No of Questions: 100 **Time: 2 (Hours)**

1. By adding x to 1254934, the resulting number becomes divisible by 11, while adding y to 1254934 makes the resulting number divisible by 3. Which one of the following is the set of values for x and y?
a) x = 1, y = 1 b) x = 1, y = – 1
c) x = – 1, y = 1 d) x = – 1, y = – 1

2. If the numbers q, q + 2 and q + 6 are all prime, then what can be the value of 3q + 9?
a) Only 18 b) Only 42
c) Only 60 d) Both b and c

3. What is the sum of all prime numbers between 100 and 120?
a) 652 b) 650
c) 644 d) 533

4. The angles of a triangle are in AP and the greatest angle is double the least. What is the ratio of angles in the radian measure?
a) 2: 3: 4 b) 1: 2: 3
c) 3: 3: 6 d) 4: 5: 7

5. What is the last digit in the expansion of 3^{4798}?
a) 1 b) 3
c) 7 d) 9

6. If three sides of a right angled triangle are integers in their lowest form, then one of its sides is always divisible by
a) 6 b) 5
c) 7 d) None of these

7. How many numbers between – 11 and 11 are multiples of 2 or 3?
a) 11 b) 14
c) 15 d) None of these

8. What is the harmonic mean of 10, 20, 25, 40 and 50?
a) 25 b) 30
c) 26.1 d) 21.3

9. If k is a positive integer, then every square integer is of the form
a) only 4k b) 4k or 4k + 3
c) 4k + 1 or 4k + 3 d) 4k or 4k + 1

10. If N^2– 33, N^2– 31 and N^2– 29 are prime numbers, then what is the number of possible values of N, where N is an integer?
a) 1 b) 2
c) 6 d) None of these

11. The difference between the squares of two consecutive odd integers is always divisible by
a) 3 b) 7
c) 8 d) 16

12. What is the remainder obtained when 1421 × 1423 × 1425 is divided by 12?
a) 1 b) 2
c) 3 d) 4

13. What is the HCF of (x^2+bx – x – b) and [x^2+ x (a – 1) – a]?
a) x + b b) x + a
c) x + 1 d) x – 1

14. Consider those number between 300 and 400 such that when each number is divided by 6, 9 and 12, it leaves 4 as remainder in each case. What is the sum of the numbers?
a) 692 b) 764
c) 1080 d) 1092

15. The product of two numbers is 6912 and their GCD is 24. What is their LCM?
a) 280 b) 286
c) 288 d) 296

16. For any integer n, what is HCF (22n + 7, 33n + 10) equal to?
a) n b) 1
c) 11 d) None of these

17. Consider the following statements:
I. 1/22 cannot be written as a terminating decimal.
II. 2/15 can be written as a terminating decimal.
III. 1/16 can be written as a terminating decimal.
Which of the statements given above is/are correct?
a) Only I b) Only II
c) Only I and III d) II and III

18. What is the square root of $9+2\sqrt{14}$?
a) $1+2\sqrt{2}$ b) $\sqrt{2}+\sqrt{7}$
c) $\sqrt{2}+\sqrt{7}$ d) $\sqrt{2}+\sqrt{5}$

19. $\sqrt{1+\frac{93}{196}}=1+\frac{x}{14}$, then what does x equal to?
a) 0 b) 1
c) 2 d) 3

20. If the radius of the base and the height of a right circular cone are increased by 20%, then what is the approximate percentage increase in volume?
a) 60% b) 68%
c) 73% d) 75%

21. An employee is required to contribute 10% of his payment to General Provident Fund. If he gets Rs13500 as net pay in a month, then what is the monthly General Provident Fund contribution (assuming no other deductions)?

a) 1215 b) 1350
c) 1500 d) 1650

22. x varies inversely as the square of y in such a way that, if x = 1, then y = 6. If y = 3, then what is the value of x?
a) 1/3 b) ½
c) 2 d) 4

23. 10 years ago, Ram was 5 times as old as Sham but 20 years later from now he will be only twice as old as Sham. How many years old is Sham?
a) 20 years b) 30 years
c) 40 years d) 50 years

24. Three numbers are in the ratio 3: 2: 5 and the sum of their squares is 1862. What are the three numbers?
a) 18, 12, 30 b) 24, 16, 40
c) 15, 10, 25 d) 21, 14, 35

25. If x: y = 7: 5, then what is the value of (5x – 2y): (3x + 2y)?
a) 5/4 b) 6/5
c) 25/31 d) 31/42

26. A milkman claims to sell milk at its cost price only, but he is making a profit of 20% since he has mixed some amount of water in the milk. What is the percentage of milk in the mixture?
a) 80% b) 250/3%
c) 75% d) 200/3%

27. Out of 250 observations, the first 100 observations have mean 5 and the average of the remaining 150 observations is 253.What is the average of the whole group of observations?
a) 6 b) 7
c) 8 d) 9

28. The compound interest on a sum for 2 years is Rs832 and the simple interest on the same sum at the same rate for the same period is Rs 800.What is the rate of interest?
a) 6% b) 8%
c) 10% d) 12%

29. What is the compound interest on Rs 1600 at 25% per annum of 2 years compounded annually?
a) Rs 700 b) Rs 750
c) Rs 800 d) Rs 900

30. A man buys 4 tables and 5 chairs for Rs 1000. If he sells the tables at 10% profit and chairs 20% profit, he earns a profit of Rs 120. What is the cost of one table?
a) Rs 200 b) Rs 220
c) Rs 240 d) Rs 260

31. One sari was purchased for Rs 564 after getting a discount of 6% and another sari was purchased for Rs396 after getting a discount of 1%. Taking both the items as a single transaction, what is the percentage of discount?
a) 3.5 b) 4
c) 7 d) 7.5

32. A cloth store is offering by 3, get 1 free. What is the net percentage discount being offered by the store?
a) 20% b) 25%
c) 30% d) 100/3%

33. A train crosses a telegraph post in 8s and a bridge 200 m long in 24 s. What is the length of the train?
a) 100 m b) 120 m
c) 140 m d) 160 m

34. Two trains of lengths 100 m and 150 m are travelling in opposite directions at speeds of 75 km/h and 50 km/h, respectively. What is the time taken by them to cross each other?
a) 7.4 s b) 7.2 s
c) 7 s d) 6.8 s

35. A person travels a certain distance at 3 km/h and reaches 15 min late. If he travels at 4 km/h, he reaches 15 min earlier. The distance he has to travel is
a) 4.5 km b) 6 km
c) 7.2 km d) 12 km

36. A car travels the first one-third of a certain distance with a speed of 10 km/hr, the next one-third distance with a speed of 20 km/hr and the last one-third distance with a speed of 60 km/hr. The average speed of the car for the whole journey is
a) 18 km/hr b) 24 km/hr
c) 30 km/hr d) 36 km/hr

37. Ram can do a piece of work in 6 days and Shaman finish the same work in 12 days. How much work will be finished, if both work together for 2 days?
a) One-fourth of the work
b) One-third of the work
c) Half of the work
d) Whole of the work

38. Four taps can individually fill a cistern of water in 1h, 2h, 3h and 6h, respectively. If all the four taps are opened simultaneously, the cistern can be filled in how many minutes?
a) 20 b) 30
c) 35 d) 40

39. 18 men can earn Rs 360 in 5 days. How much money will 15 men earn in 9 days?
a) Rs 600 b) Rs 540
c) Rs 480 d) Rs 360

40. A and B can do a piece of work in 10 h. B and C can do it in 15 h, while A and C take 12 h to

complete the work. B independently can complete the work in

a) 12h b) 16h
c) 20h d) 24h

41. If (x + y + z = 0), then what is (x + y) (y + z) (z + x) equal to?

a) $-xyz$ b) $x^2 + y^2 + z^3$
c) $x^3 + y^3 + z^3 + 3xyz$ d) xyz

42. If $x^2 - 11x + a$ and $x^2 - 14x + 2a$ have a common factor, then what are the values of a?

a) 0, 7 b) 5, 20
c) 0, 24 d) 1, 3

43. Which one of the following statements is correct?

a) Remainder theorem is a special case of factor theorem
b) Factor theorem is a special case of remainder theorem
c) Factor theorem and remainder theorem are two independent results
d) None of the above

44. What is the remainder when $(x^{11} + 1)$ is divided by (x + 1)?

a) 0 b) 2
c) 11 d) 12

45. If the expression $x^3 + 3x^2 + 4x + k$ has a factor x + 5, then what is the value of k?

a) −70 b) 70
c) 48 d) −48

46. If $(49)^2 - (25)^2 = 37x$, then what is x equal to?

a) 64 b) 74
c) 48 d) 42

47. If a set A contains 60 elements and another set B contains 70 elements and there are 50 elements in common, then how many elements does A U B contain?

a) 130 b) 100
c) 80 d) 70

48. If $\theta \in R$ be such that $\sec\theta > 0$ and $2\sec^2\theta + \sec\theta - 6 = 0$. Then, what is the value of $\operatorname{cosec}\theta$?

a) $\sqrt{5}$ b) $\frac{\sqrt{3}}{2}$
c) $\frac{3}{\sqrt{5}}$ d) $\frac{2}{\sqrt{3}}$

49. If $2x^2\cos 60^0 - 4\cot^2 45^0 - 2\tan 60^0 = 0$, then what is the value of x?

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

50. Which one of the following is correct?

a) $\tan x > 1, 45^0 < 90^0$
b) $\sin x > \frac{1}{2}, 0^0 < x < 30^0$
c) $\cos x > \frac{1}{2}, 60^0 < x < 90^0$
d) $\sin x = \cos x$ for some value of $x, 30^0 < x < 45^0$

51. If $\sin\left(x + 54^0\right) = \cos x$, where $0 < x, x + 54^0 < 90^0$, then what is the value of x?

a) 54^0 b) 36^0
c) 27^0 d) 18^0

52. If $\tan^2 y \operatorname{cosec}^2 x - 1 = \tan^2 y$, then which one of the following is correct?

a) x – y = 0 b) x = 2y
c) y = 2x d) $x - y = 1^0$

53. If $x + \left(\frac{1}{x}\right) = 2\cos\alpha$, then what is the value $x^2 + \left(\frac{1}{x^2}\right)$?

a) $4\cos^2 a$ b) $4\cos^2 a - 1$
c) $2\cos^2 a - 2\sin^2 a$ d) $\cos^2 a - \sin^2 a$

54. If $\cot\theta = \frac{2xy}{x^2 - y^2}$, then what is $\cos\theta$ to?

a) $\frac{x^2 - y^2}{x^2 + y^2}$ b) $\frac{x^2 + y^2}{x^2 - y^2}$
c) $\frac{2xy}{x^2 + y^2}$ d) $\frac{2xy}{\sqrt{x^2 + y^2}}$

55. In a $\Delta ABC, \angle ABC = 90^0, \angle ACB = 30^0, AB = 5cm.$ What is the length of AC?

a) 10 cm b) 5 cm
c) $5\sqrt{2}\,cm$ d) $5\sqrt{3}\,cm$

56. Two sides of an acute angle triangle are 6 cm and 2 cm, respectively. Which one of the following represents the correct range of the third side in cm?

a) (4,8) b) $\left(4, 2\sqrt{10}\right)$
c) $\left(4\sqrt{2}, 8\right)$

57. A unit radian is approximately equal to

a) $57^0\,17'\,43''$ b) $57^0\,16'\,22''$
c) $57^0\,17'47''$ d) $57^0\,17'\,49''$

58. Consider the following statements:

I. There is only one value of x in the first quadrant that satisfies six + coos x = 2.
II. There is only one value of x in the first quadrant that satisfies sin x – coos x = 0.

Which of the statements above is/are correct?

a) Only I b) Only II
c) Both I and II d) Neither I nor II

59. A round balloon of unit radius subtends an angle of 90^0 at the eye of an observer standing at a point, say A.

What is the distance of the centre of the balloon from the point A?

a) 1/ 2 b) $\sqrt{2}$

c) 2 d) ½

60. Two poles of heights 6 m and 11 m stand vertically upright on a plane ground. If the distance between their feet is 12 m, what is the distance between their tops?

a) 11 m b) 12 m

c) 13 m d) 14 m

61. From a rectangular sheet of cardboard of size 5 cm × 2 cm, the greatest possible circle is cut-off. What is the area of the remaining part?

a) $(25 – p)$ cm^2 b) $(10 – p)$ cm^2

c) $(4 – p)$ cm^2 d) $(10 – 2p)$ cm^2

62. What is the radius of the circle inscribed in a triangle having side lengths 35 cm, 44 cm and 75 cm?

a) 3 cm b) 4 cm

c) 5 cm d) 6 cm

63. If the area of a DABC is equal to area of square of side length 6 cm, then what is the length of the altitude of AB, where AB = 9 cm?

a) 18 cm b) 14 cm

c) 12 cm d) 8 cm

64. Consider the following:

statements I. Area of a segment of a circle is less than area of its corresponding

sector. II. Distance travelled by a circular wheel of diameter 2d cm in one revolution is greater than 6d cm.

Which of the above statements is/are correct?

a) Only I b) Only II

c) Both I and II d) Neither I nor II

65. The area of an isosceles triangle ABC with AB = Ascend altitude AD = 3 cm is 12 sq cm. What is its perimeter?

a) 18 cm b) 16 m

c) 14 cm d) 12 cm

66. Consider an equilateral triangle of a side of unit length. A new equilateral triangle is formed by joining the mid-points of one, then a third equilateral triangle is formed by joining the mid-points of second. The process is continued. The perimeter of all triangles, thus formed is

a) 2 units b) 3 units

c) 6 units d) Infinity

67. The total surface area of a cone, whose generator is equal to the radius R of its base, is S. If A is the area of a circle of radius 2R, then which one of the following is correct?

a) A = S b) A = 2S

c) A = S/2 d) A = 4S

68. If the number of square centimeters on the surface area of a sphere is three times the number of cubic centimeters in its volume, then what is its diameter?

a) 1 cm b) 2 cm

c) 3 cm d) 6 cm

69. A solid metallic cube of edge 4 cm is melted and recast into solid cubes of edge 1 cm. If x is the surface area of the melted cube and y is the total surface area of all the cubes recast, then what is x: y?

a) 2: 1 b) 1: 2

c) 1: 4 d) 4: 1

70. If a sphere of radius 10 cm is intersected by a plane at a distance 8 cm from its centre, what is the radius of the curve of intersection of the plane and the sphere?

a) 8 cm b) 6 cm

c) 5 cm d) 4 cm

71. A hemispherical bowl of internal radius 20 cm contains sauce. The sauce is to be filled in conical shaped bottles of radius 5 cm and height 8 cm. What is the number of bottles required?

a) 100 b) 90

c) 80 d) 75

72. A figure is formed by revolving a rectangular sheet of dimensions 7 cm × 4 cm about its length. What is the volume of the figure, thus formed?

a) 352 cu cm b) 296 cu cm

c) 176 cu cm d) 616 cu cm

73. The material of a solid cone is converted into the shape of a solid cylinder of equal radius. If the height of the cylinder is 5 cm, what is the height of the cone?

a) 15 cm b) 20 cm

c) 25 cm d) 30 cm

74. What will be the cost to plaster the inner surface of a well 14 m deep and 4 m in diameter at the rate of Rs25 per sq m?

a) Rs 4000 b) Rs 4200

c) Rs 4400 d) Rs 5400

75. A right circular metal cone (solid) is 8 cm high and the radius is 2 cm. It is melted and recast into a sphere. What is the radius of the sphere?

a) 2 cm b) 3 cm

c) 4 cm d) 5 cm

76. The height of a cylinder is 15 cm. The lateral surface area is 660 sq cm. Its volume is

a) 1155 cu cm b) 1215 cu cm

c) 1230 cu cm d) 2310 cu cm

77. What is the whole surface area of a cone of base radius 7 cm and height 24 cm?

a) 654 sq cm b) 704 sq cm

c) 7 24 sq cm d) 964 sq cm

78. What is the volume of the double cone so formed?

a) 3124 cm^3 b) 3424 cm^3
c) 3768 cm^3 d) 3924 cm^3

79. The radius of a sphere is equal to the radius of the base of a right circular cone, and the volume of the sphere is double the volume of the cone. The ratio of the height of the cone to the radius of its base is

a) 2: 1 b) 1: 2
c) 2: 3 d) 3: 2

80. Consider the following statements Two lines intersected by a transversal are parallel, if

I. the pairs of corresponding angles are equal.
II. the interior angles on the same side of the transversal are supplementary.

Which of the statements given above is/are correct?

a) Only I b) Only II
c) Both I and II d) Neither I nor II

81. Consider the following statements :

I. The locus of points which are equidistant from two parallel lines is a line parallel to both of them and drawn mid way between them
II. The perpendicular distances of any point on t his locus line from two original parallel lines are equal. Further, no point outside this locus line has this property.

Which of the above statements is/are correct?

a) Only I b) Only II
c) Both I and II d) Neither I nor II

82. Consider the following statements A triangle can be constructed if its

I. two sides and the included angles are given.
II. three angles are given. III. two angles and the included side are given.

Which of the statements given above are correct?

a) I and II b) I and III
c) II and III d) All of these

83. Consider the following statements:

I. Congruent triangles are similar.
II. Similar triangles are congruent.
III. If the hypotenuse and a side of one right triangle are equal to the hypotenuse and a side of another right triangle respectively, then the two right triangles are congruent.

Which of the statement given above is/are correct?

a) Only I b) Only I
c) Both II and III d) Both I and III

84. Which one among the following is not correct?

a) Two congruent triangles are necessarily similar
b) All equiangular triangles are similar
c) Two isosceles right triangles are similar
d) All isosceles triangles are similar

85. Consider the following statements

I. The perpendicular bisector of a chord of a circle does not pass through the centre of the circle.
II. The angle in a semi-circle is a right angle.

Which of the statements given above is/are correct?

a) Only I b) Only II
c) Both I and II d) Neither I nor II

86. In a cricket match, the first 5 batsmen of a team scored runs: 30, 40, 50, 30 and 40.If these data represent a four sided figure with 50 as its one of the diagonals, then what does second diagonal represent?

a) 30 runs b) 40 runs
c) 50 runs d) 70 runs

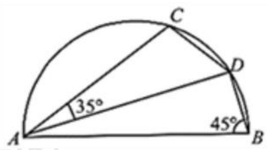
87. If two parallel lines are cut by two distinct transversals, then the quadrilateral formed by the four lines is always a

a) square b) parallelogram
c) rhombus d) trapezium

88. How many equilateral triangles can be formed by joining any three vertices of a cube?

a) 0 b) 4
c) 8 d) None of these

89.



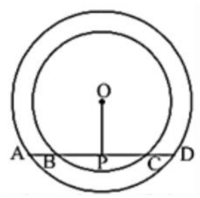
In the figure given above, C and D **are points on the semi-circle described on AB as diameter. If** $\angle ABD = 75^0$ **and** $\angle BAC = 35^0$**, then what is the** $\angle BDC$?

a) 130^0 b) 110^0
c) 90^0 d) 100^0

90. What is the number of tangents that can be drawn to a circle from a point on the circle?

a) 0 b) 1
c) 2 d) 3

91.

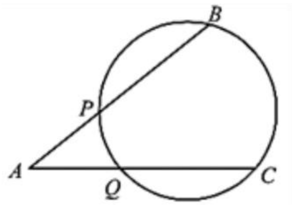


In the figure given above, *AD* is a straight line, OP perpendicular to *AD* and *O* is the centre of both

circles. If $OA = 20cm, OB = 15cm$ and $OP = 12cm,$ then what is AB equal to ?

a) 7 cm b) 8 cm
c) 10 cm d) 12 cm

92.



In the figure given above, If $AP = 3cm, PB = 5cm,$ $AQ = 2cm$ and $QC = x,$ then what is the value of x?

a) 6 cm b) 8 cm
c) 10 cm d) 12 cm

93. ABCD is a quadrilateral, the sides of which touch a circle.
Which one of the following is correct?

a) AB + AD = CB + CD
b) AB: CD = AD: BC
c) AB + CD = AD + BC
d) AB: AD = CB: CD

94. ABC is an equilateral triangle inscribed in a circle with AB = 5 cm. Let the bisector of the angle A meet BC in X and the circle in Y. What is the value of AX. AY?

a) 16 cm^2 b) 20 cm^2
c) 25 cm^2 d) 30 cm^2

95. The locus of the mid-points of all equal chords in a circle is

a) The circumference of the circle concentric with the given circle and having radius equal to the length of the chords.
b) The circumference of the circle concentric with the given circle and having radius equal to the distance of the chords from the centre.
c) The circumference of the circle concentric with the given circle and having radius equal to half of the radius of the given circle.
d) The circumference of the circle concentric with the given circle and having radius equal to half of the distance of the chords from the centre.

96. If the angle between the radii of a circle is 130°, then the angle between the tangents at the ends of the radii is

a) 90° b) 70°
c) 50° d) 40°

97. Which one of the following statements is not correct with reference to a histogram?

a) Frequency curve is obtained by joining the mid points of the top of the adjacent rectangles with smooth curves
b) Histogram is drawn for continuous data
c) The height of the bar is proportional to the frequency of that class
d) Mode of the distribution can be obtained from the histogram

98. Consider the following pairs of numbers:

I. (8, 12) II. (9, 11)
III. (6, 24)

Which pairs of number have the same harmonic means?

a) I and II b) II and III
c) I and III d) I, II and III

99. The arithmetic mean of 100 numbers was computed as 89.05. It was later found that two numbers 92 and 83 have been misread as 192 and 33, respectively.
What is the correct arithmetic mean of the numbers?

a) 88.55
b) 87.55
c) 89.55
d) Cannot be determined

100. Which one of the following relations for the numbers 10, 7, 8, 5, 6, 8, 5, 8 and 6 is correct?

a) Mean = Median b) Mean = Mode
c) Mean > Median d) Mean > Mode

ANSWER KEY

1.b	21.c	41.a	61.b	81.c
2.d	22.d	42.c	62.d	82.d
3.d	23.a	43.b	63.d	83.d
4.a	24.d	44.a	64.c	84.d
5.d	25.c	45.b	65.a	85.b
6.b	26.b	46.c	66.c	86.c
7.c	27.b	47.c	67.b	87.d
8.d	28.b	48.c	68.b	88.c
9.d	29.d	49.d	69.c	89.a
10.c	30.a	50.a	70.b	90.b
11.c	31.b	51.d	71.c	91.a
12.c	32.b	52.a	72.a	92.c
13.d	33.a	53.c	73.a	93.c
14.a	34.b	54.c	74.c	94.c
15.c	35.d	55.a	75.a	95.b
16.b	36.a	56.b	76.d	96.c
17.c	37.c	57.b	77.b	97.c
18.c	38.b	58.b	78.c	98.c
19.c	39.b	59.b	79.a	99.a
20.c	40.d	60.c	80.c	100.a

SOLUTION

1. Difference = sum of digit at odd place – sum of digit at even place
= (1+5+9+4) –(2+4+3)
= 19 – 9
= 10
In 10, we must add at least 1 so that it is divisible by 11. So, x = 1
Also, the sum of digit of 1254934
= 1 +2 +5+4 +9 +4 = 28
1254934 will be divisible by 3, after adding y, if the value of y is -1.
So, x = 1 and y = -1 is the set of values for x and y.
2. By considering every option
(a) 3q + 9 = 18
Q = 3
Then number are 3,5, and 9 which are not all prime.
(b) 3q+9 = 42
q =11
Then, number are 11,13, 17 which are all prime.
(c) 3a+ 9= 60
q =17
Then number are 17,19 and 23 which are all prime.
Hence , option (d) is correct.
3. The prime nubmerss beteeen 100 and 120 are 101, 103, 107, 109 and 113.
Required sum = 101+103+107+109+113 = 533
4. Let angles of a triangle in AP are $a, a+d, a+2d$
Also, $a+2d = 2a$ (given condition)
$\Rightarrow a = 2d \quad ....(i)$
Also,
$a+a+d++a+2d = 180^0$
$(\because \text{ sum of angles of triangle } = 180^0)$
$\Rightarrow 3a+3d = 180^0$
$\Rightarrow 3a+3\left(\frac{a}{2}\right) = 180^0 \quad [\text{from Eq. } (i)]$
$\Rightarrow 9a = 360^0$
$\Rightarrow a = 40^0, d = 20^0$
$\therefore$ Ratio of angle $= 40^0 : 60^0 : 80^0 = 2:3:4$
5. Last digit of 3^{-4798}
We know that 3 is cyclic of its unit digit at 4 times.
So we divide 4798 by 4.
$= 3^{4798} = 3^{1199 \text{ X } 4 + 2}$
$= (3^{1199X4}) . 3^2 = 9$
6. Let the lowest sides of a right triangle be 3, 4, 5.
By Pythagoras theorem, $(3)^2 + (4)^2 = (5)^2$ Hence, one of its sides is always divisible by 5.
7. Following are the numbers between -11 and 11 which are multiples of 2 or 3?
$-10, -9, -8, -6, -4, -3, 0, 2, 3, 4, 6, 8, 9, 10$ So, the numbers of multiples 2 or 3, between -11 and 11 are 15.
Alternative Method:
Numbers between 0 and 11 which are multiples of 2 or 3
$\frac{11}{2} + \frac{11}{3} - \frac{11}{6} = 5+3-1 = 7$
Numbers between 0 and -11
$\frac{11}{2} + \frac{11}{3} - \frac{11}{6} = 7$
So, the numbers are 15 and 0.
8. Le the number are $a_1 = 10, a_2 = 20, a_3 = 25, a_4 = 40$ and $a_5 = 50$.
$\therefore$ Harmonic mean = $\dfrac{\text{Number of observations}}{\frac{1}{a_1}+\frac{1}{a_2}+\frac{1}{a_3}+\frac{1}{a_4}+\frac{1}{a_5}}$
$= \dfrac{5}{\frac{1}{10}+\frac{1}{20}+\frac{1}{25}+\frac{1}{40}+\frac{1}{50}}$
$= \dfrac{5}{\frac{20+10+8+5+4}{200}}$
$= \frac{5 \times 200}{47} = \frac{1000}{7} = 21.27 \approx 21.3$
9. For square integer 25, 4k + 1 mean 4 × 6 + 1 and for 36 4k mean 4 × 9 Now, if k is a positive integer, then every square integer is of the form 4k or 4k + 1
10. From option (c) By Hook and Crook
N = 6
$N^2 - 33 = 62 - 33 = 36 - 33 = 3$,
which is prime. $N^2 - 31 = 6^2 - 31 = 36 - 31 = 5$, which is prime. $N^2 - 29 = 6^2 - 29 = 36 - 29 = 7$, which is prime. So, N = 6 only. possible value
11. Let two consecutive odd numbers = (2x + 1) and (2x + 3)
According to question
$= (2x + 3)^2 - (2x + 1)^2$
= 4x 2 + 12x + 9 – 4x 2 –1 – 4x
= 8x + 8 = 8(x + 1)
So, it is divisible by 8.
12. $\frac{1421 \times 1423 \times 1425}{12}$
When we divide 1421, 1423 and 1425 then 5, 7 at 0 are the remainders respectively.

$= \frac{5\times7\times9}{12} = \frac{315}{12} = 3$

13. Let $f_1(x) = x^2 + bx - x - b$

$= x(x+b) - (x+b)$

$= (x-1)(x+b)$

and $f_2(x) = x^2 + xa - x - a$

$= x(x+a) - 1(x+a)$

$= (x+a)(x-1)$

$\therefore$ HCF of $f_1(x)$ and $f_3(x) = (x-1)$

14. LCM of (6, 9, 12) = 36 Then, number is the form of 39p + 4. Since, the required number between 300 and 400. ? p = 9 and 10 ? Required sum = 328 + 364 = 692

15. Let the numbers be $24x$ and 24y.

$\therefore 24x \times 24y = 6912 \Rightarrow xy = \frac{6912}{(24)^2} = 12$

$\therefore LCM$ is 24×12 = 288

16. HCF of (22n +7, 33n+10) is always 1

Example

For n =1 , HCF (29,43) => HCF =1

For n =2, HCF (51,76) => HCF =1

For n =3, HCF (13,109) => HCF =1

Since 22n and 33n are multiple of 11, therefore 22n+7

And 33n +10 are not the multiple of 11,

Hence, HCF of 22n+7 and 33+10 2ill be equal.

17. $\frac{1}{22} = 0.04545...$

$\frac{2}{15} = 0.1333...$

$\frac{1}{16} = 0.0625$

$\frac{1}{16}$ can be written as terminating decimal.

18. $9 + 2\sqrt{14} = (\sqrt{7})^2 + (\sqrt{2})^2 + 2\sqrt{7}\times\sqrt{2}$

$= (\sqrt{7}+\sqrt{2})^2$

$\because \sqrt{9+2\sqrt{14}} = (\sqrt{7}+\sqrt{2})$

19. Given that, $\sqrt{1+\frac{93}{196}} = 1 + \frac{x}{14}$

$\Rightarrow \sqrt{\frac{289}{196}} = 1 + \frac{x}{14} \Rightarrow \frac{17}{14} = 1 + \frac{x}{14}$

$\Rightarrow \frac{x}{14} = \frac{17}{14} - 1 \Rightarrow x = 3$

20. Change in volume

$= x + y + z + \frac{xy+yz+zx}{100} + \frac{xyz}{10000}$

Here, $x = y = z = 20\%$

Change in volume

$= 20 + 20 + 20 + \frac{20\times20 + 20\times20 + 20\times20}{100} + \frac{20\times20\times20}{10000}$

$= 60 + \frac{1200}{100} + \frac{8}{10} = 72.8 \approx 73\%$

21. let the net pay of employee = x

After contributing $10\% = x \times \frac{90}{100} = \frac{9x}{10}$

According to question $\frac{9x}{10} = 12500$

$\because x = \frac{12500\times10}{9} = 15000$

General provident fund = 10% of basic pay

$= \frac{10\times15000}{100} = 1500$

22. $\because x \propto \frac{1}{y^2} \Rightarrow x = \frac{k}{y^2}$ .....(i)

$x = 1$ and y = 6

From Eq. (i)

$1 = \frac{k}{6^2} \Rightarrow k = 36$

On putting the value of k in Eq. (i). we get

$x = \frac{36}{y^2}$

On putting $y =$ in Eq. (ii), we get

$x = \frac{36}{9} = 4$

23. Let the age of Sham and Ram was x and 2x years respectively 20 years later from now. ?

Present age of Ram = (2x – 20) years and present age of Sham = (x – 20) years 10 years ago, the age of Ram = 2x – 20 – 10

= 2x – 30

Age of Sham = x – 20 – 10 = (x – 30) years According to the question 2x – 30 = 5(x – 30) 2x – 30 = 5x – 150

150 – 30 = 5x – 2x

3x = 120 ?x

= 120/3=40 ?

The present age of Sham = 40 – 20 = 20 years.

24. Let the number be $3x, 2x$ and 5x.

$\therefore (3x)^2 + (2x)^2 + (5x)^2 = 1862$

$\Rightarrow 9x^2 + 4x^2 + 25x^2 = 1862$

$\Rightarrow x^2 = \frac{1862}{38} = 49$

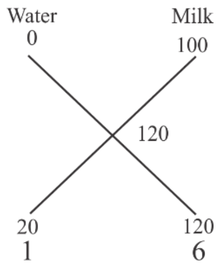
$x = 7$

Hence, the required numbers are $3\times7, 2\times7$ and 5 × 7. i.e., 14 and 35

25. $\frac{x}{y}=\frac{7}{5}(\text{Given that})$

$\therefore \frac{5x-2y}{3x+2y}=\frac{(5\times 7-2\times 5)}{(3\times 7+2\times 5)}=\frac{35-10}{21+10}=\frac{25}{31}$

26. Let milkman buy milk of Rs. 100.
25% profit then = Rs. 120



Percentage of milk = $\frac{6-1}{6}\times 100=\frac{5}{6}\times 100=\frac{250}{3}\%$

27. Given, $n_1=100, \bar{x}_1=5$ and $n_2=150, \bar{x}_2=\frac{25}{3}$

Average of whole group of observations

$$\bar{x}_1=\frac{n_1\bar{x}_1+n_2\bar{x}_2}{n_1+n_2}$$

$$=\frac{100\times 5+150\times \frac{25}{3}}{100+150}=\frac{1750}{250}=7$$

28. Given $CI=Rs.832, SI=Rs.800$ and T= 2 years

From formula,

$$CI=\left\{\left(1+\frac{R}{100}\right)^T-1\right\}$$

$$\therefore 832=P\left\{\left(1+\frac{R}{100}\right)^2-1\right\}$$

$$\Rightarrow 832=P\left\{1++\frac{R^2}{10000}+\frac{2R}{100}-1\right\}$$

$$\Rightarrow 832=P\left\{1+\frac{R^2}{10000}+\frac{2R}{100}\right\} \quad ..(i)$$

Using SI formula,

SI = $\frac{P\times R\times T}{100}$

$$\Rightarrow 800=\frac{P\times R\times 2}{100}\Rightarrow P=\frac{40000}{R} \quad ...(ii)$$

Now putting the value of P in Eq. (i) then,

$$832=\frac{40000}{R}\left(\frac{R^2}{10000}+\frac{2R}{100}\right)$$

$$\Rightarrow 832=4R+800\Rightarrow 4R=32$$

29. Given, $P=Rs.1600, R=25\%$ and n = 2 yr

$$\therefore A=P\left[1+\frac{r}{100}\right]^n=1600\left[1+\frac{25}{100}\right]^2$$

$$=1600\times\frac{5}{4}\times\frac{5}{4}=2500$$

Compound interest = 2500 – 1600 = Rs. 900.

30. Let cost of 1 table be $Rs.x$ and cost of 1 chair be Rs. y.

$4x+5y=1000 \quad ....(i)$

	Table	Chair
CP	4x	5y
SP	$4x\left(1+\frac{1}{10}\right)=\frac{44x}{10}$	$5y\left(1+\frac{1}{5}\right)=6y$

$\because$ SP – CP = Profit

$$\therefore\left(\frac{44x}{10}-4x\right)+6y-5y=120$$

$$\Rightarrow \frac{4x}{10}+y=120 \quad ...(ii)$$

From equations (i) and (ii),

$x=Rs.200$

31. Let marked price of two sarees be $Rs.x$ and Rs.y respectively

$$x-\frac{6x}{100}=564\Rightarrow \frac{94x}{100}=564$$

$x=Rs.600$

$$y-\frac{y}{100}=396$$

$$\frac{99y}{100}\Rightarrow 396\Rightarrow y=Rs.400$$

Total M.P. amount = 600 + 400 = Rs. 1000

Total amount after discount = 564 + 396 = Rs. 960

Discount per cent = $\frac{100-960}{1000}\times 100$

$=\frac{40}{10}\%=4\%$

32. We know that,

Net percentage discount = $\frac{\text{Discount}}{Cost\ price}\times 100$

$=\frac{1}{4}\times 100=25\%$

33. Let the speed of a train be $v\,m/s$ and length of the train be x m.

When crosses telegraph $t=8s$

Time = $\frac{\text{distance}}{Speed}\Rightarrow 8=\frac{x}{v}$

$\Rightarrow x=8v \quad ...(i)$

When crosses bridge

$t=24s, Speed=v$

Distance = $x+200$

Time = $\dfrac{\text{Distance}}{Speed}$

$24=\dfrac{x\times 200}{v}\Rightarrow 24v=x+200$

$\Rightarrow 24v=8v+200 \qquad [\text{from eq. } (i)]$

$\Rightarrow 16v=200\Rightarrow v=\dfrac{25}{2}$

From eq. $(i)\, x=8v=8\times\dfrac{25}{2}=100m$

34. Relative speed = 75 + 50 = 125 km/h

$=\dfrac{125\times 5}{18}m/s$

Total covered distance = $100+150=250m$

Time taken to cross each other

$=\dfrac{\text{Total covered distance}}{\text{Relative speed}}$

$=\dfrac{250\times 18}{125\times 5}=7.2s$

35. According to question,

$t_1-t_2=15-(-15)\Rightarrow 15+15$

$\Rightarrow 30\min\Rightarrow \dfrac{x}{v_1}-\dfrac{x}{v_2}=\dfrac{30}{60}h$

$v_1=3km/h, v_2=4km/h$

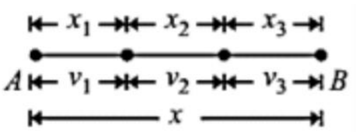
$\Rightarrow \dfrac{x}{3}-\dfrac{x}{4}=\dfrac{1}{2}$

$\Rightarrow \dfrac{4x-3x}{12}=\dfrac{1}{2}\Rightarrow \dfrac{x}{12}=\dfrac{1}{2}$

$x=\dfrac{12}{2}=6km.$

36. Let total distance = $x\,km$.

Average speed = $\dfrac{\text{total distance}}{\text{total time}}$



$\dfrac{x}{t_1+t_2+t_3}=\dfrac{x}{\dfrac{x_1}{v_1}+\dfrac{x_2}{v_2}+\dfrac{x_3}{v_3}}$

$x_1=\dfrac{x}{3},x_2=\dfrac{x}{3},x_3=\dfrac{x}{3}$

$=\dfrac{x}{\dfrac{x}{3}\left(\dfrac{1}{10}+\dfrac{1}{20}+\dfrac{1}{60}\right)}$

$=\dfrac{3}{\left(\dfrac{6+3+1}{60}\right)}=\dfrac{3\times 60}{10}=18\text{ km/h}$

37. One day's work of Ram = $\dfrac{1}{6}$

One day's work of Shyam = $\dfrac{1}{12}$

One day's work together, R am and Shyam

$=\dfrac{1}{6}+\dfrac{1}{12}$

Two day's work together = $\dfrac{1}{2}$ half of the work

38. Required time = $\dfrac{1}{\dfrac{1}{1}+\dfrac{1}{2}+\dfrac{1}{3}+\dfrac{1}{6}}=\dfrac{6}{6+3+2+1}$

$=\dfrac{6}{12}h=\dfrac{6}{12}\times 60\min=30\min$

39. $\dfrac{M_1D_1}{W_1}=\dfrac{M_2D_2}{W_2}$

$\Rightarrow$ Here $M_1=18, D_1=5, W_1=Rs.360$

$M_2=15, D_2=9, W_2=9$

$\Rightarrow 18\times 5\times W_2=15\times 9\times 360$

$W_2=\dfrac{15\times 9\times 360}{18\times 5}=Rs.540$

40. $A's$ and B's 1 h work = $\dfrac{1}{10}$

$B's$ and C's 1 h work = $\dfrac{1}{15}$

$A's$ and B's 1 h work = $\dfrac{1}{12}$

$\therefore A's, B's$ and C's 1 h work

$=\dfrac{1}{2}\left(\dfrac{1}{10}+\dfrac{1}{15}+\dfrac{1}{12}\right)$

$=\dfrac{1}{2}\times\dfrac{1}{4}=\dfrac{1}{8}$

B's work in 1 h = $\dfrac{1}{8}-\dfrac{1}{12}=\dfrac{1}{24}$

B can complete the work in 24 h

41. Given, x + y + z = 0 ? (x + y) (y + z) (z + x) = (–z) (–x) (–y)= –xyz

42. Let a be the common factors of the given equations.

$\alpha^2-11\alpha+a=0$ and $\alpha^2-14a+2a=0$

Thus, it represents the same equation

$\dfrac{\alpha^2}{-22a+14a}=\dfrac{\alpha}{a-2a}=\dfrac{1}{-14+11}$

(cross multiplication method)

$\dfrac{\alpha^2}{-8a}=\dfrac{\alpha}{-a}=\dfrac{1}{-3}$

$\dfrac{\alpha}{-a}=-\dfrac{1}{3}$

$\alpha=\dfrac{a}{3}\Rightarrow\dfrac{\alpha^2}{-8a}=-\dfrac{1}{3}$

$$\frac{\frac{a^2}{9}}{-8a}=-\frac{1}{3}$$

$a=0, a=24.$

43. Factor theorem is a special case of remainder theorem.

44. Let $f(x)=x^{11}+1$

Put $x=-1,$ we get

$f(-1)=-1,$ we get

$f(-1)=(-1)^{11}+1=-1+1=0$

$(a^n+b^n),$ where n is number then it is divisible

By $(a+b).$ Then remainder is zero.

45. Here, $x+5$ is a factor.

So,

$x+5=0$

$x=-5$

Now, when $x=-5,$ then

$x^3+3x^2+4x+k=(-5)^3+3\times(-5)^2+4\times(-5)+k$

$=-125+75-20+k=-70+k$

x^3+3x^2+4x+k

Since $(x-5)$ is a factor of $-70+k=0$

$k=70$

46. $(49)^2-(25)^2=37x$

$2401-625=37x$

$1776=37x$

$x=\frac{1776}{37}=48$

47. Here, n

$(A)=60, n(B)=70, n(A\cap B)=50$ and $n(n\cup B)=?$

We know that:

$n(A\cup B)=n(A)+n(B)-n(A\cap B)$

$=60+70-50$

$130-50=80$

48. Given, $2\sec^2\theta+\sec\theta-6=0\,2$

$\Rightarrow 2\sec\theta(\sec\theta+2)-3(\sec\theta+2)=0$

$\Rightarrow (2\sec\theta-3)(\sec\theta+2)=0$

$\Rightarrow \sec\theta=\frac{3}{2} \qquad (\because \sec\theta\neq-2, \sec\theta>0)$

$\Rightarrow \cos\theta=\frac{2}{3}$

$\Rightarrow \sin\theta=\sqrt{1-\cos^2\theta}=\sqrt{1-\frac{4}{9}}=\frac{\sqrt{5}}{2}$

$\operatorname{cosec}\theta=\frac{1}{\sin\theta}$

49. Given, $2x^2\cos 60^0-4\cot^2 45^0-2\tan 60^0=0$

$\Rightarrow 2x^2\times\frac{1}{2}-4(1)^2-2\times\sqrt{3}=0$

$\Rightarrow x^2-4-2\sqrt{3}=0$

$\Rightarrow x^2=4+2\sqrt{3}$

$\Rightarrow x^2=3+1+2\sqrt{3}$

$\Rightarrow x^2=(\sqrt{3})^2+(1)^2+2\sqrt{3}\cdot 1$

$\Rightarrow x^2=(\sqrt{3}+1)^2$

$\Rightarrow x=\sqrt{3}+1$

50. Since, $\sin x<\frac{1}{2}, 0^0<x<30^0$

And $\cos x<\frac{1}{2}, 60^0<x<90^0$

Then $\sin x=\cos x$ only for x = 45^0 in first quadrant.

Hence, option (a) is correct.

51. Given, $\sin(x+54^0)=\cos x$

$\sin(x+54^0)=\sin(90^0-x) \qquad (\because 0^0<x<90^0)$

$x+54^0=90^0-x$

$2x=54^0 \Rightarrow x=18^0$

52. Given, $\tan^2 y\operatorname{cosec}^2 x-1=\tan^2 y$

$\Rightarrow \tan^2 y\operatorname{cosec}^2 x-\tan^2 y=1$

$\Rightarrow \tan^2 y(\operatorname{cosec}^2 x-1)=1$

$\Rightarrow \tan^2 y.\cot^2 x=1$

$\Rightarrow \cot^2 x=\cot^2 y$

$\Rightarrow x=y$

$\therefore = x-y=0$

53. $x+\frac{1}{x}=2\cos\alpha$

Squaring both sides, then we get

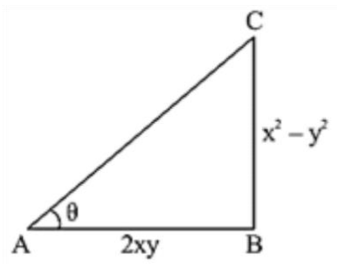
$x^2+\frac{1}{x^2}+2=4\cos^2\alpha$

$x^2+\frac{1}{x^2}=2(2\cos^2\alpha-1)$

$=2(2\cos^2\alpha-\sin^2\alpha-\cos^2\alpha)$

$=2\cos^2\alpha-2\sin^2\alpha$

54. Given, $\cot\theta=\frac{2xy}{x^2-y^2}$



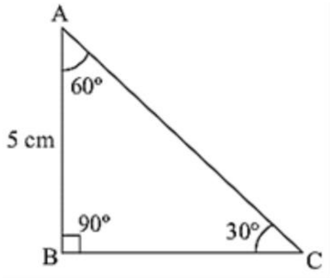
In ΔABC,

$$AC^2 = (x^2 - y^2) + (2xy)^2$$

$$AC^2 = (x^2 + y^2)^2 \Rightarrow AC = x^2 + y^2$$

$$\cos\theta = \frac{AB}{AC} = \frac{2xy}{x^2 + y^2}$$

55. In ΔBAC,



$$\cos 60^0 = \frac{AB}{AC} \Rightarrow \frac{1}{2} = \frac{5}{AC}$$

$$AC = 10cm$$

56. $\cos\theta = \dfrac{a^2 + b^2 - c^2}{2ab}$ By cosine rule

$$= \frac{6^2 + 2^2 - c^2}{2 \times 6 \times 2} = \frac{40 - c^2}{24}$$

For acute angle,

$$\cos\theta > 0 \Rightarrow \frac{40 - c^2}{24} > 0 \Rightarrow c^2 < 40$$

$0 < c < 2\sqrt{10}$ (since, c cannot be negative) ...(i)

$b + c > a$

$c > 6 - 2 \Rightarrow c > 4$

From equation (i)and (ii),

$c \in (4, 2\sqrt{10})$

57. We know that,

π radian = 180^0

$$1 \text{ radian} = \frac{180^0}{\pi} = \frac{180^0}{22} \times 7^0$$

$$= \frac{630^0}{11} = 57\frac{3^0}{11} = 57^0 + \frac{3 \times 60}{11}\min$$

$$= 57^0 + 16' + \frac{4}{11}\min$$

$$= 57^0 + 16' + \frac{4}{11} \times 60x = 57^0 + 16' + 21.8''$$

$$= 57^0 16' 21.8'' = 57^0 16' 22''$$

58. I. given that, $\sin x + \cos x = 2$

$$\Rightarrow (\sin x + \cos x)^2 = 4$$

$$\Rightarrow (\sin^2 x + \cos^2 x) + 2\sin x \cos x = 4$$

$$\Rightarrow 1 + \sin x 2x = 4$$

$$\Rightarrow \sin 2x \neq 3$$

Hence, there is no value of x in the first quadrant that satisfies

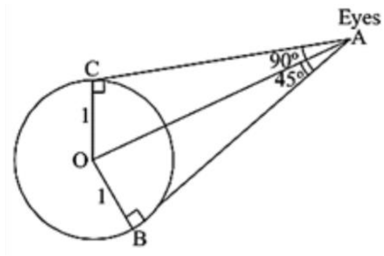
II. $\sin x - \cos x = 0$

$$\Rightarrow \tan x = 1 = \tan\frac{\pi}{4} \Rightarrow x = \frac{\pi}{4}$$

Also, there is only one value of x in the first quadrant that satisfies $\sin x - \cos x = 0$

59. Let O = Centre of the balloon

OB = OC = Radii of the balloon

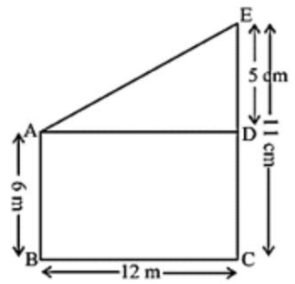


In $\Delta OBA, \sin 45^0 = \dfrac{OB}{OA} \Rightarrow \dfrac{1}{\sqrt{2}} = \dfrac{1}{OA} \Rightarrow OA = \sqrt{2}$

60. AD = BC = 12 m

and ED = 11 – 6 = 5cm

Since, AE is distance between top point of AB and *CE,*



In ΔADE,

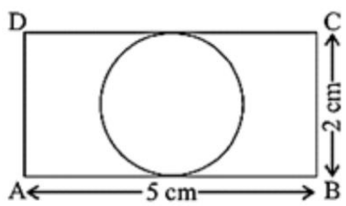
$$AE^2 = AD^2 + ED^2 = 12^2 + 5^2$$

$$= 144 + 25 = 169$$

$$AE = 13m$$

Hence, the distance between their tips = 13 m

61. From a rectangular sheet of cardboard of size $5 \times 2cm^2$, cirle of radius 1 cm, can be cut-off.



Area of rectangular sheet = $5 \times 2 = 10cm^2$

And area of circle = $\pi(1)^2 = \pi cm^2$

Required area = Area of sheet – Area of circle

$= (10 - \pi)cm^2$

62. Let side of triangle a, b, c are 35 cm 44 cm and 75 respectively.

$\therefore s = \frac{a+b+c}{2} = \frac{35+44+75}{2} = 77$

Area of triangle

$\Delta = \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{77\times 42\times 33\times 2}$

$= \sqrt{7\times 11\times 2\times 3\times 7\times 3\times 11\times 2}$

$= 7\times 11\times 2\times 3 = 462\,cm^2$

Radius of incircle = $\frac{\Delta}{s} = \frac{462}{77} = 6\,cm$

63. Let the length of altitude AB = h

According to question

Are of $\Delta ABC =$ Area of square

$\therefore \frac{1}{2}\times$ Base $\times$ Altitude = $(Side\ lenght)^2$

$\Rightarrow \frac{1}{2}\times 9\times h = 36$

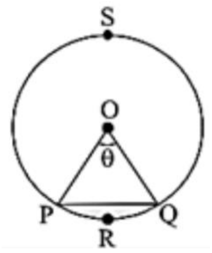
$\Rightarrow h = \frac{36\times 2}{9}$

$h = 8\ cm$

64. I. We know that, Area of segment $(PRQP)$

= Area of sector (OPRQO) – Area of ΔOPQ

$= \frac{\pi r^2\theta}{360} - \frac{1}{2}r^2\sin\theta$



So, the area of segment of a circle is always less than area of its corresponding sector,

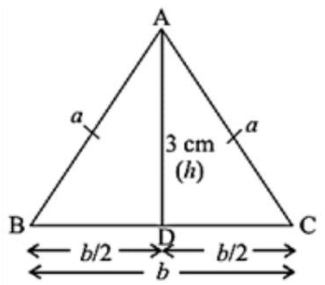
II. distance travelled by a circular wheel of diameter 2d cm in one revolution =

$2\pi\frac{(2d)}{2} = 2\times 3.14\times d = 6.28d$

Which is greater than $6dcm.$

Therefore, statement I and II both are correct.

65. Area of the $\Delta ABC = \frac{1}{2}\times b\times h$



$\Rightarrow 12 = \frac{1}{2}\times b\times 3$

$b = \frac{12\times 2}{3} = 8cm$

Here, BD = CD = $\frac{b}{2} = \frac{8}{2} = 4cm$

In right angled ΔABD, by Pythagoras theorem,

$AB = \sqrt{BD^2 + AD^2}$

$\Rightarrow a = \sqrt{4^2+3^2} = \sqrt{16+9} = \sqrt{25} = 5cm$

Now, perimeter of an isosceles triangle

$= 2a+b = 2\times 5+8 = 10+8 = 18cm$

66. Sides of equilateral triangle are follows:

$3, \frac{3}{2}, \frac{3}{4}, \frac{3}{8}$..... so on

These sequence formed a GP serves.

So sum of GP for Infinite terms.

$S = \frac{a}{1-r}$

Here a=3, r = $\frac{1}{2}$

$S = \frac{3}{1+\frac{1}{2}} = 6units$

67. Given $l = R$

Total surface area of cone,

$S = \pi r(r+l) = \pi R(R+R) = 2\pi R^2$

$Area$ of circle, A = $\pi(2R)^2 = 4\pi R^2$

$\Rightarrow A = 2S$

68. According to question

Surface area of sphere = 3 (Volume of sphere)

$\Rightarrow 4\pi r^2 = 3\times\frac{4}{3}\pi r^3 \Rightarrow r = 1$

Diameter = 2r = 2cm

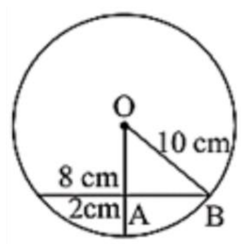
69. Volume of solid cube = $(4)^3$ = 64 cm^3

Volume of recast cube = $(1)^3$ = 1 cm^3

Total surface area of cube : Total surface area of recast cube= x : y

x : y = $6(4)^2 : 6(1)^2$ X 64 = 1: 4

70. In $\Delta OAB, OA^2 + AB^2 = OB^2$



$AB^2 = 10^2 - 8^2 = 36$ A

$AB = 6cm$

71. Volume of hemispherical bowl

$=\frac{2}{3}\pi(20)^3$

$=\frac{16000}{3}\pi$ cu cm

Volume of conical shape bottle

$=\frac{1}{2}\pi(5)^2 8=\frac{200\pi}{3}cu\,cm$

Required number of bottles

$=\frac{16000\pi/3}{200\pi/3}=80$

72. Sheet is revolved about its length
$h=7cm$ and r = 4 cm
Then, Volume of the figure
$=\pi r^2h=\frac{22}{7}\times4\times4\times7=352cu\,cm$

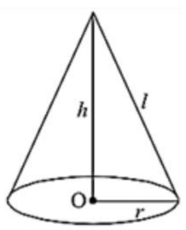
73. According to question,
Volume of cone = Volume of cylinder
$\frac{1}{3}\pi r^2h=\pi r^2\times5$
$\Rightarrow h=5\times3=15cm$

74. Curved surface area of the well = $2\pi rh$
$=2\times\frac{22}{7}\times2\times14=176m^2$
Expense of getting per square metre plastered = Rs. 25
Expense of
$176m^2=176\times25=Rs.4400$

75. Given that, the height and radius of a right circular metal cone (solid) are 8 cm and 2 cm, respectively.
i.e., $h=8cm$ and r = 2 cm
Let the radius of the sphere is R.
Then, by condition, $\frac{1}{3}\pi r^2h=\frac{4}{3}\pi R^3$
$\Rightarrow 4\times8=4R^3$
$\Rightarrow R^3=(2)^3$
$R=2$
Radius of the sphere = 2 cm

76. Given that, $h=15cm$
And lateral surface = $660cm^2$
Let radius of cylinder = r
Lateral surface area of cylinder =
$2\pi rh\Rightarrow 2\pi rh=660$
$\Rightarrow \pi rh=330\Rightarrow\frac{22}{7}\times r\times5=330$

77. Slant height, $l=\sqrt{h^2+r^2}$

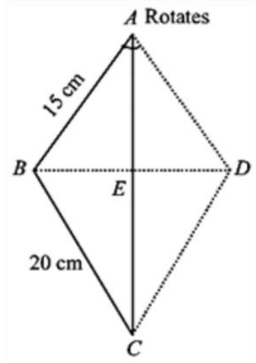


$=\sqrt{(24)^2+(7)^2}=\sqrt{576+49}=\sqrt{625}=25$

Total surface area = $\pi rl+\pi r^2$

$=\frac{33}{7}\times7\times25+\frac{22}{7}\times7\times7=704\,sq\,cm.$

78. Let ABC be a right angled triangle.
Given hypotenuse, AC = 25 cm

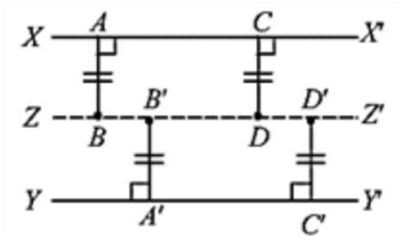


Let $AB=3x$ and BC = $4x$
By Pythagoras, theorem $AC^2=AB^2+BC^2$
$(25)^2=(3x)^2+(4x)^2$
$(25)^2=9x^2+16x^2$
$25^2=x^2$
$x=5$
AB = 25 cm and BC = 20 cm
But, ΔABC revolves about AC, so it forms two cones ABD and BCD.
ΔAEB and ΔABC are similar triangle.
$\frac{BE}{BC}=\frac{AB}{AC}\Rightarrow\frac{BE}{20}=\frac{15}{25}$
$BE=\frac{15\times20}{25}=12cm$
$BE=12cm$
in right angled ΔAEB
$BE=\sqrt{(AB)^2-(BE)^2}$

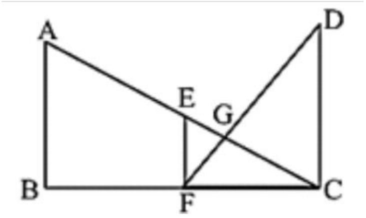
79. Radius of sphere = Radius of right circular cone Now,
Volume of sphere = $2\times$ Volume of cone
$=\frac{4}{3}\pi r^3=2\times\frac{1}{3}\pi r^2h$
$2r=h$
$\frac{h}{r}=\frac{2}{1}=2:1$

80. Hence both statement I and II are correct.

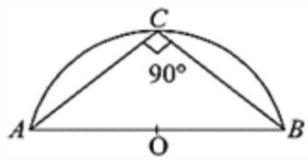
81. Statements I and II are both true, because the locus of points which are equidistant from two parallel lines is a line parallel to both of them and draw mid-way between them.
Also, it is true that the perpendicular distances of any point on this locus line from two original parallel lines are equal. Further, no point outside this locus line has this property.



82. A triangle can be constructed by given all three statements.

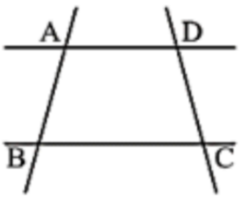


83. It is true that congruent triangles are similar but converse is not true. Also, Statement III is true.
84. All isosceles triangles are similar.
85. The perpendicular bisector of the chord of a circle always pass through the centre. So, Statement I is wrong

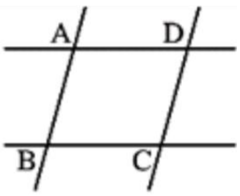


The angle in a semi-circle is a right angle. So, Statement II is correct.

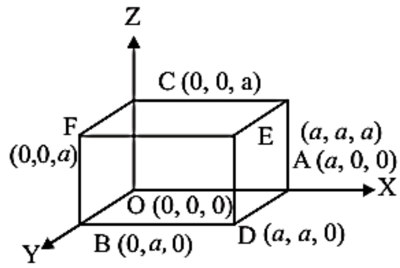
86. Here we see $(50)^2 = (30)^2 + (40)^2$
 2500 = 900 + 1600
 2500 = 2500
 It means given scores are the sides of a rectangle.
 So, other diagonal should be 50 runs.
87. if two parallel lines are cut by two distinct transversals, the quadrilateral formed by the four liens is always a 'Trapezium'.
 Case I If two distinct transversals (are not parallel), then always $\rightarrow$ (Trapezium)



Case II If two distinct transversals are parallel, then always (Trapezium + Parallelogram)



88. In a cube, there are six faces. Let the sides of a cube be a.
 Diagonal of face = $\sqrt{a^2 + a^2} = a\sqrt{2}$
 Hence, there is no equilateral traingles will be formed in faces.



In ΔABC,

$AB = \sqrt{a^2 + a^2} = a\sqrt{2}, BC = \sqrt{a^2 + a^2} = a\sqrt{2}$

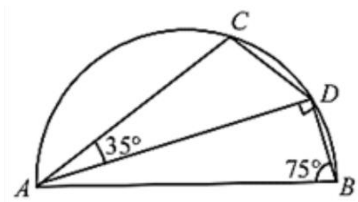
And $AC = \sqrt{a^2 + a^2} = a\sqrt{2}$

ΔABC, is an equilateral triangle.

Similarly, In $\Delta ABE, \Delta ODG, \Delta ODE, \Delta CEB, \Delta CEA,$ ΔFGO and ΔFGD

Eight equilateral triangles are possible.

89. Since, ΔADB is a right angles triangles at D.



$\therefore \quad \angle DAB = 180^0 - (90^0 + 75^0)$

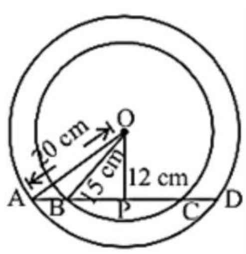
$\Rightarrow \quad \angle DAB = 15^0$

Also, ABCD is cyclic quadrilateral.

$\therefore \angle CAB + \angle BDC = 180^0$

$\Rightarrow \quad \angle BDC = 180^0 - (35^0 + 15^0) = 130^0$

90. From a point on the circle only one tangent can be drawn to a circle.
91. Given $OA = 20cm$
 OB = 15 cm and OP = 12 cm



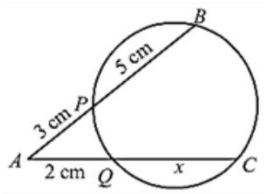
$AP = \sqrt{AO^2 - OP^2}$

$= \sqrt{20^2 - 12^2}$

$= \sqrt{400 - 144}$

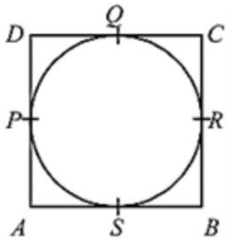
$$= \sqrt{256} = 16cm$$
$$BP = \sqrt{15^2 - 12^2}$$
$$= \sqrt{225-144} = \sqrt{81} = 9cm$$
$$AB = AP - BP = 16 - 9$$
$$= 7cm$$

92. By using theorem, we have



$$AB \times AP = AC \times AQ \quad \Rightarrow 8\times 3 = (2+x)\times 2$$
$$\Rightarrow \quad \frac{8\times 3}{2} = 2 + x \Rightarrow x = 10cm$$

93. When two tangents drawn from an external point to a circle, the length of the tangent are equal.

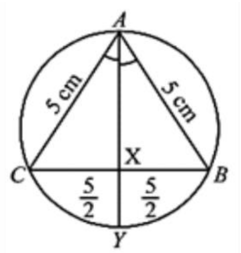


$$AS = AP \qquad ...(i)$$
$$BS = BR \qquad ...(ii)$$
$$CQ = CR \qquad ...(iii)$$
$$DP = DQ \qquad ...(iv)$$

Adding (i), (ii), (iii), and (iv), we get.

$$AS + BS + CQ + DQ = AP + BR + DP + CR$$
$$= AB + CD = AD + BC$$

94. $In\,\Delta ABC,$

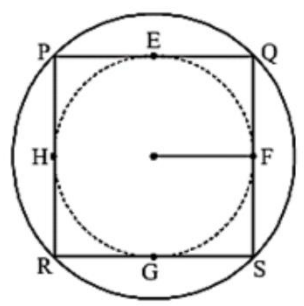


$$BX = \frac{5}{2}cm, CX = \frac{5}{2}cm$$
$$and \qquad AX = \frac{\sqrt{3}}{2}\times 5 = \frac{5\sqrt{3}}{2}cm$$

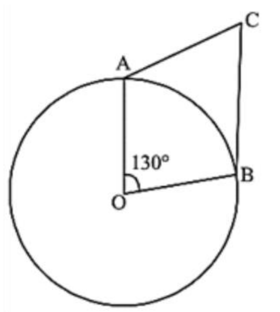
AY and BC are the chord of circle.

$$AX.XY = BX.XC$$
$$\frac{5\sqrt{3}}{2}.XY = \frac{5}{2}.\frac{5}{2}$$
$$XY = \frac{5}{2\sqrt{3}}$$
$$AX.AY = \left(\frac{5\sqrt{3}}{2} + \frac{5}{2\sqrt{3}}\right)\times\frac{5}{2\sqrt{3}} = 25cm^2$$

95. $PQ = QS = SR = RP$



96. OA and OB are radii of circle, AC and BC a re tangents



Now, $\angle AOB + \angle ACB = 180^0$

$$\angle ACB = 180^0 - 130^0 = 50^0$$

97. The height of the bar is not proportional to the frequency of the class

98. I. H.M. = $\dfrac{2\times 8\times 12}{8+12} = \dfrac{2\times 8\times 12}{20}$

$$\left(\therefore \text{harmonic mean } (HM) \text{ of a and b} = \frac{2ab}{a+b}\right)$$
$$= \frac{48}{5} = 9.6$$

II. $H.M. = \dfrac{2\times 9\times 11}{9+11} = \dfrac{2\times 9\times 11}{20} = 9.9$

II. H. M. = $\dfrac{2\times 6\times 24}{6+24} = \dfrac{2\times 6\times 24}{30} = \dfrac{48}{5} = 9.6$

Thus, 1st and IIIrd pairs have same harmonic means.

99. Arithmetic Mean of 100 numbers = 89.05
So, sum of the 100 numbers = 89.05 x 100 =8905
Two numbers 92 and 83 has been read as 192 and 33.
Comparatively increased = (192+33)-(92+83)

=225- 175 = 50
Sum is decreased by 50.
So, sum of 100 numbers = 8905 -50 = 8855
Average of 100 numbers = 8855/100 = 88.55

100. Given numbers are 10, 7, 8, 5, 6, 8, 5, 8 and 6
Arrange in ascending order
5, ,=5, 6, 6, 7, 8, 8, 8, 10
Total term, n = 9 (odd)

i. Mean = $\frac{5+5+6+6+7+8+8+8+10}{9}=\frac{63}{9}=7$

II. Median = $\left(\frac{n+1}{2}\right)th$ term = $\left(\frac{9+1}{2}\right)thterm$
$=5th$ term = 7

iii. Mode = 8 because of higher frequency term

Mean = Median

❖❖❖