

# MATHS OLYMPIAD

PRACTICE BOOK



GRADE  
**10**

The Math Olympiad series is an initiative of International Society for Olympiad (ISFO)

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# Preface

Our education system effectively provides an introduction to the concepts of Math and Science and helps us understand the underlying concepts. But in its overly generalized approach, which aims to enlighten and test all students of varying caliber and interests, it leaves the exploration of application of all these concepts completely on the students.

This workbook is designed to enable students to explore Maths effectively. Designed in accordance with the requirements of the Maths Olympiads, the workbook is an efficient tool to achieve comprehensive success at the **ISFO – Maths Olympiad**.

The main aim of this workbook is to assist students in developing and improving their ability to solve problems.

Each chapter of the book consists of 3 sets of questions.

- **Section A** (Mathematical Reasoning) : This section is created to test the knowledge of mathematical concepts and topic pertaining to the respective grades.
- **Section B** (Everyday Maths) : This section deals with the application.
- **Section C** (BrainBox) : Questions to prepare students with HOTS (Higher Order Thinking Skills) based on the syllabus provided.

**Logical Reasoning** section is provided to equip students with verbal and non-verbal analysis and reasoning skills.

**Sample Test Papers** and Answer keys have been provided to accelerate the learning process.





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## SECTION - A : MATHEMATICAL REASONING

1. For some integer m, even integer is of the form
  - a. m
  - b.  $m + 1$
  - c.  $2m$
  - d.  $2m + 1$
2. If the HCF of 65 and 117 is expressible in the form  $65m - 117$ , then the value of m is
  - a. 4
  - b. 2
  - c. 1
  - d. 3
3. For some integer q, every odd integer is of the form
  - a. q
  - b.  $2q$
  - c.  $q + 1$
  - d.  $2q + 1$
4. The product of HCF and LCM for the numbers 189 and 297 is
  - a. 57,633
  - b. 56,337
  - c. 56,133
  - d. 56,733
5. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
  - a. 10
  - b. 100
  - c. 504
  - d. 2520
6. The decimal expression of the number  $\frac{441}{2^2 \times 5^3 \times 7}$  is a
  - a. terminating decimal
7.  $\pi - \frac{22}{7}$  is a/an
  - a. rational number.
  - b. irrational number.
  - c. prime number.
  - d. even number.
8. The LCM of  $2^3 \times 3^2$  and  $2^2 \times 3^3$  is
  - a.  $2^3$
  - b.  $3^3$
  - c.  $2^3 \times 3^3$
  - d.  $2^2 \times 3^2$
9. The decimal expansion of the rational number  $\frac{14587}{1250}$  will terminate after
  - a. one decimal place.
  - b. two decimal places.
  - c. three decimal places.
  - d. four decimal places.
10. If two positive integers p and q can be expressed as  $p = ab^2$  and  $q = a^3b$ , where a, b are prime numbers, then the LCM of (p, q) is
  - a.  $ab$
  - b.  $a^2b^2$
  - c.  $a^3b^2$
  - d.  $a^3b^3$

11.  $\sqrt{5} - 3 - 2$  is
- a rational number.
  - a natural number.
  - equal to zero.
  - an irrational number.
12. If the HCF of  $(306, 1314) = 18$ , then the LCM of  $(306, 1314)$  is
- 22,330
  - 22,335
  - 22,336
  - 22,338
13. What is the value of  $x$  and  $y$ ?
- 
14. For any positive integer  $a$  and 3, there exists unique integers  $q$  and  $r$  such that  $a = 3q + r$ , where  $r$  must be
- $0 \leq r < 3$
  - $1 < r < 3$
  - $0 < r < 3$
  - $0 < r \leq 3$
15. The HCF of the smallest composite number and the smallest prime number is
- 4
  - 2
  - 1
  - None of these
16. The HCF and LCM of two numbers are 33 and 264, respectively. When the first number is completely divided by 2, and the quotient is 33, then the other number is
- 66
  - 130
  - 132
  - 196
17. If  $A = 2n + 13$ ,  $B = n + 7$ , where  $n$  is a natural number, then HCF of  $A$  and  $B$  is
- 2
  - 1
  - 3
  - 4
18. Two natural numbers whose sum is 85 and the least common multiple is 102 are
- 30 and 55
  - 17 and 68
  - 35 and 55
  - 51 and 34
19. A rational number can be expressed as a terminating decimal if the denominator has \_\_\_\_\_ as factors.
- 2, 3 or 5
  - 2 or 3
  - 3 or 5
  - 2 or 5
20.  $(119)^2 - (111)^2$  is a/an
- prime number.
  - composite number.
  - odd prime number.
  - odd composite number.

## SECTION - B : EVERYDAY MATHS

21. The areas of three fields are  $165\text{ m}^2$ ,  $195\text{ m}^2$  and  $285\text{ m}^2$ , respectively. From these, flower beds of equal size are to be made. If the breadth of each bed be 3 meters, then what will be maximum length of each bed?
- a. 4 m
  - b. 5 m
  - c. 6 m
  - d. 7 m
22. Four bells toll at an interval of 8, 12, 15 and 18 seconds, respectively. All the four begin to toll together. How many times will they toll together in one hour excluding the one at the beginning?
- a. 9 times
  - b. 10 times
  - c. 11 times
  - d. 12 times
23. A forester wants to plant 66 apple trees, 88 banana trees and 110 mango trees in rows of equal number of trees. Also, he wants to have distinct rows of trees with only one type of tree in one row. The minimum number of rows required is
- a. 10
  - b. 1
24. On a morning walk, three persons step off together and their steps measures 40 cm, 42 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps?
- a. 2530 cm
  - b. 2520 cm
  - c. 4520 cm
  - d. None of these
25. There is a circular path around a sports field. Sonia takes 18 minutes for completing one round of field while Ravi takes 12 minutes for the same. Suppose they both start at the same time, and go in the same direction. After how many minutes will they meet again at the starting point?
- a. 40 minutes
  - b. 36 minutes
  - c. 42 minutes
  - d. None of these

## SECTION - C : BRAINBOX

26. The LCM of two numbers is 14 times its HCF. The sum of LCM and HCF is 600. If one number is 280, then the other number is
- a. 40
  - b. 60
  - c. 80
  - d. 100
27. Which of following is incorrect?
- a. The square of an odd integer is of the form  $4q + 1$ , for some integer q.
  - b.  $9^x$  cannot end with digit 2, for any integer x.
  - c. The prime factorisation of 546 is equal to  $2 \times 5 \times 7 \times 13$ .
  - d. All terminating decimals and repeating decimals are rational numbers.

28. Which of the following is incorrect?

- | <b>Column I</b>  | <b>Column II</b>                  |
|--|-----------------------------------|
| (P) $\frac{a+b}{2}$ is a rational number between           | (i) composite number              |
| (Q) The sum of a rational and an irrational number is an   | (ii) 13                           |
| (R) Given that LCM (91, 26) = 182, then the HCF (91, 26) = | (iii) irrational number           |
| (S) $7 \times 11 \times 13 + 11$ is a                      | (iv) two rational numbers a and b |
- a. P → iv, Q → iii, R → ii, S → i  
 b. P → iii, Q → iv, R → ii, S → i  
 c. P → iv, Q → ii, R → iii, S → i  
 d. P → i, Q → iii, R → ii, S → iv

29. If 'd' is the HCF of two positive integers a and b, then there exists two integers k and e such that

- a.  $a = kd + eb$
- b.  $b = ka + ed$
- c.  $d = ka + eb$
- d. None of these

30. Which of the following is an irrational number?

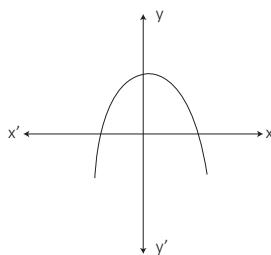
- a.  $\sqrt{4}$
- b.  $\sqrt{1.44}$
- c.  $-\sqrt{.64}$
- d.  $3\sqrt{18}$

Darken your choice with HB pencil -

1. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	9. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	17. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	25. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
2. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	10. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	18. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	26. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
3. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	11. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	19. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	27. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
4. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	12. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	20. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	28. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
5. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	13. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	21. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	29. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
6. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	14. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	22. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	30. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
7. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	15. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	23. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	
8. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	16. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	24. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	

## SECTION - A : MATHEMATICAL REASONING

1. The graph of  $y = P(x)$  is given in the figure shown below. The number of zeros of  $P(x)$  is



- a. 2      b. 3  
c. 4      d. 1
2. The sum of the zeros of the polynomial  $2x^2 + 2x - 12$  is  
a. 2      b. -2  
c. -1      d. 0
3. For what value of  $k$ ,  $(-4)$  is the zero of the polynomial  $x^2 - x - (2k + 2)$ ?  
a. 8      b. 9  
c. 7      d. 6
4. If  $\alpha$ ,  $\beta$  and  $\gamma$  are the zeros of  $2x^3 - 4x^2 + 5x + 6$ , then the value of  $\alpha + \beta + \gamma$  is  
a. 2      b. 3  
c. 4      d. 6
5. If  $\alpha$  and  $\beta$  are the zeros of quadratic polynomial  $x^2 - 7x + 10$ , then the value of  $\alpha^3 + \beta^3$  is  
a. 133      b. 120  
c. 124      d. 139

6. The quadratic polynomial, in which the sum and the product of zeros is 0 and  $\sqrt{5}$ , respectively is

- a.  $x^2 + \sqrt{5}$       b.  $x^2 + x + \sqrt{5}$   
c.  $x^2 + \sqrt{5}x + 1$       d. None of these.

7. If the product of the zeros of the polynomial  $ax^2 - 6x - 6$  is 4, then the value of  $a$  is

- a.  $\frac{5}{2}$       b.  $\frac{4}{3}$   
c.  $\frac{-5}{9}$       d.  $\frac{-3}{2}$

8. If the polynomial  $x^3 - 3x^2 + Kx + 42$  is divisible by  $x + 3$ , then the value of  $K$  is

- a. -4      b. -3  
c. -2      d. -5

9. If one of the zeros of a cubic polynomial  $ax^3 + bx^2 + cx + d$  is zero, then the product of the other two zeros is

- a.  $\frac{-c}{a}$       b.  $\frac{c}{a}$   
c.  $\frac{a}{c}$       d.  $\frac{-a}{c}$

10. The zeros of the quadratic polynomial  $x^2 + 99x + 127$  is/are

- a. negatives.  
b. positives.  
c. both negative and positive.  
d. none of these.

11. When  $x^3 + 2x^2 + 4x + 6$  is divided by  $x + 1$ , the quotient is  $x^2 + ax + 3$ , and the remainder is  $-3 + 2b$ . What is the respective value of  $a$  and  $b$ ?
- $a = 2, b = 0$
  - $a = 0, b = 2$
  - $a = 1, b = 3$
  - $a = 3, b = 0$
12. If one zero of the polynomial  $ax^2 + bx + c$  is double than the other, then  $2b^2$  is
- $8ac$
  - $7ac$
  - $6ac$
  - $9ac$
13. What will be the remainder if you divide  $x^3 - 3x^2 - 3x + 1$  by  $x + 1$ ?
- 0
  - 1
  - 2
  - 1
14. What will be the quotient (Q) and remainder (R), if  $x^5 - 4x^3 + x^2 + 3x + 1$  is divided by  $x^3 - 3x + 1$ ?
- $Q = 0, R = x - 1$
  - $Q = x^2 - 1, R = 2$
  - $Q = x + 1, R = 2$
  - $Q = x^2 - 1, R = 3.$
15. If the polynomial  $x^3 - hx^2 - 13x + k$  has  $(x - 1)$  and  $(x + 3)$  as its factor, then the value of  $h$  and  $k$ , respectively is
- 3 and 15
  - 4 and 9
  - 4 and 15
  - 9 and 11
16. Which of following statements is incorrect?
- A quadratic polynomial can have at most two zeros.
  - The zeros of a polynomial  $p(x)$  are precisely the  $x$ -coordinates of the points, where the graph of  $y = p(x)$  intersects the  $x$ -axis.
- c. If  $\alpha, \beta$  and  $\gamma$  are the zeros of polynomial  $6x^3 + 3x^2 - 5x + 1$ , then the value of  $\alpha^{-1} + \beta^{-1} + \gamma^{-1}$  is 5.
- d.  $x^2 + 3x + 1$  is not a factor of  $3x^4 + 5x^3 - 7x^2 + 2x + 2$ .
17. Which of the given polynomials  $f(x)$ ,  $g(x)$ ,  $q(x)$  and  $r(x)$  satisfies  $f(x) = g(x) \cdot q(x) + r(x)$ , where degree  $r(x) = 0$ .
- $f(x) = x^2 + 1, g(x) = x + 1, q(x) = (x - 1), r(x) = 2$
  - $f(x) = x^3 - 3x + 1, g(x) = x^2 + 1, q(x) = x + 1, r(x) = 3$
  - $f(x) = x^3 - 6x^2 + 11x - 6, g(x) = x^2 - 8x, q(x) = x + 2, r(x) = -60$
  - None of these
18. If one of the zeros of the cubic polynomial  $x^3 + ax^2 + bx + c$  is  $-1$ , then the product of the other two zeros is
- $b - a - 1$
  - $b - a + 1$
  - $b + a - 1$
  - $b + a + 1$
19. If  $-1$  is one of the zeros of the cubic polynomial  $15x^3 + 14x^2 - 3x - 2$ , then the other two zeros are
- $\frac{3}{2}$  and  $-\frac{1}{3}$
  - $-\frac{3}{2}$  and  $\frac{1}{3}$
  - $\frac{4}{3}$  and  $\frac{1}{2}$
  - $\frac{2}{5}$  and  $-\frac{1}{3}$
20. A quadratic polynomial, whose zeros are  $6$  and  $2$ , is
- $x^2 - 7x + 8$
  - $x^2 - 8x + 12$
  - $x^2 - 8x + 11$
  - $x^2 + 7x - 8$

## SECTION - B : EVERYDAY MATHS

21. If A donates ₹ $\alpha$  and B donates ₹ $\beta$  to poor people in such a way that  $\alpha$  and  $\beta$  are the zeros of the quadratic polynomial  $f(x) = x^2 - 5x + 4$ .

The value of the donated money is

- ₹10
- ₹8
- ₹5
- ₹20

22. If 'K' is number of honest students in class VIII such that one zero of the quadratic polynomial  $x^2 - 5x + K$  is 2, then how many honest students are there in the class?
- 10
  - 6
  - 8
  - 5
23. A school has decided to give awards to their students for three values—honesty ( $\alpha$ ) punctuality ( $\beta$ ) and obedience ( $\gamma$ ). School has decided to give 3 awards for honesty, 1 for punctuality and 2 for obedience. Choose the polynomial from the following whose zeros are depicting the number of awards for honesty, punctuality and obedience.
- $x^3 - 6x^2 + 11x - 6$
  - $x^3 - 2x^2 + 10x - 5$
  - $x^3 - x^2 + 7x - 5$
  - None of these
24. If the number of sweets distributed among the students are zeros of the polynomial  $2x^4 + 7x^3 - 19x^2 - 14x + 30$ , and the two zeros are  $\sqrt{2}$  and  $-\sqrt{2}$ , then the other two zeros are
- $\sqrt{3}$  and  $-5$
  - $\frac{3}{2}$  and  $-5$
  - $\frac{4}{3}$  and  $-5$
  - $\sqrt{5}$  and  $-5$
25. If the length of the rectangle is  $(x^2 - 3x + 2)$  units whose area is  $(2x^3 - 7x^2 + x - 2)$  sq. units, then the breadth of the rectangle is
- $2x + 1$
  - $2x - 3$
  - $2x + 4$
  - $2x - 1$

### SECTION - C : BRAINBOX

26. If the zeros of the polynomial  $2x^3 - 15x^2 + 37x - 30$  are in AP, then all the zeros of the polynomial are
- $\frac{7}{2}$  and 3
  - $2, \frac{5}{2}$  and 3
  - 2, 1 and 3
  - 4, 5 and 6
27. Read the following statements.
- Statement 1: The graph of  $y = -3(x + 2)^2 - 9$  has no x-intercepts.
- Statement 2: The only value of K, for which the quadratic polynomial  $Kx^2 + x + K$  has equal zeros, is  $\frac{1}{2}$ .
- Which of the following is the correct option?
- Both statements are false.
  - Both statements are true.
- c. Statement 1 is false and statement 2 is true.
- d. Statement 1 is true and statement 2 is false.
28. When  $x^5 - 5x^4 + 9x^3 - 6x^2 - 16x + 13$  is divided by  $x^2 - 3x + a$ , the quotient and remainder are  $x^3 - 2x^2 + x + 1$  and  $-15x + 11$ , respectively. The value of 'a' is
- 3
  - 5
  - 2
  - 10
29. If the zeros of the polynomial  $x^2 + px + q$  are double the zeros of the polynomial  $2x^2 - 5x - 3$ , respectively, then the values of 'p' and 'q' are, respectively
- 5 and -6
  - 4 and -3
  - 6 and -9
  - 2 and -3

30. If  $\alpha$ ,  $\beta$  and  $\gamma$  are the zeros of the cubic polynomial  $x^3 + 4x + 2$ , then the value of  $\frac{1}{\alpha+\beta} + \frac{1}{\beta+\gamma} + \frac{1}{\gamma+\alpha}$  is
- a. 4      b. 2      c. 6      d. 10

Darken your choice with HB pencil -

1.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	9.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	17.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	25.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
2.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	10.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	18.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	26.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
3.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	11.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	19.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	27.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
4.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	12.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	20.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	28.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
5.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	13.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	21.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	29.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
6.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	14.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	22.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	30.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
7.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	15.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	23.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d		
8.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	16.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	24.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d		

# Pair of Linear Equations in Two Variables

## SECTION - A : MATHEMATICAL REASONING

1. If a pair of linear equations is consistent, then the lines will be
  - a. parallel
  - b. always coincident
  - c. intersecting or coincident
  - d. always intersecting
2. The pair of equations  $y = 0$  and  $y = -9$  has
  - a. one solution.
  - b. two solutions.
  - c. infinitely many solutions.
  - d. no solution.
3. For what values of K, do the equations  $3x - y + 8 = 0$  and  $6x - Ky = -16$  represent coincident lines ?
  - a.  $\frac{1}{2}$
  - b.  $-\frac{1}{2}$
  - c. 2
  - d. -2
4. The pair of equations  $x = a$  and  $y = b$  graphically represent lines which are
  - a. parallel
  - b. intersecting at  $(b, a)$
  - c. coincident
  - d. intersecting at  $(a, b)$
5. In one equation of a pair of dependent linear equations is  $-5x + 7y = 2$ , then the second equation will be
  - a.  $10x + 14y + 4 = 0$
  - b.  $-10x - 14y + 4 = 0$
6. The value of 'c' for which the pair of equations  $cx - y = 2$  and  $6x - 2y = 3$  will have infinitely many solutions is
  - a. 3
  - b. -3
  - c. -12
  - d. none of these
7. A pair of linear equations, which has a unique solution as  $x = 2$  and  $y = -3$ , is
 

$x + y = -1$	$2x + 5y = -11$
$2x - 3y = -5$	$4x + 10y = -22$
$2x - y = -1$	$x - 4y - 14 = 0$
$3x + 2y = 0$	$5x - y = 13$
8. If  $x = a$  and  $y = b$  is the solution of the equations  $x - y = 2$  and  $x + y = 4$ , then the value of a and b is, respectively
  - a. 3 and 5
  - b. 5 and 3
  - c. 3 and 1
  - d. -1 and -3
9. The solutions of the equations  $\frac{x+4}{4} + \frac{y+3}{5} = 2$  and  $\frac{2x+1}{3} - \frac{y+5}{2} = 2$  is
 

$x = 4$ and $y = 3$	$x = 4$ and $y = -3$
$x = -4$ and $y = -3$	$x = -4$ and $y = -3$
10. If the lines given by  $3x + 2Ky = 2$  and  $2x + 5y + 1 = 0$  are parallel, then the value of K would be
 

$\frac{-5}{4}$	$\frac{2}{5}$
$\frac{15}{4}$	$\frac{3}{2}$

11. If a pair of linear equations is inconsistent then the lines representing them will be
- parallel
  - coincident
  - intersecting or coincident
  - intersecting
12. If  $ax + by = a^2 - b^2$  and  $bx + ay = 0$ , then the value of  $(x + y)$  is
- $a^2 - b^2$
  - $b - a$
  - $a - b$
  - $a^2 + b^2$
13. The value of  $K$ , for which the pair of linear equations  $4x + 6y - 1 = 0$  and  $2x - Ky = 7$  represent parallel lines, is
- 2
  - 3
  - 4
  - 2
14. If  $4x + 3y = 18xy$  and  $2x - 5y + 4xy = 0$ , then the value of  $x$  and  $y$ , respectively will be
- $\frac{1}{2}$  and  $\frac{1}{3}$
  - $\frac{1}{4}$  and  $\frac{1}{3}$
  - $\frac{-1}{2}$  and  $\frac{-1}{3}$
  - 1 and -3
15. The solution of system of equations  

$$x - y = 0.9 \text{ and } \frac{11}{2(x+y)} = 1$$
 is
- $x = 3.2, y = 2.3$
  - $x = 4, y = 3$
  - $x = 2.3, y = 3.2$
  - $x = 4.3, y = 2.3$
16. If the difference between two numbers is 26 and one of the numbers is three times the other, then the numbers are
- 23 and 31
  - 39 and 14
  - 39 and 13
  - 14 and 31
17. The larger of two supplementary angles exceeds the smaller by  $18^\circ$ , then the measure of the angles are
- $99^\circ$  and  $81^\circ$
  - $71^\circ$  and  $91^\circ$
  - $99^\circ$  and  $26^\circ$
  - $26^\circ$  and  $27^\circ$
18. The solution of the system of equations  

$$\frac{1}{2x} + \frac{1}{3y} = 2 \text{ and } \frac{1}{3x} + \frac{1}{2y} = \frac{13}{6}$$
 is
- $\frac{1}{2}$  and  $\frac{1}{4}$
  - $\frac{2}{3}$  and  $\frac{4}{5}$
  - $\frac{1}{2}$  and  $\frac{1}{3}$
  - $\frac{4}{7}$  and  $\frac{3}{5}$
19. A two digit number is formed in such a way that the product of the digits is 14. When 45 is added to the number, then the digits interchange their places. The number is
- 73
  - 28
  - 82
  - 27
20. In a  $\triangle ABC$ ,  $\angle C = 3$ ,  $\angle B = 2(\angle A + \angle B)$ . The measure of three angles are
- $20^\circ, 40^\circ$  and  $120^\circ$
  - $40^\circ, 60^\circ$  and  $70^\circ$
  - $70^\circ, 60^\circ$  and  $45^\circ$
  - $90^\circ, 75^\circ$  and  $45^\circ$

## SECTION - B : EVERYDAY MATHS

21. The cost of 25 pencils and 20 erasers is ₹100. If the cost of an eraser is more than the cost of the pencil by 50 paise, then what will be the cost of three pencils and four erasers?
- ₹20
  - ₹30
  - ₹16
  - ₹25
22. A train crosses a 90 m long platform in 30 seconds and a man standing on the platform in 15 seconds, then the speed of the train is
- 20 km/h
  - 21.6 km/h
  - 26.1 km/h
  - 27.1 km/h

23. If four men and six women can do a piece of work in 8 days while three men and seven women can do it in 10 days, then the number of days in which 10 women can do the same work is
- 45 days
  - 43 days
  - 40 days
  - 39 days
24. Raman says, "Give me a 100-rupee note, Ravi! I shall then become twice as rich as you". Ravi, then replies, 'if you give me 10-rupee note I will be six times as rich as you.' How much money do they have?
- ₹160 and ₹60
  - ₹40 and ₹170
  - ₹90 and ₹45
  - ₹60 and ₹75
25. A person can row downstream 20 km in two hours and upstream 4 km in two hours. The man's speed of rowing in still water and the speed of current, respectively, is
- 6 km/h and 4 km/h
  - 10 km/h and 8 km/h
  - 10 km/h and 40 km/h
  - None of these

### SECTION - C : BRAINBOX

26. The students of a class are made to stand in rows. If 3 students are extra in a row, then there would be 1 less row. If three students are less in a row, then there would be two more rows. The number of students in the class is
- 40
  - 60
  - 36
  - 63
27. 90% and 97% pure acidic solutions are mixed to obtain 21 litres of 95% pure acidic solution. The amount of each type of acid to be mixed to form the mixture is
- 6 litres and 15 litres
  - 17 litres and 20 litres
  - 9 litres and 16 litres
  - 10 litres and 22 litres
28. Which of the following options is incorrect?
- For  $\frac{x}{a} + \frac{y}{b} = a + b$  and  $\frac{x}{a} - \frac{y}{b} = a - b$ , the solutions are  $x = a^2$  and  $y = b^2$ .
  - For  $ax + by = a - b$  and  $bx - ay = a + b$ , the solutions are  $x = 1$  and  $y = -1$ .
  - For  $\frac{y}{x} + 3y = 7$  and  $\frac{6}{x} - 4y = -5$ , the solutions are  $x = 2$  and  $y = 2$ .
  - The line represented by  $x = 5$  is parallel to the x-axis.
29. A train covered a certain distance at a uniform speed. If the train would have been 10 km/h faster, then it would have taken two hours less than the scheduled time, and if the train was slower by 10 km/h, then it would have taken three hours more than the scheduled time. The distance covered by the train is
- 500 km
  - 700 km
  - 600 km
  - 1000 km

30. A person buys a horse and a cart for ₹1200. He sells the horse at 12% profit and cart at 6% loss. If he makes a profit of 6% on the whole deal, then the cost of the horse is
- a. ₹400
  - b. ₹800
  - c. ₹1600
  - d. None of these

Darken your choice with HB pencil -

1.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
2.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
3.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
4.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
5.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
6.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
7.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
8.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

9.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
10.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
11.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
12.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
13.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
14.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
15.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
16.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

17.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
18.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
19.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
20.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
21.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
22.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
23.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
24.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

25.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
26.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
27.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
28.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
29.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
30.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

## SECTION - A : MATHEMATICAL REASONING

1. Which of the following is a quadratic equation?
  - a.  $x^4 - 2x^2 + 1$
  - b.  $x + \frac{1}{x} = x^2$
  - c.  $(2x + 1)(3x + 2) = 6(x - 1)(x - 2)$
  - d.  $7x = 2x^2$
2. The two consecutive odd natural numbers, sum of whose squares is 202, are
  - a. 7 and 13
  - b. 9 and 11
  - c. 13 and 9
  - d. 11 and 15
3. Which of the following is a whole number, which when decreased by 20 is equal to 69 times the reciprocal of the number?
  - a. 24
  - b. 23
  - c. 26
  - d. 28
4. Which constant must be added and subtracted to solve the given quadratic equation  $9x^2 + \frac{3}{4}x - \sqrt{2} = 0$ ?
  - a.  $\frac{1}{64}$
  - b.  $\frac{1}{65}$
  - c.  $\frac{1}{67}$
  - d.  $\frac{1}{45}$
5. If 2 is a root of the equation  $x^2 - 10x + K = 0$ , then the value of K is
  - a. 18
  - b. 16
  - c. 15
  - d. 14
6. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 - 5x + K = 0$ , then what is the value of K such that  $\alpha - \beta = 1$ ?
  - a. 1
  - b. 3
  - c. 4
  - d. 6
7. If one root of the equation  $5x^2 + 13x + K = 0$ , is the reciprocal of the other, then the value of K is
  - a. 5
  - b. 6
  - c. 8
  - d. 10
8. What values of 'x' satisfy the equation  $4^x - 5(2^x) + 4 = 0$ ?
  - a. 0, 3
  - b. 0, 4
  - c. 0, 2
  - d. 4, 2
9. The value(s) of 'p' for which the quadratic equation  $4x^2 - 3px + 9 = 0$  has real roots, is
  - a.  $p \geq 4$  or  $p \leq -4$
  - b.  $p \geq 3$  or  $p \leq \sqrt{3}$
  - c.  $p \geq -4$  or  $p \leq 4$
  - d.  $p \geq 7$  or  $p \leq 0$
10. The roots of the equation  $a^2 b^2 x^2 - (4b^4 - 3a^4)x - 12a^2 b^2 = 0$  are
  - a.  $\frac{4b^2}{a^2}$  and  $\frac{7b^2}{a^2}$
  - b.  $\frac{4b^2}{a^2}$  and  $\frac{-3a^2}{b^2}$
  - c.  $\frac{4b^2}{a^2}$  and  $\frac{7b^2}{5}$
  - d. None of these
11. For what value of K,  $x = \sqrt{2}$  is the solution of the equation  $Kx^2 + \sqrt{2}x - 4 = 0$ ?
  - a. 2
  - b. 5
  - c. 1
  - d. 0

12. The roots of the equation  $x^2 + 3x - m(m + 3) = 0$ , where  $m$  is a constant, are
- $-m, m + 2$
  - $m, m + 3$
  - $m, -(m + 3)$
  - $m, m - 1$
13. The sum of the squares of three consecutive natural numbers is 110. The numbers are
- 4, 5 and 6
  - 3, 4 and 5
  - 2, 3 and 4
  - 5, 6 and 7
14. A natural number is greater than twice its square root by 3. The natural number is
- 9
  - 8
  - 10
  - 7
15. Two numbers differ by 3 and their product is 504. The possible numbers are
- 22, -23 or 23, 22
  - 24, 27 or 24, 27
  - 21, -24 or 24 and 21
  - None of these
16. The sides of a right-angled triangle are  $x - 1, x$  and  $x + 1$ . The sides of the triangle are
- 5, 6 and 7
  - 3, 4 and 5
  - 2, 3 and 4
  - 7, 9 and 10
17. Choose the polynomial from the following whose roots are real and equal.
- $2x^2 - 4x + 3 = 0$
  - $x^2 - 4x + 4 = 0$
  - $x^2 - 2\sqrt{2}x - 6 = 0$
  - None of these
18. If the roots of the equation  $x^2 + px + q = 0$  are 1 and 2, then the roots of the equation  $qx^2 - px + 1 = 0$  must be
- 1 and  $\frac{-1}{2}$
  - 2 and -3
  - 4 and 5
  - 0 and 1
19. The roots of the equation  $x^2 - 3x - m(m + 3) = 0$ , where  $m$  is a constant, are
- $m, \frac{3m+7}{2}$
  - $m, 4m + 7$
  - $-m, \frac{2m+6}{2}$
  - $\frac{-m+6}{2}, m$
20. If the roots of the equation  $ax^2 + 2bx + c = 0$  are  $\alpha$  and  $\beta$ , then the value of  $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}}$  is
- $\frac{2b}{\sqrt{a}}$
  - $\frac{-2b}{\sqrt{ac}}$
  - $\frac{2c}{\sqrt{ab}}$
  - $\frac{2a}{\sqrt{bc}}$

## SECTION - B : EVERYDAY MATHS

21. A cyclist cycles non-stop from A to B and covers a distance of 14 km at a certain average speed. If the average speed reduces by 1 km per hour, he takes  $\frac{1}{3}$  hour more to cover the same distance. The original speed of the cyclist is
- 6 km/hr
  - 8 km/hr
  - 7 km/hr
  - 10 km/hr
22. The sum of the ages of a father and his son is 45 years. Five years ago, the product
- of their ages was 124. Their present ages, respectively are
- 36 years and 9 years
  - 45 years and 8 years
  - 35 years and 10 years
  - 37 years and 8 years
23. A rectangular parking lot is 30 units long and 20 units wide. An equal number of units are to be added to the length and the width of the rectangle so that the area of the parking lot is doubled. The dimensions of the new parking lot are

- a. 60 units and 50 units  
 b. 50 units and 100 units  
 c. 40 units and 30 units  
 d. 40 units and 70 units
24. A plane left 30 minutes later than the scheduled time. In order to reach its destination on time, which is 1500 km away, it has to increase its speed from its usual speed by 250 km/h. Its usual speed is  
 a. 650 km/h      b. 750 km/h  
 c. 700 km/h      d. 900 km/h

## SECTION - C : BRAINBOX

26. On solving  $\frac{x^{2002} + 4x^{2001}}{4x^{2000}} = 2449.25$ , the value of x is  
 a. 97      b. 102  
 c. -100      d. 98
27. The roots of  $\frac{5}{2-x} + \frac{x-5}{x+2} + \frac{3x+8}{x^2-4} = 0$  is  
 a. 2 and 8      b. 1 and 8  
 c. 2 and 7      d. 4 and 6
28. One-fourth of a herd of sheep was seen in the forest. Twice the square root of the herd went to the mountains and the remaining 15 were seen on the bank of a river. The total number of sheep is  
 a. 36      b. 49  
 c. 47      d. 50
29. Read the following statements.  
 Statement 1:  $(x^2 + 1)^2 - x^2 = 0$  has no real roots.  
 Statement 2:  $x^2 - 2\sqrt{2}x - 6 = 0$  has real and unequal roots.  
 Which of the following is the correct option?  
 a. Both statements are true.  
 b. Both statements are false.  
 c. Statement 1 is true and statement 2 is false.  
 d. Statement 1 is false.
30. If the equation  $(1+m^2)x^2 + 2mcx + (c^2 - a^2) = 0$  has equal roots, then  $c^2 =$   
 a.  $a^2(m^2 + 2)$       b.  $a^2(m^2 + 3)$   
 c.  $a^2(1 + m^2)$       d.  $a^2(m^2 + 4)$

Darken your choice with HB pencil

1. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	9. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	17. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	25. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
2. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	10. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	18. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	26. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
3. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	11. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	19. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	27. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
4. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	12. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	20. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	28. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
5. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	13. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	21. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	29. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
6. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	14. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	22. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	30. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
7. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	15. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	23. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	
8. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	16. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	24. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	

# Arithmetic Progression

## SECTION - A : MATHEMATICAL REASONING

1. If the numbers  $a, b, c, d$  and  $e$  form an AP, then the value of  $a - 4b + 6c - 4d + e$  is
 

a. 0	b. 1
c. 2	d. 6
  
2. In a certain AP, five times of the 5th term is equal to eight times the 8th term, then the 13th term is
 

a. -13	b. -12
c. -1	d. 0
  
3. If the  $p$ th term of an AP is  $q$  and the  $q$ th term of an AP is  $P$ , then the  $r$ th term is
 

a. $p - q - r$	b. $p + q - r$
c. $p + q + r$	d. None of these
  
4. The sum of an AP :  $3, 7, 11, 15, \dots$  is 406. How many terms does this AP have?
 

a. 14	b. 15
c. 16	d. 20
  
5. If the sum of ' $n$ ' terms of an AP is  $3n^2 - n$ , then the first term of an AP is
 

a. 4	b. 2
c. 3	d. 6
  
6. The sum of all odd numbers which are divisible by 3 between 1 and 1000 is
 

a. 82777	b. 82669
c. 83667	d. 92729
  
7. Three numbers are in AP such that their sum is 18 and the sum of their squares is 158. The greatest number among them is
 

a. 10	b. 12
c. 11	d. 9
  
8. The sum of the first three terms of an AP is 30 and the sum of the last three terms is 36. If the first term is 9, then the number of terms of an AP is
 

a. 5	b. 10
c. 7	d. 6
  
9. The common difference of an AP:
 
$$\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}, \dots$$
 is
 

a. -2	b. -4
c. -3	d. -1
  
10. The sum of  $7 + 10\frac{1}{2} + 14 + \dots + 84$  is
 

a. $1045\frac{1}{2}$	b. $1043\frac{1}{2}$
c. $1045\frac{1}{5}$	d. $1046\frac{1}{2}$
  
11. If the first, the second and the last term of an AP are  $a, b$  and  $2a$  respectively, then their sum is
 

a. $\frac{2ab}{4(a-b)}$	b. $\frac{3ab}{2(b-a)}$
c. $\frac{4ab}{b-a}$	d. $\frac{4-a}{2-b}$

12. The interior angles of a quadrilateral are in AP with common difference  $10^\circ$ . The largest of these angles is  
 a.  $65^\circ$       b.  $100^\circ$   
 c.  $105^\circ$       d.  $90^\circ$
13. How many numbers between 1 to 99 are divisible by 5?  
 a. 20      b. 19  
 c. 17      d. 18
14. The sum of the first 25 terms of an AP in which the 2nd term is 9 and the 4th term is 21, is  
 a. 1875      b. 2075  
 c. 1975      d. 2000
15. If the value of  $d = 5$  and  $S_9 = 75$ , then  $a_9$  is  
 a.  $\frac{85}{4}$       b.  $\frac{85}{3}$   
 c.  $\frac{23}{9}$       d.  $\frac{17}{8}$
16. If the 7th term of an AP is  $7b + 5c$  and the 10th term is  $10b + 8c$ , then the AP is
17. If the terms  $a$ ,  $b$  and  $c$  are in AP, then  $a^3 + c^3 + 6abc =$   
 a.  $8a^3$       b.  $7b^3$   
 c.  $8b^3$       d.  $8c^3$
18. Which term of an AP: 21, 42, 63, 84 is 210?  
 a. 9th      b. 10th  
 c. 7th      d. 6th
19. The value of  $x$  for the given equation  $1 + 6 + 11 + 16 + \dots + x = 148$  is  
 a. 36      b. 35  
 c. 28      d. 27
20. How many numbers lie between 10 and 300, which when divided by 4 leaves the remainder 3?  
 a. 73      b. 77  
 c. 80      d. 66

## SECTION - B : EVERYDAY MATHS

21. A club consists of members whose ages are in an AP and the common difference is 3 months. If the younger member of the club is just 7 years old and the sum of the ages of all the members is 250 years, then the number of members in the club is  
 a. 26      b. 25  
 c. 27      d. 30
22. A sum of ₹700 is used to give four prizes to the students of a school for their overall academic performance. If each prize is ₹20 less than its preceding prize, then the value of each of prize is  
 a. ₹160, ₹140, ₹120, ₹100  
 b. ₹100, ₹80, ₹40, ₹20  
 c. ₹80, ₹60, ₹40, ₹20  
 d. None of these
23. A man arranges to pay off a debt of ₹3,600 in 40 annual instalments which form an AP. When 30 of the instalments are paid, he dies leaving one-third of the debt unpaid. The value of the first instalment is  
 a. ₹50      b. ₹59  
 c. ₹51      d. 63

24. Rani was given her pocket money on 1 January, 2008. She puts ₹1 on day 1, ₹2 on day 2, ₹3 on day 3 and so on till the end of the month from this money into her piggy bank. She also spends ₹204 of her pocket money, and found that at the end of the month she still had ₹100 with her. How much was her pocket money for the month?
- a. ₹1000                  b. ₹600  
c. ₹800                  d. ₹300

25. Two hundred logs are stacked in different rows in such a way that 20 logs are in the bottom row, 19 are in the next row, 18 in the row next to it and so on. In how many rows are 200 logs placed and how many logs are there in the top row?
- a. 16 rows, 5 logs  
b. 20 rows, 4 logs  
c. 20 rows, 7 logs  
d. 18 rows, 7 logs

### SECTION - C : BRAINBOX

26. The sums of 'n' terms of two APs series is in the ratio  $7n + 1 : 4n + 27$ . The ratio of their 11th terms is
- a. 4 : 3                  b. 4 : 5  
c. 5 : 3                  d. 3 : 7

27. The  $p$ th term of an A.P is  $\frac{3p-1}{6}$ . The sum of the first  $n$  terms of the AP is
- a.  $\frac{n}{12}(3n+1)$                   b.  $\frac{n}{6}(2n+1)$   
c.  $\frac{n}{5}(4n+1)$                   d. None of these

28. Two APs have the same common difference. If the difference between their

- 1000th terms is 100, then the difference between their 100th terms is
- a. 200                  b. 100  
c. 500                  d. 300

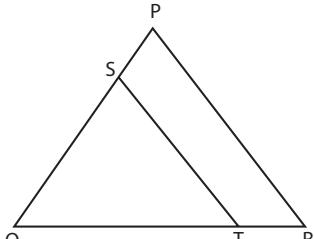
29. The sum of two middle most terms of an AP:  $\frac{-4}{3}, -1, \frac{-2}{3}, \dots, 4\frac{1}{3}$  is
- a. 3                  b. 5  
c. 7                  d. 9
30. The 9th term of an AP is 499 and the 499th term is 9. So, the term which is equal to zero is
- a. 510th                  b. 502th  
c. 508th                  d. None of these

Darken your choice with HB pencil —

1.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	9.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	17.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	25.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
2.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	10.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	18.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	26.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
3.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	11.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	19.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	27.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
4.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	12.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	20.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	28.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
5.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	13.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	21.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	29.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
6.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	14.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	22.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	30.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
7.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	15.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	23.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d		
8.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	16.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	24.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d		

## SECTION - A : MATHEMATICAL REASONING

1. In given figure,  $ST \parallel PR$ . If  $QT = x$ ,  $TR = x - 2$ ,  $QS = x + 2$  and  $SP = x - 1$ , then the value of  $x$  is



- a. 3      b. 5  
c. 9      d. 4

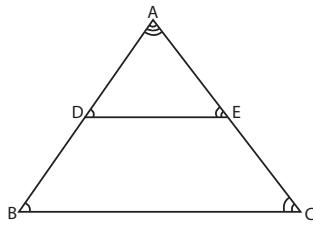
2. If the lengths of the diagonals of a rhombus are 16 cm and 12 cm, then the length of the side of the rhombus is
- a. 10 cm      b. 6 cm  
c. 4 cm      d. 20 cm

3. In two triangles ABC and PQR,  

$$\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$$
. What will be the symbolic form of the similarity of the two triangles?

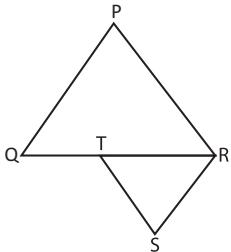
- a.  $\Delta PQR \sim \Delta ABC$       b.  $\Delta PQR \sim \Delta CAB$   
 c.  $\Delta CBA \sim \Delta PQR$       d.  $\Delta BCA \sim \Delta PQR$
4.  $\Delta PQR \sim \Delta MNO$  such that the area of  $\Delta PQR$  is 16 times the area of  $\Delta MNO$ . The ratio of their perimeters is
- a. 1 : 3      b. 4 : 1  
c. 1 : 2      d. 1 : 8

5. In  $\Delta ABC$  as shown in the figure,  $DE \parallel BC$ . If  $BC = 8\text{ cm}$ ,  $DE = 6\text{ cm}$  and area of  $\Delta ADE$  is  $45\text{ cm}^2$ , then the area of  $\Delta ABC$  is
- a.  $60\text{ cm}^2$       b.  $90\text{ cm}^2$   
c.  $80\text{ cm}^2$       d.  $50\text{ cm}^2$



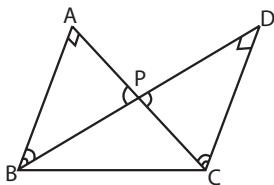
6. In an equilateral  $\Delta ABC$ , if point D is a mid-point of the side BC, then  $4AD^2$  is equal to
- A.  $3BC^2$       B.  $4AC^2$   
C.  $4AB^2$       D.  $2AC^2$
7. In  $\Delta ABC$  and  $\Delta DEF$ , if  $\angle B = \angle E$ ,  $\angle F = \angle C$  and  $AB = 3DE$ , then the two triangles are
- a. congruent but not similar.  
b. congruent as well as similar.  
c. neither congruent nor similar.  
d. similar but not congruent.
8. The area of two similar triangles is  $64\text{ cm}^2$  and  $81\text{ cm}^2$ , respectively. The ratio of their corresponding medians is
- a.  $\frac{8}{9}$       b.  $\frac{7}{9}$   
c.  $\frac{9}{7}$       d.  $\frac{19}{7}$
9. The hypotenuse 'c' and one side 'a' of a right-angled triangle are consecutive numbers. The square of the other side of the triangle is
- a.  $c + b$       b.  $c + a$   
c.  $a + b$       d.  $ab$

10. In the given figure,  $PQ \parallel RS$  and  $PR \parallel TS$ . If  $QT = \frac{1}{3}QR$ , then the ratio of the areas of  $\Delta PQR$  and of  $\Delta STR$  is



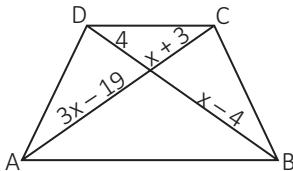
- a. 6 : 4
- b. 9 : 4
- c. 2 : 3
- d. 6 : 5

11. The hypotenuse BC, in the given figure, is common to the two right triangles ABC and DBC. Which of the following conditions is true?



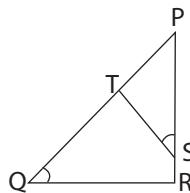
- a.  $AP \times PC = BP \times DP$
- b.  $AP \times DP = PC \times BP$
- c.  $\frac{AP}{PC} = \frac{BP}{DP}$
- d. None of these

12. In the given figure,  $AB \parallel CD$ . If  $OA = (3x - 19)$  units,  $OB = (x - 4)$  units,  $OC = (x + 3)$  units and  $OD = 4$  units, then the possible values of  $x$  are



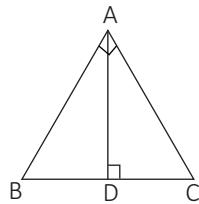
- a. 2 units and 8 units
- b. 8 units and 9 units
- c. 9 units and 8 units
- d. 8 units and 11 units

13. In the given figure, if  $\angle PST = \angle Q$ ,  $PS = 4.8$  cm,  $PT = 7.2$  cm,  $QT = 4$  cm and  $QR = 8$  cm, then ST is equal to



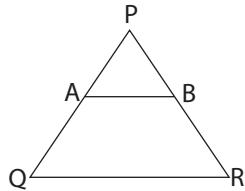
- a. 3.4 cm
- b. 4.3 cm
- c. 5.6 cm
- d. 6.7 cm

14. In the given figure,  $\angle BAC = 90^\circ$  and  $AD \perp BC$ , then  $AD^2$  is equal to



- a.  $BD \times DC$
- b.  $BC \times CB$
- c.  $BA \times AC$
- d. none of these

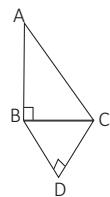
15. In  $\Delta PQR$ , a line drawn parallel to  $QR$  cuts  $PQ$  and  $PR$  at  $A$  and  $B$ , respectively. Given that,  $PA : AQ = 3 : 7$ , and the area of  $\Delta PQR$  is  $72 \text{ cm}^2$ . The area of trapezium  $ABRQ$  is



- a.  $77.52 \text{ cm}^2$
- b.  $68.52 \text{ cm}^2$
- c.  $65.52 \text{ cm}^2$
- d. None of these

16. In a quadrilateral  $ABCD$ ,  $CA = CD$ ,  $\angle B = 90^\circ$  and  $AD^2 = AB^2 + BC^2 + CD^2$ . The  $m\angle ACD$  is
- a.  $70^\circ$
  - b.  $90^\circ$
  - c.  $50^\circ$
  - d. None of these

17. A triangle has sides 5 cm, 12 cm and 13 cm. The length of the perpendicular from the opposite vertex to the side of length 13 cm, corrected to one decimal place, is
- 4.7 cm
  - 4.8 cm
  - 4.2 cm
  - 4.6 cm
18. In  $\Delta PQR$ ,  $PD \perp QR$  such that D lies on QR. If  $PQ = a$ ,  $PR = b$ ,  $QD = c$  and  $DR = d$ , then  $(a + b)(a - b)$  is equal to
- $(c + d)^2$
  - $(c + d)(c - d)$
  - $(c - d)^2$
  - None of these
19. In the given figure,  $AB = 9\text{ cm}$ ,  $BD = 6\text{ cm}$ ,  $CD = 3\sqrt{3}\text{ cm}$  and  $\angle ABC = \angle D = 90^\circ$ . The length of AC is equal to
- 12 cm
  - 8 cm
  - $9\sqrt{3}$  cm
  - 14 cm
- 



20. In  $\Delta PQR$ , the length of the side QR is less than twice the length of side PQ by 2 cm. The length of the side PR exceeds the length of side PQ by 10 cm. If the perimeter of the triangle is 40 cm, then the length of the smallest side of the triangle PQR is
- 7 cm
  - 8 cm
  - 10 cm
  - 7.5 cm

## SECTION - B : EVERYDAY MATHS

21. A 12 cm long vertical stick casts a shadow 8 cm long on the ground. At the same time, a tower casts 40 cm long shadow on the ground. The height of the tower is
- 60 cm
  - 70 cm
  - 75 cm
  - 67 cm
22. A man goes 4 m due east and then 3 m due north. Now, his distance from the starting point is
- 15 m
  - 25 m
  - 5 m
  - 20 m
23. A fighter plane leaves the runway and flies due north at a speed of 1600 km/h. At the same time, another fighter plane leaves from the same runway and flies due west at a speed of 1200 km/h. How far apart will be the two fighter planes after  $2\frac{1}{2}$  hours?
- 15000 km
  - 7000 km
  - 25000 km
  - 5000 km
24. A street light bulb is fixed on a pole 8 m above the street level. If a woman of height 2.5 m casts a shadow of 5 m, then how far is she away from the base of the pole?
- 21 m
  - 12 m
  - 14 m
  - 11 m
25. The area of two similar triangular huts are  $36\text{ cm}^2$  and  $100\text{ cm}^2$ . The length of a side of a larger hut is 20 cm. The length of the corresponding side of the smaller hut is
- 12 cm
  - 14 cm
  - 16 cm
  - 20 cm

## SECTION - C : BRAINBOX

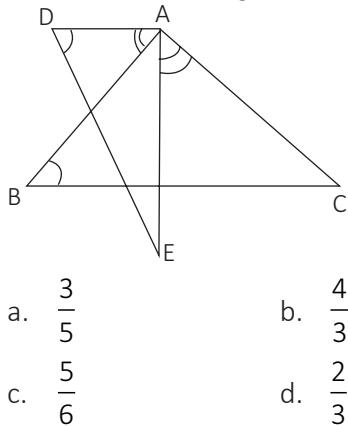
26. E is a point in the interior of the rectangle PQRS. If E is joined to each of the vertices of the rectangle and the length of EP, EQ and ER are 3 cm, 4 cm and 5 cm, respectively, then the length of ES is

- a. 5.24 cm
- b. 4.24 cm
- c. 6.24 cm
- d. 7.24 cm

27. CE and DE are equal chords of a circle with centre O. If  $\angle AOB = 90^\circ$  and CD is the diameter of the circle, then the ratio of areas of  $\Delta CED$  and  $\Delta AOB$  is

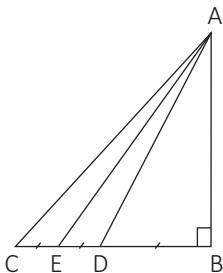
- a. 2 : 1
- b. 3 : 4
- c. 4 : 3
- d.  $1:\sqrt{2}$

28. In the given figure,  $\angle BAD = \angle CAE$  and  $\angle ADE = \angle ABC$ . If  $\frac{AC}{BC} = \frac{3}{2}$ , then  $\frac{DE}{AE}$  is equal to



- a.  $\frac{3}{5}$
- b.  $\frac{4}{3}$
- c.  $\frac{5}{6}$
- d.  $\frac{2}{3}$

29. In the given figure, D and E trisect BC. So,  $3AC^2 + 5AD^2$  is equal to



- a.  $7AE^2$
- b.  $8CD^2$
- c.  $8EB^2$
- d.  $8AE^2$

30. Which of the following statements is incorrect?

- a. If a line is drawn parallel to one side of a triangle, then the other two sides are divided in the same ratio.
- b. The diagonals of a rhombus are 15 cm and 36 cm, then its perimeter is 76 cm.
- c. In an equilateral triangle of side  $a$  units, the altitude is  $\frac{a\sqrt{3}}{2}$  units.
- d. In a right-angled triangle, if the length of the hypotenuse is 20 cm and the ratio of other two sides is 4 : 3, then the length of their sides is 16 cm and 12 cm, respectively.

Darken your choice with HB pencil

1.  a  b  c  d

2.  a  b  c  d

3.  a  b  c  d

4.  a  b  c  d

5.  a  b  c  d

6.  a  b  c  d

7.  a  b  c  d

8.  a  b  c  d

9.  a  b  c  d

10.  a  b  c  d

11.  a  b  c  d

12.  a  b  c  d

13.  a  b  c  d

14.  a  b  c  d

15.  a  b  c  d

16.  a  b  c  d

17.  a  b  c  d

18.  a  b  c  d

19.  a  b  c  d

20.  a  b  c  d

21.  a  b  c  d

22.  a  b  c  d

23.  a  b  c  d

24.  a  b  c  d

25.  a  b  c  d

26.  a  b  c  d

27.  a  b  c  d

28.  a  b  c  d

29.  a  b  c  d

30.  a  b  c  d

## SECTION - A : MATHEMATICAL REASONING

1. The distance of a point  $P(2, 6)$  from the  $x$ -axis is \_\_\_\_\_ units.
- 2
  - 6
  - 1
  - 4
2. The distance between the points  $P(0, 4)$  and  $Q(0, -2)$  is \_\_\_\_\_ units.
- 6
  - 4
  - 2
  - 8
3. If  $P\left(\frac{a}{3}, 4\right)$  is the mid-point of the line segment joining the points  $Q(-6, 5)$  and  $R(-2, 3)$ , then the value of  $a$  is
- 4
  - 6
  - 12
  - 12
4. The point which divides the line segment joining the points  $(7, -6)$  and  $(3, 4)$  in the ratio  $1 : 2$  lies internally in the
- Ist quadrant
  - IIInd quadrant
  - IIIrd quadrant
  - IVth quadrant
5. The distance of the point  $(2, 4)$  from the mid-point of the line segment joining the points  $(4, 6)$  and  $(8, 8)$  is \_\_\_\_\_ units.
- 4
  - 5
  - 7
  - 9
6. The distance between the points  $(a \cos \theta, a \sin \theta)$  and  $(-a \cos \theta, -a \sin \theta)$  is \_\_\_\_\_ units.
- 2a
  - 4a
  - 6a
  - 3a
7. The perimeter of a triangle with vertices  $(0, 6)$ ,  $(0, 0)$  and  $(8, 0)$  is \_\_\_\_\_ units.
- 20
  - 13
  - 24
  - 12
8. The points  $(-3, 0)$ ,  $(3, 0)$  and  $(0, 4)$  are vertices of a/an
- right-angled triangle.
  - isosceles triangle.
  - equilateral triangle.
  - scalene triangle.
9. The point which lies on the perpendicular bisector of the line segment joining the points  $A(-3, -5)$  and  $B(3, 5)$  is
- $(2, 4)$
  - $(1, 2)$
  - $(0, 1)$
  - $(0, 0)$
10. The fourth vertex  $D$  of a parallelogram  $ABCD$  whose three vertices are  $A(4, 5)$ ,  $B(7, 6)$  and  $C(4, 3)$  is
- $(1, 2)$
  - $(0, 1)$
  - $(-1, 2)$
  - $(2, 3)$
11. If the distance between the points  $(6, a)$  and  $(2, 0)$  is 5 units, then the value of  $a$  is
- 4
  - 2
  - 3
  - 7
12. If the points  $P(1, 2)$ ,  $Q(0, 0)$  and  $R(a, b)$  are collinear, then
- $a = b$
  - $a = -b$
  - $a = b^2c$
  - $2a = b$

13. If P and Q are the points  $(-5, 8)$  and  $(0, -4)$ , respectively, then the distance of four times the length of PQ is equal to
- 52 units
  - 64 units
  - 26 units
  - 39 units
14. Point A is on y-axis at 8 units from the origin. If co-ordinates of the point B are  $(-6, 0)$ , then the length of AB is \_\_\_\_\_ units.
- 10
  - 20
  - 15
  - 9
15. If  $(4, -3)$  and  $(-9, 7)$  are the co-ordinates of two vertices of a triangle and  $(1, 4)$  is the co-ordinate of its centroid, then the area of the triangle is \_\_\_\_\_ sq. units.
- $\frac{200}{9}$
  - $\frac{183}{2}$
  - $\frac{233}{7}$
  - $\frac{283}{2}$
16. The area of  $\triangle ABC$ , shown below, is
- 

- 12 sq. units
- 7.5 sq. units
- 24 sq. units
- 6 sq. units

17. The radius of a circle, whose centre is  $(6, 0)$  and which passes through  $(9, -4)$ , is
- 6 units
  - 8 units
  - 9 units
  - 5 units.
18. The ratio in which the line segment joining the points  $(6, 4)$  and  $(1, -7)$  is divided by the x-axis is
- $2 : 5$
  - $4 : 7$
  - $2 : 8$
  - $9 : 10$
19. Points A( $-5, x$ ), B( $y, 7$ ) and C( $1, -3$ ) are collinear such that  $AB = BC$ . The value of x and y, respectively is
- $17, -2$
  - $3, 15$
  - $-15, 3$
  - $0, 10$
20. The area of a triangle whose vertices are  $(a, b+c)$ ,  $(b, c+a)$  and  $(c, a+b)$  is
- $(a+b+c)^2$  sq. units
  - 0 sq. units
  - $(a+b+c)$  sq. units
  - $abc$  sq. units

## SECTION - B : EVERYDAY MATHS

21. A town Q is located 36 km east and a town P is located 15 km north. The distance between town Q and town P is
- 36 km
  - 39 km
  - 40 km
  - 42 km
22. In a classroom, four friends are seated at the points A( $-1, -2$ ), B( $1, 0$ ), C( $-1, 2$ ) and D( $-3, 0$ ). After observing for few minutes, Ravi and Chinu walk into the class. Ravi asks Chinu, "Do you think ABCD is a square?", Chinu disagrees and says, "ABCD is a rectangle". Who is correct?
- Ravi
  - Chinu
  - Neither Ravi nor Chinu
  - None of these
23. On a Independence day celebration, Rohit and Roshan are standing at positions P and Q whose co-ordinates are  $(2, -2)$  and  $(4, 8)$ , respectively. The teacher asked

- Ravinder to fix the country flag at the mid-point of the points P and Q. The co-ordinates of the mid-point is
- (3, 3)
  - (3, 4)
  - (2, 6)
  - (2, -1)
24. The end points of a town in triangular shape are (1, 2), (0, 1) and (2, -1). An earthquake hits the town. The area damaged by earthquake in  $\text{km}^2$  is
- 4
  - 14
  - 2
  - 10
25. Three villages are located around the circle at the points (6, -3), (4, -5) and (2, -3). A health centre is located at a point in the circle in such a way that each village is equidistant from the health centre. The point at which the health centre is located, is
- (4, -3)
  - (-1, 1)
  - (0, 1)
  - (1, 2)

### SECTION - C : BRAINBOX

26. The co-ordinates of a point which is at a distance of 10 units from (0, 1) and at a distance of 5 units from (3, 5) is
- (7, 2)
  - (6, 9)
  - (4, 5)
  - (7, 6)
27. The line joining the points (3, -1) and (-6, 5) is trisected. The co-ordinates of the points of trisection is
- (-3, 3)
  - (-2, 2)
  - (4, -4)
  - (-4, 3)
28. If the co-ordinates of the point Q on the x-axis which lies on the perpendicular bisector of the line segment joining the points A(-5, -2) and B(4, -2) is (0, 0), then, the type of triangle formed by Q, A and B is a/an
- Equilateral triangle.
  - Isosceles triangle.
- c. Right-angled triangle.  
d. None of these.
29. The ratio in which the line  $2x + 3y - 30 = 0$  divides the line segment joining the points A(3, 4) and B(7, 8) is
- 4 : 3
  - 4 : 5
  - 3 : 2
  - 1 : 2
30. The incentre of the right-angled isosceles triangle with one vertex at the origin and the other two vertices at (6, 0) and (0, 6) is
- $\left(\frac{35}{\sqrt{2}+1}, \frac{35}{\sqrt{2}+1}\right)$
  - $\left(\frac{36}{12+6\sqrt{2}}, \frac{36}{12+6\sqrt{2}}\right)$
  - $\left(\frac{40}{\sqrt{2}+1}, \frac{40}{\sqrt{2}+1}\right)$
  - None of these

### Extra question For Hots

Which of the following is the correct match?

Column I	Column II
(1) Vertices of a $\Delta ABC$ are $A(2,2)$ , $B(-4, -4)$ and $C(5, -8)$ . Then the length of the median through $C$ is	(i) $-1$
(2) The end points of the diagonal of a parallelogram are the points $(3, -4)$ and $(-6, 5)$ , third vertex is at the point $(-2, 1)$ then, the fourth vertex is	(ii) $(2,0)$
(3) The value of $a$ , if points $P(1, 5)$ , $Q(a, 1)$ and $R(4, 11)$ are collinear is	(iii) $\sqrt{85}$
(4) The point on $x$ -axis which is equidistant from $A(4, -3)$ and $B(0, 11)$ is	(iv) $(-1, 0)$

- a.  $1-i, 2 \rightarrow iv, 3 \rightarrow i, 4 \rightarrow ii$   
 c.  $1-i, 2 \rightarrow i, 3 \rightarrow iv, 4 \rightarrow ii$

- b.  $1-ii, 2 \rightarrow iii, 3 \rightarrow iv, 4 \rightarrow i$   
 d.  $1-i, 2 \rightarrow ii, 3 \rightarrow iii, 4 \rightarrow iv$

Darken your choice with HB pencil –

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2.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	10. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	18. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	26. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
3.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	11. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	19. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	27. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
4.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	12. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	20. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	28. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
5.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	13. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	21. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	29. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
6.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	14. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	22. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	30. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
7.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	15. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	23. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	
8.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	16. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	24. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	

## SECTION - A : MATHEMATICAL REASONING

1. The value of  $\sec^2 42^\circ - \operatorname{cosec}^2 48^\circ$  is
  - 0
  - 1
  - 2
  - 3
2. If  $(1 + \cos A)(1 - \cos A) = \frac{3}{4}$ , then the value of  $\sec A$  is
  - $\pm 3$
  - $\pm 2$
  - $\pm 4$
  - $\pm 6$
3.  $\sin 53^\circ - \cos 37^\circ + \cot 45^\circ$  is equal to
  - 2
  - 0
  - 3
  - 1
4. If  $4\sin \theta = 3\cos \theta$ , then  $\frac{\sec^2 \theta}{4(1 - \tan^2 \theta)}$  is equal to
  - $\frac{25}{28}$
  - $\frac{45}{28}$
  - $\frac{28}{25}$
  - $\frac{29}{36}$
5. The value of  $\left(\frac{\sin 35^\circ}{\cos 55^\circ}\right)^2 + \left(\frac{\cos 55^\circ}{\sin 35^\circ}\right)^2 - 2\cos 60^\circ$  is
  - 2
  - $\sqrt{2}$
  - 3
  - 1
6.  $\tan 10^\circ \tan 15^\circ \tan 75^\circ \tan 80^\circ$  is equal to
  - 2
  - 1
  - 3
  - 4
7. If  $\tan A = \sqrt{2} - 1$ , then  $\frac{\tan A}{1 + \tan^2 A}$  is equal to
  - $\frac{4}{\sqrt{2}}$
  - $\frac{3}{\sqrt{2}}$
  - $\frac{\sqrt{2}}{4}$
  - None of these
8. The value of  $\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$  is
  - $\frac{12}{67}$
  - $\frac{67}{13}$
  - $\frac{67}{15}$
  - $\frac{67}{12}$
9. If  $\tan(A + B) = \sqrt{3}$  and  $\tan(A - B) = \frac{1}{\sqrt{3}}$ , where  $0^\circ < A + B < 90^\circ$  and  $A > B$ , then the value of  $A$  is
  - $60^\circ$
  - $90^\circ$
  - $45^\circ$
  - $60^\circ$
10. If  $x = a \sec^n \theta$ ,  $y = b \tan^n \theta$ , then  $\left(\frac{x}{a}\right)^{\frac{2}{n}} - \left(\frac{y}{b}\right)^{\frac{2}{n}}$  is equal to
  - 2
  - 3
  - 12
  - 1
11. The value of  $\frac{\cos^2 56^\circ + \cos^2 34^\circ}{\sin^2 56^\circ + \sin^2 34^\circ} + 3\tan^2 56^\circ \tan^2 34^\circ$  is
  - 4
  - 3
  - 6
  - 8

12. If  $\tan A = \cot B$ , then  $A + B$  is equal to  
 a.  $45^\circ$       b.  $90^\circ$   
 c.  $80^\circ$       d.  $70^\circ$
13. If  $\cos 9a = \sin a$ , then the value of  $\tan 5a$  is  
 a. 1      b.  $\sqrt{3}$   
 c.  $\frac{1}{\sqrt{2}}$       d. 0
14. The value of the expression  $(\sin 80^\circ - \cos 80^\circ)$  is  
 a. negative  
 b. positive  
 c. neither positive nor negative.  
 d. none of these
15. If  $x = \cot \theta + \operatorname{cosec} \theta$ , then the value of  $\frac{1+\cos \theta}{1-\cos \theta}$  is  
 a.  $x^3$       b.  $x^4$   
 c.  $x^2$       d.  $x$
16. If  $\cos \theta = \frac{12}{13}$  and  $\theta$  is an acute angle, then the value of  $\sqrt{\left(1 + \frac{\sin \theta}{\cos \theta}\right)(1 - \tan \theta)}$  is
- a.  $\frac{\sqrt{119}}{12}$       b.  $\frac{\sqrt{116}}{2}$   
 c.  $\frac{\sqrt{136}}{13}$       d.  $\frac{\sqrt{125}}{12}$
17. The value of the expression  $[\tan 1^\circ \tan 2^\circ \tan 3^\circ \dots \tan 89^\circ]$  is  
 a. 0      b. 1  
 c.  $\frac{1}{2}$       d. 2
18. If  $\tan 2A = \cot(A - 18)^\circ$ , then the value of  $A$  is  
 a.  $36^\circ$       b.  $45^\circ$   
 c.  $90^\circ$       d.  $78^\circ$
19. If  $\cot A + \frac{1}{\cot A} = 2$ , then  $\cot^2 A + \frac{1}{\cot^2 A}$  is equal to  
 a. 4      b. 8  
 c. 12      d. 2
20. If  $\sin \theta + \cos \theta = 1$ , then the value of  $\sin \theta \cos \theta$  is  
 a. 0      b. 1  
 c. -1      d.  $\frac{1}{2}$

## SECTION - B : EVERYDAY MATHS

21. From two distinct points on the ground at a distance of  $a$  units and  $b$  units from the base of a tower, the angles of elevation of the top of the tower that lie along the same straight line are complementary. The height of the tower is  
 a.  $ab$  units      b.  $\sqrt{ab}$  units  
 c.  $\frac{a}{b}$  units      d.  $\sqrt{\frac{a}{b}}$  units
22. The angle of elevation of a jet plane from a point  $A$  on the ground is  $60^\circ$ . After flying for 15 seconds, the angle of elevation changes to  $30^\circ$ . If the jet plane is flying at a constant height of  $1500\sqrt{3}$  m, then the speed of the jet plane is  
 a. 710 km/h      b. 715 km/h  
 c. 725 km/h      d. 720 km/h
23. From a light house, the angles of depression of the two ships on opposite sides of the light house are observed to be  $30^\circ$  and  $45^\circ$ . If the height of the light house is  $h$  meters, then the distance between the two ships is

- a.  $(\sqrt{3} + 1)h$  metres  
 b.  $(\sqrt{3} - 1)h$  metres  
 c.  $\sqrt{3} h$  metres  
 d.  $1 + \left(1 + \frac{1}{\sqrt{3}}\right)h$  metres
24. When the sun's altitude is  $30^\circ$  the shadow of a tower standing on a levelled ground is found to be 400 m which is longer than

when the sun's altitude is  $60^\circ$ . The height of the tower is

- a.  $200\sqrt{3}$  m      b.  $100\sqrt{3}$  m  
 c.  $\sqrt{3}$  m      d. 100 m

25. A bridge across a river makes an angle of  $45^\circ$  with the banks of the river. If the length of the bridge across the river is 150 m, then the width of the river is
- a. 107.05 m      b. 106.06 m  
 c. 100 m      d. 102.05 m

### SECTION - C : BRAINBOX

26. If  $\sin \theta = \frac{p}{q}$ , then the value of  $\tan \theta + \sec \theta$  is
- a.  $\sqrt{\frac{q^2 + p^2}{q^2 - p^2}}$       b.  $\sqrt{\frac{q-p}{q+p}}$   
 c.  $\sqrt{\frac{q+p}{q-p}}$       d.  $\sqrt{\frac{q^2 + p^2}{2p^2}}$
27. The value of  $\frac{2\sin^2 63^\circ + 1 + 2\sin^2 27^\circ}{3\cos^2 17^\circ - 2 + 3\cos^2 73^\circ}$  is
- a. 2      b. 4  
 c. 3      d. 8
28. If  $\operatorname{cosec} \theta - \sin \theta = a^3$  and  $\sec \theta - \cos \theta = b^3$ ,

then the value of  $a^2b^2(a^2 + b^2)$  is

- a. 1      b. 2  
 c. 3      d. 5
29. If  $\sec \theta = x + \frac{1}{4x}$ , then  $\tan \theta + \sec \theta$  is equal to
- a.  $\frac{1}{2x}$  or  $2x$       b.  $4x$  or  $\frac{1}{4x}$   
 c.  $5x$  or  $\frac{1}{5x}$       d. None of these
30. If  $x \tan^2 60^\circ + 3\sin^2 60^\circ - \frac{3}{4} \tan^2 30^\circ = 6$ , then the value of  $x$  is
- a.  $\frac{3}{4}$       b.  $\frac{4}{3}$   
 c.  $\frac{\sqrt{2}}{3}$       d. None of these

Darken your choice with HB pencil

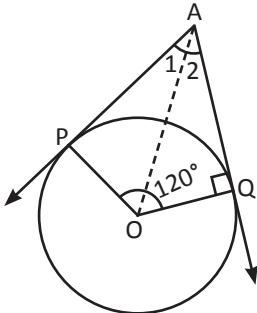
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3.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	11.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	19.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	27.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
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6.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	14.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	22.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	30.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
7.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	15.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	23.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d		
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## SECTION - A : MATHEMATICAL REASONING

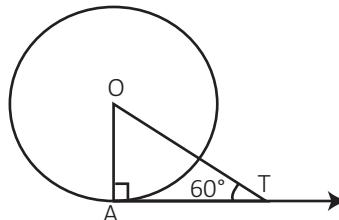
1. If the radii of two concentric circles are 8 cm and 10 cm, then the length of the chord of one circle which is tangent to the other circle is
- 6 cm
  - 7 cm
  - 9 cm
  - 12 cm

2. From a point Q, the length of the tangent to a circle is 4 cm and the distance of Q from its centre is 5 cm. The radius of the circle is
- 3 cm
  - 4 cm
  - 2 cm
  - 16 cm

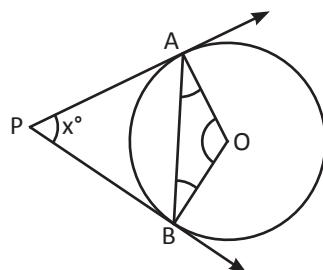
3. In the given figure, if AP and AQ are two tangents to a circle with centre O such that  $\angle POQ = 120^\circ$ , then the  $m\angle PAQ$  is equal to



- $75^\circ$
  - $80^\circ$
  - $60^\circ$
  - $70^\circ$
4. In a given figure, AT is a tangent to the circle with centre O such that  $OT = 4$  cm and  $\angle OTA = 60^\circ$ . The length of AT is equal to



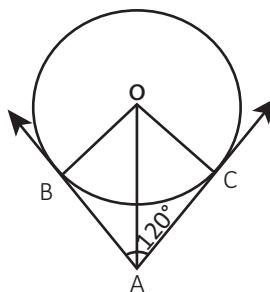
- 4 cm
  - 2 cm
  - 4.5 cm
  - $\sqrt{2}$  cm
5. In the given figure, if PA and PB are tangents to the circle with centre O such that  $\angle APB = x^\circ$ , then the  $m\angle OAB$  is equal to



- $\frac{x^\circ}{2}$
- $2x^\circ$
- $\frac{x^\circ}{4}$
- $\sqrt{2}x^\circ$

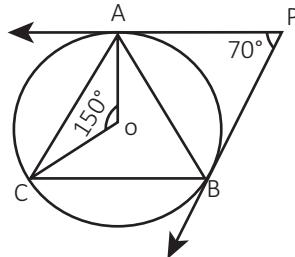
6. The distance between two parallel tangents of a circle of radius 3 cm is
- 6 cm
  - 4 cm
  - 3 cm
  - 9 cm
7. At how many points does the tangent to a circle intersect each other?
- 2
  - 1
  - 3
  - 0

8. A parallelogram circumscribing a circle is a
- square
  - rhombus
  - rectangle
  - incircle
9. The segment joining the points of contact of two parallel tangents to a circle
- will not pass through its centre.
  - will pass through its centre.
  - may or may not pass through its centre.
  - None of these
10. A tangent to a circle drawn from an exterior point T of the circle touches the circle at a point P. Which of the following conditions is true?
- $\angle TPO = 90^\circ$
  - $\angle TPO > 90^\circ$
  - $\angle TPO < 90^\circ$
  - $\angle TPO = 180^\circ$
11. PQ is a diameter of a circle with centre O. The tangent at any point S meets PQ at point R outside the circle. If  $\angle SPQ = a^\circ$ , then the measure of  $\angle SQP$  is
- $90^\circ - 2a^\circ$
  - $180^\circ - a^\circ$
  - $90^\circ - a^\circ$
  - $90^\circ + a^\circ$
12. If four sides of a quadrilateral PQRS touches the circle, then
- $PR + PS = QS + RS$
  - $PQ + RS = QR + PS$
  - $PQ + RS = PR + QS$
  - $PR + PS = QR + SQ$
13. The perimeter of  $\triangle PQR$  is
- 
14. Two concentric circles of radii 5 cm and 3 cm are drawn such that the chord of the larger circle touches the other circle. The length of the chord is
- $2\sqrt{2}$  cm
  - 7 cm
  - 8 cm
  - 10 cm
15. Two tangents AB and AC are drawn to a circle with centre O such that  $\angle BAC = 120^\circ$ , then OA is equal to
- 



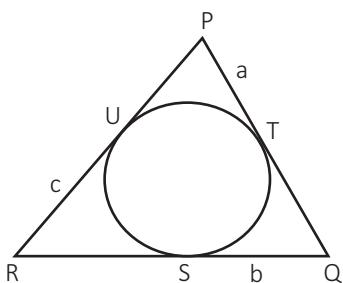
- $2AC$
- $2AO$
- $2OB$
- $2AB$

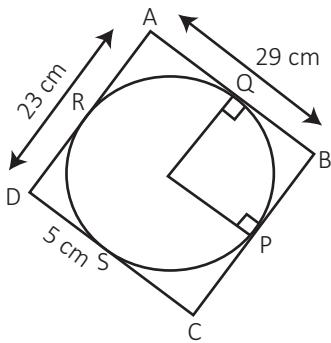
16. In the given figure, O is centre of the circle, and  $\triangle ABC$  is inscribed in the circle such that tangents at A and B intersect at P. Given that,  $\angle APB = 70^\circ$  and  $\angle AOC = 150^\circ$ , the value of  $\angle CAB$  is



- $40^\circ$
- $50^\circ$
- $60^\circ$
- $55^\circ$

17. In the given figure, a circle is inscribed in a quadrilateral ABCD in which  $\angle B = 90^\circ$ . If  $AD = 23$  cm,  $AB = 29$  cm and  $DS = 5$  cm, then the length of the radius of the circle is



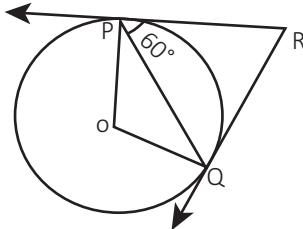


18. The line segment joining the points of two parallel tangents to a circle is a
- radius of the circle.
  - diameter of the circle.
  - chord of the circle.
  - None of these.

19. AB and CD are two tangents to the circles which touch each other at point C. If D is a point on AB such that CD = 5 cm, then the length of AB is equal to

- 10 cm
- 20 cm
- 15 cm
- 2 cm

20. If PR is a tangent to the circle at P and Q is the centre of the circle, then the  $m\angle POQ$  is



- $100^\circ$
- $140^\circ$
- $130^\circ$
- $120^\circ$

## SECTION - B : EVERYDAY MATHS

21. Two equal circles of radius 4 cm intersect each other such that each of them passes through the centre of the other. The length of the common chord is
- $4\sqrt{3}$  cm
  - 8 cm
  - $2\sqrt{3}$  cm
  - $2\sqrt{2}$  cm
22. If the length of the largest chord of a circle is 8.02 cm, then the radius of the circle must be
- greater than 5 cm.
  - 4.01 cm.
  - less than 3 cm.
  - None of these
23. In a circle, a diameter AB and a chord PQ which is not a diameter intersect each other at X at right angles. If  $AX : BX = 3 : 2$

and the radius of the circle is 5 cm, then the length of the chord PQ is

- $2\sqrt{13}$  cm
- $4\sqrt{6}$  cm
- $2\sqrt{3}$  cm
- $4\sqrt{2}$  cm

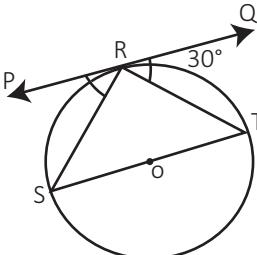
24. If PQ is a direct common tangent of two circles of radii  $r_1$  and  $r_2$  touching each other externally at A, then the value of  $PQ^2$  is

- $2r_1r_2$
- $3r_1r_2$
- $r_1r_2$
- $4r_1r_2$

25. The tangents drawn at the points A and B of a circle with centre O, meet at P externally. If  $\angle AOB = 120^\circ$ , then  $\angle APB : \angle APO$  is

- 3 : 2
- 5 : 1
- 2 : 1
- 5 : 2

## SECTION - C : BRAINBOX

26. A triangle PQR circumscribes a circle of radius 8 cm such that QR is divided by the point of contact T. If the area of  $\Delta PQR$  is  $336 \text{ cm}^2$  and the lengths of the segments QT and TR are 14 cm and 16 cm, respectively, then the lengths of the sides PQ and PR are, respectively equal to  
 a. 26 cm and 28 cm b. 22 cm and 24 cm  
 c. 26 cm and 27 cm d. 29 cm and 30 cm
27. PQ is tangent at a point R on the circle with centre O. If  $\angle TRQ = 30^\circ$ , then the  $m\angle PRS$  is
- 
- a.  $60^\circ$  b.  $80^\circ$   
 c.  $40^\circ$  d.  $65^\circ$
28. Which of the following is incorrect?  
 a. A circle may have two parallel tangents.  
 b. The angle between the tangent on a circle at the point of contact and the radius through that point is  $90^\circ$ .  
 c. A circle have infinitely many tangents.  
 d. A line intersecting a circle at two distinct points is called a segment.
29. The distance between two parallel chords of length 8 cm each in a circle of diameter 10 cm is  
 a. 7 cm b. 6 cm  
 c. 5.5 cm d. 10 cm
30. P and Q are centres of two circles with radii 9 cm and 2 cm, respectively, where  $PQ = 17 \text{ cm}$ . R is the centre of another circle of radius x cm, which touches each of the above two circles externally. If  $\angle PRQ = 90^\circ$ , then the value of x is  
 a. 4 cm b. 8 cm  
 c. 7 cm d. 6 cm

**Darken your choice with HB pencil**

1.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	9.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	17.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	25.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
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3.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	11.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	19.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	27.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
4.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	12.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	20.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	28.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
5.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	13.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	21.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	29.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
6.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	14.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	22.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	30.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
7.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	15.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	23.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d		
8.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	16.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	24.	<input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d		

# Chapter 10

# Constructions

## SECTION - A : MATHEMATICAL REASONING

1. To divide a line segment AB in the ratio 5 : 7, a ray AY is drawn such that  $\angle BAY$  is an acute angle, and then at equal distances, points are marked on the ray such that the minimum number of these points is
- a. 8                          b. 10  
c. 11                          d. 12
2. To divide a line segment AB in the ratio 5 : 6, draw a ray such that  $\angle BAX$  is an acute angle, and then the points  $A_1, A_2$  and  $A_3$  are located at equal distances on the ray AX and the point B is joined to
- a.  $A_{12}$                           b.  $A_{11}$   
c.  $A_{10}$                           d.  $A_9$
3. To construct a triangle similar to a given  $\Delta ABC$  with its sides  $\frac{8}{5}$  of the sides of  $\Delta ABC$ , draw a ray BX such that  $\angle CBX$  is an acute angle and X is on the opposite side of A with respect to BC. The minimum number of points to be located at equal distances on ray BX is
- a. 5                                  b. 8  
c. 13                                  d. 3
4. To divide a line segment AB in the ratio 5 : 6, draw a ray AX such that  $\angle BAX$  is an acute angle. Then draw a ray BY parallel to AX to mark the points  $A_1, A_2, A_3, \dots, A_n$  and  $B_1, B_2, B_3, \dots, B_m$ , located at equal distances on the rays AX and BY, respectively. The points \_\_\_\_\_ will divide AB in the required ratio.
- a.  $A_5$  and  $B_6$                           b.  $A_5$  and  $B_5$   
c.  $A_4$  and  $B_5$                           d.  $A_5$  and  $B_4$
5. By geometrical construction, is it possible to divide a line segment in the ratio  $\sqrt{4} : \frac{1}{\sqrt{4}}$ .
- a. Yes, it is.  
b. No, not possible.  
c. The statement is wrong.  
d. None of these
6. To construct a triangle similar to a given  $\Delta ABC$  with its sides  $\frac{3}{7}$  of the corresponding sides of  $\Delta ABC$ , draw a ray BX such that  $\angle CBX$  is an acute angle and X is on the opposite side of A with respect to BC. Then locate points  $B_1, B_2, B_3, \dots$  on BX at equal distances. So, the next step is to join
- a.  $B_{10}$  to C.                          b.  $B_3$  to C.  
c.  $B_7$  to C.                                  d.  $B_4$  to C.
7. To draw a pair of tangents to a circle which are inclined to each other at an angle of  $60^\circ$ , it is required to draw tangents at the end points of those two radii of the circle which forms an angle of
- a.  $135^\circ$                                   b.  $90^\circ$   
c.  $60^\circ$     d.  $120^\circ$

8. A circle can have at most \_\_\_\_\_ parallel tangents.
- 2
  - 1
  - 4
  - 3
9. The length of tangents drawn from an external point to a circle are
- unequal.
  - equal.
  - both a and b
  - None of these
10. Given below are the steps of construction to draw a pair of tangents to a circle of radius 5 cm, inclined to each other at an

angle of  $60^\circ$ . Which of the following is the correct arrangement of steps?

- Step 1: Draw a circle with centre O and radius 5 cm.
- Step 2: Draw OC such that  $\angle AOC = 180^\circ - 60^\circ = 120^\circ$ .
- Step 3: Draw a diameter AOB.
- Step 4: Draw AP  $\perp$  OA and CP  $\perp$  OC intersecting each other at P.
- 1, 3, 2, 4
  - 4, 3, 2, 1
  - 1, 2, 3, 4
  - 1, 3, 4, 2

## SECTION - B : BRAINBOX

11. Which of the following is incorrect?
- By geometrical construction, it is possible to divide a line segment in the ratio  $3 + \sqrt{2} : 3 - \sqrt{2}$
  - We can draw two tangents to a given circle from a point P outside the circle without using the centre.
  - The common point of a tangent and the circle is called the point of contact.
  - The tangent at any point on a circle is perpendicular to the radius through the point of contact.
12. Read the following statements.

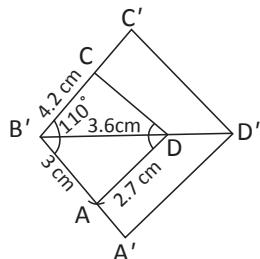
Statement 1: Draw an equilateral triangle of side 5 cm. On constructing a triangle similar to it with scale factor of  $\frac{2}{3}$ , the new triangle so formed is also an equilateral triangle.

Statement 2: A pair of tangents can be constructed from a point P outside the circle of radius 3.5 cm and at a distance of 3 cm from its centre.

Which of the following is the correct option?

- Both statements are true.
- Statement 1 is true and statement 2 is false.
- Statement 1 is false and statement 2 is true.
- Both statements are false.

13. Which of the following is the correct arrangement of the given steps of constructing a similar quadrilateral  $A'B'C'D'$  to quadrilateral ABCD with  $AB = 3\text{ cm}$ ,  $AD = 2.7\text{ cm}$ ,  $DB = 3.6\text{ cm}$ ,  $\angle B = 110^\circ$ ,  $BC = 4.2\text{ cm}$  and diagonal  $D'B' = 4.8\text{ cm}$ .



- Step 1: Construct a triangle  $\triangle ABD$  with  $AB = 3\text{ cm}$ ,  $AD = 2.7\text{ cm}$  and  $DB = 3.6\text{ cm}$ .
- Step 2: Along BD, draw  $B'D' = 4.8\text{ cm}$ .
- Step 3: Let  $B'$  be coincident with B.
- Step 4: From  $D'$ , draw a line parallel to DC

and DA intersecting BC and BA (produced) at the points C' and A', respectively.

Step 5: Make an  $\angle ABC = 110^\circ$  and cut off BC = 4.2 cm. Join CD.

- a. 1, 5, 3, 4, 2
- b. 1, 5, 3, 2, 4
- c. 5, 1, 2, 3, 4
- d. 4, 1, 5, 2, 3

14. Given below are the steps of construction. Draw a circle with the help of a bangle. Take a point outside the circle. Construct the pair of tangents from this point to the circle. Which of the following steps of the construction is incorrect?

Step 1: Draw a circle with the help of a bangle.

Step 2: Draw any two chords AB and AC.

Step 3: Draw the perpendicular bisectors of AB and AC. Let these cut each other at O, the centre of circle.

Step 4: Take a point P inside the circle. Join OP.

Step 5: Draw the perpendicular bisector of OP. Let M be the mid-point of OP.

Step 6: With M as centre and MO as radius, draw a circle. Let it intersect the circle drawn with the help of the bangle at the points Q and R. Join PQ and PR which are the required tangents.

- a. Step 1 and step 2
- b. Only step 6
- c. Only step 4
- d. Step 3 and step 5

15. Given below are the steps of construction of  $\triangle ABC$  in which AB = 6 cm, BC = 8 cm and  $\angle B = 90^\circ$ . BD is the perpendicular drawn from B on AC. The circle through B, C and D is drawn. Construct the tangents from A to the circle. Which of following steps is incorrect?

- 1. Draw a line segment BC of length 4 cm.
- 2. At point B, draw a perpendicular on BC and cut BA = 3 cm.
- 3. Join A and C.
- 4. Draw a perpendicular BD from B on AC.
- 5. With P as the mid-point of BC, draw a circle of radius 4 cm which passes through B, C and D.
- 6. With A as centre and radius AB = 3 cm, draw an arc cutting the circle at E. Join AE.
- 7. AB and AE are the required tangents.
- a. Step 1 and 2
- b. Step 5 only
- c. Step 6
- d. Step 2 only

Darken your choice with HB pencil

1.  a  b  c  d  
2.  a  b  c  d  
3.  a  b  c  d  
4.  a  b  c  d

5.  a  b  c  d  
6.  a  b  c  d  
7.  a  b  c  d  
8.  a  b  c  d

9.  a  b  c  d  
10.  a  b  c  d  
11.  a  b  c  d  
12.  a  b  c  d

13.  a  b  c  d  
14.  a  b  c  d  
15.  a  b  c  d

## SECTION - A : MATHEMATICAL REASONING

1. The area of a square that can be inscribed in a circle of diameter 4 cm is \_\_\_\_\_  $\text{cm}^2$ .
  - 8
  - $4\sqrt{2}$
  - 8
  - $6\sqrt{2}$
2. The radii of two circles are 8 cm and 6 cm, respectively. The diameter of the circle that has an area equal to the sum of the areas of the two circles is
  - 20 cm
  - 30 cm
  - 40 cm
  - 28 cm
3. If the perimeter of a circle is equal to that of a square, then the ratio of their areas is
  - 7 : 22
  - 14 : 11
  - 20 : 7
  - 14 : 127
4. If the difference between the circumference and the radius of a circle is 37 cm, then the circumference of the circle is
  - 40 cm
  - 37 cm
  - 14 cm
  - 44 cm
5. A piece of wire 10 cm long is bent to form an arc of a circle subtending an angle of  $60^\circ$  at its centre. The radius of the circle is
  - 9.54 cm
  - 8.54 cm
  - 7.54 cm
  - 7.50 cm
6. The perimeter of a sector of a circle of radius 5 cm, subtending an angle of  $45^\circ$  is
  - 18.7 cm
  - 28.7 cm
  - 3.9 cm
  - 20 cm
7. The area of the race track with semicircular ends as shown in the given figure, is
 

A diagram showing a central rectangle with a horizontal width of 38 m and a vertical height of 10 m. Two semicircular ends are attached to the top and bottom edges of the rectangle, forming a race track shape.

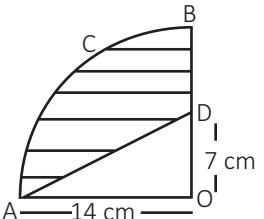
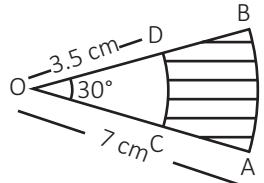
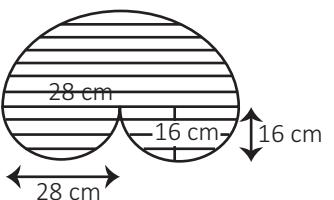
  - $380 + 25\pi \text{ sq. m}$
  - $280 + 25\pi \text{ sq. m}$
  - $20\pi + 250 \text{ sq. m}$
  - $380 + 2\sqrt{2}\pi \text{ sq. m}$
8. E, F, G and H are the mid-points of the sides AB, BC, CD and DA, respectively, of a square ABCD. The area of the shaded region as shown in the given figure is
 

A diagram of a square ABCD with all four sides labeled as 14 cm. Point E is the midpoint of AB, F is the midpoint of BC, G is the midpoint of CD, and H is the midpoint of DA. Four quadrilaterals are shaded: AEGH, BEFH, CGHF, and DFGA.

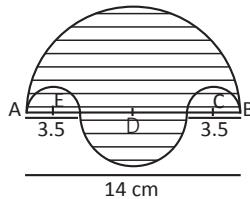
  - $36 \text{ cm}^2$
  - $42 \text{ cm}^2$
  - $38 \text{ cm}^2$
  - $40 \text{ cm}^2$
9. ABCD is a square land of side 42 m. Two semicircular portion are made on two of its opposite sides as shown in the given figure. The area of uncovered land is \_\_\_\_\_  $\text{m}^2$ .
 

A diagram of a square ABCD with all four sides labeled as 42 cm. Two semicircular portions are drawn on the top and bottom sides, each with a radius of 21 cm. The area of the square is covered by the central rectangle and the two semicircles.

  - 400
  - 378
  - 252
  - 450

10. In a circle of radius 14 cm, an arc subtends an angle of  $60^\circ$  at the centre. The area of the sector formed by an arc is  
 a.  $104.24 \text{ cm}^2$       b.  $102.6 \text{ cm}^2$   
 c.  $124.02 \text{ cm}^2$       d.  $132.05 \text{ cm}^2$
11. OACB is a quadrant of a circle with centre O and radius 14 cm. If OD = 7 cm, then the area of the shaded region is \_\_\_\_\_  $\text{cm}^2$ .
- 
- a. 105      b. 285  
 c. 95      d. 100
12. A chord AB of a circle of radius 10 cm makes a right angle at the centre of the circle. The area of the minor segment is \_\_\_\_\_  $\text{cm}^2$ .  
 a. 26.5      b. 27.5  
 c. 28.5      d. 30.5
13. The area of the unshaded portion as shown in the figure given below, where ABC is an equilateral triangle, is  
 a.  $192 \text{ m}^2$       b.  $102 \text{ m}^2$   
 c.  $124 \text{ m}^2$       d.  $92 \text{ m}^2$
14. A sector of  $40^\circ$  is cut from a circle, which has an area of  $3\frac{4}{7} \text{ cm}^2$ . The radius of the circle is \_\_\_\_\_ cm.  
 a.  $\approx 1.07$       b.  $\approx 3.197$   
 c.  $\approx 1.8$       d.  $\approx 2.09$
15. The area of a circle varies as the square of its radius. If the area of the circle of radius 20 cm is  $600 \text{ cm}^2$ , then the area of the circle with radius 24 cm is  
 a.  $1800 \text{ cm}^2$       b.  $900 \text{ cm}^2$   
 c.  $764 \text{ cm}^2$       d.  $864 \text{ cm}^2$
16. Sectors of two concentric circles of radius 7 cm and 3.5 cm, respectively are shown below. The area of the shaded region is \_\_\_\_\_  $\text{cm}^2$ .
- 
- a. 9.625      b. 8.625  
 c. 7.625      d. None of these
17. The area of the sector of a circle of radius 40 cm is  $54\pi \text{ cm}^2$ . The length of the corresponding arc of the sector is \_\_\_\_\_ cm.  
 a.  $2.7\pi$       b.  $2.5\pi$   
 c.  $2.2\pi$       d.  $2.9\pi$
18. In a circle with centre O and radius 4 cm, AB is a chord of length  $4\sqrt{3}$  cm. The area of the sector AOB is  
 a.  $\approx 10\pi \text{ cm}^2$       b.  $\approx 6\pi \text{ cm}^2$   
 c.  $\approx 5\pi \text{ cm}^2$       d.  $\approx 4\pi \text{ cm}^2$
19. The area of the shaded region in the given figure is \_\_\_\_\_  $\text{cm}^2$ .
- 
- a. 2024      b. 1039.7  
 c. 1525      d. 2124.5

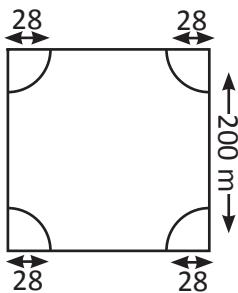
20. The boundary of the shaded region consists of four semicircular arcs. The smallest two semicircular arcs are equal. If the diameter of the largest semicircle is 14 cm and that of the smallest semicircle is 3.5 cm, then the length of the boundary is



- a. 42 cm
- b. 44 cm
- c. 48 cm
- d. 46 cm

## SECTION - B : EVERYDAY MATHS

21. A square Park has each side of 200 m. At each corner of the park, there is a flowerbed in the form of a quadrant of radius 28 m as shown in the figure given below. The area of the remaining part of the park is \_\_\_\_\_  $m^2$ .

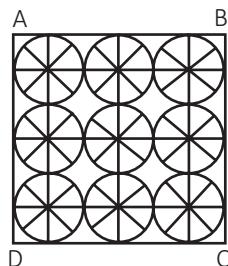


- a. 39,356
- b. 40,536
- c. 37,635
- d. 37,536

22. The length of the minute hand of a clock is 21 cm. The area swept by the minute hand in one minute is \_\_\_\_\_  $cm^2$ .

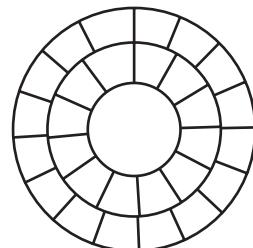
- a. 32.1
- b. 23.1
- c. 44.1
- d. 45.1

23. On a square handkerchief, there are nine circular designs, each of radius 4 cm. The area of the remaining portion of the handkerchief is



- a. 478  $cm^2$
  - b. 2.874  $cm^2$
  - c. 123.4  $cm^2$
  - d. 873  $cm^2$
24. How many times will the wheel of a car rotate in a journey of 100 km if it is known that the diameter of the wheel is 63 cm?
- a.  $\approx 50,505$
  - b.  $\approx 50,405$
  - c.  $\approx 55,505$
  - d.  $\approx 50,555$

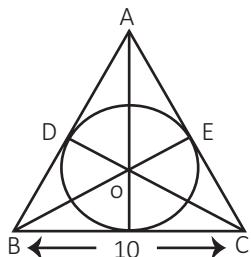
25. An archery target has three regions formed by three concentric circles as shown in the given figure. If the diameter of the concentric circles are in the ratio 3 : 5 : 7, then the ratio of the areas of three regions is



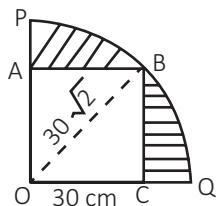
- a. 9 : 16 : 27
- b. 9 : 16 : 24
- c. 28 : 16 : 23
- d. 9 : 16 : 25

## SECTION - C : BRAINBOX

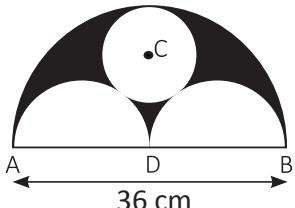
26. In the given figure, a circle is inscribed in an equilateral triangle ABC of side 10 cm. The radius of the inscribed circle is \_\_\_\_\_ cm.



- a. 8.78                          b. 8.82  
 c. 2.88                           d. 7.88
27. In the given figure, a square OABC is inscribed in a sector OPBQ. If OC = 30 cm, then the area of the shaded portion is



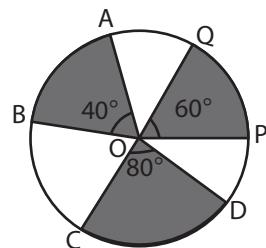
- a.  $613.3 \text{ cm}^2$   
 b.  $316.7 \text{ cm}^2$   
 c.  $315 \text{ cm}^2$   
 d.  $514.3 \text{ cm}^2$
28. In the given figure, AB = 36 cm and D is the mid-point of AB. Three semicircles are drawn on AB, AD and DB as diameters. A circle with centre C and radius 3 cm touches all the three semicircles. The area of the shaded region is \_\_\_\_\_  $\text{cm}^2$ .



- a. 721  
 b. 891.42  
 c. 226.28  
 d. 918.38

29. Which of following is incorrect?
- If the perimeter of a circle is equal to that of a square, then the ratio of their areas is 14 : 11.
  - The diameter of a circle, whose area is equal to the sum of the areas of two circles of diameters 16 cm and 12 cm, is 30 cm.
  - A chord of a circle of radius 14 cm subtends a right angle at the centre. The area of the minor sector is  $154 \text{ cm}^2$ .
  - If the diameter and the area of a circle are numerically equal, then the radius of the circle is  $\frac{2}{\pi}$  units.

30. In the given figure, the radius of the circle with centre O is 7 cm,  $\angle POQ = 60^\circ$ ,  $\angle AOB = 40^\circ$  and  $\angle COD = 80^\circ$ . The area of the shaded region is



- a.  $77 \text{ cm}^2$   
 b.  $66 \text{ cm}^2$   
 c.  $79 \text{ cm}^2$   
 d.  $76 \text{ cm}^2$

Darken your choice with HB pencil -

1.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
2.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
3.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
4.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
5.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
6.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
7.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
8.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

9.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
10.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
11.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
12.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
13.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
14.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
15.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
16.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

17.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
18.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
19.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
20.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
21.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
22.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
23.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
24.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

25.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
26.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
27.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
28.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
29.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d
30.	<input type="radio"/> a	<input type="radio"/> b	<input type="radio"/> c	<input type="radio"/> d

## SECTION - A : MATHEMATICAL REASONING

1. Three cubes each of side 5 cm are joined together to form a cuboid. The surface area of the resulting cuboid is
  - a.  $348 \text{ cm}^2$
  - b.  $358 \text{ cm}^2$
  - c.  $350 \text{ cm}^2$
  - d.  $355 \text{ cm}^2$
2. A metallic sphere of radius 6.3 cm is melted and recast into the shape of a cylinder of radius 7 cm. The height of the cylinder is
  - a. 2.80 cm
  - b. 4.80 cm
  - c. 6.80 cm
  - d. 8.80 cm
3. A metallic sphere of radius 10.5 cm is melted and then recast into small cones, each of radius 3.5 cm and height 3 cm. The number of such cones is
  - a. 63
  - b. 126
  - c. 21
  - d. 130
4. The diameter of a metallic sphere is 9 cm. It is melted and recast into a long wire of diameter 2 mm having a uniform cross-section. The length of the wire is
  - a. 121.5 m
  - b. 12150 m
  - c. 120 m
  - d. 486 m
5. The volume of the largest right circular cone that can be cut from a cube of edge 14 cm is
  - a.  $715.67 \text{ cm}^3$
  - b.  $720.67 \text{ cm}^3$
  - c.  $730.67 \text{ cm}^3$
  - d.  $718.67 \text{ cm}^3$
6. How many silver coins of diameter 1.75 cm in and thickness 2 mm must be melted to form a cuboid of dimensions  $5.5 \text{ cm} \times 10 \text{ cm} \times 3.5 \text{ cm}$ ?
  - a. 400
  - b. 600
  - c. 800
  - d. 126
7. A spherical iron ball is dropped into a cylindrical vessel of diameter 14 cm, containing water. If the water level is increased by  $9\frac{1}{3} \text{ cm}$ , then the radius of the ball is
  - a. 3.5 cm
  - b. 7 cm
  - c. 9 cm
  - d. 12 cm
8. A cubical block of side 7 cm is surmounted by a hemisphere with the greatest diameter that a hemisphere can have. The surface area of the solid is
  - a.  $330 \text{ cm}^2$
  - b.  $332.5 \text{ cm}^2$
  - c.  $880.5 \text{ cm}^2$
  - d.  $780 \text{ cm}^2$
9. A solid is hemispherical from the bottom and conical from the above. If the surface areas of two parts are equal, then the ratio of the radius and height of the conical part is
  - a.  $2:\sqrt{3}$
  - b.  $3:\sqrt{2}$
  - c.  $1:\sqrt{3}$
  - d.  $1:2$
10. A solid is in the shape of a cone standing on a hemisphere of radius 2 cm. The height of the cone is equal to its radius.

So, the volume of the solid in terms of  $\pi$  is

- a.  $8\pi$       b.  $12\pi$   
c.  $7\pi$       d.  $5\pi$

11. A right circular cylinder of radius  $r$  cm and height  $h$  cm, where  $h > 2r$  encloses a sphere of diameter  
a.  $r$  cm      b.  $2r$  cm  
c.  $h$  cm      d.  $2h$  cm

12. A hollow cylinder of height 3 cm is recast into a solid cylinder of height 9 cm. If the external and internal radii of the hollow cylinder are 4.3 cm and 1.1 cm, respectively, then the radius of solid cylinder is  
a. 2.5 cm      b. 2.6 cm  
c. 2.4 cm      d. 2 cm

13. A hemispherical bowl of internal radius 9 cm is full of liquid. This liquid to be filled into a cylindrical shaped small bottles each of diameter 3 cm and height 4 cm. The number of bottles required is  
a. 52      b. 54  
c. 62      d. 51

14. A sphere of radius 6 cm is dropped in a right circular cylindrical vessel, partly filled with water. If the sphere is completely submerged in water, then the water level in the cylindrical vessel rises by  $\frac{32}{9}$  cm.  
The radius of the cylindrical vessel is  
a. 9 cm      b. 18 cm  
c. 21 cm      d. 10 cm

15. The ratio of the volumes of a cube to that of a sphere which will exactly fit inside the cube is  
a.  $7 : \pi$       b.  $\pi : 7$   
c.  $6 : \pi$       d. None of these

16. The maximum volume of a cone that can be carved out of a solid hemisphere of radius  $r$  cm is

- a.  $\frac{1}{3}\pi r^3$       b.  $\frac{2}{3}\pi r^3$   
c.  $\frac{4}{3}\pi r^3$       d.  $\frac{3}{4}\pi r^3$

17. From a shower, rain of 5 cm falls on the ground. The volume of water that falls on 2 hectares of ground is  
a.  $100 \text{ m}^3$   
b.  $10 \text{ m}^3$   
c.  $1000 \text{ m}^3$   
d.  $10000 \text{ m}^3$

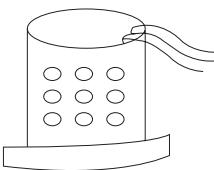
18. A hemispherical tank of radius 275 cm is full of water. It is connected with a pipe which empties it at the rate 4 litres per second. How much time will it take to empty the tank completely?  
a. 181.5 min  
b. 121 min  
c. 184.2 min  
d. 200 min

19. A bucket is in the form of a cone. Its depth is 24 cm and the radius of the top and bottom ends are 15 cm and 5 cm, respectively. The capacity of the bucket is  
a.  $8171.43 \text{ cm}^3$   
b.  $7141.43 \text{ cm}^3$   
c.  $1837.43 \text{ cm}^3$   
d. None of these

20. The slant height of a frustum of a cone is 4 cm and the perimeters of its circular ends are 18 cm and 6 cm, respectively. The curved surface area of the frustum is  
a.  $47 \text{ cm}^2$       b.  $48 \text{ cm}^2$   
c.  $28 \text{ cm}^2$       d.  $40 \text{ cm}^2$

## SECTION - B : EVERYDAY MATHS

21. A fez, the hat used by the Turks, is shaped like a frustum of a cone. If the radius of the circular base at the bottom is 10 cm and that at the top is 4 cm with slant height of 15 cm, then the area of the material used is



- a.  $710\frac{2}{7} \text{ cm}^2$
- b.  $170\frac{2}{7} \text{ cm}^2$
- c.  $210\frac{2}{7} \text{ cm}^2$
- d.  $210\frac{4}{7} \text{ cm}^2$

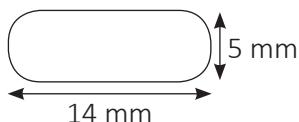
22. A solid toy is in the form of a right circular cylinder with a hemisphere at one end and a cone at the other end. Their common diameters is 4.2 cm and the heights of the cylindrical and conical portions are 12 cm and 7 cm, respectively. The volume of the toy is
- a.  $217.068 \text{ cm}^3$
  - b.  $218.064 \text{ cm}^3$
  - c.  $213.064 \text{ cm}^3$
  - d.  $210.068 \text{ cm}^3$

23. A vessel is in the form of an inverted cone. Its height is 8 cm and the radius is 5 cm. It is filled with water up to the brim. When lead shots, each of which is

a sphere of radius 0.5 cm is dropped into the vessel, one-fourth of the water flows out. The number of lead shots dropped into the vessel is

- a. 200
- b. 400
- c. 100
- d. 150

24. A medicine capsule is in the shape of a cylinder with two hemispheres, stuck to each of its ends. The length of the entire capsule is 14 mm and the radius is 2.5 mm. The surface area of the capsule is



- a.  $225 \text{ mm}^2$
- b.  $240 \text{ mm}^2$
- c.  $220 \text{ mm}^2$
- d.  $240 \text{ mm}^2$

25. The water in a canal 10 m wide and 2 m deep is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minutes, if 10 cm of standing water is needed?
- a. 5000 hectares
  - b. 10000 hectares
  - c. 100 hectares
  - d. 50 hectares

## SECTION - C : BRAINBOX

26. If a solid cone of radius ( $r$ ) and height ( $h$ ) is placed over a solid cylinder with same radius ( $r$ ) and height  $h$  as that of the cone, then the curved surface area of the shape so formed is  $\pi r(\sqrt{h^2+r^2}) + 2\pi rh$ . Is it true?
- a. No
  - b. Yes
  - c. May be
  - d. Can't say

27. A cistern of length 6 m and width 4 m contains water up to the height of 1 m 25 cm. The total area of the wet surface is
- a.  $42 \text{ m}^2$
  - b.  $64 \text{ m}^2$
  - c.  $59 \text{ m}^2$
  - d.  $49 \text{ m}^2$

28. A boat of a length 3 m and breadth 2 m is floating on a lake. The boat sinks 1 cm below the surface of the water when a man gets into it. The mass of the man is
- a. 60 kg
  - b. 43 kg
  - c. 50 kg
  - d. 62 kg

Each of the questions given below is followed by two statements. Read the the statements and decide which of statement(s) is/are necessary to answer (Q29 and Q30).

29. What is the capacity of a cylindrical tank?

Statement 1: The area of the base is  $61,600 \text{ m}^2$ .

Statement 2: The height of the tank is 1.5 times the radius of the base.

Statement 3: The circumference of the base is 880 cm.

- a. Only 1 and 2
- b. Only 2 and either 1 or 3
- c. Only 1
- d. Only 2 and 3

30. What is the height of a circular cone?

Statement 1: The area of the cone is equal to the area of a rectangle whose length is 33 cm.

Statement 2: The area of the base of the cone is  $154 \text{ cm}^2$ .

- a. Both 1 and 2 are not sufficient to answer.
- b. Both are sufficient to answer.
- c. Both 1 and 2 are necessary for answer.
- d. Only 2 is sufficient to answer.

Darken your choice with HB pencil

1.  a  b  c  d

2.  a  b  c  d

3.  a  b  c  d

4.  a  b  c  d

5.  a  b  c  d

6.  a  b  c  d

7.  a  b  c  d

8.  a  b  c  d

9.  a  b  c  d

10.  a  b  c  d

11.  a  b  c  d

12.  a  b  c  d

13.  a  b  c  d

14.  a  b  c  d

15.  a  b  c  d

16.  a  b  c  d

17.  a  b  c  d

18.  a  b  c  d

19.  a  b  c  d

20.  a  b  c  d

21.  a  b  c  d

22.  a  b  c  d

23.  a  b  c  d

24.  a  b  c  d

25.  a  b  c  d

26.  a  b  c  d

27.  a  b  c  d

28.  a  b  c  d

29.  a  b  c  d

30.  a  b  c  d

## SECTION - A : MATHEMATICAL REASONING

1. Which of the following is not a measure of central tendency?
  - a. Mean
  - b. Standard deviation
  - c. Median
  - d. Mode
2. The arithmetic mean of  $1, 2, 3, \dots, n$  is
  - a.  $\frac{n+1}{2}$
  - b.  $\frac{n-1}{2}$
  - c.  $\frac{n}{2}$
  - d.  $\frac{n}{2} + 1$
3. For the frequency distribution, mean, median and mode are connected by the relation
  - a. Mode = 3 Median – 2 mean
  - b. 2 Median = 3 Mean
  - c. Mode = 2 Mean – 2 Median
  - d. Mode = 3 Median + 2 Mean
4. The mode of frequency distribution is found graphically with the help of
  - a. histogram
  - b. frequency curve
  - c. ogive
  - d. frequency polygon
5. Which of the following cannot be determined graphically?
  - a. Mean
  - b. Median
  - c. Mode
  - d. None of these
6. If the arithmetic mean of  $x, x+3, x+6, x+9$  and  $x+12$  is 10, then the value of  $x$  is
  - a. 4
  - b. 6
  - c. 3
  - d. 2
7. If the median and mode of a data are 20 and 10, respectively, then the value of the mean is
  - a. 28
  - b. 20
  - c. 25
  - d. 90
8. If the mean of 3, 4,  $x, 6, y$  and 8 is 5.5, then
  - a.  $x+y=72$
  - b.  $x+y=42$
  - c.  $x+y=12$
  - d.  $x+y=4$
9. If the mean of first  $n$  natural numbers is  $\frac{4n}{5}$ , then the value of  $n$  is
  - a.  $\frac{6}{7}$
  - b.  $\frac{5}{3}$
  - c.  $\frac{3}{2}$
  - d.  $\frac{4}{5}$
10. The mean of  $n$  observations is  $\bar{x}$ . If the first observation is increased by 1, the second by 2, the third by 3 and so on, then the new mean is
  - a.  $\bar{x}+(n+1)$
  - b.  $\bar{x}+(2n+1)$
  - c.  $\bar{x}+\left(\frac{n}{2}+1\right)$
  - d.  $\bar{x}+\left(\frac{n+1}{2}\right)$

11. The mode of the following data is 25.  
 $15, 20, 25, 18, 14, 15, 25, 15, 18, 16, 20, 25, x, 18$ .  
The value of  $x$  is  
a. 20                      b. 18  
c. 25                      d. 16
12. The abscissa of the point of intersection of less than type and more than type cumulative frequency curves of a grouped data gives its  
a. mode                      b. mean  
c. median                      d. none of these
13. The mean of  $n$  even natural numbers is  
a.  $n - 1$                       b.  $n + 1$   
c.  $\frac{n+1}{2}$                       d.  $n$
14. The arithmetic mean of  $7, 8, x, 11, 14$  is  $x$ , then the value of  $x$  is  
a. 3                              b. 6  
c. 8                              d. 10
15. For the following distribution,
- | Class Intervals | No. of Students |
|-----------------|-----------------|
| Below 10        | 3               |
| Below 20        | 12              |
| Below 30        | 27              |
| Below 40        | 57              |
| Below 50        | 75              |
| Below 60        | 80              |
- the modal class is  
a. 10–20  
b. 50–60  
c. 30–40  
d. 20–30
16. If the median of a series exceeds the mean by 3, then its mode exceeds its mean by  
a. 2                              b. 9  
c. 7                              d. 10
17. While computing the mean of grouped data, we assume that the frequencies are  
a. evenly distributed overall the classes.  
b. centred at the class marks of the classes.  
c. centred at the upper limits of the classes.  
d. centred at the lower limits of the classes.
18. A distribution with two modes is called a  
a. premodal  
b. modal  
c. bimodal  
d. none of these
19. A number 25 is removed from the given data.  
 $15, 20, 24, 25, 26, 27, 30, 31$   
The median increases by  
a. 1  
b. 1.5  
c. 2  
d. 0.5
20. Consider the following frequency distribution.
- | Class     | 0–5 | 5–10 | 10–15 | 15–20 | 20–25 |
|-----------|-----|------|-------|-------|-------|
| Frequency | 10  | 15   | 27    | 20    | 9     |
- The sum of the lower limits of median class and the modal class is  
a. 20  
b. 30  
c. 25  
d. 40

## SECTION - B : EVERYDAY MATHS

21. The number of students absent in a school was recorded everyday for 150 days, for the raw data is printed in the form of the following frequency table.

No. of students absent	5	7	9	10	2	4	3
No. of days	10	25	30	30	10	25	20

The median is

- a. 25                          b. 10  
 c. 2                            d. 4
22. The following table gives the number of boys of a particular age in a class of 40 students. The mean age of the students is

Age	15	16	17	18	19	20
No. of students	3	8	10	10	5	4

- a.  $\approx 17$  yrs                          b.  $\approx 18$  yrs  
 c.  $\approx 19$  yrs                                d.  $\approx 20$  yrs

23. A car maintains an average speed of 80 km/h while going from A to B and maintains an average speed of 100 km/h because of less traffic. While returning from B to A the average speed of the car is  
 a. 75 km/hr                                b. 95 km/hr  
 c. 90 km/hr                                d. 70 km/hr

24. For the following distribution,

Marks	No. of students	Marks	No. of students
Below 10	3	Below 40	57
Below 20	12	Below 50	75
Below 30	28	Below 60	80

The modal class is

- a. 0–20                                    b. 30–40  
 c. 0–10                                    d. None of these
25. The mean weight of 21 boys is 40 kg. The mean of the first 10 boys is 42 kg and that of the last 10 boys is 38 kg. The weight of the 11th boy is  
 a. 20 kg                                    b. 45 kg  
 c. 30 kg                                    d. 40 kg

## SECTION - C : BRAINBOX

26. If the mean of  $x$  and  $\frac{1}{x}$  is N, then what is the mean of  $x^3 + \frac{1}{x^3}$ ?  
 a.  $N(8N^2 - 3)$                             b.  $N8N^2 - 7$   
 c.  $8N^2 - 3$                                 d.  $N(8N^2 + 3)$

27. The mode of the following frequency distribution is

Class	25-30	30-35	35-40	40-45	45-50
Frequency	25	34	50	42	28

- a. 39.33                                    b. 38.33  
 c. 37.33                                    d. 27.33
28. The arithmetic mean of the following frequency distribution is 53. The value of P is
- |            |      |       |       |       |        |
|------------|------|-------|-------|-------|--------|
| Classes    | 0-20 | 20-40 | 40-60 | 60-80 | 80-100 |
| Frequ-ency | 12   | 15    | 32    | P     | 13     |
- a. 28                                        b. 27  
 c. 32                                        d. 14

29. Which of the following statements is incorrect?
- The mean of 10 observations is 15.2. If two observation 5 and 9 are replaced by 8 and 14, then the new mean is 16.
  - The mode is the value which occurs most frequently in a set of observation
  - The sum of the deviations of all values of  $x$  from their arithmetic mean is zero, that is  $\sum_{i=1}^n (x_i - \bar{x}) = 0$ .
  - The arithmetic mean of all the factors of 20 is 8.

30. If the median of the following observations  
 $11, 12, 14, 18, x + 2, x + 4, 30, 32, 35, 41$   
after arranging in ascending order is 24, then the value of  $x$  is
- 20
  - 27
  - 21
  - 17

Darken your choice with HB pencil

1. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	9. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	17. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	25. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
2. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	10. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	18. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	26. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
3. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	11. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	19. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	27. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
4. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	12. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	20. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	28. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
5. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	13. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	21. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	29. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
6. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	14. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	22. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	30. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
7. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	15. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	23. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	
8. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	16. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	24. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	

## SECTION - A : MATHEMATICAL REASONING

1. If  $P(A) = 0.65$ ,  $P(B) = 0.15$ , then the value of  $P(\bar{A}) + P(\bar{B})$  is  
 a. 1.2                          b. 1.5  
 c. 0.2                           d. 0.8
2. What is the probability that an ordinary year has 53 Mondays?  
 a.  $\frac{1}{7}$                           b.  $\frac{2}{7}$   
 c.  $\frac{7}{53}$                            d.  $\frac{7}{52}$
3. A bag contains eight red, two black and five white balls. One ball is drawn at random. What is the probability that the ball drawn is not a black ball?  
 a.  $\frac{8}{15}$                           b.  $\frac{13}{15}$   
 c.  $\frac{2}{15}$                             d.  $\frac{1}{3}$
4. What is the probability that the coin will be a 50 paise coin?  
 a.  $\frac{17}{18}$                           b.  $\frac{5}{9}$   
 c.  $\frac{1}{9}$                               d.  $\frac{2}{3}$
5. What is the probability that the coin will not be a 5-rupee coin?  
 a.  $\frac{5}{9}$                             b.  $\frac{2}{3}$   
 c.  $\frac{7}{18}$                             d.  $\frac{17}{18}$
6. One card is drawn at a random from a well-shuffled deck of 52 cards. What is the probability of getting a face card?  
 a.  $\frac{1}{26}$                             b.  $\frac{3}{26}$   
 c.  $\frac{4}{13}$                             d.  $\frac{3}{13}$
7. In a lottery, there are 8 prizes and 16 blanks. What is the probability of getting a prize?  
 a.  $\frac{1}{3}$                             b.  $\frac{2}{3}$   
 c.  $\frac{1}{2}$                             d. None of these
8. The king, queen and jack of clubs are removed from a well-shuffled deck of 52 playing cards. If one card is selected from the remaining cards, then the probability of getting the number '10' of a heart is  
 a.  $\frac{1}{10}$                             b.  $\frac{1}{13}$   
 c.  $\frac{1}{49}$                             d. None of these
9. There are 25 tickets numbered as 1, 2, 3, ..., 25, respectively. One ticket is drawn at random. What is the probability that the number on the ticket is a multiple of 3 or 5?

Study the information given below and answer Q4 and Q5.

A piggy bank contains hundred 50-paise coins, fifty 1-rupee coins, twenty 2-rupee coins and ten 5-rupee coins. If it is equally likely that one of the coins will come out when the piggy bank is turned upside down.

- |   |   |   |
|---|---|---|
| <p>a. <math>\frac{11}{25}</math></p> <p>c. <math>\frac{12}{25}</math></p> | <p>b. <math>\frac{2}{5}</math></p> <p>d. <math>\frac{13}{25}</math></p> | <p>c. <math>\frac{3}{4}</math></p> <p>d. <math>\frac{5}{9}</math></p> |
|---|---|---|
10. A letter is chosen at random from the letters of the English alphabet. The probability that it is a letter of the word 'CHILD' is
- |  |   |
|--|---|
| <p>a. <math>\frac{21}{26}</math></p> <p>c. <math>\frac{4}{26}</math></p> | <p>b. <math>\frac{4}{26}</math></p> <p>d. <math>\frac{5}{26}</math></p> |
|--|---|
11. The probability that a number selected at random from the set of numbers 1, 2, 3, ..., 100 is
- |   |   |
|---|---|
| <p>a. <math>\frac{2}{25}</math></p> <p>c. <math>\frac{1}{25}</math></p> | <p>b. <math>\frac{4}{25}</math></p> <p>d. <math>\frac{3}{25}</math></p> |
|---|---|
12. A die is tossed once. The probability of getting an even number or a multiple of 3 is
- |   |   |
|---|---|
| <p>a. <math>\frac{2}{3}</math></p> <p>c. <math>\frac{4}{3}</math></p> | <p>b. <math>\frac{3}{2}</math></p> <p>d. <math>\frac{4}{5}</math></p> |
|---|---|
13. Which of the following cannot be the probability of an event?
- |                             |   |
|-----------------------------|---|
| <p>a. 2.5</p> <p>c. 0.4</p> | <p>b. <math>\frac{4}{5}</math></p> <p>d. 20 %</p> |
|-----------------------------|---|
14. The probability of an impossible event is
- |                          |                         |
|--------------------------|-------------------------|
| <p>a. 1</p> <p>c. -1</p> | <p>b. 0</p> <p>d. 2</p> |
|--------------------------|-------------------------|
15. Three coins are tossed at once. What is the probability of getting neither 3 heads nor 3 tails?
- |                                    |                                    |
|------------------------------------|------------------------------------|
| <p>a. <math>\frac{3}{5}</math></p> | <p>b. <math>\frac{4}{5}</math></p> |
|------------------------------------|------------------------------------|
16. A box contains 90 discs numbered from 1 to 90. If one disc is drawn at random from the box, then the probability that it bears a prime number less than 23 is
- |  |  |
|--|--|
| <p>a. <math>\frac{7}{95}</math></p> <p>c. <math>\frac{41}{45}</math></p> | <p>b. <math>\frac{9}{7}</math></p> <p>d. <math>\frac{4}{45}</math></p> |
|--|--|
17. Two dice are thrown together. The probability that the dice bears total of 8 is
- |  |   |
|--|---|
| <p>a. <math>\frac{1}{5}</math></p> <p>c. <math>\frac{5}{36}</math></p> | <p>b. <math>\frac{1}{12}</math></p> <p>d. None of these</p> |
|--|---|
18. A coin is tossed two times. The probability of getting not more than one head is
- |   |   |
|---|---|
| <p>a. <math>\frac{2}{3}</math></p> <p>c. <math>\frac{4}{7}</math></p> | <p>b. <math>\frac{3}{4}</math></p> <p>d. <math>\frac{3}{5}</math></p> |
|---|---|
19. Two dice are thrown simultaneously. The probability that the sum of the two numbers appearing on the top is less than or equal to 10 is
- |   |   |
|---|---|
| <p>a. <math>\frac{12}{13}</math></p> <p>c. <math>\frac{11}{12}</math></p> | <p>b. <math>\frac{11}{13}</math></p> <p>d. <math>\frac{10}{11}</math></p> |
|---|---|
20. Out of a pack of well-shuffled 52 playing cards, two black kings were lost. The probability that the card drawn is a red card is
- |   |   |
|---|---|
| <p>a. <math>\frac{26}{50}</math></p> <p>c. <math>\frac{50}{51}</math></p> | <p>b. <math>\frac{13}{50}</math></p> <p>d. <math>\frac{48}{52}</math></p> |
|---|---|

## SECTION - B : EVERYDAY MATHS

21. At a traffic signal, out of 100 people, 8 jumped red light. The probability of people not jumping the red light is
- a.  $\frac{19}{23}$       b.  $\frac{21}{24}$   
 c.  $\frac{23}{25}$       d.  $\frac{24}{27}$
22. Two friends were born in the year 2000. What is the probability that they have the same birth date?
- a.  $\frac{1}{365}$       b.  $\frac{1}{366}$   
 c.  $\frac{2}{365}$       d.  $\frac{2}{366}$
23. A school with five houses A, B, C, D and E have 50 students—14 from house A, 2 from B, 5 from C, 10 from D and the rest from house E. A student is selected for class monitor at random. The probability that the selected student is not from house B and D is

- a.  $\frac{37}{50}$       b.  $\frac{17}{50}$   
 c.  $\frac{18}{19}$       d.  $\frac{38}{50}$

Two customers Shyam and Ram are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the shop on any day as that on another day. What is probability that both will visit the shop on

24. the same day?

- a.  $\frac{1}{5}$       b.  $\frac{4}{5}$   
 c.  $\frac{3}{5}$       d.  $\frac{2}{5}$

25. different days?

- a.  $\frac{1}{7}$       b.  $\frac{5}{7}$   
 c.  $\frac{4}{5}$       d.  $\frac{3}{5}$

26. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, then the number of blue balls in the bag is
- a. 10      b. 20  
 c. 15      d. 17
27. A jar contains 54 marbles, each of which is blue, green or white. The probability of selecting a blue marble at random from the jar is  $\frac{1}{3}$ , and the probability of selecting a green marble at random is  $\frac{4}{9}$ . How many white marbles does the jar contain?

- a. 10      b. 12  
 c. 22      d. 27

28. Out of 600 bolts, 20% are too large and 10% are too small. The remaining are considered to be suitable, if a bolt is selected at random. The probability that it will be suitable is

- a.  $\frac{2}{9}$       b.  $\frac{7}{5}$   
 c.  $\frac{7}{10}$       d.  $\frac{5}{7}$

29. An ordinary dice is tossed twice and the difference between the number of dots turned up is noted. The probability of a difference of 3 is

- a.  $\frac{1}{7}$       b.  $\frac{1}{6}$   
c.  $\frac{1}{5}$       d.  $\frac{1}{9}$

30. Which of the following is incorrect?

- a. An event containing no outcome is a null set and is impossible to occur.  
b. The subset of a sample space containing any number of outcomes is called an event.  
c. An event containing all sample points is an event that is certain to occur.  
d. The probability of an event A is a number between 1 and 2 inclusively.

Darken your choice with HB pencil

1.  a  b  c  d

2.  a  b  c  d

3.  a  b  c  d

4.  a  b  c  d

5.  a  b  c  d

6.  a  b  c  d

7.  a  b  c  d

8.  a  b  c  d

9.  a  b  c  d

10.  a  b  c  d

11.  a  b  c  d

12.  a  b  c  d

13.  a  b  c  d

14.  a  b  c  d

15.  a  b  c  d

16.  a  b  c  d

17.  a  b  c  d

18.  a  b  c  d

19.  a  b  c  d

20.  a  b  c  d

21.  a  b  c  d

22.  a  b  c  d

23.  a  b  c  d

24.  a  b  c  d

25.  a  b  c  d

26.  a  b  c  d

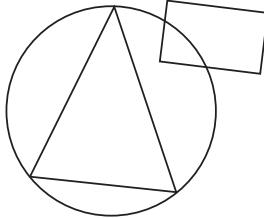
27.  a  b  c  d

28.  a  b  c  d

29.  a  b  c  d

30.  a  b  c  d

## SECTION - A : VERBAL

1. Which of the following is the meaningful sequence of the following words?  
 i. WORD    ii. PARAGRAPH    iii. SENTENCE  
 iv. LETTERS    v. PHRASE  
 a. iv, i, v, iii, ii                  b. i, ii, iii, iv, v  
 c. iv, v, ii, i, iii                  d. iv, i, iii, v, ii
2. Which of the following is the meaningful sequence of the following words?  
 1. Poverty                          2. Population  
 3. Death                            4. Unemployment  
 5. Disease  
 a. 1, 5, 3, 4, 2                    b. 2, 4, 1, 5, 3  
 c. 2, 1, 4, 3, 5                   d. 2, 1, 4, 5, 3
3. There are two statements given below, which are followed by four conclusions P, Q, R and S?  
 Choose the conclusions which are logically followed from the given statements.  
 Statement 1: No door is dog.  
 Statement 2: All dogs are cats.  
 Conclusion:  
 P – No door is cat.  
 Q – No cat is door.  
 R – Some cats are dogs.  
 S – All the cats are dogs.  
 a. Only P  
 b. Only R and S  
 c. Only R  
 d. Only P and Q
4. In an organisation of population control board, engineers are represented by a circle, legal experts by a rectangle and environmentalists by a triangle. Who is most represented in the board according to the figure given below?  


a. Environmentalists  
 b. Engineers with legal background  
 c. Environmentalists with Engineering background.  
 d. Legal experts.
5. The diagram given below represent those students who play cricket, football and badminton.  

Study the diagram given above and identify which of the following the students play all three games?

a. P + Q + R  
 b. V + T  
 c. S + V  
 d. S

6.  $123 : 13^2 :: 127 : P$

The value of P is

- a.  $12^2$
- b.  $17^2$
- c.  $27^2$
- d.  $89^2$

7. ‘Indolence’ is related to ‘work’ as ‘Tacitum’ is related to

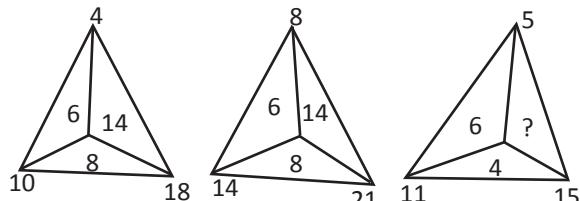
- a. Speak
- b. Act
- c. Observe
- d. Chest

8. Which of the following will replace the question mark?

$A_2$	$C_4$	$E_6$
$G_3$	$I_5$	?
$M_5$	$O_9$	$Q_{14}$

- a.  $L_{10}$
- b.  $K_8$
- c.  $I_{15}$
- d.  $O_7$

9. Which of the following will replace the question mark?



- a. 10
- b. 12
- c. 24
- d. 6

10. Choose the odd one out.

- a. Faraday
- b. Marconi
- c. Beethovan
- d. Addison

11. A number of friends decided to go on a picnic and planned to spend ₹96 on eatables. Four of them, however, did not turn up. As a consequence, the remaining ones had to contribute ₹4 each extra. The number of friends who attended the picnic was

- a. 10
- b. 14
- c. 16
- d. 8

12. I have few sweets to be distributed. If I keep 2, 3 or 4 sweets in a pack, then I am left with one sweet. If I keep 5 sweets in a pack, then I am left with none. What is the minimum number of sweets that I have to pack and distribute?

- a. 37
- b. 40
- c. 25
- d. 60

13. If ‘ $a + b$ ’ means ‘a is mother of b’; ‘ $a - b$ ’ means ‘a is brother of b’; ‘ $a \% b$ ’ means ‘a is father of b’ and ‘ $a \times b$ ’ means ‘a is the sister of b’, then which of the following shows that P is the maternal uncle of Q?

- a.  $P - M + N \times Q$
- b.  $Q - S \% P$
- c.  $P + S \times N - Q$
- d. None of these

14. Choose the correct option for the missing letters in the given pattern.

\_\_\_\_\_ Stt \_\_\_\_\_ tt \_\_\_\_\_ tts \_\_\_\_\_

- a. tsts
- b. tsst
- c. ssst
- d. sttt

15. Which of the following is always related to bravery?

- a. Experience
- b. Power
- c. Courage
- d. Knowledge

16. The wrong term in the series  
6, 15, 35, 77, 165, 221 is

- a. 35
- b. 15
- c. 6
- d. 165

17. Rahul puts his timepiece on the table in such a way that at 6 p.m., the hour hand points towards north. In which direction does the minute hand point when the time is 9:15 p.m.?

- a. South
- b. East
- c. West
- d. North

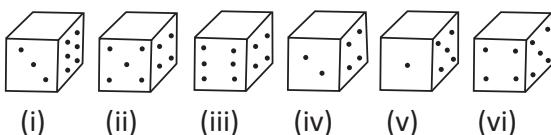
18. Read the statements carefully.

Statement 1: The standard of living among the middle class society is constantly going up.

Statement 2: Indian Economy is observing a remarkable growth.

Which of the following is the correct option?

- a. Statement 1 is the cause and statement 2 is its effect.
  - b. Statement 2 is the cause and statement 1 is its effect.
  - c. Both the statements 1 and 2 are independent causes.
  - d. Both the statements 1 and 2 are effects of independent causes.
19. Six dice with nothing imprinted on its upper face is shown below.



The sum of the number of dots on the opposite face is 7.

If an even-numbered dice have even number of dots on their top faces, then what would be the total number of dots on the top faces of their dice?

- a. 16
- b. 19
- c. 20
- d. 18

Q20 and Q21 are based on the information given below.

- 1. A cuboid-shaped wooden block has length of 6 cm, breadth of 4 cm and height of 1 cm.
- 2. Two faces measuring  $4\text{ cm} \times 1\text{ cm}$  are coloured in black.

- 3. Two faces measuring  $6\text{ cm} \times 1\text{ cm}$  are coloured in red.
- 4. Two faces measuring  $6\text{ cm} \times 4\text{ cm}$  are coloured in green.
- 5. The block is divided into 6 equal cubes of side 1 cm (on 6 cm side), 4 equal cubes of side 1 cm (on 4 cm side).

20. How many cubes with red, green and black colours on at least one side will be formed?

- a. 20
- b. 4
- c. 16
- d. 17

21. How many small cubes will be formed ?

- a. 24
- b. 16
- c. 17
- d. 20

Q22 and Q23 are based on the information given below.

P, Q, R, S, T, U, V and W are sitting a round the circle and are facing towards the centre.

- 1. P is second to the right of T, who is the neighbour of R and V.
- 2. S is not the neighbour of P.
- 3. V is the neighbour of U.
- 4. Q is not between S and W.
- 5. W is not between U and S.

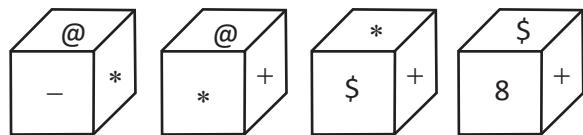
22. Which two of the following are not neighbours?

- a. UV
- b. RV
- c. WQ
- d. SW

23. Which of the following is to the immediate right of V?

- a. T
- b. U
- c. R
- d. P

24. Which symbol will be on the face opposite to the face with symbol \* ?



- a. @                      b. \$  
c. 8                      d. +

25. Read the following statements and the questions given below. Decide whether the given statements are sufficient to answer the question or not. Choose the correct option?

Question: In which year was Rahul born?

Statements 1: Rahul at present is 25 years younger to his mother.

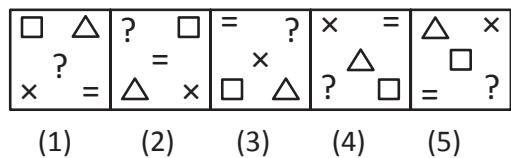
Statements 2: Rahul's brother, who was born in 1964, is 35 years younger to his mother.

- a. 1 alone is sufficient while 2 alone is not sufficient to solve the above question.
- b. 2 alone is sufficient while 1 alone is not sufficient to solve the above question.
- c. Either 1 or 2 is sufficient to solve the above question.
- d. Both 1 and 2 are sufficient to solve the above question.

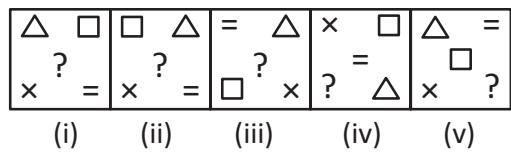
## SECTION - B : NON VERBAL REASONING

26. Select a figure from amongst the answer figures which will continue the same series as established by the five problem figures.

Problem Figures:

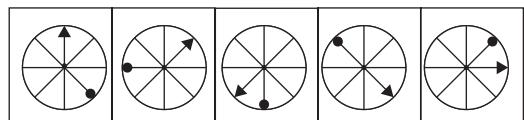


Answer Figures:



- a. i                      b. ii  
c. iii                    d. iv

27. In the given problem, out of the five figures marked as (i), (ii), (iii), (iv) and (v), four are similar in a certain manner. However, one figure is not like the other four. Choose the figure which is different from the rest?



- (i)                      (ii)                      (iii)                      (iv)                      (v)

- a. v                      b. ii  
c. iii                    d. iv

28. Choose the alternative which closely resembles the mirror image of the given combination, when the mirror is placed vertically to the right of the given image.

ANS43Q12

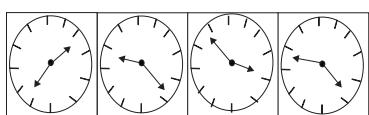
- (1) AÑS4343011                      (2) 110343AÑS  
(3) SÑA343011                      (4) 110343AÑS

- a. 3  
b. 2  
c. 4  
d. 1

29. Choose the correct mirror image of the given figure (X) from amongst the four alternatives, when the mirror is placed vertically to the right of the given image.



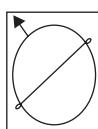
(X)



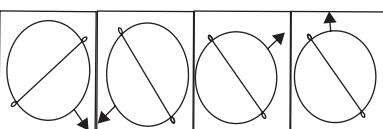
(i) (ii) (iii) (iv)

- a. i
- b. ii
- c. iii
- d. iv

30. Choose the correct mirror image of the given figure (X) from amongst the four alternatives, when the mirror is placed vertically to the right of the given image.



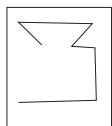
(X)



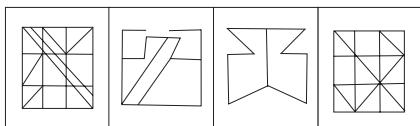
(i) (ii) (iii) (iv)

- a. i
- b. ii
- c. iii
- d. iv

31. Which of the following is the alternative figure which contains figure (P) as its part?



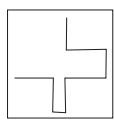
(P)



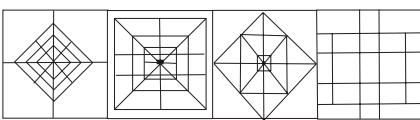
(i) (ii) (iii) (iv)

- a. i
- b. ii
- c. iii
- d. iv

32. Which of the following is the alternative figure which contains figure (Q) as its part?



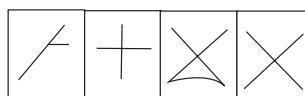
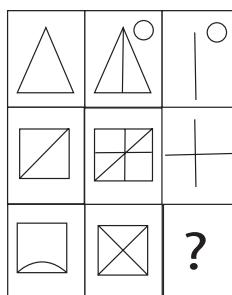
(Q)



(i) (ii) (iii) (iv)

- a. i
- b. ii
- c. iii
- d. iv

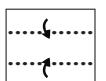
33. Select a suitable figure from the four alternatives that would complete the figure matrix.



(i) (ii) (iii) (iv)

- a. i
- b. ii
- c. iii
- d. iv

34. Choose a figure which would most closely resemble the unfolded form of figure (Z).



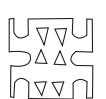
X



Y



Z



(i)



(ii)



(iii)



(iv)

- a. i
- b. ii
- c. iii
- d. iv

35. Choose a figure which would most closely resemble the unfolded form of figure (Z).



X



Y



Z



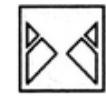
(i)



(ii)



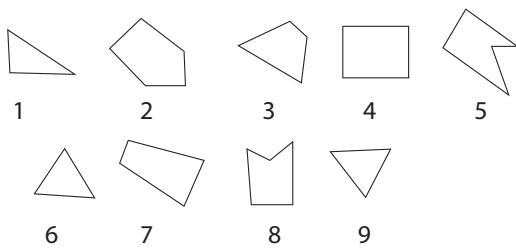
(iii)



(iv)

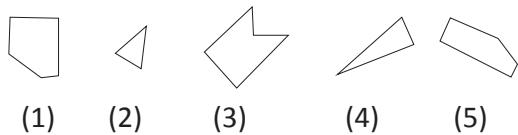
- a. i
- b. ii
- c. iii
- d. iv

36. Which of the following figures can be grouped into three similar classes using each figure only once?



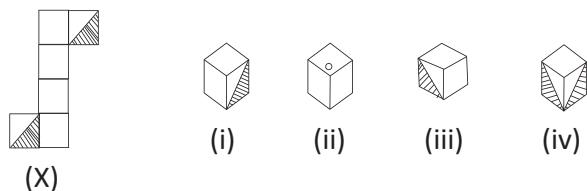
- a. 1,6,9 ; 3,4,7 ; 2,5,8
- b. 1,6,8 ; 3,4,7 ; 2,5,9
- c. 1,3,2 ; 4,5,7 ; 6,8,9
- d. 7,8,9 ; 2,4,3 ; 1,5,6

37. Select the alternative which represents three out of the five alternative figures, which when fitted into each other would form a complete square.



- a. 123
- b. 124
- c. 125
- d. 145

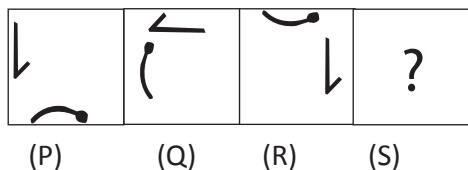
38. Choose the box that is similar to the box formed from the given sheet of paper (X).



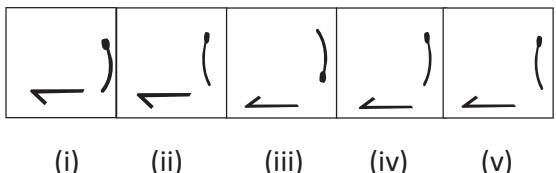
- a. i and ii only
- b. i and iii only
- c. iii and iv only
- d. None of these

39. Select a suitable figure from the answer figures that would replace the question mark (?) in the problem figures.

Problem Figures:



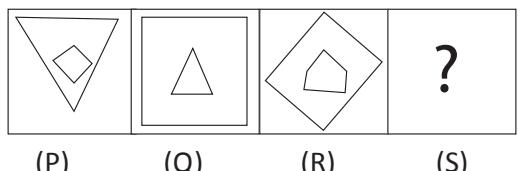
Answer Figures:



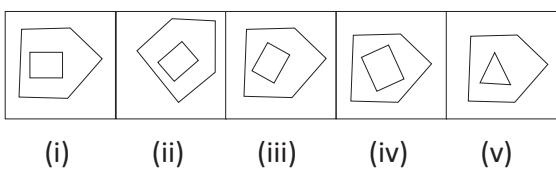
- a. iv
- b. ii
- c. iii
- d. v

40. Select a suitable figure from the Answer figures that would replace the question mark (?) in the problem figures.

Problem Figures:

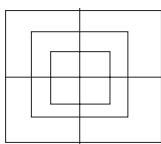


Answer Figures:



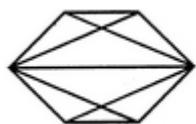
- a. i
- b. ii
- c. iii
- d. iv

41. The number of squares in the given figure is



- a. 10
- b. 15
- c. 18
- d. 19

42. The number of quadrilaterals in the given figure is



- a. 11
- b. 13
- c. 14
- d. 15

43. Choose the alternative which closely resembles the water image of the given combination, when the mirror is placed horizontally below the given image.

**NUCLEAR**

(1) **BAEFCUN**  
(3) **NUCGEAEF**

(2) **NUCLEAF**  
(4) **NUCGEAEB**

- a. 1
- b. 2
- c. 3
- d. 4

44. Choose the correct water image of the given figure (X) from amongst the four alternatives, when the mirror is placed horizontally below the given image.



(X)



(i)



(ii)



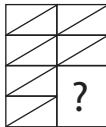
(iii)



(iv)

- a. i
- b. ii
- c. iii
- d. iv

45. The figure that completes the given pattern is



(P)



(i)



(ii)



(iii)



(iv)

- a. i
- b. ii
- c. iii
- d. iv

46. Choose the option from amongst the four alternatives to show how the pattern would appear when the transparent sheet is folded along the dotted line.



(P)



(i)



(ii)



(iii)

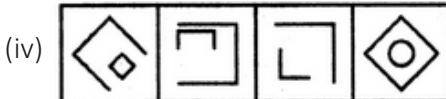
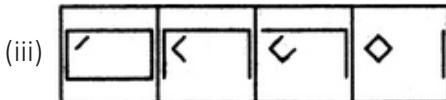
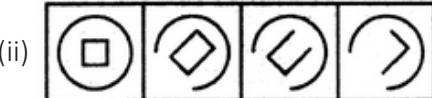
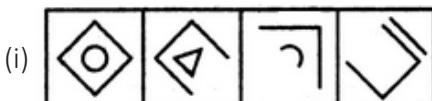


(iv)

- a. i
- b. ii
- c. iii
- d. iv

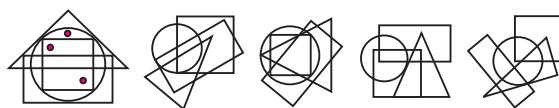
47. Choose the set of figures which follows the given rule.

**Rule:** Closed figures gradually become open and open figures gradually become closed.



- a. i
- b. ii
- c. iii
- d. iv

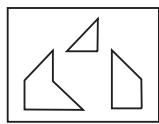
48. Select the figure which satisfies the same conditions of placement of the dots as in figure X.



(X) (i) (ii) (iii) (iv)

- a. i
- b. ii
- c. iii
- d. iv

49. Which of the following figures can be formed from the pieces given in figure (X)?



(X) (i) (ii) (iii) (iv)

- a. i
- b. ii
- c. iii
- d. iv

50. How will the key figure (X) look like after rotation?



(X)



(i)



(ii)



(iii)



(iv)

- a. i
- b. ii
- c. iii
- d. iv

Darken your choice with HB pencil

1. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	14. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	27. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	40. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
2. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	15. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	28. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	41. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
3. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	16. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	29. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	42. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
4. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	17. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	30. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	43. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
5. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	18. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	31. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	44. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
6. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	19. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	32. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	45. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
7. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	20. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	33. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	46. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
8. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	21. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	34. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	47. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
9. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	22. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	35. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	48. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
10. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	23. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	36. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	49. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
11. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	24. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	37. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	50. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d
12. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	25. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	38. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	
13. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	26. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	39. <input type="radio"/> a <input type="radio"/> b <input type="radio"/> c <input type="radio"/> d	

# Answers

## Chapter 1: Real Numbers

1.	c	2.	b	3.	d	4.	c	5.	d	6.	a	7.	b	8.	c	9.	d	10.	c
11.	d	12.	d	13.	b	14.	a	15.	b	16.	c	17.	b	18.	d	19.	d	20.	b
21.	b	22.	b	23.	c	24.	b	25.	b	26.	c	27.	c	28.	a	29.	c	30.	d

## Chapter 2: Polynomials

1.	a	2.	c	3.	b	4.	a	5.	a	6.	a	7.	d	8.	a	9.	b	10.	a
11.	c	12.	d	13.	a	14.	b	15.	a	16.	d	17.	a	18.	b	19.	d	20.	b
21.	c	22.	b	23.	a	24.	b	25.	d	26.	b	27.	c	28.	c	29.	a	30.	b

## Chapter 3: Pair of Linear Equations in Two Variables

1.	c	2.	d	3.	c	4.	d	5.	d	6.	a	7.	b	8.	c	9.	b	10.	c
11.	a	12.	c	13.	b	14.	a	15.	a	16.	c	17.	a	18.	c	19.	d	20.	a
21.	c	22.	b	23.	c	24.	b	25.	a	26.	c	27.	a	28.	d	29.	c	30.	b

## Chapter 4: Quadratic Equations

1.	d	2.	b	3.	b	4.	a	5.	b	6.	d	7.	a	8.	c	9.	a	10.	b
11.	c	12.	c	13.	d	14.	a	15.	c	16.	b	17.	b	18.	a	19.	c	20.	b
21.	c	22.	a	23.	c	24.	b	25.	c	26.	a	27.	b	28.	a	29.	a	30.	c

## Chapter 5: Arithmetic Progression

1.	a	2.	d	3.	b	4.	a	5.	b	6.	c	7.	c	8.	a	9.	d	10.	d
11.	b	12.	c	13.	b	14.	a	15.	b	16.	a	17.	c	18.	b	19.	a	20.	a
21.	b	22.	d	23.	c	24.	c	25.	a	26.	a	27.	a	28.	b	29.	a	30.	c

## Chapter 6: Triangles

1.	d	2.	a	3.	b	4.	b	5.	c	6.	a	7.	d	8.	a	9.	b	10.	b
11.	a	12.	d	13.	a	14.	a	15.	c	16.	b	17.	d	18.	b	19.	a	20.	b
21.	a	22.	c	23.	d	24.	d	25.	a	26.	b	27.	a	28.	d	29.	d	30.	b

## Chapter 7: Co-ordinate Geometry

1.	b	2.	a	3.	c	4.	d	5.	b	6.	a	7.	c	8.	b	9.	d	10.	a
11.	c	12.	d	13.	a	14.	a	15.	b	16.	a	17.	d	18.	b	19.	a	20.	b
21.	b	22.	a	23.	a	24.	c	25.	a	26.	b	27.	a	28.	b	29.	c	30.	b

## Chapter 8: Trigonometry

1.	a	2.	b	3.	d	4.	a	5.	d	6.	b	7.	c	8.	d	9.	c	10.	d
11.	a	12.	b	13.	a	14.	b	15.	c	16.	a	17.	b	18.	a	19.	d	20.	a
21.	b	22.	d	23.	a	24.	a	25.	b	26.	c	27.	c	28.	a	29.	a	30.	b

## Chapter 9: Circles

1.	d	2.	a	3.	c	4.	b	5.	a	6.	a	7.	b	8.	b	9.	b	10.	a
11.	c	12.	b	13.	a	14.	c	15.	d	16.	b	17.	c	18.	b	19.	a	20.	d
21.	a	22.	b	23.	b	24.	d	25.	c	26.	a	27.	a	28.	d	29.	b	30.	d

## Chapter 10: Constructions

1.	d	2.	b	3.	b	4.	a	5.	a	6.	c	7.	d	8.	a	9.	b	10.	a
11.	a	12.	b	13.	b	14.	c	15.	b										

## Chapter 11: Area Related to Circles

1.	c	2.	a	3.	b	4.	d	5.	a	6.	c	7.	a	8.	b	9.	b	10.	b
11.	a	12.	c	13.	d	14.	b	15.	d	16.	a	17.	a	18.	c	19.	d	20.	a
21.	d	22.	b	23.	c	24.	a	25.	b	26.	c	27.	d	28.	c	29.	b	30.	a

## Chapter 12: Surface Areas and Volumes

1.	c	2.	c	3.	b	4.	a	5.	d	6.	a	7.	b	8.	b	9.	c	10.	a
11.	b	12.	c	13.	b	14.	a	15.	c	16.	a	17.	c	18.	a	19.	a	20.	b
21.	a	22.	b	23.	c	24.	c	25.	c	26.	b	27.	d	28.	a	29.	b	30.	a

## Chapter 13: Statistics

1.	b	2.	a	3.	a	4.	a	5.	a	6.	a	7.	c	8.	c	9.	b	10.	d
11.	c	12.	c	13.	b	14.	d	15.	c	16.	b	17.	b	18.	c	19.	d	20.	a
21.	b	22.	a	23.	c	24.	b	25.	d	26.	a	27.	b	28.	a	29.	d	30.	c

## Chapter 14: Probability

1.	a	2.	a	3.	b	4.	b	5.	d	6.	d	7.	a	8.	c	9.	c	10.	d
11.	c	12.	a	13.	a	14.	b	15.	c	16.	d	17.	c	18.	b	19.	c	20.	a
21.	c	22.	b	23.	d	24.	a	25.	c	26.	a	27.	b	28.	c	29.	b	30.	d

## Chapter 15: Logical Reasoning

1.	a	2.	b	3.	c	4.	c	5.	d	6.	b	7.	a	8.	b	9.	a	10.	c
11.	d	12.	c	13.	a	14.	b	15.	c	16.	d	17.	c	18.	a	19.	d	20.	b
21.	a	22.	b	23.	a	24.	c	25.	d	26.	b	27.	d	28.	b	29.	d	30.	c
31.	a	32.	d	33.	d	34.	b	35.	b	36.	a	37.	c	38.	b	39.	a	40.	d
41.	b	42.	a	43.	d	44.	b	45.	d	46.	c	47.	c	48.	b	49.	a	50.	c