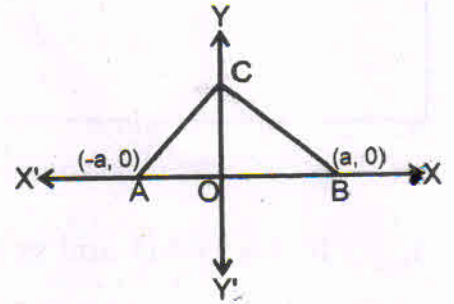


1. If $x = 9 + 4\sqrt{5}$ and $xy = 1$. Then $\frac{1}{322} \left(\frac{1}{x^2} + \frac{1}{y^2} \right)$ is
(a) 1 (b) 2 (c) 3 (d) 4
2. The sum of two prime numbers is 999. What is their product ?
(a) 1998 (b) 1994 (c) 1990 (d) 1988
3. Let $10^{101} - 1$ be expressed as an integer in the standard form. What is the sum of the digits of this integer ?
(a) 900 (b) 918 (c) 909 (d) 1000
4. If $a + b + c = 10$ and $a^2 + b^2 + c^2 = 83$. The value of $a^3 + b^3 + c^3 - 3abc$ is
(a) 450 (b) 540 (c) 645 (d) 745
5. If $z^2 + \frac{1}{z^2} = 14$, the value of $z^3 + \frac{1}{z^3}$ is
(a) 52 (b) 42 (c) 40 (d) 32
6. The number of books in the library is a number between 1961 and 2001. Exactly $\frac{1}{7}$ of them are novels and exactly 20% of them poetry books. Total number of books in the library is (both novels & poetry books)
(a) 1980 (b) 1995 (c) 2000 (d) 1990

(SPACE FOR ROUGH WORK)

7. In the figure, ABC is an equilateral triangle, find the co-ordinates of C. If co-ordinates of A & B are $(-a, 0)$ & $(a, 0)$ respectively.



- (a) $(\sqrt{3}a, 0)$ (b) $(a, \sqrt{3})$
 (c) $(0, \sqrt{3}a)$ (d) $(\sqrt{3}, a)$

8. If $x = k^2$ and $y = k$ is a solution of the equation $x - 5y + 6 = 0$, then the sum of the values of k is :

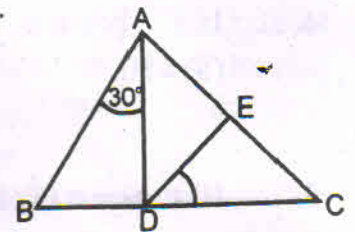
- (a) 2 (b) 3 (c) 4 (d) 5

9. For a class, copies of 9 maths books & 16 science books cost Rs.220. Each copy costs a whole number of rupees. Find the cost of each copy of maths book.

- (a) 12 (b) 7 (c) 10 (d) 5

10. In the figure, $AB = AC$, $\angle BAD = 30^\circ$ and $AE = AD$. Find $\angle CDE$.

- (a) 30° (b) 15°
 (c) 20° (d) 45°



11. Areas of the three consecutive faces of a rectangular box are 84 cm^2 , 70 cm^2 and 30 cm^2 . Find out the volume of the box.

- (a) 320 cm^3 (b) 520 cm^3 (c) 420 cm^3 (d) 500 cm^3

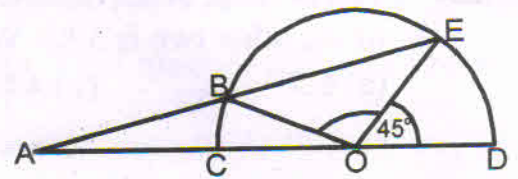
12. What are the last two digits of 4^{2001} ?

- (a) 16 (b) 64 (c) 76 (d) 04

(SPACE FOR ROUGH WORK)

13. P and Q are the mid points of the side AB and BC respectively of the triangle ABC, right angle at B. Also satisfying the relation : $AQ^2 + CP^2 = \frac{5}{K} AC^2$. The value of K is :
- (a) 2 (b) 3 (c) 4 (d) 7
14. A monkey begins climbing a pole. It ascends at the rate of 3 m per second, but after every three seconds of ascent, it descends 4 m in the next one second. Find the time taken by it to reach the top if the height of the pole be 40 m.
- (a) 32 sec (b) 28 sec (c) $29\frac{1}{3}$ sec (d) $29\frac{2}{3}$ sec
15. In a division, the dividend is 4758, the quotient is 25 & the remainder is more than 25 but less than 50. The divisor is :
- (a) 190 (b) 189 (c) 188 (d) 191
16. LMNO is a trapezium with $LM \parallel NO$. If P and Q are the mid points of LO and MN respectively and $LM = 5$ cm and $ON = 10$ cm & $PQ = ?$
- (a) 2.5 cm (b) 5 cm (c) 7.5 cm (d) 15 cm
17. If E, F, G, H are respectively the mid points of the sides of a parallelogram ABCD and $ar(EFGH) = 40$ cm², then the value of $\frac{ar(ABCD)}{40}$ is :
- (a) 2 (b) 4 (c) 10 (d) 5
18. In the figure, CD is the diameter of semicircle with centre 'O', $AB = OD$, and $\angle DOE = 45^\circ$. Compute $\angle BOE$.

- (a) 30° (b) 60°
(c) 120° (d) 75°



(SPACE FOR ROUGH WORK)

19. If two of the angles of a polygon are 90° each and remaining angles are 120° each. Find the number sides of the polygon.
(a) 10 (b) 8 (c) 7 (d) 5
20. A circle has radius $\sqrt{2}$ cm. It is divided into two segments by a chord of length 2 cm. Find the angle subtended by the chord at a point in major segment.
(a) 90° (b) 60° (c) 45° (d) 30°
21. Two chords AB and CD of lengths 5 cm and 11 cm respectively of a circle are parallel to each other & are an opposite sides of its centre. If the distance between AB & CD is 6 cm. Find the radius of the circle.
(a) $\frac{5\sqrt{5}}{2}$ cm (b) $5\sqrt{5}$ cm (c) 5 cm (d) $2\sqrt{5}$ cm
22. A sphere and a right circular cylinder of the same radius have equal volumes by what percentage does the diameter of the cylinder exceeds its height?
(a) 25% (b) 50% (c) 75% (d) 100%
23. Water flows out through a circular pipe whose internal diameter is 2 cm at the rate of 6 cm per second into a cylindrical tank, the radius of whose base is 60 cm. Find the rise in the level of water in 30 minutes.
(a) 1 cm (b) 2 cm (c) 3 cm (d) 4 cm
24. The radius of a sphere is increased by 10%. Percentage of increase its volume is
(a) 30% (b) 33.1% (c) 33.3% (d) 30.1%
25. The average of six numbers is 3.95. The average of two of them is 3.4, while the average of the other two is 3.85. What is the average of the remaining two numbers?
(a) 4.5 (b) 4.6 (c) 4.7 (d) 4.8

(SPACE FOR ROUGH WORK)

26. If the ratio of mean and median of a certain data is 2 : 3. Find the sum of ratio of its mode and mean.
(a) 2 (b) 3 (c) 5 (d) 7
27. If \bar{x} is the mean of n observations $x_1, x_2, x_3, \dots, x_n$, then the algebraic sum of deviations from mean is :
(a) 0 (b) 1 (c) 2 (d) 3
28. Simran and Jyotirmayee playing a game. Simran's winning probability is $\frac{1}{3}$. Numerator of Jyotirmayee's winning probabilities is :
(a) 0 (b) 1 (c) 2 (d) 3
29. If two dice are tossed, find the probability of throwing a total of ten or more.
(a) $\frac{1}{4}$ (b) $\frac{1}{5}$ (c) $\frac{1}{6}$ (d) $\frac{1}{2}$
30. One hundred cards are numbered from 1 to 100. Find the probability that a card chosen at random has the digit 5.
(a) $\frac{17}{100}$ (b) $\frac{19}{100}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$
31. If $1 - 2 + 3 - 4 + 5 - 6 + 7 - 8 + \dots + (n-2) - (n-1) + n = 2008$. What is the value of n ?
(a) 4016 (b) 4010 (c) 4018 (d) 4015
32. If a, b, c, d represent distinct non zero digits for which $aaaa + bbb + cc + d = 1995$
Find $a \times b \times c \times d$. Here $abcd$ is a four digit number.
(a) 504 (b) 524 (c) 608 (d) 424

(SPACE FOR ROUGH WORK)

33. Five bells toll at intervals 3, 5, 7, 8 & 10 seconds respectively. Beginning together, how many times will the bells toll together in one week (including starting one)
 (a) 720 (b) 721 (c) 725 (d) 723
34. Shriyans goes from his home to school at a speed of 2 km per hour then he is 6 minutes late but he goes at a speed of 3 km/hr then he reaches the school 10 minutes earlier. What is the distance between his school from his home.
 (a) 1.2 km (b) 1.4 km (c) 1.5 km (d) 1.6 km
35. A679B is a five digit number where A and B are written for two missing digit of the number. If the number is divisible by 72, then find the value of A + B.
 (a) 7 (b) 6 (c) 5 (d) 4
36. If a, b and c are positive integers, the radicals $\sqrt{a+\frac{b}{c}}$ and $a\sqrt{\frac{b}{c}}$ are equal when and only when:
 (a) $a = b = c = 1$ (b) $c = \frac{b(a^2-1)}{a}$
 (c) $a = b$ and $c = a = 1$ (d) $a = b$ and c is only value
37. The area of the largest triangle that can be inscribed in a semi-circle whose radius r is :
 (a) r^2 (b) r^3 (c) $2r^2$ (d) $2r^3$
38. If the radius of a circle is increased 100%, the area is increased :
 (a) 100% (b) 200% (c) 300% (d) 400%
39. A 25 m ladder is placed against a vertical wall of a building. The foot of the ladder is 7 m from the base of the building. If the top of the ladder slips 4 m, then the foot of the ladder will slide :
 (a) 9 m (b) 15 m (c) 5 m (d) 8 m

(SPACE FOR ROUGH WORK)

40. As the number of sides of a polygon increases from 3 to n , the sum of the exterior angles formed by extending each side in succession :
- (a) increases (b) decreases
(c) remains constant (d) cannot be predicted
41. The largest number by which the expression $n^3 - n$ is divisible for all possible integral values of n , is
- (a) 2 (b) 3 (c) 4 (d) 6
42. The radius of a cylindrical box is 8 cm and the height is 3 cm. The number of inches that may be added to either the radius or the height to give the same non-zero increase in volume is :
- (a) 1 (b) $5\frac{1}{3}$ (c) any number (d) non-existent
43. If r and s are the roots of the equation $ax^2 + bx + c = 0$, the value of $\frac{1}{r^2} + \frac{1}{s^2}$ is
- (a) $b^2 - 4ac$ (b) $\frac{b^2 - 4ac}{2a}$ (c) $\frac{b^2 - 4ac}{c^2}$ (d) $\frac{b^2 - 2ac}{c^2}$
44. The medians of a right triangle which are drawn from the vertices of the acute angles are 5 and $\sqrt{40}$. The value of the hypotenuse is :
- (a) 10 (b) $2\sqrt{40}$ (c) $\sqrt{13}$ (d) $2\sqrt{13}$
45. In the set of equations $z^x = y^{2x}$, $2^z = 2 \times 4^x$, $x + y + z = 16$, the integral roots in the order x, y, z are :
- (a) 3, 4, 9 (b) 9, -5, 12 (c) 12, -5, 9 (d) 4, 3, 9
46. The ratio of the perimeter of an equilateral triangle having an altitude equal to the radius of a circle, to the perimeter of an equilateral triangle inscribed in the circle is :
- (a) 1 : 2 (b) 1 : 3 (c) 1 : $\sqrt{3}$ (d) 2 : 3

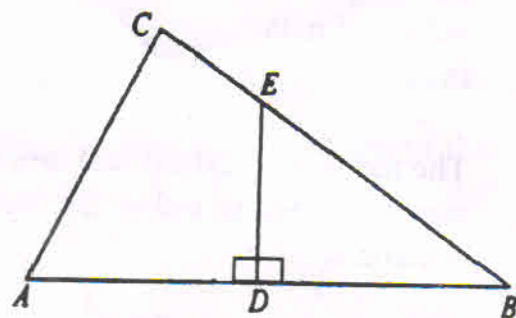
(SPACE FOR ROUGH WORK)

47. Given 12 points in a plane no three of which are collinear, the number of lines they determine is :

- (a) 24 (b) 54 (c) 120 (d) 66

48. In the figure, it is given that angle $C = 90^\circ$, $\overline{AD} = \overline{BD}$, $DE \perp AB$, $\overline{AB} = 20$, and $\overline{AC} = 12$. The area of quadrilateral ADEC is :

- (a) 75 (b) $58\frac{1}{2}$
(c) 48 (d) $37\frac{1}{2}$



49. Two high school classes took the same test. One class of 20 students made an average grade of 80%; the other class of 30 students made an average grade of 70%. The average grade for all students in both classes is :

- (a) 75% (b) 74% (c) 72% (d) 77%

50. Two cyclists, k km apart, and starting at the same time, would be together in r hours if they travelled in the same direction, but would pass each other in ' t ' hours if they travelled in opposite directions. The ratio of the speed of the faster cyclist to that of the slower is :

- (a) $\frac{r+t}{r-t}$ (b) $\frac{r}{r-t}$ (c) $\frac{r+t}{r}$ (d) $\frac{r}{t}$

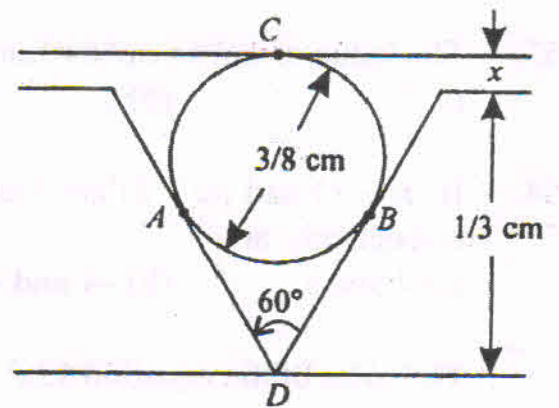
(SPACE FOR ROUGH WORK)

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51. When the sum of the first ten terms of an arithmetic progression is four times the sum of the first terms, the ratio of the first term to the common difference is
(a) 1 : 2 (b) 2 : 1 (c) 1 : 4 (d) 1 : 1
52. A dog at point A goes in pursuit of a fox 30 m away. The dog makes 2 m and the fox, 1 m long leaps. If the dog makes two leaps to the fox's three, at what distance from A will the dog catch up with the fox?
(a) 100 m (b) 110 m (c) 105 m (d) 120 m
53. The value of $\sin^6 \theta + \cos^6 \theta + 3 \sin^2 \theta \cdot \cos^2 \theta$ is
(a) 1 (b) 2 (c) 3 (d) 5
54. If $(x - 1)$ and $(x - 2)$ are factors of $x^3 + ax^2 + bx - 2$; then the values of a and b , respectively, are
(a) 4 and 5 (b) -4 and -5 (c) -4 and 5 (d) 4 and -5
55. The roots of the equation $12x^2 + mx + 5 = 0$ will be in the ratio 3 : 2. If m equals
(a) $\frac{1}{12}$ (b) $\frac{5}{12}$ (c) $5\sqrt{10}$ (d) $\frac{5}{12}\sqrt{10}$
56. The base of a triangle is of length b , and altitude is of length h . A rectangle of height x is inscribed in the triangle with the base of the rectangle in the base of triangle. The area of rectangle is
(a) $\frac{bx}{h}(h-x)$ (b) $\frac{hx}{b}(b-x)$ (c) $(b-x)$ (d) $(h-x)$
-

(SPACE FOR ROUGH WORK)

57. ABCD is a square, whose side is a . We draw 4 equal circles with centre at A, B, C and D in such a way that each circle touches 2 other circles. If we draw one more small circle in the middle of the square which touches all the four circles drawn earlier, then the area of the smaller circle will be
- (a) $\frac{\pi a^2}{16}$ (b) $\frac{\pi a^2}{4}(3-2\sqrt{2})$ (c) $\frac{\pi a^2}{2}(5\sqrt{2}-7)$ (d) $\frac{\pi a^2}{32}$
58. In the diagram if points A, B, C are points of tangency, then x equals :

- (a) $\frac{3}{16}$ cm
 (b) $\frac{1}{16}$ cm
 (c) $\frac{1}{32}$ cm
 (d) $\frac{3}{32}$ cm



59. The times between 7 and 8 o'clock, correct to the nearest minute, when the hands of a clock will form an angle of 84 degrees are :
- (a) 7:23 and 7:53 (b) 7:20 and 7:50 (c) 7:22 and 7:53 (d) 7:23 and 7:52
60. Angle of elevation of the top of a tower from a certain point is 30° . If the observer moves 20 metre towards the tower, the angle of elevation of the top of the tower increases by 15° . Then the height of the tower is :
- (a) $\frac{15}{\sqrt{3}-1}$ m (b) $10(\sqrt{3}+1)$ m (c) 30 m (d) $30(\sqrt{3}-1)$ m

(SPACE FOR ROUGH WORK)