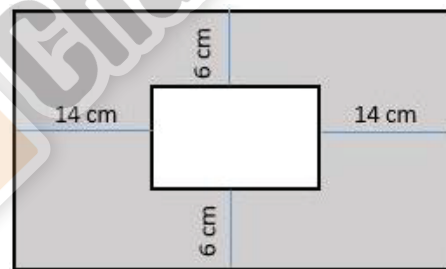
2. In the figure, the perimeter of each small square is 56 cm. Find the perimeter of the whole shape.

- A) 280 cm
- B) 168 cm
- C) 300 cm
- D) 224 cm



3. The figure shows two rectangles. The length of the bigger rectangle is 36 cm, and the perimeter of the smaller rectangle is 22 cm. Find the area of the shaded region.

- A) 540 cm<sup>2</sup>
- B) 564 cm<sup>2</sup>
- C) 516 cm<sup>2</sup>
- D) 534 cm<sup>2</sup>



4. Yamato owes 780 USD to his VISA credit account. He returns three items costing 43.10 USD, 36.80 USD, and 125.00 USD and receives credit on his account. Next, he makes a payment of 400 USD to his VISA account. He then purchases 82.75 USD. How much does Yamato still owe?

- A) 584.90 USD
- B) 1302.15 USD
- C) 502.15 USD
- D) 257.85 USD

5. How many degrees is the smaller angle between the hour hand and the minute hand on a clock that reads eight o'clock?

- A) 100°
- B) 120°
- C) 150°
- D) 170°

6. Faris bought rice, carrots, tomatoes, onions, and oil. The price of 1 kg rice is 3.53 USD, 1 kg carrots are 1.19 USD, 1kg tomatoes are 1.38 USD, 1kg onion is 2.72 USD, and 1lt oil is 2.61 USD. How much did Faris pay according to this receipt?



- A) 31.48 USD      B) 34.90 USD      C) 34.09 USD      D) 30.10 USD

7. If  $\frac{a}{2} = b$ , then find  $\frac{5ab}{a^2 b^2}$ .

- A) 2      B)  $2a$       C)  $2b$       D) 10

8. Given that  $7x + 17 = 49$ , find the value of  $\sqrt{7x - 49}$ .

- A) 7      B) 8      C) 9      D) 10

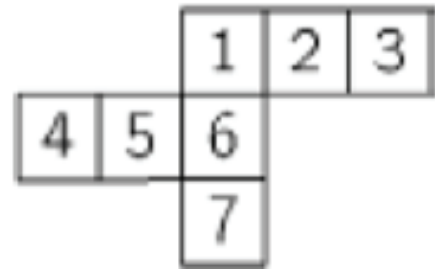
9. If  $a$  is 9 more than  $b$ ,  $b$  is 4 more than  $c$ , and  $d$  is 3 more than  $c$ , find the positive difference between  $b$  and  $d$ .

- A) 1      B) 2      C) 0      D) 5

10. Calculate  $3 \times (49 - 26) + 5(2 + 3)^2 - (6 - 4^2)$ .

- A) 204      B) 240      C) 250      D) 200

11. Alisha wants to fold a cube from a paper net. By mistake, she drew seven squares on her sheet instead of 6 squares. Which squares can she remove so that the figure remains connected and she can fold a cube from it?



- A) 4 or 7                                      B) 6 or 3  
 C) 3 or 4                                      D) 3 or 7

12. Given that  $a$ ,  $b$ , and  $c$  are natural numbers. If  $a \times b = 8 \times c + 4$ , which of the following is always true?

- A)  $a+b$  is odd              B)  $a \times b \times c$  is even              C)  $a-b$  is even              D)  $a+b+c$  is odd

13. Calculate  $\frac{0.2^3}{0.02^3}$ .

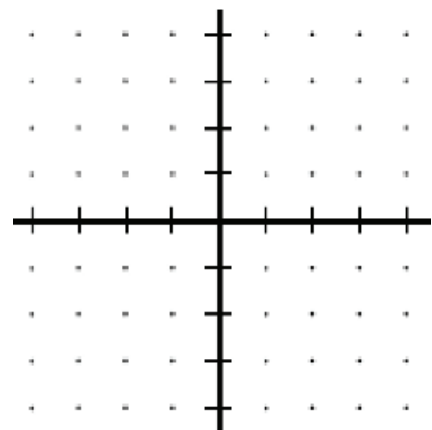
- A) 1                                      B) 0.1                                      C) 10                                      D) 1000

14. If  $\otimes$  is an operation defined as  $a \otimes b = \frac{a-b}{a+b}$ , find the value of  $6 \otimes 3$ .

- A)  $\frac{8}{7}$                                       B)  $\frac{8}{7}$                                       C)  $\frac{7}{8}$                                       D)  $\frac{7}{8}$

15. Points A, B, C and D have these coordinates: A(3, 1), B(3,-1), C(-3,-1) and D(-3, 0). Find the area of quadrilateral ABCD.

- A) 9 square units              B) 10 square units  
 C) 11 square units              D) 12 square units

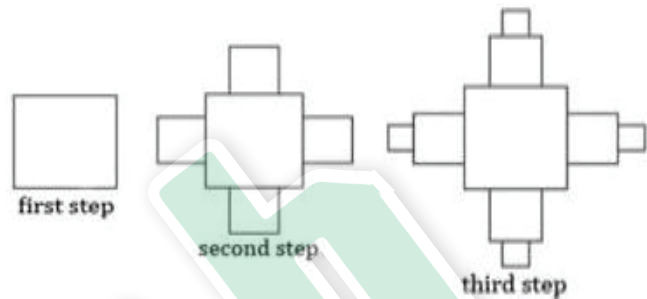


16. Louis has a string wire 32 cm long. If he bends it and makes a square, what will be the area of that square?

- A)  $36 \text{ cm}^2$       B)  $49 \text{ cm}^2$       C)  $64 \text{ cm}^2$       D)  $81 \text{ cm}^2$

17. According to the following pattern, how many squares will be used to prepare the 6<sup>th</sup> step?

- A) 9                      B) 17  
C) 14                    D) 21



18. In the equation below, let  $a$ ,  $b$  and  $c$  be integers and  $x = 2a - 4b + 5c$ . If we increase  $a$  by 1,  $c$  by 3 and decrease  $b$  by 2, what would be the change in the number  $x$ ?

- A) increase by 13    B) decrease by 13    C) decrease by 25    D) increase by 25

19. If  $4 < a < 3$  and  $3 < b < 5$  find the greatest value of  $a^2 - b^2$ .

- A) 9                      B) 16                      C) 25                      D) 36

20. If  $x - y = 7$ ,  $y - z = 5$  and  $z - x = 12$ , then find the value of  $xyz$ .

- A) 12                      B) 24                      C) 30                      D) 0

21. If  $152x - 63^2 = 13^2$  find the value of  $x$ .

- A) 30                      B) 25                      C) 20                      D) 15

22. Find the sum of all positive factors of 90.

- A) 260                      B) 252                      C) 234                      D) 235

23. Evaluate  $\frac{1}{4} \frac{1}{4} \frac{1}{4} 4 4 4$ .

- A) 16                      B) 4                      C)  $\frac{1}{4}$                       D)  $\frac{1}{16}$

24. If  $a, b, c, d, e$  are positive integers, then find the digit in the unit place of the expression  $1^a 5^{2b} 6^{3c} 10^{4d} 11^{5e}$ .

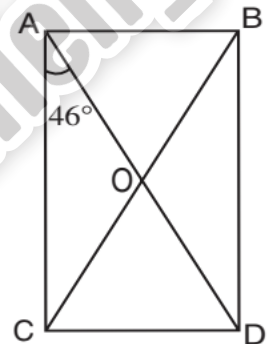
- A) 2                      B) 3                      C) 6                      D) 8

25. If  $\sqrt{4^n} = 16$ , then find the value of  $n$ .

- A)  $\frac{1}{2}$                       B)  $\frac{1}{4}$                       C) 2                      D) 4

26. The figure  $ABCD$  is a rectangle. If  $\angle CAD = 46^\circ$ , then find the measure of  $\angle ABC$ .

- A)  $54^\circ$                       B)  $50^\circ$                       C)  $48^\circ$                       D)  $44^\circ$



27. How many numbers between 80 and 320 are exactly divisible by 2, 3, and 10?

- A) 7                      B) 8                      C) 9                      D) 10

28. What is the following number in this sequence 2, 5, 9, 14, 20, ... ?

- A) 25                      B) 26                      C) 27                      D) 28

29. Find the last digit of  $7 \times 3^{2007}$ .

- A) 7                      B) 3                      C) 9                      D) 1

30. On a farm, the ratio of horses to cows is 4:3, and the ratio of cows to goats is 4:5. Find the ratio of goats to horses.

- A) 15:16                      B) 3:4                      C) 4:3                      D) 16:15

31. A tank is  $\frac{1}{6}$  full. When 330 liters of water are added to the tank, it is then  $\frac{5}{8}$  full. How many additional liters of water are required to fill the tank?

- A) 250                      B) 260                      C) 270                      D) 300

32. A data set of 5 positive integers is given with the following conditions;

- Only 8 repeats more than once
- Median of the data is 9 (middle value in sorted data)
- Mean of the data is 10 (the arithmetic mean, or average)

Which of the below numbers can be the largest possible value in this data set?

- A) 14                      B) 15                      C) 17                      D) 18

33. If  $A$  is the product of four eights and  $B$  is the sum of eight fours. What is the value of  $A \div B$ ?

- A)  $2^7$                       B)  $2^4$                       C)  $2^5$                       D)  $2^8$

34. If  $3^4 \frac{1}{x} \frac{1}{x}$  and  $y^3 \frac{1}{8} \frac{1}{8}$ , find  $xy - 2y + x$ .

- A) 10                      B) 19                      C) 28                      D) 37

35. Joseph completed the bike track in 180 seconds and Jasmine in 150 seconds. If they started at the same time, how many minutes would they meet again after they started?

- A) 9                      B) 12  
C) 15                      D) 18



36. Find the value of  $(-5)^{-3}$ .

- A) -125                      B) 125                      C)  $\frac{1}{125}$                       D)  $\frac{1}{125}$

37. Nataly makes some purple paint. She mixes red, blue, and white paint in a ratio of 3:5:1. She uses 650 ml of blue paint. How much purple paint does she have?

- A) 1000                      B) 1040                      C) 1110                      D) 1170

38. In a family, the father's age is five times the child's. Mother is four years younger than father. 6 years later, the sum of the ages of the father, mother, and child is 91. What is the child's current age?

- A) 15                      B) 13                      C) 9                      D) 7

39. Find the sum of the digits of multiplicand.

- A) 4                      B) 9                      C) 7                      D) 8

$$\begin{array}{r} \dots \\ \times \quad 24 \\ \hline \dots \\ + \quad \dots \\ \hline 6024 \end{array}$$

40. Find  $x$  in this equation  $1 \frac{1}{2} + 1 \frac{1}{3} + 1 \frac{1}{4} + \dots + 1 \frac{1}{x} = \frac{1}{79}$ .

- A) 81                      B) 78                      C) 80                      D) 79



**Answers:**

1. A) 75% 2. B) 168 cm 3. C)  $516 \text{ cm}^2$  4. D) 257.85 USD 5. B)  $120^0$   
6. C) 34.09 USD 7. A) 2 8. C) 9 9. A) 1 10. A) 204 11. D) 3 or 7  
12. B)  $a \times b \times c$  is even 13. D) 1000 14. D)  $\frac{7}{8}$  15. A) 9 square units 16. C)  $64 \text{ cm}^2$   
17. D) 21 18. D) increase by 25 19. B) 16 20. D) 0 21. B) 25 22. C) 234  
23. D)  $\frac{1}{16}$  24. B) 3 25. D) 4 26. D)  $44^0$  27. B) 8 28. C) 27 29. C) 9 30. A) 15:16  
31. C) 270 32. B) 15 33. A)  $2^7$  34. D) 37 35. C) 15 36. C)  $\frac{1}{125}$  37. D) 1170  
38. D) 7 39. D) 8 40. D) 79

