



# INSTITUTE OF MATHEMATICS EDUCATION

## JUNIOR MATHS OLYMPIAD – 2022 (Primary Level)

Std. : V/VI

Question Paper

Date : 12.02.2022

Time : 2 Hours

Total Marks : 100

- Find the largest number which when divides the numbers 1349222, 3390586 and 12567585, leaving the same remainder.  
(A) 259 (B) 351 (C) 481 (D) 91
- How many two digit numbers are there such that if product of the digits is added to sum of its digits, then you get the original number?  
(A) 10 (B) 1 (C) 9 (D) 5
- How many pairs of co-prime numbers are there whose LCM is 15015, excluding pair (1,15015) ?  
(A) 8 (B) 9 (C) 12 (D) 15
- If  $\frac{5! \times 7!}{10!} + \frac{3! \times 8!}{10!} = \frac{7N}{6!}$ , then find N.  
(A) 4! (B) 5! (C) 7! (D) 3!
- If
$$\begin{array}{r} \text{ATOM} \\ + \text{BOMB} \\ \hline \text{BINGO} \end{array}$$
then find the digital sum of BANG + TANG [Take A = 8 and T = 4]  
Note : Each letter denotes different digit.  
(A) 21 (B) 22 (C) 18 (D) 30
- Let  $A_n = 5 \times T_n$ , and  $B_n = 3P_n$  and  $C_n = B_n - A_n$ . Also  $T_n$  is the sequence of Triangular numbers and  $P_n$  is the sequence of Pentagonal numbers, then find  $C_{20}$ .  
(A) 840 (B) 720 (C) 360 (D) 1080
- The alphabets are assigned numerical values as follows.  
 $A = 0, B = 2, C = 4, D = 6, \dots, Z = 50$   
The word 'CAB' is coded as 6, 0, 2.  
The word 'D E A R' is coded as 12, 20, 0, 306.  
How will you code the word 'FIT'?  
(A) 32, 54, 312 (B) 30, 72, 380 (C) 40, 48, 326 (D) None of these
- Find highest power of 144 dividing  $120!$   
(A) 58 (B) 29 (C) 116 (D) 30
- Observe the following and find how many possible values of  $(x + y + z)$  are there if  $z < 12$ 
$$\begin{array}{r} 243_x \\ +314_x \\ \hline 1112_x \end{array} \quad \begin{array}{r} 243_y \\ +314_y \\ \hline 560_y \end{array} \quad \begin{array}{r} 243_z \\ +314_z \\ \hline 557_z \end{array}$$
  
(A) 2 (B) 3 (C) 4 (D) 5
- Let  $A_n = D_n - O_n$ , where  $D_n$  is sequence of Decagonal numbers and  $O_n$  is sequence of Octagonal numbers.  
Divide each term of  $A_n$  by 5 and generate a sequence  $B_n$ , a sequence of remainders.  
Find the sum of first 100 terms of  $B_n$ .  
(A) 50 (B) 200 (C) 150 (D) 100

11. In the given sum, identify the base and complete the sum. Then find answer in base 12.

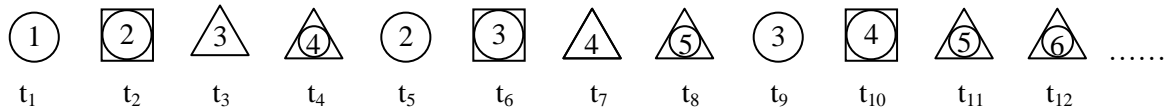
$$\begin{array}{r} (8\ 2\ 1\ 0)_x \\ - (7\ 4\ 5\ 2)_x \\ \hline (0\ \_\_\_\ 7)_x = (\_\_\_\_\_\_\_\_)_{12} \end{array}$$

- (A) 647                      (B) 629                      (C) 381                      (D) 554

12. Numerical value of symbol with number  $m$  is as shown below. e.g.  $\boxed{8} = 8^2 + 1 = 65$

$$\textcircled{m} = m + 1 \quad \text{and} \quad \boxed{m} = m^2 + 1 \quad \text{and} \quad \triangle m = m - 1 \quad \text{and} \quad \triangle m = m^2 - 1.$$

Now observe the sequence of symbols given below and find the numerical value of 50<sup>th</sup> term



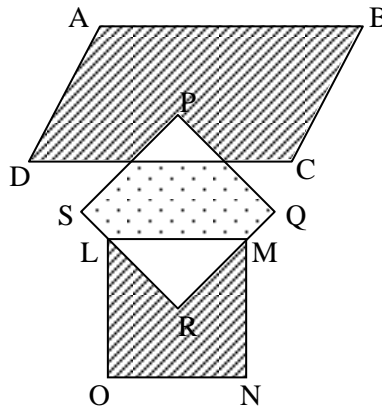
- (A) 197                      (B) 226                      (C) 122                      (D) 257

13. If the GCD of 180 and  $a$  is 12 and  $50 < a < 300$ , then how many values of ' $a$ ' are possible?

- (A) 9                      (B) 10                      (C) 8                      (D) 11

14. Refer figure. Parallelogram ABCD has length  $AB = 12$  and distance between sides  $AB$  and  $CD$  is 8 cm. Rhombus PQRS has length of side 10 cm and length of one diagonal is 12 cm. Square LMNO has length of side 6 cm.

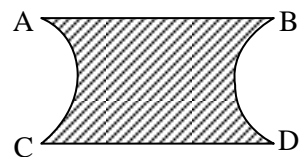
Some part of figure is lined and some part is dotted. (Figure is not to scale.)  
Find [Area(Lined part) – Area (Dotted part)] in sq. cm.



- (A) 18                      (B) 14                      (C) 36                      (D) Can't determine

15. Two parallel rods of length 40 cm are connected by semi circular arcs as shown in figure. Radius of the semi circular arcs is 5 cm. Find the area of shaded region in sq. cm. (Figure not to scale)

- (A)  $200 - 25\pi$   
(B)  $400 - 50\pi$   
(C)  $400 - 25\pi$   
(D)  $200 - 50\pi$

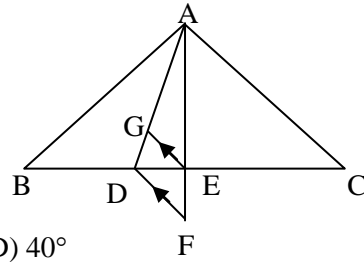


16. Refer figure. (figure not to scale).

In  $\triangle ABC$ ,  $m\angle BAD = m\angle DAF = m\angle FAC$ .

$m\angle ABC = 50^\circ$  and  $m\angle ACB = 70^\circ$ .

Points A, E, F are collinear.  $m\angle AGE = 90^\circ$  and line GE is parallel to line DF. Find  $m\angle FDE$ .



- (A)  $20^\circ$                       (B)  $25^\circ$                       (C)  $30^\circ$                       (D)  $40^\circ$

17. How many 4 digit numbers can be made from digits 0, 6, 7, 8 without repetition if digit at unit's place must be greater than digit at ten's place?

- (A) 6                      (B) 12                      (C) 14                      (D) 9

18. Three families A, B and C have 3, 5 and 6 members respectively. They are going to stand for a photo graph. But members of family B do not want to stand with member of their family on either side. In how many ways they can be arranged for a photograph?

- (A)  $\frac{(9!)^2}{12}$                       (B)  $\frac{(10!)^2}{6}$                       (C)  $\frac{14!}{5!}$                       (D)  $(9!)(5!)$

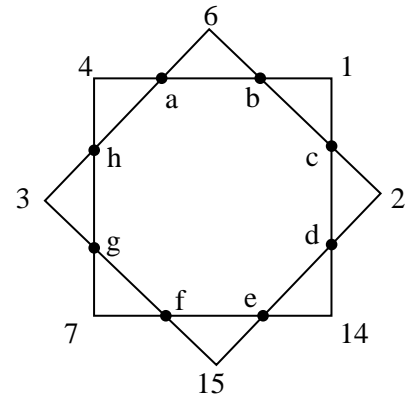
19. Refer figure.

Number from 1 to 16 are to be arranged such that sum of numbers in any straight line is 34.

Some numbers are already arranged and they do not change their position.

Find the numbers in place of dots 'a' to 'h'. Write the sum of a + e.

- (A) 19                      (B) 23  
(C) 21                      (D) 13



20. Refer figure.

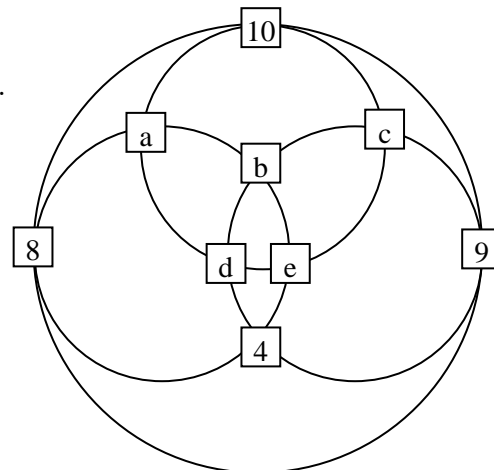
Sum of numbers surrounding all 4 circles is 27.

Numbers 4, 8, 9, 10 are already filled.

Fill the boxes 'a' to 'e' by using numbers 2, 3, 5, 6, 7.

Find the value of b.

- (A) 9  
(B) 6  
(C) 13  
(D) 7



**Answer Key**

- |         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1. (C)  | 2. (C)  | 3. (D)  | 4. (A)  | 5. (B)  |
| 6. (B)  | 7. (B)  | 8. (B)  | 9. (C)  | 10. (D) |
| 11. (C) | 12. (A) | 13. (B) | 14. (C) | 15. (C) |
| 16. (A) | 17. (D) | 18. (A) | 19. (C) | 20. (B) |

