STUDY CAMPUS

AN ISO 9001 : 2015 CERTIFIED INSTITUTE

CDS-MATHS-MOCK TEST - 02

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

1. A ten-digit number is divisible by 4 as well as by 5. What could be the possible digit at the ten's place in the given number?
a) 0, 1, 2, 4 or 6
b) 1, 2, 4, 6 or 8
c) 2, 3, 4, 6 or 8
d) 0, 2, 4, 6 or 8

2. let p denote the product 2,3,5,59,61 of all primes from 2 to 61. Consider the sequence p + n (2 d n d 59). What is the number of primes in this sequence (where n is a natural number)?
a) 0 b) 16
c) 17 d) 58

3. What is the sum of positive integers less than 100 which leave a remainder 1 when divided by 3 and leave a remainder 2 when divided by 4?
a) 416 b) 620
c) 1250 d) 1314

4. What least value must be given to, so that the number 84705 2 is divisible by 9?
a) 0 b) 1
c) 2 d) 3

5. If k is any even positive integer, then (k^2 + 2k) is
a) divisible by 24
b) divisible by 8 but may not be divisible by 24
c) divisible by 4 but may not be divisible by 8
d) divisible by 2 but may not be divisible by 4

6. What is the number of prime factors of 30030?
a) 4 b) 5
c) 6 d) None of these

7. What number should be added to 231228 to make it exactly divisible by 33?
a) 1 b) 2
c) 3 d) 4

8. The two digit number, which when divided by sum of the digit and product of the digits, respectively. The remainder is same and the difference of quotients is one, the number digit is
a) 14 b) 23
c) 32 d) 41

9. $19^5 + 21^5$ is divisible by
a) Only 10 b) Only 20
c) Both 10 and 20 d) Neither 10 nor 20

10. Consider all those two-digits positive integers less than 50, which when divided by 4 yield unity as remainder. What is their sum?
a) 310 b) 314
c) 218 d) 323

11. What is the maximum value of m if the number N = 35 × 45 × 55 × 60 × 124 × 75 is divisible by 5m?
a) 4 b) 5
c) 6 d) 7

12. What is the remainder when 4^{96} is divided by 6?
a) 4 b) 3
c) 2 d) 1

13. If the HCF of (x^2 + x – 12) and ($2x^2$ – kx – 9) is (x – k), then what is the value of k?
a) – 3 b) 3
c) – 4 d) 4

14. What is the smallest positive integer which when divided by 4, 5, 8 and 9 leaves remainder 3, 4, 7 and 8, respectively?
a) 119 b) 319
c) 359 d) 719

15. The sum of two numbers is 232 and their HCF is 29. What is the number of such pairs of numbers satisfying the above condition?
a) One b) Two
c) Four d) None of these

16. For any integers 'a' and 'b' with HCF (a, b) = 1, what is HCF (a + b, a – b) equal to?
a) It is always 1 b) It is always 2
c) Either 1 or 2 d) None of these

17. Which one is the largest among the following?
a) 0.725 b) 0.725
c) 0.725 d) 0.725

18. Which is the largest number among $\sqrt{2}, \sqrt[3]{3}, \sqrt[3]{3}, \sqrt[6]{6}$ and $\sqrt[12]{12}$?
a) $\sqrt{2}$ b) $\sqrt[3]{3}$
c) $\sqrt[6]{6}$ d) $(4)^{\frac{1}{4}}$

19. What is the value of $\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + ... + \frac{1}{\sqrt{15}+\sqrt{16}}$?
a) 0 b) 1
c) 2 d) 3

20. 10% of the inhabitants of a certain city left that city. Later on 10% of the remaining inhabitants of that city again left the city. What is the remaining percentage of population of that city?
a) 80% b) 80.4%
c) 80.6% d) 81%

21. A man losses 20% of his money. After spending 25% of the remaining, he has Rs480 left. What is the amount of money he originally had?
a) Rs 600 b) Rs 720

c) Rs 800 d) Rs 840

22. 6 years hence a father's age will be three times his son's age and three years ago father was nine times as old as his son. What is the present age of father?

a) 48 years b) 42 years
c) 36 years d) 30 years

23. The sum of the age of a father and the age of a son is 75 years. If the product of their ages before 5 years was 750, then what is the present age of the father?

a) 60 years b) 55 years
c) 52 years d) 50 years

24. In a class, the number of boys is more than the number of girls by 12% of the total students. What is the ratio of number of boys to that of girls?

a) 11: 14 b) 14: 11
c) 28: 25 d) 25: 28

25. Two numbers are in the ratio 2: 3. If 9 is added to each number, they will be in the ratio 3: 4. What is the product of the two numbers?

a) 360 b) 480
c) 436 d) 512

26. 16 litres of a mixture contains milk and water in the ratio 5:3. If 4 litres of milk is added to this mixture, the ratio of milk to water in the new mixture would be

a) 2: 1 b) 7: 3
c) 4: 3 d) 8: 3

27. The mean weight of 150 students in a class is 60 kg. The mean weight of boys is 70 kg and that of girls is 55 kg, what is the number of boys in the class?

a) 50 b) 60
c) 75 d) 100

28. If the rate of interest is 10% per annum and is compound half-yearly, then the principle of Rs 400 in 3/2 years will amount to

a) Rs 463.00 b) Rs 463.05
c) Rs 463.15 d) Rs 463.20

29. A sum of money becomes 3 times in 5 years. In how many years will the same sum become 6 times at the same rate of simple interest?

a) 15 years b) 12.5 years
c) 10 years d) 7.5 years

30. In respect of a bill of Rs 10000, what is the difference between a discount of 40% and two successive discounts of 36% and 4%?

a) Rs 0 b) Rs 144
c) Rs 256 d) Rs 400

31. A man bought a number of oranges at 3 for a rupee and an equal number at 2 for a rupee. At what price per dozen should he sell them to make a profit of 20%?

a) Rs 4 b) Rs 5
c) Rs 6 d) Rs 7

32. Two lots of onions with equal quantity, one costing Rs 10 per kg and the other costing Rs15 per kg, are mixed together and whole lot is sold at Rs 15 per kg. What is the profit or loss?

a) 10% loss b) 10% profit
c) 20% profit d) 20% loss

33. A train 110 m long is running with a speed of 60 km/h. What is the time in which it will pass a man who starts from the engine running at the speed of 6 km/h in the direction opposite to that of the train?

a) 5 s b) 6 s
c) 10 s d) 15 s

34. A motorboat takes 2 h to travel a distance of 9 km down the current and it takes 6 h to travel the same distance against the current. What is the speed of the boat in still water 1 km/hr?

a) 3 b) 2
c) 1.5 d) 1

35. A sailor sails a distance of 48 km along the flow of a river in 8 h. If it takes 12 h return the same distance, then the speed of the flow of the river is

a) 0.5 km/h b) 1 km/h
c) 1.5 km/h d) 2 km/h

36. In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. The duration of the flight is

a) 1 hour b) 2 hours
c) 3 hours d) 4 hours

37. If one man or two women or three boys can do a piece of work in 55 days, then one man, one woman and one boy will do it how many days?

a) 20 days b) 30 days
c) 40 days d) 50 days

38. X completes a job in 2 days and Y completes it in 3 days and Z takes 4 days to complete it. If they work together and get Rs3900 for the job, then how much amount does Y get?

a) Rs 1800 b) Rs 1200
c) Rs 900 d) Rs 800

39. 20 workers working for 5 h per day complete a work in 10 days. if 25 workers are employed to work 10 h per day, what is the time required to complete the work?

a) 4 days b) 5 days
c) 6 days d) 8 days

40. There are two taps A and B to fill up a water tank. The tank can be filled in 40 min, if both taps are on. The same tank can be filled in 60 min, if tap A alone is on. How much time will tap B alone take, to fill up the same tank?

a) 64 min b) 80 min
c) 96 min d) 120 min

41. A stock of food is enough for 240 men for 48 days. How long will the same stock last for 160 men?

a) 54 days b) 60 days
c) 64 days d) 72 days

42. If (a + b = 3), then what is the value of ($a^3 + b^3$ + 9ab)?

a) 18 b) 27
c) 81
d) Cannot be determined

43. Which one of the following is a factor of $2x^3 - 3x^2 - 11x + 6$?

a) x + 1 b) x – 1
c) x + 2 d) x – 2

44. If x(x + y + z) = 9, y(x + y + z) = 16 and z(x + y + z) = 144, then what is x equal to?

a) 9/5 b) 9/7
c) 9 /13 d) 16/13

45. If (x – 3) is a factor of (x^2 + 4px – 11p), then what is the value of p?

a) –9 b) –3
c) –1 d) 1

46. If (x + k) is the common factor of x^2 + ax + b and x^2 + cx + d. of and then what is k equal to?

a) (d – b)/ (c – a)
b) (d – b)/ (a – c)
c) (d + b)/ (c + a)
d) (d – b)/ (c + a)

47. Let x {2, 3, 4} and y {4, 6, 9, 10}. If A be the set of all order pairs (x, y) such that x is a factor of y. Then, how many elements does the set A contain?

a) 12 b) 10
c) 7 d) 6

48. Under which one of the following conditions is the trigonometrical identify $\frac{\sin x}{(1+\cos x)} = \frac{(1-\cos x)}{\sin x}$ true?

a) x is not a multiple of 360°
b) x is not an odd multiple of 180°
c) x is not a multiple of 180°
d) None of the above

49. Which one of the following statements is true in respect of the expression sin 31° + sin 32°?

a) Its value is 0
b) Its value is 1
c) Its value is less than 1
d) Its value is greater than 1.

50. What is the expression:

$\left(\sin^4 x - \cos^4 x + 1\right) \operatorname{cosec}^2 x$ **equal to?**

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

51. 34. If clock started at noon, then what is the angle turned by hour hand at 3: 45 pm?

a) 67.5º b) 97.5º
c) 112.5º d) 142.5º

52. If $\frac{\cos x}{1+\operatorname{cosec} x} + \frac{\cos x}{\operatorname{cosec} x - 1} = 2$, then which one of the following is one of the values of x?

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

53. If $\theta = \frac{8}{15}$, then what is the value of $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}$ where, θ is a positive acute angle?

a) 1/5 b) 2/5
c) 3/5 d) 4/5

54. For what value of θ is $\left(\sin\theta + \operatorname{cosec}\theta\right) = 2.5$, where $0 < \theta < 90^0$?

a) 30^0 b) 45^0
c) 60^0 d) 90^0

55. If $0 \le \theta \le \frac{\pi}{2}$ and $\cos\theta + \sqrt{3}\sin\theta = 2$, then what is the value of θ ?

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

56. What is cot 15º cot 20º cot 70º cot 75º equal to?

a) –1 b) 0
c) 1 d) 2

57. How many degrees are there in an angle which equals two-third of its complement?

a) 36º b) 45º
c) 48º d) 60º

58. If x lies in the first quadrant and $\cos x = \frac{5}{13}$, what is the value of $\tan x - \cot x$?

a) $\frac{-139}{60}$ b) $\frac{139}{60}$
c) $\frac{119}{60}$ d) None of these

59. The angle of elevation and angle of depression both are measured with

a) the vertical only
b) the horizontal line only

c) both horizontal and vertical
d) None of the above

60. The angle of elevation of the tip of a tower from a point on the ground is 45º. Moving 21 m directly towards the base of the tower, the angle of elevation changes to 60º.
What is the height of the tower, to the nearest meter?
a) 48 m b) 49 m
c) 50 m d) 51 m

61. A chord AB of a circle of radius 20 cm makes a right angle at the centre of the circle.
What is the area of the minor segment in cm2? (take p = 3.14)
a) 31.4 cm^2 b) 57 cm^2
c) 62.8 cm^2 d) 114 cm^2

62. A rectangular area of 6 sq m is to be painted on a 3m × 4 m board leaving a border of uniform width on all sides.
What should be the width of the border?
a) 0.25 m b) 0.5 m
c) 1 m d) 3 m

63. If a lawn 30 m long and 16 m wide is surrounded by a path 2 m wide, then what is the area of the path?
a) 200 m^2 b) 280 m^2
c) 300 m^2 d) 320 m^2

64. The perimeter of a rectangle is 82 m and its area is 400 sq m.
What is the breadth of the rectangle?
a) 18 m b) 16 m
c) 14 m d) 12 m

65. A hospital room is to accommodate 56 patients. It should be done in such a way that every patient gets 2.2 m^2 of floor and 8.8 m3 of space. If the length of the room is 14 m, then breadth and the height of the room are respectively
a) 8.8 m, 4 m
b) 8.4 m, 4.2 m
c) 8 m, 4 m
d) 7.8 m, 4.2 m

66. A rectangle of maximum area of drawn inside a circle of diameter 5 cm.
What is the maximum area of such a rectangle?
a) 25 cm^2 b) 12.5 cm^2
c) 12 cm^2 d) None of these

67. An iron block is in the form of a cylinder of 1.5 m diameter and 3.5 m length. The block is to be rolled into the form of a bar, having a square section of side 5 cm.
What will be the length of the bar?
a) 2375 m b) 2475 m
c) 2575 m d) 2600 m

68. The ratio of the surface areas of two hemispheres is 4: 1.
What is the ratio of their volumes?
a) 8: 1 b) 4: 1
c) 3: 1 d) 2: 1

69. What is the total surface area of a one-side open cubical box of outer side of length 5 cm and thickness 0.5 cm?
a) 125 sq cm b) 214 sq cm
c) 180 sq cm d) None of these

70. A cylindrical can of internal diameter 24 cm contains water. A solid sphere of radius 6 cm is completely immersed in water in the cylinder.
The water level increases by
a) 0.25 cm b) 0.5 cm
c) 2 cm d) 3 cm

71. Smaller lead shots are to be prepared by using the material of a spherical lead shot of radius 1 cm. Some possibilities are listed in the statements given below :
I. The material is just sufficient to prepare 8 shots each of radius 0.5 cm.
II. A shot of radius 0.75 cm and a second shot of radius 0.8 cm can be prepared from the available material.
Which of the above statements is/are correct?
a) Only I b) Only II
c) Both I and II d) Neither I nor II

72. A solid cylinder of height 9 m has its curved surface area equal to one-third of the total surface area.
What is the radius of the base?
a) 9 m b) 18 m
c) 27 m d) 30 m

73. The surface area of a sphere is 616 sq cm. If its radius is changed so that the area gets reduced by 75%, then the radius becomes
a) 1.6 cm b) 2.3 cm
c) 2.5 cm d) 3.5 cm

74. The total surface area of a cube is 150 sq cm.
What is its volume?
a) 64 cu cm b) 81 cu cm
c) 125 cu cm d) 160 cu cm

75. The volume of a cube is numerically equal to sum of its edges.
What is the total surface area in square units?
a) 12 b) 36
c) 72 d) 144

76. From a solid wooden right circular cylinder, a right circular cone whose radius and height are same as the radius and height of the cylinder, respectively is curved out.
What is the ratio of the volume of the utilized wood to that of the wasted wood?

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

77. A tent is in the form of a right circular cylinder surmounted by a cone. The diameter of the cylinder is 24 m.
The height of the cylindrical portion is 11 m, while the vertex of the cone is 16 m above the ground. What is the area of the curved surface for conical portion?
a) 3434/9 sq m b) 3431/8 sq m
c) 3432/7 sq m d) 3234/7 sq m

78. What is the surface area of the double cone so formed?
a) 1101.2 cm^2 b) 1111.4 cm^2
c) 1310.4 cm^2 d) 1318.8 cm^2

79. Water flows through a cylindrical pipe of internal diameter 7 cm at the rate of 5 m/s. The time, in minutes, the pipe would take to fill an empty rectangular tank 4m × 3m × 2.31m is
a) 28 b) 24
c) 20 d) 12

80. Let AB and AC be two rays intersecting at A. If D, E be the points lying on AB, AC respectively and P be the point such that P divides the line DE such that PD: PE =
AD: AE. Then, what is the locus of the point P?
a) The angle bisector of angle A
b) The angle trisect or of angle A
c) The perpendicular bisector of angle A
d) None of the above

81. If the arms of one angle are respectively parallel to the arms of another angle, then the two angles are
a) neither equal nor supplementary
b) not equal but supplementary
c) equal but not supplementary
d) either equal or supplementary

82. AB, EF and CD are parallel lines. If EG = 5 cm GC = 10 cm, AB = 15 cm and DC = 18 cm, then what is the value of AC?
a) 20 cm b) 24 cm
c) 25 cm d) 28 cm

83. Consider the following statements I. If two triangles are equiangular, then they are similar.
Statement II. If two triangles have equal area, then they are similar. 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

84. Consider the following statement in respect of an equilateral triangle ABC.
I. There is a point P inside the triangle ABC such that each of its sides subtends an angle of 120º at P.
II. There is a point P inside the triangle ABC such that the DPBC is obtuse angled and A is the orthocenter of triangle PBC.
Which of the above statements is/are correct?
a) Only I
b) Only II
c) Both I and II
d) Neither I nor II

85. If triangles ABC and DEF are similar such that 2AB = DE and BC = 8 cm, then what is EF equal to?
a) 16 cm b) 12 cm
c) 10 cm d) 8 cm

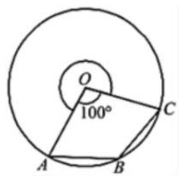
86. In a triangle ABC, AD is perpendicular of BC and BE is perpendicular to AC. Which of the following is correct?
a) CE × CB = CA × CD
b) CE × CA = CD × CB
c) AD × BD = AE × BE
d) AB × AC = AD × BE

87. The in circle of a quadrilateral of perimeter 2p has radius r. What is the area of the quadrilateral?
a) p(r + 1)
b) 2 pr
c) pr
d) None of these

88. ABCD is a trapezium with parallel sides AB = 2 cm and DC = 3 cm. E and F are the mid-points of the non parallel sides.
The ratio of area of ABFE to area of EFCD is
a) 9: 10 b) 8: 9
c) 9: 11 d) 11: 9

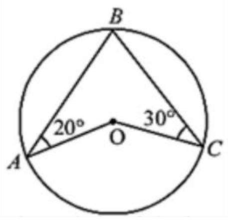
89. If each interior angle of a regular polygon is 135°, then the number of diagonals of the polygon is equal to
a) 54 b) 48
c) 20 d) 18

90.



In the figure given above, the $\angle AOC$ *is* 100^0, **where O is the centre of the circle. What is the** $\angle ABC$?
a) 100^0 b) 80^0
c) 120^0 d) 130^0

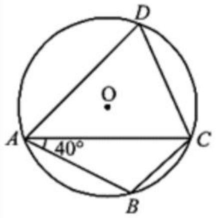
91.



In the figure given above, O is the centre of the circle. What is $\angle AOC$?

a) 160^0 b) 150^0
c) 120^0 d) 100^0

92. In the figure given above, O is the centre of a circle circumscribing a quadrilateral ABCD. If AB = BC and $\angle ADC$ equal to?



a) 50^0 b) 60^0
c) 70^0 d) 80^0

93. The diameter of two circles are 18 cm and 8 cm. The distance between their centres is 13 cm. What is the number of common tangents?

a) 1 b) 2
c) 3 d) None of these

94. Two unequal circle are touching each other externally at P, APB and CPD are two secants cutting the circles at A, B, C and D. Which one of the following is correct?

a) ACBD is parallelogram
b) ACBD is a trapezium
c) ACBD is a rhombus
d) None of the above

95. Consider a circle with centre at O and radius r. Points A and B lie on its circumference and a point M lies outside of it such that M, A and O lie on the same straight line. Then, the ratio of MA to MB is

a) equal to 1 b) equal to r
c) greater than 1 d) less than 1

96. Out of two concentric circles, the diameter of the outer circle is 26 cm and the chord MN of length 24cm is tangent to the inner circle. The radius of the inner circle is

a) 5 cm b) 6 cm
c) 8 cm d) 10 cm

97. Assume that population densities of 5 major states of India are given. Which one of the following diagrams is suitable to represent the data?

a) Single bar diagram
b) Percentage bar diagram
c) Pie diagram
d) Since population density is a ratio, it cannot be represented by any diagram

98. What is the weighted mean of first 10 natural numbers whose weights are equal to the corresponding number?

a) 7 b) 5.5
c) 5 d) 4.5

99. Consider the following statements in respect of a histogram:

I. The histogram consists of vertical rectangular bars with a common base such that there is no gap between consecutive bars.

II. The height of the rectangle is determined by the frequency of the class it represents.

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

100. The mean of 100 values is 45. If 15 is added to each of the first forty values and 5 is subtracted from each of the remaining sixty values, the new mean becomes

a) 45 b) 48
c) 51 d) 55

ANSWER KEY

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

SOLUTIONS

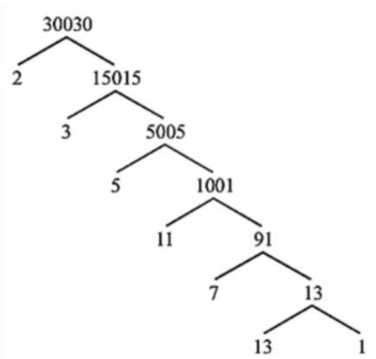
1. **For divisible by 5:**
A number is divisible by 5 , then its unit place must be 0 or 5.
For divisible by 4 :
The last two digit of a number 13 divisible by 4, then the number is divisible by 4.
Possible digit at ten's place = 0,2,4,6,8.

2. Give, $p = 2 \cdot 3 \cdot 5 .... 59 \cdot 61 = ...0$
Also, $2 \le n \le 59$
Now, we check the sequence $p + n$
Since, unit digit of *p* is zero. Therefore, for every even value of $n, (p+n)$ is always divisible.
For odd value of $= 2, 5, ...59$
Take $n = 3$
$\therefore p + n = p + 3 = (2 \cdot 3 \cdot 5 .....59 \cdot 61 + 3)$
$= 3(2 \cdot 5 .....59 \cdot 61 + 1)$
Which is divisible. Similarly, for even value of $n, p + n$ is that divisible by any number. So, there is no prime number exist in this sequence.

3. Required numbers are of the form of 12q -2
Ie.., 10,22,34,46,58,70,82,94
Total sum = 10+22+34+46+58+70+82+94 =416

4. $84705 \otimes 2$
If sum of digit of a number is divisible by 9, then it is also divisible by 9.
$\Rightarrow 84705 \otimes 2 = 8 + 4 + 7 + 0 + 5 + \otimes + 2 = 26 + \otimes$
Now, we replace $\otimes$ by 1 then it become 27 and divided by 9.

5. If k is any even positive integer, then (k^2+2k) is divisible by 8 but may not be divisible by 24.
Let k =2m, m ϵ N, then
k^2+k.2 = $4m^2$ + 4m =4m (m+1)
which is divisible by 4.

6.


So, prime factors of 30030 are 2,3,5,11,7, and 13
So, number of prime factors of 30030 is 6.

7. Quotient = divisor × dividend + remainder Ÿ 231228 = 7006 × 33 + 30... (1)
Now, when the number divides by 33 its remainder is 30. Therefore, 3 must be added to 23/28 to make it exactly divisible by 33.

8. From options,
a) $\frac{14}{(1+4)} = \frac{14}{5} = 4(\text{Re}m)$ *and*
$\frac{14}{1 \times 4} = \frac{14}{4} = 2(\text{Rem})$
Since, remainder is not same.
b) $\frac{23}{(2+3)} = \frac{23}{6} = 3(\text{Rem})$ and
$\frac{23}{2 \times 3} = \frac{23}{6} = 5(\text{Rem})$
Since, remainder is not same.
c) $\frac{32}{(3+2)} = \frac{32}{5} = 2(\text{Rem})$ *and*
$\frac{32}{(3 \times 2)} = \frac{32}{6} = 5(\text{Rem})$
Since, remainder is same
Difference of quotients = $6 - 5 = 1$
d) $\frac{41}{(4+1)} = \frac{41}{5} = 1(\text{Rem})$ and
$\frac{41}{(4 \times 1)} = \frac{41}{4} = 1(\text{Rem})$
Since, remainder is same.
But difference of quotients = $10 - 8 = 2 \ne 1$

9. We know that an + bn where n is odd numbers then it is divides by a + b. So, 195 + 215 = 19 + 21 = 40 Now, 40 is divided by both 10 and 20. So that number is also divided by 10 and 20.

10. Let the two-digits numbers less than 50 which when divided by 4 yield unity as remainder be 13, 17,..49. Here, first term, a = 13, common difference,
$d = 4$ and n = 10.
Required sum = $\frac{n}{2}\left[2a + (n-1)d\right]$
$= \frac{10}{2}\left[2 \times 13 + (10-1)4\right]$
$= \frac{10}{2}[26 + 36] = \frac{10 \times 62}{2} = 310$

11. $N = 35 \times 45 \times 55 \times 60 \times 124 \times 75$
$= \underbrace{7 \times 5} \times \underbrace{9 \times 5} \times \underbrace{11 \times 5} \times \underbrace{12 \times 5} \times 124 \times \underbrace{5 \times 5 \times 3}$
$= 5^6 \times 7 \times 9 \times 11 \times 12 \times 124 \times 3$

12. $m = 6$, The given number has maximum factor of 5 is 6.
When 4^1 is divided by 6 then remainder = 4

4^2 is divided by 6 then remainder = 4
4^3 is divided by 6 then remainder = 4
4^4 is divided by 6 then remainder = 4
……………………………………………………………
……………………………………………………………
4^{96} divided by 6 then remainder =4

13. HEF of x^2+x-12 and $2x^2-kx-9$ is $(x-k)$,
Then $x=k$ will be the factor of $2x-kx-9$
$2k^2-k^2-9=0$
$\Rightarrow k^2-9=0$
$k=\pm 3$
And factor of x^2+x-12 are $(x+4)(x-3)$.
Hence ,the value of k is 3.

14. LCM of (4, 5, 8, 9) = 360 Difference between divisor and remainder.
= 3 – 4 = 4 – 5 = 7 – 8. = 8 – 9 = – 1
Hence, Required value = 360 – 1 = 359.

15. Let two numbers by 29x and 29y. 29x + 29y = 232
Ÿ x + y = 8 Ÿ (x, y) = (1, 7), (3, 5)
Since, one such pair is 87 and 145. Hence, the other pairs is 203 and 29.

16. Given that HCF (a, b) = 1 means that a and b are coprime numbers.
So, HCF (a + b, a – b) Let a = 4, b = 3 HCF (4, 3)= 1 Now, HCF (3 + 4, 4 – 3) = HCF (7, 1) HCF is equal = 1
Let a = 23 and b = 17 HCF (23, 17) = 1 HCF (23 + 17, 23 – 17) = HCF (40, 6) = 2 So, HCF (a + b, a – b) = Either 1 or 2

17. a) 0.725
b) $0.72\bar{5}=0.7255..$
c) $0.7\overline{25}=0.7252525..$
d) $0.\overline{725}=0.725725725...$
Largest number is $0.\overline{725}$

18. $\sqrt{2},\sqrt[3]{3},\sqrt[6]{6}$ and $\sqrt[12]{12}$
LCM of 2, 3, 6 and 12 is 12
It can be written as
$\sqrt[12]{2^6},\sqrt[12]{3^4},\sqrt[12]{6^2}$ and $\sqrt[12]{12}$.
So $\sqrt[3]{3}$ is largest number.

19. $\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+.....+\frac{1}{\sqrt{15}+\sqrt{16}}$
(on rationalization)
$=\frac{1-\sqrt{2}}{1-2}+\frac{\sqrt{2}-\sqrt{3}}{2-3}+...+\frac{\sqrt{15}-\sqrt{16}}{15-16}$
$=-1\left(1-\sqrt{2}+\sqrt{2}-\sqrt{3}+....+\sqrt{15}-\sqrt{16}\right)$
$=-1(1-4)=3$

20. Here two times decrease inth population of certain city. so net rate of decrement in population
$=x+y+\frac{xy}{100}$
$=-1-10+\frac{10\times 10}{100}$
$=-19\%$
Rest of Remaining population = $(100-19)\%=81\%$

21. Let man has originally Rs. x
After 20% loss = $\frac{x\times 80}{100}=\frac{8x}{10}$
After spending 25% = $\frac{8x}{10}\times\frac{75}{100}=\frac{8x}{10}\times\frac{3}{4}$
According to the question,
$\frac{8x}{10}\times\frac{3}{4}=480$
$\Rightarrow 8x\times 3=480\times 4\times 10$
$x=\frac{480\times 4\times 10}{8\times 3}=800$

22. Let the age of son and father is x and 3x years respectively 6 years hence. ?
Present age of father = (3x– 6) years
Present age of son = (x – 6) years 3 years ago, age of father = 3x – 6 – 3 = (3x – 9) years
Age of son = x – 6 – 3 = (x – 9) years According to given condition,
3x – 9 = 9(x – 9)
3x – 9 = 9x – 81
81 – 9 = 9x – 3x
6x = 72 ?
x = 72/6= 12 ?
Present age of father = 3 × 12 – 6 = 30 years

23. Let the present age of father and the son is x years and $(75-x)$ years respectively.
5 years ago, age of father = $(x-5)$ years
And age of son = $75-x-5=(70-x)$ years
According to the question,
$(x-5)(70-x)=750$
$\Rightarrow\ 70x-x^2-350+5x=750$
$\Rightarrow\ -x^2+75x-350+5x=750$
$\Rightarrow\ x^2+55x-20x+1100=0$
$\Rightarrow\ (x-55)(x-20)=0$
$x=20,55$
Present age of father = 55 years

24. Let the number of boys = x
The number of girls = y
According to the question,
$x-y=\frac{(x+y)\times 12}{100}$

$\Rightarrow \quad 25x - 25y = 3x + 3y$

$\Rightarrow \quad 22x = 28y \Rightarrow x : y = 14 : 11$

25. Let the two numbers are $2x$ and 3x.
According to the question,

$$\frac{2x+9}{3x+9} = \frac{3}{4}$$

$\Rightarrow \quad 9x + 27 = 8x + 36$

$\Rightarrow \quad 9x - 8x = 36 - 27$

$x = 9$

So the numbers are 18 and 27.
Their product = $18 \times 27 = 486$.

26.
16 litres
10 l milk   6 l water

If 4l milk is added in mixture then

New ratio = $\frac{(10+4)}{6}$

$= \frac{14}{6} = \frac{7}{3} = 7:3$

27. Total weight of 150 students
$= 150 \times 60 = 9000\,kg$
Let total no. of boys = x
No. of girls = $150 - x$

Average weight = $\frac{x \times 70 + (150 - x)55}{150}$

$\Rightarrow \quad 60 = \frac{70x + 150 \times 55 - 55x}{150}$

$\Rightarrow \quad 60 \times 150 = 15x + 150 \times 55$

$\Rightarrow \quad 15x = 60 \times 150 - 150 \times 55$

$\therefore \quad x = \frac{750}{15} = 50$

No. of boys in the class = 50

28. Given R = 10%,P = Rs. 400 and T = $\frac{3}{2}$ *years*

Compounding is half-yearly, then,

$T = \frac{3}{2} \times 2 = 3$ years

$P = \frac{10}{2} = 5\%$

Amount, $A = P\left(1 + \frac{R}{200}\right)^T$

$A = 400\left(1 + \frac{5}{100}\right)^3$

$= 400 \times \frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} = Rs.462.04$

29. using the formula, SI = $\frac{P \times R \times T}{100}$

$\Rightarrow \quad 2P = \frac{P \times R \times 5}{100}$

$\Rightarrow \quad R = 40\%$

Let required time be t_1 years and rate of interest is same.

$5P = \frac{P \times R \times T_1}{100}$

$\Rightarrow \quad T_1 = \frac{500}{R} = \frac{500}{40} = 12.5$ years

30. Two successive discounts

$= 36 + 4 - \frac{36 \times 4}{100} = 38.56\%$

Difference between discounts
$= 40\% - 38.56\% = 1.44\%$
Required difference = $1000 \times 1.44\%$

$= \frac{10000 \times 1.44}{100} = Rs.144$

31. cost of 1 orange of 1st variety = Rs. $\frac{1}{3}$

Cost of 1o range of 2nd variety = $Rs.\frac{1}{2}$

Cost of 1 orange after mixing = $\frac{5}{12}$

Profit of 20% = $\frac{5}{12} \times \frac{120}{100} = \frac{1}{2}$

Selling price of 1 orange = Rs. $\frac{1}{2}$

Then, SP of 12 oranges = $\frac{1}{2} \times 12 = Rs.6$

32. Let each lot of onion contains x kg onion, then total cost price of these two lots together
$= 10x + 15x = 25x$
Selling price of whole lot = $15 \times (x + x)$
$= 15 \times 2x = 30x$

Profit percentage = $\frac{30x - 25x}{25x} \times 100$

$= \frac{5x}{25x} \times 100 = 20\%$

33. Train and man running opposite to each other.
Relative speed = $60 + 6 = 66\,km/h$

$= \frac{66 \times 5}{18}\,m/s$

Required time = $\frac{\text{Distance}}{Speed}$

$= \frac{110}{\frac{66 \times 5}{18}} = \frac{110 \times 18}{66 \times 5} = 6x$

34. Let speed of motorboat be B km/h.
Speed of water = D km/k.
According to question

$$B+D=\frac{9}{2}=4.5 \qquad (i)$$

$$B-D=\frac{9}{6}=\frac{3}{2}=1.5 \qquad (ii)$$

Now, on solving eqs. (i) and (ii), we get

B = 3 km/h and D = 1.5 km/h

speed of boat = 3km/h.

35. Let speed of the flow of water be v km/h and rate of sailing of sailer be $u\,km/h$.

Then, $u+v=\frac{48}{8} \Rightarrow u+v=6 \quad ...(i)$

And $u-v=\frac{48}{12} \Rightarrow u-v=4 \quad ...(ii)$

On solving eqs. (i) and (ii), we get v = 1 km/hr

36. let average speed of flight = v

Time taken by flight (t) = $\frac{600}{v} \quad ...(i)$

Now, flight speed is reduced by

$$200km/hr = \frac{600}{v-200}=t+\frac{30}{60} \quad ...(ii)$$

Now, put value of t in equ (ii)

$$\Rightarrow \frac{600}{\frac{600}{t}-200}=t+\frac{1}{2}$$

$$\Rightarrow \frac{600t}{600-200t}=t+\frac{1}{2}$$

$$\Rightarrow 600t-200t^2+300-100t=600t$$

$$\Rightarrow 2t^2+t-3=0$$

$$t=\frac{-1\pm\sqrt{1+24}}{2\times 2}$$

$$=\frac{-1\pm 5}{4},\frac{-6}{4},\frac{4}{4}$$

$t=1$ hour

Duration of flight = 1 hour

37. (b) 1 man = 2 women = 3 boys

$\therefore$ 1 man + 1 woman + 1 boy = 3 boys + $\frac{3}{2}$boys + 1 boy

$\therefore$

Boys	Days
3	5
$\frac{11}{2}$ ↑	x ↓

$M_1D_1 = M_2D_2$

$\Rightarrow \quad 3\times 55=\frac{11}{2}\times D_2$

$D_2=\frac{3\times 55\times 2}{11}$ = 30 days

38. Ratio of work done by X, Y and Z = $\frac{1}{2}:\frac{1}{3}:\frac{1}{4}$

= 6 : 4 : 3

Ratio in their amount = 6 : 4 : 3

Part of Y = $\frac{4}{6+4+3}\times 3900 = Rs.1200$

39. $M_1D_1T_1 = M_2D_2T_2$

Here $M_1 = 20_1$, $D_1 = 10_1 T_1 = 5h$, $M_2 = 25$, D = ?, $T_2 = 10$ h

$\Rightarrow 20\times 10\times 5 = 25\times D_2\times 10$

$\therefore D_2 = \frac{20\times 10\times 5}{25\times 10}$ = 4 days

40. = $\frac{1}{40}-\frac{1}{60}-\frac{3-2}{120}=\frac{1}{120}$

Total time taken by the tap B to fill the tank is 120 min.

41. Required days = $\frac{240\times 48}{760}=72\,days$

42. Given, a + b = 3 ? $(a + b)^3 = 33$

$a^3 + +b^3 + 3ab(a + b) = 27$

$a^3 + b^3 + 9ab = 27$

43. Let $f(x) = 2x^3 - 3x^2 - 11x + 6$

Put $x = -2$, we get

$f(-2) = 2(-2)^3 - 3(-2)^2 - 11(-2) + 6$

$= -16 - 12 + 22 + 6 = 0$

Hence, $(x + 2)$ is a factor of $f(x)$.

44. Given, $x(x+y+z)=9 \quad ....(i)$

$y(x+y+z)=16 \quad ..(ii)$

And $z(x+y+z)=144 \quad ...(iii)$

On adding (i), (ii) and (iii), we get

$(x+y+z)(x+y+z)=9+16+144$

$\Rightarrow (x+y+z)^2=13 \qquad [x(x+y+z)=9]$

$\Rightarrow x(13)=9 \Rightarrow x=\frac{9}{13}$

45. Let $f(x)=x^2+4px-11p$

Since, $(x-3)$ is a factor of f (x).

$f(3)=0$

$(3)^2+4p(3)-11p=0$

$p=-9$

46. Given, $(x + k)$ is the common factor of $x^2 + ax + b$ and $x^2 + cx + d$.

$k^2 - ka + b = 0$ ...(i) $\qquad k^2 - kc + d = 0$ ...(ii)

Now, from equation (i) and equation (ii)

$k^2 - ka + b = k^2 - kc + d$

$k(c - a) = d - b$

$$k=\frac{d-b}{c-a}$$

47. Given that

$x\in\{2,3,4\}$

And

$y\in\{4,6,9,10\}$

$A=x\times y$

But, A is set of pairs in which 1st number is factor of second number.

$A=\{2,3,4\}\times\{4,6,9,10\}$

$=\{(2,4);(2,6);(2,10);(3,6);(3,9);(4,4)\}$

48. Given that

$x \in \{2, 3, 4\}$

and

$y \in \{4, 6, 9, 10\}$

$A = x \times y$

But, A is set of pairs in which 1st number is factor of second number.

$A = \{2, 3, 4\} \times \{4, 6, 9, 10\}$

$= \{(2, 4); (2, 6); (2, 10); (3, 6); (3, 9); (4, 4)\}$

49. We know:

$\sin 30^\circ = \frac{1}{2}$

Value of sin increases 0° to 90°

$\sin 31^\circ > \sin 30^\circ$ and $\sin 32^\circ > \sin 30^\circ$

$\sin 31^0 > \frac{1}{2}$ and $\sin 32^0 > \frac{1}{2}+\frac{1}{2}$

On adding both sides, we get

$\sin 30^0+\sin 32^0$

$\frac{1}{2}+\frac{1}{2} \Rightarrow \sin 31^0+\sin 32^0>1$

50. $\left(\sin^4 x-\cos^4 x+1\right)\operatorname{cosec}^2 x$

$\left\{\left(\sin^2 x-\cos^2 x\right)\left(\sin^2 x+\cos^2 x\right)+1\right\}\operatorname{cosec}^2 x$

$\left[\left(\because a^2-b^2\right)=(a+b)(a-b)\right]$

$=\left(\sin^2 x-\cos^2 x+1\right)\operatorname{cosec}^2 x$

$=\left(\sin^2 x+\sin^2 x\right)\operatorname{cosec}^2 x$

$\left(\because 1-\cos^2 x=\sin^2 x\right)$

$=2\sin^2 x.\frac{1}{\sin^2 x}=2$

51. Given time =

$3:45 \text{ pm } = \left(3+\frac{45}{60}\right)\text{h}$

$=\left(3+\frac{3}{4}\right)\text{h}=\frac{15}{4}\text{h}$

We know that

The hour hand revolve 360° in 12 hour.

So, 12h hour hand made 360°

$\therefore$ 1h hour hand made $\frac{360^\circ}{12}$

$\frac{15}{4}h$ hour hand made $=\frac{360}{12}\times\frac{15}{4}$

$=\frac{450^0}{4}=112.5^0$

52. Given, $\frac{\cos x}{1+\operatorname{cosec} x}+\frac{\cos x}{\operatorname{cosec} x-1}=2$

$\Rightarrow \frac{2\cos x \operatorname{cosec} x}{\operatorname{cosec}^2 x-1}=2$

$\Rightarrow \frac{\cos x \operatorname{cosec} x}{\cot^2 x}=1$

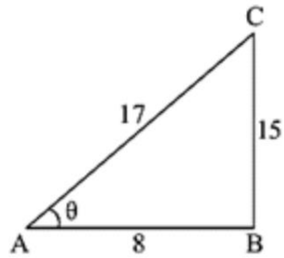
$\Rightarrow \tan x = 1$

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

53. $\cot\theta=\frac{8}{15}$

$AC=\sqrt{8^2+15^2}$

$=\sqrt{64+225}=17$



$\cos\theta=\frac{8}{17}$ $\quad\left(\angle B=90^0\right)$

$\sqrt{\frac{1-\cos\theta}{1+\cos\theta}}=\sqrt{\frac{1-\frac{8}{17}}{1+\frac{8}{17}}}=\sqrt{\frac{9}{25}}=\frac{3}{5}$

54. Here, $(\sin\theta+\operatorname{cosec}\theta)=2.5$

$\left(\sin\theta+\frac{1}{\sin\theta}\right)=\frac{5}{2}$

$2\sin^2\theta-5\sin\theta+2=0$

$2\sin^2\theta-4\sin\theta-\sin\theta+2=0$

$2\sin\theta(\sin\theta-2)-1(\sin\theta-2)=0$

$(2\sin\theta-1)(\sin\theta-2)=0$

$\sin\theta=\frac{1}{2}$ $\quad(\sin\theta\neq 2)$

$\theta=20^0$

55. Given that, $\cos\theta+\sqrt{3}\sin\theta=2$

$\frac{1}{2}\cos\theta+\frac{\sqrt{3}}{2}\sin\theta=1$

$\sin 30^0\cos\theta+\cos 30^0\sin\theta=1$

$\sin\left(30^0+\theta\right)=\sin 90^0$

$30^0+\theta=90^0$

$\theta=60^0$

56. $\cot 15^0\cot 20^0\cot 70^0\cot 75^0$

$$= \tan\left(90^0 - 15^0\right)\tan\left(90^0 - 20^0\right)\cot 70^0 \cot 75^0$$

$$= \tan 75^0 \tan 70^0 \frac{1}{\tan 70^0} \cdot \frac{1}{\tan 75^0} = 1$$

57. Given that, $\alpha + \beta = 90°$ ... (i)

According to question,

$$\beta = \frac{2}{3}\alpha$$

$$\beta = \frac{2}{3}\alpha = \frac{2}{3}(90° - \beta) \qquad \text{[from equation (i)]}$$

$$\beta = 60° - \frac{2}{3}\beta \Rightarrow \beta = 36°$$

58. Given that, $\cos x = \frac{5}{13} = \frac{\text{Base}}{\text{Hypotenuse}}$

$$P = \sqrt{h^2 - b^2} = \sqrt{13^2 - 5^2}$$

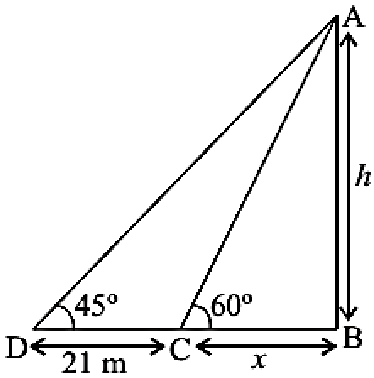
$$= \sqrt{169 - 25} = \sqrt{144} = 12$$

$$\tan x - \cot x = \frac{p}{b} - \frac{b}{p}$$

$$= \frac{12}{5} - \frac{5}{12} = \frac{144 - 25}{60} = \frac{199}{60}$$

59. The angle of elevation and angle of depression are measured with the horizontal line only.

60. Let the height of the tower be h



In ΔABC,

$$\tan C = \frac{AB}{BC}$$

$$\tan 60^0 = \frac{h}{x}$$

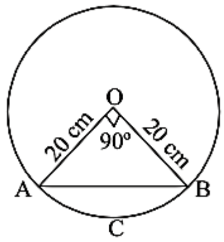
$$\Rightarrow \sqrt{3} = \frac{h}{x}$$

$$\Rightarrow x = \frac{h}{\sqrt{3}}$$

In ΔABD,

$$\tan 45^0 = \frac{h}{21 + x} = 1$$

61. Area of $\Delta AOB = \frac{1}{2} \times OA \times OB$



$$= \frac{1}{2} \times 20 \times 20 = 200 \text{ cm}^2$$

and area of sector OACBO

$$= \frac{\pi r^2 \theta}{360°} = \frac{3.14 \times 20 \times 20 \times 90°}{360°}$$

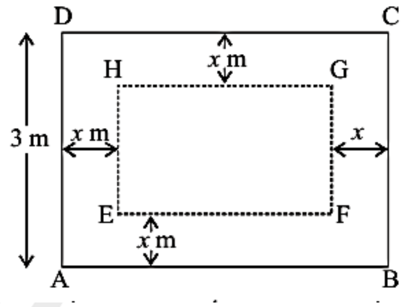
$$= \frac{3.14 \times 400}{4} = 314 \text{ cm}^2$$

$\therefore$ Area of minor segment

= Area of sector OACBO – Area of ΔAOB

$= 314 - 200 = 114 \text{ cm}^2$

62. Vidth of the border = x m



Given, area of EFGH = $6m^2$

$$\Rightarrow (4 - 2x)(3 - 2x) = 6$$

$$\Rightarrow 12 - 8x - 6x + 4x^2 = 6$$

$$\Rightarrow 4x^2 - 14x + 12 = 6$$

$$\Rightarrow 2x^2 - 7x + +3 = 0$$

$$\Rightarrow 2x^2 - 6x - x + 3 = 0$$

$$\Rightarrow 2x(x - 3) - 1(x - 3) = 0$$

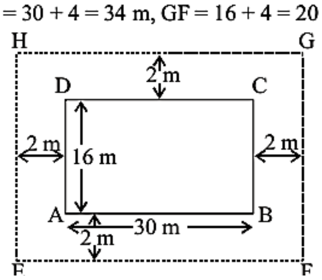
$$\Rightarrow (x - 3)(2x - 1) = 0$$

$$\therefore x = 3, \frac{1}{2}$$

$$\therefore x = \frac{1}{2} = 0.5m \qquad (x \neq 3)$$

63. $\therefore$ Required area of the path,

EF = 30 + 4 = 34 m, GF = 16 + 4 = 20 m



Area of path = Area of EFGH – Area of ABCD

$= 34 \times 20 - 30 \times 16 = 680 - 480 = 200 m^2$

64. Perimeter of a rectangle = 82 m

$\therefore$ 2(Length + Breadth) = 82 m

$\Rightarrow$ Length + Breadth = 41 m

$\Rightarrow$ $l + b = 41$ m

Also, its area = 400 m^2

$\Rightarrow$ $l \cdot b = 400$

Now, $(l - b)^2 = (l + b)^2 - 4lb$

$= (41)^2 - 4(400)$

$= 1681 - 1600 = 81$

$\therefore$ $l - b = 9$

From Eqs. (*i*) and (*iii*)

$2l = 50 \Rightarrow l = 25$ m and $b = 16$ m

$\therefore$ Required breadth (b) = 16 m

65. Let the breadth and height of room be b and h m, respectively.

Then, according to the question,

$\Rightarrow l \times b = n \times$ Area occupied by one patient

$\Rightarrow 14 \times b = 56 \times 22$

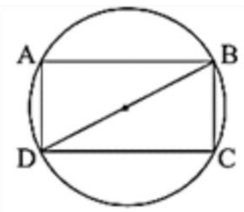
$\Rightarrow b = \frac{56 \times 2.2}{14} = 8.8m$

Now, total volume of the room is equal to total patients multiplied by volume occupied by each patient.

Then, $14 \times 8.8 \times h = 8.8 \times 56$

$h = \frac{8.8 \times 56}{14 \times 8.8} = 4m$

66. ABCD be the rectangle inscribed in the circle of diameter 5 cm.



Diameter = Diagonal of rectangle

Now, let x and y be the lengths and breadths of rectangle, respectively.

67. According to question,

Volume of cylinder = Volume of bar

$\Rightarrow$ $\pi r^2 h$ = base area of block × length

$\Rightarrow \frac{22}{7} \times \left(\frac{1.5}{2}\right)^2 \times 3.5 = \frac{5}{100} \times \frac{5}{100} \times L$

$\Rightarrow \frac{22}{7} \times \frac{2.25}{4} \times 3.5 \times \frac{100}{5} \times \frac{100}{5} = L$

L = 2475m

68. According to question

$\frac{4\pi r_1^2}{4\pi r_2^2} = \frac{4}{1} \Rightarrow \frac{r_1}{r_2} = \frac{2}{1}$

Required ratio = $\frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{8}{1}$ or 8 : 1

69. Since, the outer edges of a cubical box is 5 cm.

Surface area of outer cubical box = $5(edge)^2$

$= 5(5)^2 = 125 sq\,cm$

Surface area of the inner cubical box

$= 4(4.5 \times 4) + 4 \times 4$

$= 72 + 16 = 88 sq\,cm$

Total surface area =

$125 + 88 + (15 \times 0.5) = 222 sq\,cm$

70. Let water level increase by $x cm$.

Volume of cylindrical can = $\pi(12)^2 \times x = 144\pi x$

Volume of sphere = $\frac{4}{3}\pi(6)^3 = 288\pi\, cu\,cm$

According to question

$144\pi x = 288\pi$

$x = 2cm$

71. Volume of spherical lead shot

$= \frac{4}{3}\pi(1)^3$

$= \frac{4}{3}\pi\, cu\,cm$

I. Volume of shots = $\frac{4}{3}\pi(0.5)^3 \times 8 = \frac{4}{3}\pi\, cu\,cm$

II. Volume of both shots = $\frac{4}{3}\pi(0.75)^3 + \frac{4}{3}\pi(0.8)^2$

$= \frac{4}{3}\pi\left[\left(\frac{3}{4}\right)^3 + \left(\frac{4}{5}\right)^3\right] = \frac{4}{3}\pi\left[\frac{37}{64} + \frac{64}{125}\right]$

$= \frac{4}{3}\pi\left[\frac{3375 + 4096}{8000}\right] = \frac{4}{3}\pi\left(\frac{7471}{8000}\right)$

$= \frac{4}{3}\pi(0.93)$ cu cm

Let radius and height of cylinder be r and h respectively.

72. According to question

$2\pi r \times h = \frac{2\pi r}{3}(h + r)$

$\Rightarrow$ $9 = \frac{1}{3}(9 + r)$

$\Rightarrow$ $27 = 9 + r$

$\therefore$ $r = 18$ m

73. According to question,
Surface area of sphere = 25% of 616

$4\pi r^2 = 154$

$\Rightarrow r^2 = \dfrac{154}{\frac{22}{7}\times 4} = \left(\dfrac{7}{2}\right)^2 \Rightarrow r = 3.5cm$

74. Total surface area of cube = 6 × (Side)²

$\therefore \quad 150 = 6 \times (\text{Side})^2$

$\Rightarrow \quad \text{Side}^2 = \dfrac{150}{6} = 25$

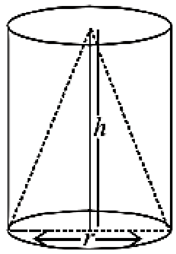
$\therefore \quad \text{Side} = \sqrt{25} = 5 \text{ cm}$

$\therefore \quad$ Volume of cube = $(\text{Side})^3$

$= 5 \times 5 \times 5 = 125 \text{ cm}^3$

75. Let the edge of a square x. Then its volume = x^3 and
Sum of its edges = 12x
According to question
$x^3 = 12x \Rightarrow x(x^2 - 12) = 0$
$x^2 = 12$ (as x can not be 0)
Total surface area = $6x^2 = 6(12) = 72$ sq units

76. Let height and radius of cylinder is h and r resectively.
Volume of cylinder = $\pi r^2 h$



Volume of circular cone = $\dfrac{1}{3}\pi r^2 h$

Required ratio = $\dfrac{\text{Volume of utilised wood}}{\text{Volume of wasted wood}}$

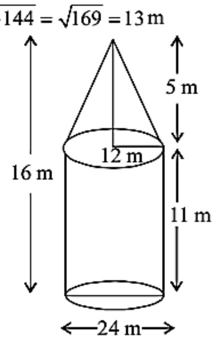
$\left(\text{Volume of right circular cylinder}\right.$

$= \dfrac{-\text{ Volume of right circular cone}}{\text{Volume of right circular cone}}$

$= \dfrac{\pi r^2 h - \frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi r^2 h} \Rightarrow \dfrac{\frac{2}{3}\pi r^2 h}{\frac{1}{3}\pi r^2 h} = \dfrac{3}{1} = 2:1$

77. Slant height of the cone = $\sqrt{5^2 + 12^2}$

$= \sqrt{25 + 144} = \sqrt{169} = 13 \text{ m}$



78. Surface area of cone ABD = $\pi r l$

$= \pi \times 12 \times 15 = 180\pi \, cm^2$

79. Area of cross-section of cylindrical pipe

$= \pi \times \left(\dfrac{7}{2}\right)^2 = \dfrac{49\pi}{4} \text{cm}^2$

Volume of water flow per minute

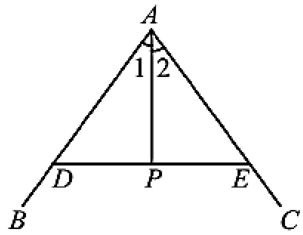
$= \dfrac{49\pi}{4} \times 5 \times 100 \times 60 \text{ cm}^3$

Volume of the tank $= 3 \times 4 \times 231 \times 10000 \text{ cm}^3$

Now, time taken to fill up tank

$= \dfrac{3 \times 4 \times 231 \times 10000}{\frac{49}{4} \times \frac{22}{7} \times 5 \times 100 \times 60} = 24 \text{ min.}$

80. Since, $\dfrac{PD}{PE} = \dfrac{AD}{AE} = \dfrac{AP}{AP}$

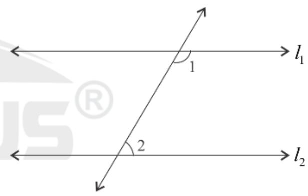


ΔDAP and ΔAPE are similar. So, $\angle 1 = \angle 2$

AP is bisector of $\angle A$.

Hence, the locus of P is the bisector of angle A.

81. l_1 and l_2 are two parallel liens and $\angle 1$ and $\angle 2$ are interior angles on the same side of the transversal.

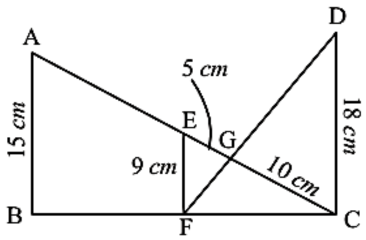


$\angle 1 \neq \angle 2$

$\angle 1 + \angle 2 = 180^0.$

Therefore, these are supplementary angles or consecutive interior angles.

82. $\because AB \parallel EF \parallel CD$



In $\Delta\, EFG$ and $\Delta\, CDG$, Here triangle EFG and $\Delta\, CDG$ similar

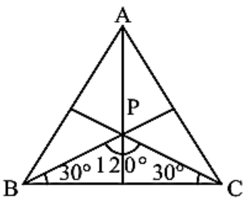
Also, ΔABC and ΔEFC, are similar In ΔABC and Δ EFC.

$$\frac{EC}{AC}=\frac{EF}{AB}\Rightarrow\frac{15}{AC}=\frac{9}{15}$$

$$AC=\frac{15\times15}{9}=25cm$$

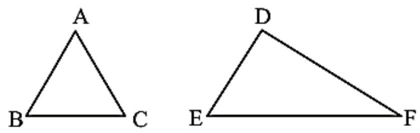
83. We know that, if two triangles are equiangular, then they are similar (refer similarity conditions). Statement II is not true.

84. **Statement–I**



In equilateral triangle ABC, P is in incentre and $AP = BP = CP$ and each side of an equilateral triangle make 120° angle at P.

85.



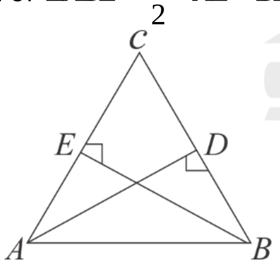
Given that $\Delta ABC\sim\Delta DEF$

$$\frac{AB}{DE}=\frac{BC}{EF}\Rightarrow\frac{1}{2}=\frac{8}{EF}$$

$EF=16cm$

86. Area of $\Delta ABD=\frac{1}{2}\times BD\times AD$ ..(i)

Area of $\Delta ABE=\frac{1}{2}\times AE\times BE$ ..(ii)

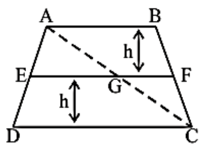


Now comparing both equations (i) and (ii)

$$\frac{1}{2}\times BD\times AD=\frac{1}{2}\times AE\times BE\Rightarrow BD\times AD=AE\times BE$$

87. We know that, if r be the radius of incircle and 2p be the perimeter of a quadrilateral, then Area of quadrilateral pr

88. Join AC.
In ΔACD, $EG \| DC$ and E and G are mid-points of AD and AC, respectively.



$$EG=\frac{1}{2}DC=\frac{3}{2}$$

Similarly, in ΔABC

$$GF=\frac{1}{2}AB=1$$

$$EF=EG+GF=1+\frac{3}{2}=\frac{5}{2}$$

Area of trapezium =

$$\frac{1}{2}(\text{Sum of parallel side }\times\text{ Height})$$

Now, the ratio = $\frac{\text{Area of ABEF}}{\text{Area of EFCD}}$

$$=\frac{\frac{1}{2}\left(2+\frac{5}{2}\right)\times h}{\frac{1}{2}\left(3+\frac{5}{2}\right)\times h}=\frac{9}{11}$$

89. (c) Sum of angle of regular polygon $=\frac{(n-2)180°}{n}$

$\Rightarrow$ $135\,n = 180n - 360$

$\Rightarrow$ $45\,n = 360$

$$n=\frac{360}{45}=8$$

Number of diagonals = ${}^8C_2-8$

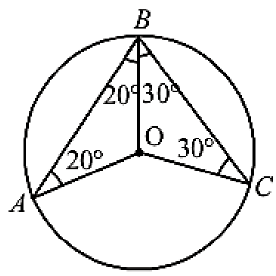
$$=\frac{8\times7}{2}-8=20$$

90. Reflex $\angle AOC=360^0-100^0=260^0$

$$\angle ABC=\frac{1}{2}\text{ Reflex}$$

$$\angle\text{ABC}=\frac{1}{2}\times260^0=130^0$$

91.



Join OB

OA = OB = OC

Then, $\angle OAB=\angle OBA=20^0$

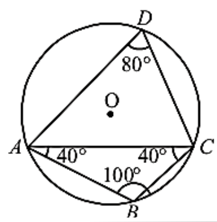
$\angle OCB=\angle OBC=30^0$

$\angle ABC=50^0$

We know that $\angle ABC=\frac{1}{2}\angle AOC$

$$\angle AOC=2\angle ABC=2\times50^0=100^0$$

92. Since, $AB = CB$



$\therefore \quad \angle CAB = \angle ACB = 40^0$

$\angle ABC = 180^0 - 2(40^0) = 100^0$

We know that, in cyclic quadrilateral, the sum of opposite angles are equal.

$\therefore \quad \angle B + \angle D = 180^0$

$\Rightarrow \quad \angle D = 180^0 - 100^0 = 80^0$

93. Here, $r_1 = 9cm$ and $r_2 = 4cm$

$r_1 + r_2 = 9 + 4 = 13cm$

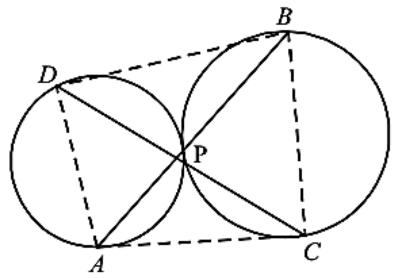
$and\ r_1 - r_2 = 9 - 4 = 5cm$

Also, d = 13 cm

Here, d = $r_1 + r_2$

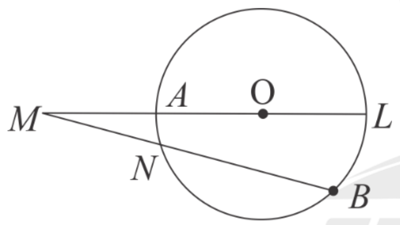
Hence, two circles touch each other externally, so three total no of common tangents are three.

94.



is clear from the figure that $ACBD$ is a quadrilateral.

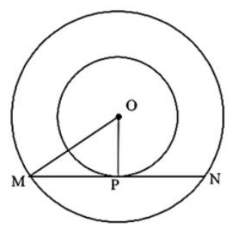
95. Since, secants $\angle A$ and BN are intersecting at an exterior point M, then



$LM \times AM = BM \times NM$

$\frac{MA}{MB} = \frac{MN}{LM} < 1$

96.



MN = 24 cm, MP = 12 cm

Radius of outer circle = $\frac{26}{2} = 13cm$

$OP = \sqrt{(OM)^2 - (MP)^2}$

$= \sqrt{164 - 144} = \sqrt{25} = 5cm$

97. To determine the population of 5 major states of India, the best suitable data is pie diagram.

98. Weighted mean

$= \left(\frac{w_1x_1 + w_2x_2 + ... + w_{10}x_{10}}{w_1 + w_2 + ... + w_{10}} \right)$

$\bar{x}_n = \frac{1.1 + 2.2 + ... + 10.10}{1 + 2 + 3 + .. + 10} = \frac{1^2 + 2^2 + ... + 10^2}{1 + 2 + .. + 10}$

By using the formula,

$\sum n^2 = \frac{n(n+1)(2n+1)}{6}$ and $\sum n = \frac{n(n+1)}{2}$

$= \frac{\frac{10(10+1)(20+1)}{6}}{10\left(\frac{10+1}{2}\right)} = \frac{10 \times 11 \times 21}{6 \times 55} = 7$

99. **Statement I:** A graph which displays the data by using vertical bars of various heights in rectangular shapes to represent frequencies. Such that there is no gap between consecutive bars and also the height of the rectangle.

Statement II: The height of the rectangle is determined by the frequency of the class it represents. So, both the statements are correct.

100. Given that, mean of 100 values is 45

Sum of 100 values, i.e. $\sum_{i=1}^{100} x = 45 \times 100 = 4500$

According to condition,

$\sum_{i=1}^{40}(x_i + 15) + \sum_{i=41}^{100}(x_i - 5)$

$= \sum_{i=1}^{40} x_i + 15 \times 40 + \sum_{i=41}^{100} x_i - 5 \times 60$

$= \left(\sum_{i=1}^{40} x_i + \sum_{i=41}^{100} x_i \right) + 600 - 300 = \sum_{i=1}^{100} x_i + 300$

$= 4500 + 300 = 4800 \quad [\text{from equation}(i)]$

New mean = $\frac{4800}{100} = 48$

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