

**IMO CLASS 10**

**Total Questions: 50**

**Time: 1 hr.**

**Section – 1 :** Verbal and Non-Verbal Reasoning.

**Section – 2 :** Real Numbers, Polynomials, Pair of Linear Equations in Two Variables, Quadratic Equations, Arithmetic Progressions, Triangles, Coordinate Geometry, Introduction to Trigonometry, Some Applications of Trigonometry, Circles, Constructions, Areas Related to Circles, Surface Areas and Volumes, Statistics, Probability.

**Section – 3 :** The Syllabus of this section will be based on the syllabus of Mathematical Reasoning and Quantitative Aptitude.

**Section – 4 :** Higher Order Thinking Questions - Syllabus as per Section – 2.

**SECTION 01 LOGICAL REASONING**

1. In the given question, which pair of numbers is different from the other three.

- A. 2197
- B. 2744
- C. 3375
- D. 4096

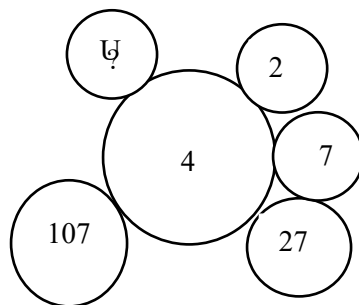
2. Keshav is taller than Vijay but shorter than Nitin, Nitin is taller than Kishan but shorter than Amar. If Vijay is taller than Kishan, then who is the shortest among them?

- A. Keshav
- B. Vijay
- C. Nitin
- D. Kishan

3. **Directions :** Choose the odd one out from the following :

- A. Taste
- B. Chew
- C. Gulp
- D. Swallow

4. **Directions :** Find the missing number in each of the following figure



- A. 407
- B. 427
- C. 417
- D. 327



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**Directions (Q. 5 to 6) :** Study the alpha-numeric series and answer the questions given below :  
EF7298AG43BMDNI6QR39XS8UZLH938T54YW

5. How many digits are there which are immediately preceded by a vowel but not followed by a digit?

- A. 0
- B. 2
- C. 1
- D. 3

6. How many vowels are immediately followed by an even number?

- A. 1
- B. 2
- C. 3
- D. 4

**Directions (7-10) :** In the following questions, two columns I and II have been given. In column I few words are given and in column II their codes have been given using a particular rule. The order of the smaller letter have been placed in jumbled up form. Decode the language and choose the alternative which is equal to the letter asked in the questions.

Column I

(1) DESIGN

Column II

(A) uklbjz

(2) INFORM

(B) cbxkqy

(C) ygzwxc

(D) bjuegw

(E) wcpybv

(F) vzcjlk

(3) MOTHER

(4) RIGHTS

(5) TAILOR

(6) GARDEN

7. What is the code for the letter N ?

(A) u (B) k

(C) c

(D) g

8. What is the code for the letter O ?

(A) y (B) k

(C) v

(D) c

9. What is the code for the letter G ?

(A) l (B) p

(C) b

(D) j

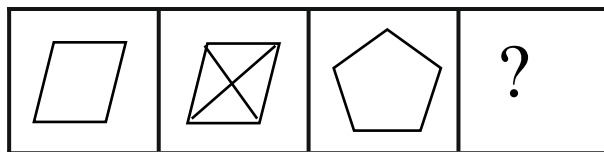
10. What is the code for the letter M ?

(A) g (B) y

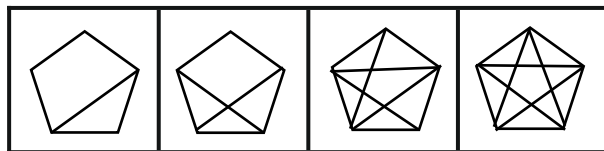
(C) v

(D) j

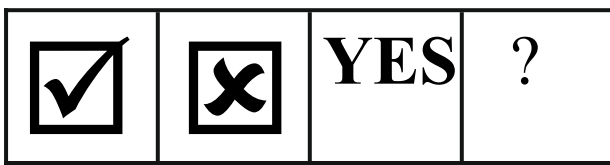
**Direction (11-12) :** In the following questions, problem figures 1 and 2 are related in a particular manner. Establish the same relationship between problem figures 3 and 4 by choosing a figure from amongst the four options, which would replace the question mark in fig. (4)



11. 1. 2. 3. 4.



(A) (B) (C) (D)



12.        1                      2.                      3.                      4.

<b>N</b>	<b>O</b>	<b>NO</b>	<b>no</b>
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(A)                      (B)                      (C)                      (D)

13. If  $x > 8$  and  $y > -4$ , then which one of the following is always true?

- (A)  $xy < 0$   
 (B)  $2x < -y$   
 (C)  $-x < 2y$   
 (D)  $x > y$

14. Which letter in the word AMAZING is the same number in the word (counting from the beginning) as it is in the alphabet?

- (A) N  
 (B) M  
 (C) I  
 (D) G

15. If '+' means '÷', '÷' means '-', '-' means '×', '×' means '+', then  $12 + 6 \div 3 - 2 \times 8 =$

- (A) -2  
 (B) 2  
 (C) 4  
 (D) 8

### SECTION02 MATHEMATICAL REASONING

16. Which of the following statements is correct ?

- (A) If  $x^6 + 1$  is divided by  $x + 1$ , then the remainder is -2.  
 (B) If  $x^6 + 1$  is divided by  $x - 1$ , then the remainder is 2.  
 (C) If  $x^6 + 1$  is divided by  $x + 1$ , then the remainder is 1.  
 (D) If  $x^6 + 1$  is divided by  $x - 1$ , then the remainder is -1.

17. If  $S_n$  denotes the sum of the first  $n$  terms in an Arithmetic Progression and  $S_1:S_4=1:10$  then the ratio of first term to fourth term is:

- (A) 1:3  
 (B) 2:3  
 (C) 1:4  
 (D) 1:5

18. Graph of a quadratic polynomial is a \_\_\_\_\_.

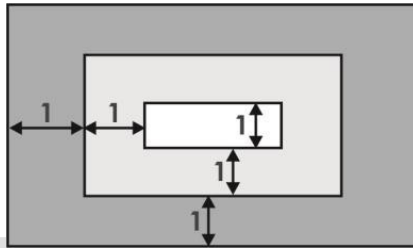
- (A) Straight line

- (B) Circle
- (C) Parabola
- (D) Ellipse

19. ABCD is a trapezium, such that AB, DC are parallel and BC is perpendicular to them. If  $\angle DAB = 45^\circ$ ,  $BC = 2$  cm and  $CD = 3$  cm then  $AB = ?$

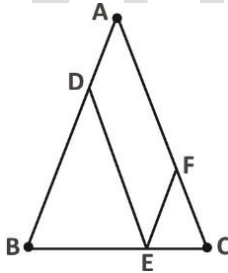
- (A) 5 cm
- (B) 4 cm
- (C) 3 cm
- (D) 2 cm

20. A rug is made with three different colours as shown. The areas of the three differently coloured regions from an arithmetic progression. The inner rectangle is one foot wide, and each of the two shaded regions is 1 foot wide on all four sides. What is the length in feet of the inner rectangle?



- (A) 1
- (B) 2
- (C) 3
- (D) 8

21. In  $\triangle ABC$ ,  $AB = AC = 28$  and  $BC = 20$ . Points D, E and F are on sides AB, BC and AC, respectively, such that DE, EF are parallel to AC, AB, respectively. What is the perimeter of parallelogram ADEF?



- (A) 48
- (B) 52
- (C) 56
- (D) 60

22. In a cricket match, Team A scored 232 runs without losing a wicket. The score consisted of byes, wides and runs scored by two opening batsmen: Ram and Shyam. The runs scored by the two batsmen are 26 times wides. There are 8 more byes than wides. If the ratio of the runs scored by Ram and Shyam is 6:7, then the runs scored by Ram is

- (A) 88
- (B) 96
- (C) 102
- (D) 112

23. Which of the following is possible ?

- (A)  $\cos \theta = 7/5$

(B)  $\sin\theta = 13/12$

(C)  $\sec\theta = 4/5$

(D)  $\tan\theta = 41$

24. Seven times of a two digit number is equal to four times the number obtained by reversing the order of digits and the sum of the digits is 3. Find the number.

(A) 12

(B) 10

(C) 15

(D) 20

25. One root of the quadratic equation  $2x^2 - x + \frac{1}{8} = 0$  is  $\frac{1}{4}$ . The other root is \_\_\_\_\_.

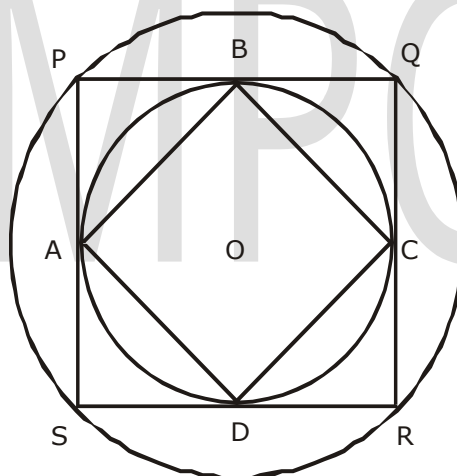
(A) 0

(B)  $1/4$

(C)  $1/8$

(D)  $-1/4$

26. The figure below shows two concentric circles with centre O. PQRS is a square inscribed in the outer circle. It also circumscribes the inner circle, touching it at points B, C, D and A. What is the ratio of the perimeter of the outer circle to that of polygon ABCD?



(A)  $\pi/4$

(B)  $3\pi/2$

(C)  $\pi/2$

(D)  $\pi$

27. Pairs of natural numbers whose least common multiple is 78 and the greatest common divisor is 13 are \_\_\_\_\_.

(A) 58 and 13 or 16 and 29

(B) 68 and 23 or 36 and 49

(C) 18 and 73 or 56 and 93

(D) 78 and 13 or 26 and 39

28. Match the column :

Column I

1. Probability of sure event is
2. Probability of impossible event is
3. If A and B are complementary events, then

Column II

- (A)  $\frac{1}{2}$
- (B) 0
- (C) 1
- (D)  $P(B) = 1 - P(A)$
- (E)  $P(A) = P(B)$

- (A)  $1 \rightarrow A, 2 \rightarrow B, 3 \rightarrow C$
- (B)  $1 \rightarrow B, 2 \rightarrow A, 3 \rightarrow C$
- (C)  $1 \rightarrow C, 2 \rightarrow B, 3 \rightarrow E$
- (D)  $1 \rightarrow C, 2 \rightarrow B, 3 \rightarrow D$

29. Two full tanks, one shaped like a cylinder and the other like a cone, contain jet fuel. The cylindrical tank holds 500 L more than the conical tank. After 200 L of fuel has been pumped out from each tank the cylindrical tank contains twice the amount of fuel in the conical tank. How many litres of fuel did the cylindrical tank have when it was full?

- (A) 700 L
- (B) 1000 L
- (C) 1100 L
- (D) 1200 L

30. If the circumference of a circle and the perimeter of a square are equal, then \_\_\_\_\_.

- (A) Area of the circle = Area of the square
- (B) Area of the circle > Area of the square
- (C) Area of the circle < Area of the square
- (D) Nothing definite can be said about the relation between the areas of the circle and square

31. If  $0 < p < 1$ , then roots of the equation  $(1-p)x^2 + 4x + p = 0$  are

- (A) Both 0
- (B) Imaginary
- (C) Real and both positive
- (D) Real and both negative

32. Two circles of radius 1 cm touch at point P. A third circle is drawn through the points A, B and C such that PA is the diameter of the first circle, and BC - perpendicular to AP - is the diameter of the second circle. The radius of the third circle is

- (A)  $\frac{9}{5}$
- (B)  $\frac{7}{4}$
- (C)  $\frac{5}{3}$

(D)  $\frac{5}{2}$

33. Median of the observation

$x_i$	5	6	7	8	9	10
$f_i$	4	5	7	9	7	6

is

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

34. . If  $x = (\sec A - \tan A)(\sec B - \tan B)(\sec C - \tan C) = (\sec A + \tan A)(\sec B + \tan B)(\sec C + \tan C)$ , then  $x =$

- (A) 0
- (B) 1
- (C) -1
- (D)  $\pm 1$

35. A toothed wheel of diameter 50 cm is attached to a smaller wheel of diameter 30 cm. How many revolutions will the smaller wheel make when the larger one makes 15 revolutions ?

- (A) 23
- (B) 24
- (C) 25
- (D) 26

### SECTION 03 EVERYDAY MATHEMATICS

36. In a certain factory, each day the expected number of accidents is related to the number of overtime hours by a linear equation. Suppose that on one day there were 1000 overtime hours logged and 8 accidents reported, and on another day there were 400 overtime hours logged and 5 accidents. What are the expected numbers of accidents when no overtime hours are logged?

- (A) 2
- (B) 3
- (C) 4
- (D) 5

37. ABCD is a rectangle. The points P and Q lie on AD and AB respectively. If the triangles PAQ, QBC and PCD all have the same areas and  $BQ = 2$  then  $AQ = ?$

- (A)  $1 + \sqrt{5}$
- (B)  $1 - \sqrt{5}$
- (C)  $\sqrt{7}$
- (D)  $2\sqrt{7}$

38. Triangle ABC has vertices A(0, 0), B(0, 6) and C(9, 0). The points P and Q lie on side AC such that  $AP = PQ = QC$ . Similarly, the points R and S lie on side AB such that  $AR = RS = SB$ . If the line segments PB and RC intersect at X, then the slope of the line AX is:

- (A)  $2/3$
- (B)  $-2/3$
- (C)  $3/2$
- (D)  $-3/2$

39. A management institute has six senior professors and four junior professors. Three professors are selected at random for a government project. The probability that at least one of the junior professors would get selected is:

- (A)  $5/6$
- (B)  $2/3$
- (C)  $1/5$
- (D)  $1/6$

40. n is the smallest positive integer such that for any integer  $n \geq m$ , the quantity  $n^3 - 7n^2 + 11n - 5$  is positive.

What is the value of  $n$ ?

- (A) 4
- (B) 5
- (C) 8
- (D) None of them

41. If  $a_1 = 1$  and  $a_{n+1} - 3a_n + 2 = 4n$  for every positive integer  $n$ , then  $a_{100}$  equals

- (A)  $3^{99} - 200$
- (B)  $3^{99} + 200$
- (C)  $3^{100} - 200$
- (D)  $3^{100} + 200$

42. Let  $S$  be the set of five-digit numbers formed by digits 1, 2, 3, 4 and 5, using each digit exactly once such that exactly two odd positions are occupied by odd digits. What is the sum of the digits in the rightmost position of the numbers in  $S$ ?

- (A) 228
- (B) 216
- (C) 294
- (D) 192

43. In what ratio must rice at Rs 7.20 per kg be mixed with rice at Rs 5.70 per kg so that the mixture be worth Rs 6.30 per kg.

- (A) 1 : 3
- (B) 2 : 3
- (C) 3 : 4
- (D) 4 : 5

44. A bank offers 5% compound interest calculated on a half-yearly basis. A customer deposits ₹ 1600 each on 1<sup>st</sup> January and 1<sup>st</sup> July of a year. At the end of the year, the amount he would have gained by way of interest is \_\_\_\_\_.

- (A) Rs 120
- (B) Rs 121
- (C) Rs 122
- (D) Rs 123

45. A forester wants to plant 66 apple trees, 88 banana trees and 110 mango trees in equal rows (in terms of number of trees). Also he wants to make distinct rows of trees (i.e., only one type of trees in one row). The number of minimum rows required are \_\_\_\_\_.

- (A) 2
- (B) 3
- (C) 10
- (D) 12

#### SECTION 04 ACHIEVER SECTION

46. The integers 1, 2, ..., 40 are written on a blackboard. The following operation is then repeated 39 times: In each repetition, any two numbers, say  $a$  and  $b$ , currently on the blackboard are erased and a new number  $a + b - 1$  is written. What will be the number left on the board at the end?

- (A) 820
- (B) 821
- (C) 781
- (D) 819

47. The number of common terms in the two sequences 17, 21, 25, ..., 417 and 16, 21, 26, ..., 466 is



- (A) 78
- (B) 19
- (C) 20
- (D) 77

48. In a triangle ABC, the lengths of the sides AB and AC equal 17.5 cm and 9 cm respectively. Let D be a point on the line segment BC such that AD is perpendicular to BC. If  $AD = 3$  cm, then what is the radius (in cm) of the circle circumscribing the triangle ABC?

- (A) 17.05
- (B) 27.85
- (C) 22.45
- (D) 26.25

49. Rahim plans to drive from city A to station C, at the speed of 70 km per hour, to catch a train arriving there from B. He must reach C at least 15 minutes before the arrival of the train. The train leaves B, located 500 km south of A, at 8:00 am and travels at a speed of 50 km per hour. It is known that C is located between west and north west of B, with BC at  $60^\circ$  to AB. Also, C is located between south and south west of A with AC at  $30^\circ$  to AB. The latest time by which Rahim must leave A and still catch the train is closest to

- (A) 6 : 15 am
- (B) 6 : 30 am
- (C) 6 :45 am
- (D) 7 : 00 am

50. Three consecutive positive integers are raised to the first, second and third powers respectively and then added. The sum so obtained is perfect square whose square root equals the total of the three original integers. Which of the following best describes the minimum, say  $m$ , of these three integers?

- (A)  $1 \leq m \leq 3$
- (B)  $4 \leq m \leq 6$
- (C)  $7 \leq m \leq 9$
- (D)  $10 \leq m \leq 12$

# OLYMP QUIZ

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