

1. What is the remainder when  $(17^{29} + 19^{29})$  is divided by 18?

(a) 6

(b) 2

(c) 1

~~(d)~~ 0

2. What is the largest value of  $n$  such that  $10^n$  divides the product

$$2^5 \times 3^3 \times 4^8 \times 5^3 \times 6^7 \times 7^6 \times 8^{12} \times 9^9 \times 10^6 \times 15^{12} \times 20^{14} \times 22^{11} \times 25^{15} ?$$

(a) 65

(b) 55

(c) 50

(d) 45

3. How many pairs  $(A, B)$  are possible in the number 479865AB if the number is divisible by 9 and it is given that the last digit of the number is odd?

~~(a)~~ 5

(b) 6

(c) 9

(d) 11

4. Consider the multiplication  $999 \times abc = def132$  in decimal notation, where  $a, b, c, d, e$  and  $f$  are digits. What are the values of  $a, b, c, d, e$  and  $f$  respectively?

(a) 6, 6, 8, 6, 8, 7

(b) 8, 6, 8, 6, 7, 8

(c) 6, 8, 8, 7, 8, 6

~~(d)~~ 8, 6, 8, 8, 6, 7

5. Three cars A, B and C started from a point at 5 p.m., 6 p.m. and 7 p.m. respectively and travelled at uniform speeds of 60 km/hr, 80 km/hr and  $x$  km/hr respectively in the same direction. If all the three met at another point at the same instant during their journey, then what is the value of  $x$ ?

(a) 120

(b) 110

(c) 105

~~(d)~~ 100

6. Priya's age was cube of an integral number (different from 1) four years ago and square of an integral number after four years. How long should she wait so that her age becomes square of a number in the previous year and cube of a number in the next year?

(a) 7 years

(b) 12 years

(c) 14 years

(d) 21 years



7. Which of the following statements is *not* true ?

- (a) The difference of two prime numbers, both greater than 2, is divisible by 2.
- (b) For two different integers  $m$ ,  $n$  and a prime number  $p$ , if  $p$  divides the product  $m \times n$ , then  $p$  divides either  $m$  or  $n$ .
- (c) If a number is of the form  $6n - 1$  ( $n$  being a natural number), then it is a prime number.
- (d) There is only one set of three prime numbers such that there is a gap of 2 between two adjacent prime numbers.

8. For  $x > 0$ , what is the minimum value of  $x + \frac{x+2}{2x}$  ?

- (a) 1
- (b) 2
- (c)  $2\frac{1}{2}$
- (d)  Cannot be determined

9. If  $\frac{1+px}{1-px} \sqrt{\frac{1-qx}{1+qx}} = 1$ , then what are the non-zero solutions of  $x$  ?

- (a)  $\pm \frac{1}{p} \sqrt{\frac{2p-q}{q}}$ ,  $2p \neq q$
- (b)  $\pm \frac{1}{pq} \sqrt{p-q}$ ,  $p \neq q$
- (c)  $\pm \frac{p}{q} \sqrt{p-q}$ ,  $p \neq q$
- (d)  $\pm \frac{q}{p} \sqrt{2p-q}$ ,  $2p \neq q$

10. In a hostel the rent per room is increased by 20%. If number of rooms in the hostel is also increased by 20% and the hostel is always full, then what is the percentage change in the total collection at the cash counter ?

- (a) 30%
- (b) 40%
- (c)  44%
- (d) 48%

11. Radha and Hema are neighbours and study in the same school. Both of them use bicycles to go to the school. Radha's speed is 8 km/hr whereas Hema's speed is 10 km/hr. Hema takes 9 minutes less than Radha to reach the school. How far is the school from the locality of Radha and Hema ?

- (a) 5 km
- (b) 5.5 km
- (c)  6 km
- (d) 6.5 km

12. Which of the following pair of numbers is the solution of the equation  $3^{x+2} + 3^{-x} = 10$  ?

- (a) 0, 2
- (b)  0, -2
- (c) 1, -1
- (d) 1, 2



13. It is given that  $\log_{10} 2 = 0.301$  and  $\log_{10} 3 = 0.477$ . How many digits are there in  $(108)^{10}$ ?

- (a) 19
- (b) 20
- (c) 21
- (d) 22

14. The sum of three prime numbers is 100. If one of them exceeds another by 36, then one of the numbers is

- (a) 17
- (b) 29
- (c) 43
- (d) None of the above

15. If  $a$ ,  $b$  and  $c$  are positive integers such that

$$\frac{1}{a + \frac{1}{b + \frac{1}{c + \frac{1}{2}}}} = \frac{16}{23},$$

then what is the mean of  $a$ ,  $b$  and  $c$ ?

- (a) 1
- (b) 2
- (c) 1.33
- (d) 2.33

Consider the following for the next three (03) items :

In a certain town of population size 1,00,000 three types of newspapers (I, II and III) are available. The percentages of the people in the town who read these papers are as follows :

Newspaper	Proportion of readers
I	10%
II	30%
III	5%
Both I and II	8%
Both II and III	4%
Both I and III	2%
All the three (I, II and III)	1%

16. What is the number of people who read only one newspaper?

- (a) 20,000
- (b) 25,000
- (c) 30,000
- (d) 35,000

17. What is the number of people who read at least two newspapers?

- (a) 12,000
- (b) 13,000
- (c) 14,000
- (d) 15,000

18. What is the number of people who do **not** read any of these three newspapers?

- (a) 62,000
- (b) 64,000
- (c) 66,000
- (d) 68,000



19. What is the unit place digit in the expansion of  $7^{73}$  ?

- (a) 1
- (b) 3
- (c)  7
- (d) 9

20. Suppose  $n$  is a positive integer such that  $(n^2 + 48)$  is a perfect square. What is the number of such  $n$  ?

- (a) One
- (b)  Two
- (c) Three
- (d) Four

21. For  $x = \frac{4\sqrt{6}}{\sqrt{2} + \sqrt{3}}$ , what is the value of

$$\frac{x + 2\sqrt{2}}{x - 2\sqrt{2}} + \frac{x + 2\sqrt{3}}{x - 2\sqrt{3}} ?$$

- (a) 1
- (b)  $\sqrt{2}$
- (c)  $\sqrt{3}$
- (d) 2

22.  $x$ ,  $y$  and  $z$  are three numbers such that  $x$  is 30% of  $z$  and  $y$  is 40% of  $z$ . If  $x$  is  $p\%$  of  $y$ , then what is the value of  $p$  ?

- (a) 45
- (b) 55
- (c) 65
- (d)  75

23. A plane is going in circles around an airport. The plane takes 3 minutes to complete one round. The angle of elevation of the plane from a point  $P$  on the ground at time  $t$  seconds is equal to that at time  $(t + 30)$  seconds. At time  $(t + x)$  seconds, the plane flies vertically above the point  $P$ . What is  $x$  equal to ?

- (a) 75 seconds
- (b) 90 seconds
- (c) 105 seconds
- (d) 135 seconds

24. Consider the following statements in respect of two integers  $p$  and  $q$  (both  $> 1$ ) which are relatively prime :

1. Both  $p$  and  $q$  may be prime numbers.
2. Both  $p$  and  $q$  may be composite numbers.
3. One of  $p$  and  $q$  may be prime and the other composite.

Which of the above statements are correct ?

- (a)  1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

25. In a class of 100 students, the average weight is 30 kg. If the average weight of the girls is 24 kg and that of the boys is 32 kg, then what is the number of girls in the class ?

- (a)  25
- (b) 26
- (c) 27
- (d) 28

26. For any two real numbers  $a$  and  $b$ ,

$$\sqrt{(a - b)^2} + \sqrt{(b - a)^2} \text{ is}$$

- (a)  always zero
- (b) never zero
- (c) positive only if  $a \neq b$
- (d) positive if and only if  $a > b$



27. If  $a : b = c : d = 1 : 6$ , then what is the value of  $\frac{a^2 + c^2}{b^2 + d^2}$  ?

(a)  $\frac{1}{600}$

(b)  $\frac{1}{60}$

~~(c)  $\frac{1}{36}$~~

(d)  $\frac{1}{6}$

28. What is  $0.\overline{53} + 0.\overline{53}$  equal to ?

(a)  $1.\overline{068}$

(b)  $1.0\overline{68}$

(c)  $1.\overline{068}$

(d)  $1.068$

29. The inequality  $3^N > N^3$  holds when

(a)  $N$  is any natural number

(b)  $N$  is a natural number greater than 2

(c)  $N$  is a natural number greater than 3

~~(d)  $N$  is a natural number except 3~~

30. Which one of the following is an irrational number ?

(a)  $\sqrt{59049}$

(b)  $\frac{231}{593}$

(c)  $0.45454545\dots$

(d)  $0.12112211122211112222\dots$

31. A race has three parts. The speed and time required to complete the individual parts for a runner is displayed on the following chart :

	Part I	Part II	Part III
Speed (kmph)	9	8	7.5
Time (minutes)	50	80	100

What is the average speed of this runner ?

~~(a) 8.17 kmph~~

(b) 8.00 kmph

(c) 7.80 kmph

(d) 7.77 kmph

32. If  $\frac{a}{b+c} = \frac{b}{c+a} = \frac{c}{a+b}$ , then which one of the following statements is correct ?

(a) Each fraction is equal to 1 or -1.

(b) Each fraction is equal to  $\frac{1}{2}$  or 1.

(c) Each fraction is equal to  $\frac{1}{2}$  or -1.

~~(d) Each fraction is equal to  $\frac{1}{2}$  only.~~

33. The number  $3^{521}$  is divided by 8. What is the remainder ?

(a) 1

(b) 3

(c) 7

(d) 9

34. A prime number contains the digit X at unit's place. How many such digits of X are possible ?

(a) 3

(b) 4

(c) 5

(d) 6



35. If an article is sold at a gain of 6% instead of a loss of 6%, the seller gets ₹ 6 more. What is the cost price of the article ?
- (a) ₹ 18  
 (b) ₹ 36  
 (c) ₹ 42  
 (d) ₹ 50
36. A field can be reaped by 12 men or 18 women in 14 days. In how many days can 8 men and 16 women reap it ?
- (a) 26 days  
 (b) 24 days  
 (c) 9 days  
 (d) 8 days
37. If  $3^x = 4^y = 12^z$ , then  $z$  is equal to
- (a)  $xy$   
 (b)  $x + y$   
 (c)  $\frac{xy}{x + y}$   
 (d)  $4x + 3y$
38. If  $(4a + 7b)(4c - 7d) = (4a - 7b)(4c + 7d)$ , then which one of the following is correct ?
- (a)  $\frac{a}{b} = \frac{c}{d}$   
 (b)  $\frac{a}{d} = \frac{c}{b}$   
 (c)  $\frac{a}{b} = \frac{d}{c}$   
 (d)  $\frac{4a}{7b} = \frac{c}{d}$
39. Given that the polynomial  $(x^2 + ax + b)$  leaves the same remainder when divided by  $(x - 1)$  or  $(x + 1)$ . What are the values of  $a$  and  $b$  respectively ?
- (a) 4 and 0  
 (b) 0 and 3  
 (c) 3 and 0  
 (d) 0 and any integer
40. Tushar takes 6 hours to complete a piece of work, while Amar completes the same work in 10 hours. If both of them work together, then what is the time required to complete the work ?
- (a) 3 hours  
 (b) 3 hours 15 minutes  
 (c) 3 hours 30 minutes  
 (d) 3 hours 45 minutes
41. What is the value of  $2 + \sqrt{2 + \sqrt{2 + \sqrt{\dots}}}$  ?
- (a) 1  
 (b) 2  
 (c) 3  
 (d) 4
42. In an examination, 52% candidates failed in English and 42% failed in Mathematics. 17% failed in both the subjects, then what percent passed in both the subjects ?
- (a) 77  
 (b) 58  
 (c) 48  
 (d) 23



43. A man who recently died left a sum of ₹ 3,90,000 to be divided among his wife, five sons and four daughters. He directed that each son should receive 3 times as much as each daughter receives and that each daughter should receive twice as much as their mother receives. What was the wife's share?

- (a) ₹ 14,000  
 (b) ₹ 12,000  
 (c) ₹ 10,000  
 (d) ₹ 9,000

44. What is the least number of complete years in which a sum of money put out at 40% annual compound interest will be more than trebled?

- (a) 3  
 (b) 4  
 (c) 5  
 (d) 6

45. A person divided a sum of ₹ 17,200 into three parts and invested at 5%, 6% and 9% per annum simple interest. At the end of two years, he got the same interest on each part of money. What is the money invested at 9%?

- (a) ₹ 3,200  
 (b) ₹ 4,000  
 (c) ₹ 4,800  
 (d) ₹ 5,000

46. What is  $\frac{(x-y)^3 + (y-z)^3 + (z-x)^3}{3(x-y)(y-z)(z-x)}$  equal to?

- (a) 1  
 (b) 0  
 (c)  $\frac{1}{3}$   
 (d) 3

47. If  $a^x = b^y = c^z$  and  $b^2 = ac$ , then what is  $\frac{1}{x} + \frac{1}{z}$  equal to?

- (a)  $\frac{1}{y}$   
 (b)  $-\frac{1}{y}$   
 (c)  $\frac{2}{y}$   
 (d)  $-\frac{2}{y}$

48. If  $p$  and  $q$  are the roots of the equation  $x^2 - 15x + r = 0$  and  $p - q = 1$ , then what is the value of  $r$ ?

- (a) 55  
 (b) 56  
 (c) 60  
 (d) 64

49. For the inequation  $x^2 - 7x + 12 > 0$ , which one of the following is correct?

- (a)  $3 < x < 4$   
 (b)  $-\infty < x < 3$  only  
 (c)  $4 < x < \infty$  only  
 (d)  $-\infty < x < 3$  or  $4 < x < \infty$



50. The expression  $5^{2n} - 2^{3n}$  has a factor

- (a) 3
- (b) 7
- (c) 17
- (d) None of the above

51. If  $\tan x = 1$ ,  $0 < x < 90^\circ$ , then what is the value of  $2 \sin x \cos x$ ?

- (a)  $\frac{1}{2}$
- (b) 1
- (c)  $\frac{\sqrt{3}}{2}$
- (d)  $\sqrt{3}$

52. What is the value of

$$\sin 46^\circ \cos 44^\circ + \cos 46^\circ \sin 44^\circ ?$$

- (a)  $\sin 2^\circ$
- (b) 0
- (c) 1
- (d) 2

53. Suppose  $0 < \theta < 90^\circ$ , then for every  $\theta$ ,  $4 \sin^2 \theta + 1$  is greater than or equal to

- (a) 2
- (b)  $4 \sin \theta$
- (c)  $4 \cos \theta$
- (d)  $4 \tan \theta$

54. Consider a regular hexagon ABCDEF. Two towers are situated at B and C. The angle of elevation from A to the top of the tower at B is  $30^\circ$ , and the angle of elevation to the top of the tower at C is  $45^\circ$ . What is the ratio of the height of towers at B and C?

- (a)  $1 : \sqrt{3}$
- (b) 1 : 3
- (c) 1 : 2
- (d)  $1 : 2\sqrt{3}$

55. What is the value of

$$\tan 1^\circ \tan 2^\circ \tan 3^\circ \dots \tan 89^\circ ?$$

- (a) 0
- (b) 1
- (c) 2
- (d)  $\infty$

56. There are two parallel streets each directed North to South. A person in the first street travelling from South to North wishes to take the second street which is on his right side. At some place, he makes a  $150^\circ$  turn to the right and he travels for 15 minutes at the speed of 20 km/hr. After that he takes a left turn of  $60^\circ$  and travels for 20 minutes at the speed of 30 km/hr in order to meet the second street. What is the distance between the two streets?

- (a) 7.5 km
- (b) 10.5 km
- (c) 12.5 km
- (d) 15 km



57. If  $3 \tan \theta = \cot \theta$  where  $0 \leq \theta \leq \frac{\pi}{2}$ , then what is the value of  $\theta$ ?

- (a)  $\frac{\pi}{6}$   
 (b)  $\frac{\pi}{4}$   
 (c)  $\frac{\pi}{3}$   
 (d)  $\frac{\pi}{2}$

58. What is the value of  $\sin^2 25^\circ + \sin^2 65^\circ$ ?

- (a) 0  
 (b) 1  
 (c) 2  
 (d) 4

59. What is the value of

$$\sin^6 \theta + \cos^6 \theta + 3 \sin^2 \theta \cos^2 \theta - 1?$$

- (a) 0  
 (b) 1  
 (c) 2  
 (d) 4

60. Consider the following for real numbers  $\alpha, \beta, \gamma$  and  $\delta$ :

1.  $\sec \alpha = 1/4$
2.  $\tan \beta = 20$
3.  $\operatorname{cosec} \gamma = 1/2$
4.  $\cos \delta = 2$

How many of the above statements are **not** possible?

- (a) One  
 (b) Two  
 (c) Three  
 (d) Four

61. Consider the following grouped frequency distribution:

x	f
0 - 10	8
10 - 20	12
20 - 30	10
30 - 40	p
40 - 50	9

$\frac{331}{13} = 25.2$

If the mean of the above data is 25.2, then what is the value of p?

- (a) 9  
 (b) 10  
 (c) 11  
 (d) 12

62. Consider the following frequency distribution:

x	f
8	6
5	4
6	5
10	8
9	9
4	6
7	4

What is the median for the distribution?

- (a) 6  
 (b) 7  
 (c) 8  
 (d) 9



63. The average of 50 consecutive natural numbers is  $x$ . What will be the new average when the next four natural numbers are also included?

- (a)  $x + 1$
- (b)  $x + 2$
- (c)  $x + 4$
- (d)  $x + (x/54)$

64. Consider two-digit numbers which remain the same when the digits interchange their positions. What is the average of such two-digit numbers?

- (a) 33
- (b) 44
- (c) 55
- (d) 66

65. Diagrammatic representation of data includes which of the following?

1. Bar diagram
2. Pie-diagram
3. Pictogram

Select the correct answer using the code given below:

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

66. The data collected from which one of the following methods is **not** a primary data?

- (a) By direct personal interviews
- (b) By indirect personal interviews
- (c) By schedules sent through enumerators
- (d) From published thesis

67. The monthly expenditure of a person is ₹ 6,000. The distribution of expenditure on various items is as follows:

Item of expenditure	Amount (in ₹)
1. Food	2,000
2. Clothing	660
3. Fuel and rent	1,200
4. Education	480
5. Miscellaneous	1,660

If the above data is represented by a percentage bar diagram of height 15 cm, then what are the lengths of the two segments of the bar diagram corresponding to education and miscellaneous respectively?

- (a) 1.25 cm and 5 cm
- (b) 1.2 cm and 4.15 cm
- (c) 1.2 cm and 3.5 cm
- (d) 4.15 cm and 6 cm

68. If the mean of  $m$  observations out of  $n$  observations is  $n$  and the mean of remaining observations is  $m$ , then what is the mean of all  $n$  observations?

- (a)  $2m - \frac{m^2}{n}$
- (b)  $2m + \frac{m^2}{n}$
- (c)  $m - \frac{m^2}{n}$
- (d)  $m + \frac{m^2}{n}$

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69. Which one of the following pairs is correctly matched?

- (a) Median - Graphical location  
(b) Mean - Graphical location  
(c) Geometric mean - Ogive  
(d) Mode - Ogive

70. The following pairs relate to frequency distribution of a discrete variable and its frequency polygon. Which one of the following pairs is **not** correctly matched?

- (a) Base line of the polygon - X-axis  
(b) Ordinates of the vertices of the polygon - Class frequencies  
(c) Abscissa of the vertices of the polygon - Class marks of the frequency distribution  
(d) Area of the polygon - Total frequency of the distribution

71. In a rectangle, length is three times its breadth. If the length and the breadth of the rectangle are increased by 30% and 10% respectively, then its perimeter increases by

- (a)  $\frac{40}{3}\%$   
(b) 20%  
(c) 25%  
(d) 27%

72. What is the percentage decrease in the area of a triangle if its each side is halved?

- (a) 75%  
(b) 50%  
(c) 25%  
(d) No change

73. The volume of a spherical balloon is increased by 700%. What is the percentage increase in its surface area?

- (a) 300%  
(b) 400%  
(c) 450%  
(d) 500%

74. If the lengths of two parallel chords in a circle of radius 10 cm are 12 cm and 16 cm, then what is the distance between these two chords?

- (a) 1 cm or 7 cm  
(b) 2 cm or 14 cm  
(c) 3 cm or 21 cm  
(d) 4 cm or 28 cm

75. Considering two opposite vertices of a square of side 'a' as centres, two circular arcs are drawn within the square joining the other two vertices, thus forming two sectors. What is the common area in these two sectors?

- (a)  $a^2 \left( \pi + \frac{1}{2} \right)$   
(b)  $a^2 \left( \pi - \frac{1}{2} \right)$   
(c)  $a^2 \left( \frac{\pi}{2} - 1 \right)$   
(d)  $a^2 \left( \frac{\pi}{2} + 1 \right)$



76. The corners of a square of side 'a' are cut away so as to form a regular octagon. What is the side of the octagon?

- (a)  $a(\sqrt{2} - 1)$
- (b)  $a(\sqrt{3} - 1)$
- (c)  $\frac{a}{\sqrt{2} + 2}$
- (d)  $\frac{a}{3}$

77. Three consecutive integers form the lengths of a right-angled triangle. How many sets of such three consecutive integers is/are possible?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) Infinitely many

78. Two circles are drawn with the same centre. The circumference of the smaller circle is 44 cm and that of the bigger circle is double the smaller one. What is the area between these two circles?

- (a) 154 square cm
- (b) 308 square cm
- (c) 462 square cm
- (d) 616 square cm

79. A rectangular red carpet of size 6 ft  $\times$  12 ft has a dark red border 6 inches wide. What is the area of the dark red border?

- (a) 9 square feet
- (b) 15 square feet
- (c) 17 square feet
- (d) 18 square feet

80. The perimeter of a right-angled triangle is k times the shortest side. If the ratio of the other side to hypotenuse is 4 : 5, then what is the value of k?

- (a) 2
- (b) 3
- (c) 4
- (d) 5

81. A 12 m long wire is cut into two pieces, one of which is bent into a circle and the other into a square enclosing the circle. What is the radius of the circle?

- (a)  $\frac{12}{\pi + 4}$
- (b)  $\frac{6}{\pi + 4}$
- (c)  $\frac{3}{\pi + 4}$
- (d)  $\frac{6}{\pi + 2\sqrt{2}}$

82. The angles of a triangle are in the ratio 1 : 1 : 4. If the perimeter of the triangle is k times its largest side, then what is the value of k?

- (a)  $1 + \frac{2}{\sqrt{3}}$
- (b)  $1 - \frac{2}{\sqrt{3}}$
- (c)  $2 + \frac{2}{\sqrt{3}}$
- (d) 2



The hypotenuse of a right-angled triangle is 10 cm and its area is  $24 \text{ cm}^2$ . If the shorter side is halved and the longer side is doubled, the new hypotenuse becomes

- (a)  $\sqrt{245}$  cm
- (b)  $\sqrt{255}$  cm
- (c)  $\sqrt{265}$  cm
- (d)  $\sqrt{275}$  cm

In a circle of radius 8 cm, AB and AC are two chords such that  $AB = AC = 12$  cm. What is the length of chord BC?

- (a)  $2\sqrt{6}$  cm
- (b)  $3\sqrt{6}$  cm
- (c)  $3\sqrt{7}$  cm
- (d)  $6\sqrt{7}$  cm

Consider the following statements :

1. An isosceles trapezium is always cyclic.
2. Any cyclic parallelogram is a rectangle.

Which of the above statements is/are correct?

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) Neither 1 nor 2

86. A ladder is resting against a vertical wall and its bottom is 2.5 m away from the wall. If it slips 0.8 m down the wall, then its bottom will move away from the wall by 1.4 m. What is the length of the ladder?

- (a) 6.2 m
- (b) 6.5 m
- (c) 6.8 m
- (d) 7.5 m

87. Two equal circles intersect such that each passes through the centre of the other. If the length of the common chord of the circles is  $10\sqrt{3}$  cm, then what is the diameter of the circle?

- (a) 10 cm
- (b) 15 cm
- (c) 20 cm
- (d) 30 cm

88. Consider the following statements :

1. The number of circles that can be drawn through three non-collinear points is infinity.
2. Angle formed in minor segment of a circle is acute.

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2



89. Consider the following inequalities in respect of any triangle ABC :

1.  $AC - AB < BC$
2.  $BC - AC < AB$
3.  $AB - BC < AC$

Which of the above are correct ?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

90. Consider the following statements :

1. The perimeter of a triangle is greater than the sum of its three medians.
2. In any triangle ABC, if D is any point on BC, then  $AB + BC + CA > 2AD$ .

Which of the above statements is/are correct ?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Consider the following for the next three (03) items :

A cube is inscribed in a sphere. A right circular cylinder is within the cube touching all the vertical faces. A right circular cone is inside the cylinder. Their heights are same and the diameter of the cone is equal to that of the cylinder.

91. What is the ratio of the volume of the sphere to that of the cone ?

- (a)  $6\sqrt{3} : 1$
- (b)  $7 : 2$
- (c)  $3\sqrt{3} : 1$
- (d)  $5\sqrt{3} : 1$

92. What is the ratio of the volume of the cube to that of the cylinder ?

- (a)  $4 : 3$
- (b)  $21 : 16$
- (c)  $14 : 11$
- (d)  $45 : 32$

93. Consider the following statements :

1. The surface area of the sphere is  $\sqrt{5}$  times the curved surface area of the cone.
2. The surface area of the cube is equal to the curved surface area of the cylinder.

Which of the above statements is/are correct ?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2



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Consider the following for the next three (03) items :

ABCD is a quadrilateral with  $AB = 9$  cm,  $BC = 40$  cm,  $CD = 28$  cm,  $DA = 15$  cm and angle  $ABC$  is a right-angle.

94. What is the area of triangle  $ADC$  ?

- (a)  $126 \text{ cm}^2$
- (b)  $124 \text{ cm}^2$
- (c)  $122 \text{ cm}^2$
- (d)  $120 \text{ cm}^2$

95. What is the area of quadrilateral  $ABCD$  ?

- (a)  $300 \text{ cm}^2$
- (b)  $306 \text{ cm}^2$
- (c)  $312 \text{ cm}^2$
- (d)  $316 \text{ cm}^2$

96. What is the difference between perimeter of triangle  $ABC$  and perimeter of triangle  $ADC$  ?

- (a) 4 cm
- (b) 5 cm
- (c) 6 cm
- (d) 7 cm

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Consider the following for the next two (02) items :

An equilateral triangle  $ABC$  is inscribed in a circle of radius  $20\sqrt{3}$  cm.

97. What is the length of the side of the triangle ?

- (a) 30 cm
- (b) 40 cm
- (c) 50 cm
- (d) 60 cm

98. The centroid of the triangle  $ABC$  is at a distance  $d$  from the vertex  $A$ . What is  $d$  equal to ?

- (a) 15 cm
- (b) 20 cm
- (c)  $20\sqrt{3}$  cm
- (d)  $30\sqrt{3}$  cm

Consider the following for the next two (02) items :

The sum of length, breadth and height of a cuboid is 22 cm and the length of its diagonal is 14 cm.

99. What is the surface area of the cuboid ?

- (a)  $288 \text{ cm}^2$
- (b)  $216 \text{ cm}^2$
- (c)  $144 \text{ cm}^2$
- (d) Cannot be determined due to insufficient data

100. If  $S$  is the sum of the cubes of the dimensions of the cuboid and  $V$  is its volume, then what is  $(S - 3V)$  equal to ?

- (a)  $572 \text{ cm}^3$
- (b)  $728 \text{ cm}^3$
- (c)  $1144 \text{ cm}^3$
- (d) None of the above