SET 23

SOLVED PAPER

SSC GRADUATE LEVEL TIER-II EXAM

Held on : 21.09.2014

PAPER-I : QUANTITATIVE ABILITIES

1. The compound interest on a certain sum of money for 2 years at 5% is ₹ 328, then the sum is

(1) ₹ 3000 (2) ₹ 3600
(3) ₹ 3200 (4) ₹ 3400

2. The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be $\frac{1}{27}$ th of the volume of the given cone, at what height above the base is the section made ?

(1) 19 cm (2) 20 cm
(3) 12 cm (4) 15 cm

3. ABCD is a trapezium with AD and BC parallel sides. E is a point on BC. The ratio of the area of ABCD to that of AED is

(1) $\frac{\overline{AD}}{\overline{BC}}$ (2) $\frac{\overline{BE}}{\overline{EC}}$

(3) $\frac{\overline{AD}+\overline{BE}}{\overline{AD}+\overline{CE}}$ (4) $\frac{\overline{AD}+\overline{BC}}{\overline{AD}}$

4. If the surface area of a sphere is 346.5 cm², then its radius $\left[\text{taking } \pi = \frac{22}{7}\right]$ is

(1) 7 cm (2) 3.25 cm
(3) 5.25 cm (4) 9 cm

5. An interior angle of a regular polygon is 5 times its exterior angle. Then the number of sides of the polygon is

(1) 14 (2) 16
(3) 12 (4) 18

6. The height of the right pyramid whose area of the base is 30 m² and volume is 500 m³, is

(1) 50 m (2) 60 m
(3) 40 m (4) 20 m

7. The base of a prism is a right angled triangle with two sides 5 cm and 12 cm. The height of the prism is 10 cm. The total surface area of the prism is

(1) 360 sq cm (2) 300 sq cm
(3) 330 sq cm (4) 325 sq cm

8. In an equilateral triangle of side 24 cm, a circle is inscribed touching its sides. The area of the remaining portion of the triangle is $\left(\sqrt{3} = 1.732\right)$

(1) 98.55 sq cm (2) 100 sq cm
(3) 101 sq cm (4) 95 sq cm

9. The base of a right prism is an equilateral triangle. If the lateral surface area and volume is 120 cm², $40\sqrt{3}$ cm³ respectively then the side of base of the prism is

(1) 4 cm (2) 5 cm
(3) 7 cm (4) 40 cm

10. Perimeter of a rhombus is 2p unit and sum of length of diagonals is m unit, then area of the rhombus is

(1) $\frac{1}{4}m^2p$ sq unit

(2) $\frac{1}{4}mp^2$ sq unit

(3) $\frac{1}{4}(m^2-p^2)$ sq unit

(4) $\frac{1}{4}(p^2-m^2)$ sq unit

11. A ball of lead 4 cm in diameter is covered with gold. If the volume of the gold and lead are equal, then the thickness of gold [given $\sqrt[3]{2} = 1.259$] is approximately

(1) 5.038 cm (2) 5.190 cm
(3) 1.038 cm (4) 0.518 cm

12. A large solid sphere is melted and moulded to form identical right circular cones with base radius and height same as the radius of the sphere. One of these cones is melted and moulded to form a smaller solid sphere. Then the ratio of the surface area of the smaller to the surface area of the larger sphere is

(1) $1 : 3^{\frac{4}{3}}$ (2) $1 : 2^{\frac{3}{2}}$

(3) $1 : 3^{\frac{2}{3}}$ (4) $1 : 2^{\frac{4}{3}}$

13. Two sides of a plot measuring 32 m and 24 m and the angle between them is a perfect right angle. The other two sides measure 25 m each and the other three angles are not right angles. The area of the plot in m² is

(1) 768 (2) 534
(3) 696.5 (4) 684

14. a and b are two sides adjacent to the right angle of a right-angled triangle and p is the perpendicular drawn to the hypotenuse from the opposite vertex. Then p² is equal to

(1) $a^2 + b^2$ (2) $\frac{1}{a^2}+\frac{1}{b^2}$

(3) $\frac{a^2b^2}{a^2+b^2}$ (4) $a^2 - b^2$

15. A conical cup is filled with ice-cream. The ice-cream forms a hemispherical shape on its open top. The height of the hemispherical part is 7 cm. The radius of the hemispherical part equals the height of the cone. Then the volume of the ice-cream is $\left[\pi = \frac{22}{7}\right]$

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(1) 1078 cubic cm
(2) 1708 cubic cm
(3) 7108 cubic cm
(4) 7180 cubic cm

16. A is the centre of circle whose radius is 8 and B is the centre of a circle whose diameter is 8. If these two circles touch externally, then the area of the circle with diameter AB is
(1) 36π (2) 64π
(3) 144π (4) 256π

17. If $a^2 + b^2 + c^2 = ab + bc + ac$ then the value of $\frac{a+C}{b}$ is
(1) 0 (2) 2
(3) 1 (4) –1

18. If $ab + bc + ca = 0$ then the value of $\left(\frac{1}{a^2-bc}+\frac{1}{b^2-ca}+\frac{1}{c^2-ab}\right)$ is
(1) 0 (2) 1
(3) 3 (4) $a + b + c$

19. If $\left(2+\sqrt{3}\right)a = \left(2-\sqrt{3}\right)b = 1$ then the value of $\frac{1}{a}+\frac{1}{b}$ is
(1) 1 (2) 2
(3) $2\sqrt{3}$ (4) 4

20. If $3x+\frac{3}{x}=1$ then $x^3+\frac{1}{x^3}+1$ is
(1) 0 (2) $\frac{1}{27}$
(3) $\frac{5}{27}$ (4) $\frac{28}{27}$

21. The factors of $(a^2 + 4b^2 + 4b - 4ab - 2a - 8)$ are
(1) $(a - 2b - 4)(a - 2b + 2)$
(2) $(a - b + 2)(a - 4b - 4)$
(3) $(a + 2b - 4)(a + 2b + 2)$
(4) $(a + 2b - 1)(a - 2b + 1)$

22. Area of the triangle formed by the graph of the straight lines $x - y = 0$, $x + y = 2$ and the x-axis is
(1) 1 sq unit (2) 2 sq units
(3) 4 sq units
(4) None of these

23. The value of
$$\frac{1}{a^2+ax+x^2}-\frac{1}{a^2-ax+x^2}+\frac{2ax}{a^4+a^2x^2+x^4}$$ is
(1) 2 (2) 1
(3) –1 (4) 0

24. If $4x + 5y = 83$ and $3x : 2y = 21 : 22$, then $(y - x)$ equals
(1) 3 (2) 4
(3) 7 (4) 11

25. If $x = 11$, then the value of $x^5 - 12x^4 + 12x^3 - 12x^2 + 12x - 1$ is
(1) 5 (2) 10
(3) 15 (4) 20

26. If p = 99, then the value of $p(p^2 + 3p + 3)$ is
(1) 10000000 (2) 999000
(3) 999999 (4) 990000

27. Two chords of lengths a metre and b metre subtend angles 60° and 90° at the centre of the circle respectively. Which of the following is true ?
(1) $b = \sqrt{2}a$ (2) $a = \sqrt{2}b$
(3) $a = 2b$ (4) $b = 2a$

28. In a triangle ABC,
$\angle A + \frac{1}{2}\angle B + \angle C = 140°$, then $\angle B$ is
(1) 50° (2) 80°
(3) 40° (4) 60°

29. The radius of a circle is 6 cm. The distance of a point lying outside the circle from the centre is 10 cm. The length of the tangent drawn from the outside point to the circle is
(1) 5 cm (2) 6 cm
(3) 7 cm (4) 8 cm

30. If ABCD be a cyclic quadrilateral in which $\angle A = 4x°$, $\angle B = 7x°$, $\angle C = 5y°$, $\angle D = y°$, then $x : y$ is
(1) 3 : 4 (2) 4 : 3
(3) 5 : 4 (4) 4 : 5

31. G is the centroid of the equilateral Δ ABC. If AB = 10 cm then length of AG is
(1) $\frac{5\sqrt{3}}{3}$ cm (2) $\frac{10\sqrt{3}}{3}$ cm
(3) $5\sqrt{3}$ cm (4) $10\sqrt{3}$ cm

32. Two chords AB and CD of a circle with centre O, intersect each other at P. If $\angle AOD = 100°$ and $\angle BOC = 70°$, then the value of $\angle APC$ is
(1) 80° (2) 75°
(3) 85° (4) 95°

33. ABCD is a cyclic quadrilateral and AD is a diameter. If $\angle DAC = 55°$ then value of $\angle ABC$ is
(1) 55° (2) 35°
(3) 145° (4) 125°

34. In triangle ABC a straight line parallel to BC intersects AB and AC at D and E respectively. If AB = 2AD then DE : BC is
(1) 2 : 3 (2) 2 : 1
(3) 1 : 2 (4) 1 : 3

35. ABC is an isosceles triangle such that AB = AC and AD is the median to the base BC with $\angle ABC = 35°$. Then $\angle BAD$ is
(1) 35° (2) 55°
(3) 70° (4) 110°

36. A man goes 24 m due west and then 10 m due north. Then the distance of him from the starting point is
(1) 17 m (2) 26 m
(3) 28 m (4) 34 m

37. From the top of a tower of height 180 m the angles of depression of two objects on either sides of the tower are 30° and 45°. Then the distance between the objects are
(1) $180\left(3+\sqrt{3}\right)$ m
(2) $180\left(3-\sqrt{3}\right)$ m
(3) $180\left(\sqrt{3}-1\right)$ m
(4) $180\left(\sqrt{3}+1\right)$ m

38. ABCD is a rectangle of which AC is a diagonal. The value of $(\tan^2 \angle CAD + 1)\sin^2 \angle BAC$ is
(1) 2 (2) $\frac{1}{4}$
(3) 1 (4) 0

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39. If $\tan x = \sin 45° \cos 45° + \sin 30°$ then the value of x is
(1) 30° (2) 45°
(3) 60° (4) 90°

40. For any real values of θ, $\sqrt{\frac{\sec\theta - 1}{\sec\theta + 1}} = ?$
(1) $\cot\theta - \operatorname{cosec}\theta$
(2) $\sec\theta - \tan\theta$
(3) $\operatorname{cosec}\theta - \cot\theta$
(4) $\tan\theta - \sec\theta$

41. If the sum and difference of two angles are 135° and $\frac{\pi}{12}$ respectively, then the value of the angles in degree measure are
(1) 70°, 65° (2) 75°, 60°
(3) 45°, 90° (4) 80°, 55°

42. In a ΔABC, $\angle B = \frac{\pi}{3}$, $\angle C = \frac{\pi}{4}$ and D divides BC internally in the ratio 1 : 3 then $\frac{\sin\angle BAD}{\sin\angle CAD}$ is equal to
(1) $\frac{1}{\sqrt{2}}$ (2) $\frac{1}{\sqrt{3}}$
(3) $\frac{1}{\sqrt{6}}$ (4) $\sqrt{6}$

43. If $\sin 3A = \cos(A - 26°)$, where 3A is an acute angle then the value of A is
(1) 29° (2) 26°
(3) 23° (4) 28°

44. Value of $\sec^2\theta - \frac{\sin^2\theta - 2\sin^4\theta}{2\cos^4\theta - \cos^2\theta}$ is
(1) 1 (2) 2
(3) –1 (4) 0

45. If $x = a(\sin\theta + \cos\theta)$, $y = b(\sin\theta - \cos\theta)$ then the value of $\frac{x^2}{a^2} + \frac{y^2}{b^2}$ is
(1) 0 (2) 1
(3) 2 (4) –2

46. If $\sin 5\theta = \cos 20°$ $(0° < \theta < 90°)$ then the value of θ is
(1) 4° (2) 22°
(3) 10° (4) 14°

47. Find the least number which when divided separately by 15, 20, 36 and 48 leaves 3 as remainder in each case.
(1) 183 (2) 243
(3) 483 (4) 723

48. Find the sum of all positive multiples of 3 less than 50
(1) 400 (2) 404
(3) 408 (4) 412

49. If $a = 64$ and $b = 289$, then the value of $\left(\sqrt{\sqrt{a} + \sqrt{b}} - \sqrt{\sqrt{b} - \sqrt{a}}\right)^{\frac{1}{2}}$ is
(1) $2^{1/2}$ (2) 2
(3) 4 (4) –2

50. If the L.C.M. and H.C.F. of two expressions are $(x^2 + 6x + 8)(x + 1)$ and $(x + 1)$ respectively and one of the expressions is $x^2 + 3x + 2$, find the other.
(1) $x^2 + 5x + 4$ (2) $x^2 - 5x + 4$
(3) $x^2 + 4x + 5$ (4) $x^2 - 4x + 5$

51. If the number of items of a set A be $n(A) = 40$, $n(B) = 26$ and $n(A \cap B) = 16$, then $n(A \cup B)$ is equal to
(1) 30 (2) 40
(3) 50 (4) 60

52. $\sqrt{64009}$ is equal to
(1) 352 (2) 523
(3) 253 (4) 532

53. What is the smallest number by which 625 must be divided so that the quotient is a perfect cube?
(1) 25 (2) 5
(3) 2 (4) 3

54. If a distance of 50 m is covered in 1 minute, that 90 m in 2 minutes and 130 m in 3 minutes find the distance covered in 15 minutes.
(1) 610 m (2) 750 m
(3) 1000 m (4) 650 m

55. Three men step off together from the same spot. Their steps measure 63 cm, 70 cm and 77 cm respectively. The minimum distance each should cover so that all can cover the distance in complete steps is
(1) 9630 cm (2) 9360 cm
(3) 6930 cm (4) 6950 cm

56. Find the greatest number which will exactly divide 200 and 320.
(1) 10 (2) 20
(3) 16 (4) 40

57. A, B and C are employed to do a piece of work for ₹ 575. A and C are supposed to finish $\frac{19}{23}$ of the work together. Amount shall be paid to B is
(1) ₹ 210 (2) ₹ 100
(3) ₹ 200 (4) ₹ 475

58. A man is twice as fast as a woman and a woman is twice as fast as a boy in doing a work. If all of them, a man, a woman and a boy can finish the work in 7 days, in how many days a boy will do it alone?
(1) 49 (2) 7
(3) 6 (4) 42

59. A, B and C can do a job in 6 days, 12 days and 15 days respectively. After $\frac{1}{8}$ of the work is completed, C leaves the job. Rest of the work is done by A and B together. Time taken to finish the work is
(1) $5\frac{5}{6}$ days (2) $5\frac{1}{4}$ days
(3) $3\frac{1}{2}$ days (4) $3\frac{3}{4}$ days

60. 15 men take 20 days to complete a job working 8 hours a day. The number of hours a day should 20 men take to complete the job in 12 days
(1) 5 hours (2) 10 hours
(3) 15 hours (4) 18 hours

61. Having the same capacity 9 taps fill up a water tank in 20 minutes. How many taps of the same capacity are required to fill up the same water tank in 15 minutes?
(1) 10 (2) 12
(3) 15 (4) 18

62. Raj and Ram working together do a piece of work in 10 days. Raj alone can do it in 12 days. Ram alone will do the work in
(1) 20 days (2) 40 days
(3) 50 days (4) 60 days

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63. A shopkeeper sold an item at 10% loss after giving a discount equal to half the marked price. Then the cost price is

(1) $\frac{1}{9}$ th of marked price

(2) $\frac{4}{9}$ th of marked price

(3) $\frac{5}{9}$ th of marked price

(4) $\frac{7}{9}$ th of marked price

64. A person purchased a saree for ₹ 7710 after availing a net discount of ₹ 1285. The percentage of discount, the saree shop offers, is

(1) $14\frac{1}{7}\%$ (2) $14\frac{2}{7}\%$

(3) $14\frac{3}{7}\%$ (4) $14\frac{4}{7}\%$

65. A cycle dealer offers a discount of 10% and still makes a profit of 26%. What does he pay for a cycle whose marked price is ₹ 840 ?

(1) ₹ 600 (2) ₹ 650
(3) ₹ 700 (4) ₹ 750

66. If the cost price of an item is two fifth of its marked price and if it is sold at a discount of 10%, then there will be

(1) 25% profit (2) 40% profit
(3) 50% profit (4) 125% profit

67. Prakash lends a part of ₹ 20,000 at 8% simple interest and remaining at $\frac{4}{3}\%$ simple interest. His total income after a year was ₹ 800. Find the sum lent at 8%.

(1) ₹ 8,000 (2) ₹ 12,000
(3) ₹ 6,000 (4) ₹ 10,000

68. 20 litres of a mixture contains 20% alcohol and the rest water. If 4 litres of water be mixed in it, the percentage of alcohol in the new mixture will be

(1) $33\frac{1}{3}\%$ (2) $16\frac{2}{3}\%$

(3) 25% (4) $12\frac{1}{2}\%$

69. A man divides his property so that his son's share to his wife's and wife's share to his daughter's are both as in the ratio 3 : 1. If the daughter gets ₹ 10,000 less than son, the value (in rupees) of the whole property is

(1) ₹ 16,250 (2) ₹ 16,000
(3) ₹ 18,250 (4) ₹ 17,000

70. There are two containers of equal capacity. The ratio of milk to water in the first container is 3 : 1, in the second container 5 : 2. If they are mixed up, the ratio of milk to water in the mixture will be

(1) 28 : 41 (2) 41 : 28
(3) 15 : 41 (4) 41 : 15

71. The sum of two numbers is equal to 20 and their difference is 25. The ratio of the two numbers is

(1) 9 : 7 (2) 7 : 9
(3) 3 : 5 (4) 2 : 7

72. A man travelled a distance of 80 km in 7 hrs partly on foot at the rate of 8 km per hour and partly on bicycle at 16km per hour. The distance travelled on the foot is

(1) 32 km (2) 48 km
(3) 36 km (4) 44 km

73. The frequency distribution data is given below. If the average age is 17 years, the value of m is

Age (in years)	:	8	20	26	29
Number of people	:	3	2	m	1

(1) 1 (2) 2
(3) 3 (4) 4

74. The average monthly expenditure of a family for the first four months is ₹ 2570, for the next three months ₹ 2490 and for the last five months ₹ 3030. If the family saves ₹ 5320 during the whole year, the average monthly income of the family during the year is

(1) ₹ 3000 (2) ₹ 3185
(3) ₹ 3200 (4) ₹ 3580

75. After replacing an old member by a new member, it was found that the average age of five members of a club is the same as it was 3 years ago. The difference between the ages of the replaced and the new members is

(1) 2 years (2) 4 years
(3) 8 years (4) 15 years

76. A man spends ₹ 1800 monthly on an average for the first four months and ₹ 2000 monthly for the next eight months and saves ₹ 5600 a year. His average monthly income is

(1) ₹ 2000 (2) ₹ 2200
(3) ₹ 2400 (4) ₹ 2600

77. The arithmetic mean of the following numbers

1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 5, 6, 6, 6, 6, 6, 6 and 7, 7, 7, 7, 7, 7, 7 is

(1) 4 (2) 5
(3) 14 (4) 20

78. The average of six numbers is 20. If one number is removed, the average becomes 15. What is the number removed ?

(1) 5 (2) 35
(3) 112 (4) 45

79. An item costing ₹ 200 is being sold at 10% loss. If the price is further reduced by 5%, the selling price will be

(1) ₹ 170 (2) ₹ 171
(3) ₹ 175 (4) ₹ 179

80. A shopkeeper buys 144 items at 90 paise each. On the way 20 items are broken. He sells the remainder at ₹ 1.20 each. His gain per cent correct to one place of decimal is

(1) 13.8% (2) 14.6%
(3) 14.8% (4) 15.8%

81. There is a profit of 20% on the cost price of an article. The % of profit, when calculated on selling price is

(1) $16\frac{2}{3}\%$

(2) 20%

(3) $33\frac{1}{3}\%$

(4) None of these

82. By selling an article for ₹ 102, there is a loss of 15%, when the article is sold for ₹ 134.40, the net result in the transaction is

(1) 12% gain (2) 12% loss
(3) 10% loss (4) 15% gain

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83. Two toys are sold at ₹ 504 each. One toy brings the dealer a gain of 12% and the other a loss of 4%.The gain or loss per cent by selling both the toys is

(1) $3\frac{5}{13}\%$ Profit

(2) $4\frac{5}{13}\%$ Profit

(3) $5\frac{1}{13}\%$ Profit

(4) $2\frac{3}{13}\%$ loss

84. A sold a horse to B for ₹ 4800 by losing 20%. B sells it to C at a price which would have given A a profit of 15%. B's gain is

(1) ₹ 1800 (2) ₹ 1900

(3) ₹ 2000 (4) ₹ 2100

85. If each side of a cube is increased by 10% the volume of the cube will increase by

(1) 30% (2) 10%

(3) 33.1% (4) 25%

86. A reduction of 21% in the price of an item enables a person to buy 3 kg more for ₹ 100. The reduced price of item per kg is

(1) ₹ 5.50 (2) ₹ 7.50

(3) ₹ 10.50 (4) ₹ 7.00

87. The number that is to be added to 10% of 320 to have the sum as 30% of 230 is

(1) 37 (2) 32

(3) 23 (4) 73

88. The strength of a school increases and decreases in every alternate year by 10%. It started with increase in 2000. Then the strength of the school in 2003 as compared to that in 2000 was

(1) increased by 8.9%

(2) decreased by 8.9%

(3) increased by 9.8%

(4) decreased by 9.8%

89. Two trains of equal length are running on parallel lines in the same direction at the rate of 46 km/hr and 36 km/hr. The faster train passes the slower train in 36 seconds. The length of each train is

(1) 50 m (2) 72 m

(3) 80 m (4) 82 m

90. A car driver leaves Bangalore at 8.30 A.M. and expects to reach a place 300 km from Bangalore at 12.30 P.M. At 10.30 he finds that he has covered only 40% of the distance. By how much he has to increase the speed of the car in order to keep up his schedule?

(1) 45 km/hr (2) 40 km/hr

(3) 35 km/hr (4) 30 km/hr

91. A train 300 m long is running with a speed of 54 km/hr. In what time will it cross a telephone pole?

(1) 20 seconds (2) 15 seconds

(3) 17 seconds (4) 18 seconds

92. A man is walking at a speed of 10 kmph. After every km, he takes a rest for 5 minutes. How much time will he take to cover a distance of 5 km?

(1) 60 minutes (2) 50 minutes

(3) 40 minutes (4) 70 minutes

93. A man borrows money at 3% per annum interest payable yearly and lend it immediately at 5% interest (compound) payable half-yearly and thereby gains ₹ 330 at the end of the year. The sum borrowed is

(1) ₹ 17000 (2) ₹ 16500

(3) ₹ 15000 (4) ₹ 16000

94. Two years ago, the value of my motorbike was ₹ 62500. If the value depreciates by 4% every year, now its value is

(1) ₹ 56700 (2) ₹ 57600

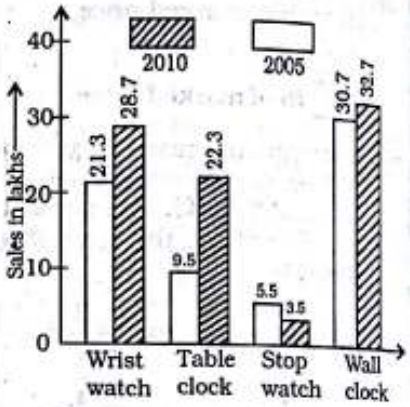
(3) ₹ 57500 (4) ₹ 55700

95. If the compound interest on a sum for 2 years at $12\frac{1}{2}$ p.a is ₹ 510, the simple interest on the same sum at the same rate for the same period of time is

(1) ₹ 400 (2) ₹ 450

(3) ₹ 460 (4) ₹ 480

Directions (96–100) : A watch company produces four different products. The sale of these products in lakhs during 2005 and 2010 are shown in the following bar diagram. Study the graph and answer the questions.



96. The sales in percentage of wrist watch in 2010 more than the sales of table clock in 2010 was nearly by

(1) 26.7% (2) 27.7%

(3) 28.7% (4) 21.7%

97. The ratio of sales of stop watch in 2010 to the sale of table clock in 2005 is

(1) 6 : 19 (2) 7 : 6

(3) 19 : 6 (4) 7 : 19

98. The sales of table clock in 2005 was less than the sales of wall clock in 2005 is nearly by

(1) 70.05% (2) 69.05%

(3) 68.05% (4) 62.05%

99. During the period 2005-2010 the minimum rate of increase in sales is in the product of

(1) Wrist watch

(2) Table clock

(3) Stop watch

(4) Wall clock

100. The sales have increased by nearly 135% from 2005 to 2010 in the product of

(1) Table clock

(2) Wrist watch

(3) Stop watch

(4) Wall clock

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ANSWERS

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

EXPLANATIONS

1. (3) Let the principal be Rs. P

$$\therefore \text{C.I.} = P\left[\left(1+\frac{R}{100}\right)^2 - 1\right]$$

$$\Rightarrow 328 = P\left[\left(1+\frac{5}{100}\right)^2 - 1\right]$$

$$\Rightarrow 328 = P\left[\left(\frac{21}{20}\right)^2 - 1\right]$$

$$\Rightarrow 328 = P\left(\frac{441}{400} - 1\right)$$

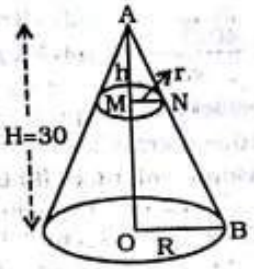
$$\Rightarrow 328 = P\left(\frac{441-400}{400}\right)$$

$$\Rightarrow 328 = \frac{41P}{400}$$

$$\Rightarrow P = \frac{328\times 400}{41} = \text{Rs. } 3200$$

2. (2)

Let H and R be the height and radius of bigger cone respectively and h and r that of smaller cone.



From triangles AOB and AMN.

$\angle A$ is common and MN || OB.

$\therefore$ Triangles AOB and AMN are similar,

$$\therefore \frac{AO}{AM} = \frac{BO}{MN}$$

$$\Rightarrow \frac{30}{h} = \frac{R}{r} \quad \ldots(i)$$

Volume of smaller cone

$$= \frac{1}{3}\pi r^2 h$$

Volume of bigger cone

$$= \frac{1}{3}\pi R^2 H$$

$\therefore$ According to the question,

$$\frac{1}{3}\pi r^2 h = \left(\frac{1}{3}\pi R^2 H\right)\times\frac{1}{27}$$

$$\Rightarrow r^2 h = \frac{R^2 H}{27}$$

$$\Rightarrow 27r^2 h = R^2 H$$

$$\Rightarrow \frac{27h}{H} = \frac{R^2}{r^2}$$

$$\Rightarrow \frac{27h}{H} = \left(\frac{30}{h}\right)^2 \quad \ldots[\text{From (i)}]$$

$$\Rightarrow \frac{27h}{H} = \frac{900}{h^2}$$

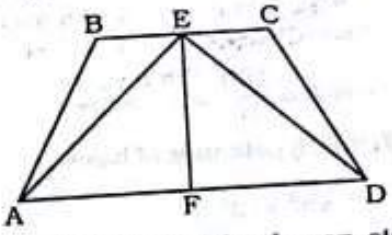
$$\Rightarrow 27h^3 = 900H = 900\times 30$$

$$\Rightarrow h^3 = \frac{900\times 30}{27} = 1000$$

$$\Rightarrow h = \sqrt[3]{1000} = 10 \text{ cm}$$

$\therefore$ Required height $= 30 - 10$
$= 20$ cm

3. (4)



EF is perpendicular on side AD.

$\therefore$ Area of trapezium

$$= \frac{1}{2}(AD + BC)\times EF$$

Area of $\Delta AED = \frac{1}{2}\times AD\times EF$

$\therefore$ Required ratio

$$= \frac{\frac{1}{2}(AD+BC)\times EF}{\frac{1}{2}\times AD\times EF}$$

$$= \frac{AD+BC}{AD}$$

4. (3) Surface area of sphere

$$= 4\pi r^2$$

$$\therefore 4\times\frac{22}{7}\times r^2 = 346.5$$

$$\Rightarrow 4\times 22\times r^2 = 346.5\times 7$$

$$\Rightarrow r^2 = \frac{346.5\times 7}{4\times 22} = 27.5625$$

$$\therefore r = \sqrt{27.5625} = 5.25 \text{ cm}$$

5. (3) If the number of sides of regular polygon be n, then

Each interior angle

$$= \frac{(2n-4)\times 90^\circ}{n}$$

and each exterior angle $= \frac{360^\circ}{n}$

$$\therefore \frac{(2n-4)}{n}\times 90^\circ = \frac{5\times 360^\circ}{n}$$

$$\Rightarrow (2n-4) = 5\times 4$$

$$\Rightarrow 2n - 4 = 20$$

$$\Rightarrow 2n = 20 + 4 = 24$$

$$\Rightarrow n = \frac{24}{2} = 12.$$

6. (1) Volume of pyramid

$$= \frac{1}{3}\times \text{area of base} \times \text{height}$$

$\Rightarrow 500 = \frac{1}{3} \times 30 \times h$

$\Rightarrow 10h = 500$

$\Rightarrow h = \frac{500}{10} = 50$ metre

7. (3) Hypotenuse of base

$= \sqrt{5^2 + 12^2}$

$= \sqrt{25 + 144} = \sqrt{169}$

$= 13$ cm

$\therefore$ Surface area

$= h(a + b + c)$

$= 10(5 + 12 + 13) = 300$ sq.cm.

Area of base $= \frac{1}{2} \times 5 \times 12$

$= 30$ sq.cm.

$\therefore$ Total surface area of lateral surfaces

$= 300 + 30$

$= 330$ sq.cm.

8. (1) In-radius $= \frac{a}{2\sqrt{3}}$

$= \frac{24}{2\sqrt{3}} = 4\sqrt{3}$ cm

Area of triangle $= \frac{\sqrt{3}}{4} \times (\text{side})^2$

$= \frac{\sqrt{3}}{4} \times 24 \times 24$

$= 144\sqrt{3}$ sq.cm. $= 144 \times 1.732$

$= 249.408$ sq.cm.

Area of circle $= \pi r^2$

$= \frac{22}{7} \times 4\sqrt{3} \times 4\sqrt{3}$

$= \frac{1056}{7} = 150.86$ sq.cm.

Area of remaining part

$= (249.408 - 150.86)$ sq.cm.

$= 98.548$ sq.cm.

≈ 98.55 sq.cm.

9. (1) Lateral surface area of prism $= 3 \times$ side $\times$ height

$\therefore 3 \times$ side $\times$ height $= 120$

$\Rightarrow$ Side $\times$ height $= \frac{120}{3}$

$= 40$ sq.cm. ...(i)

Volume of prism = Area of base $\times$ height

$\Rightarrow 40\sqrt{3} = \frac{\sqrt{3}}{4} \times \text{side}^2 \times$ height

$\Rightarrow \frac{40\sqrt{3} \times 4}{\sqrt{3}} = \text{side}^2 \times$ height

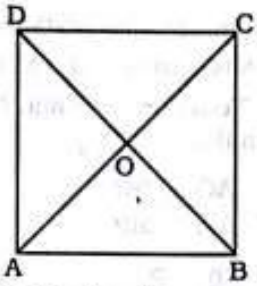
$\Rightarrow \text{side}^2 \times \text{height}$

$= 160$ cu.cm ...(ii)

Dividing equation (ii) by (i),

Side $= \frac{160}{40} = 4$ cm.

10. (3)



Side of a rhombus

$= \frac{2p}{4} = \frac{p}{2}$ units

$OA = OC = y$ (let)

$\therefore AC = 2y$ units

$OB = OD = x$ (let)

$\therefore BD = 2x$ units

From ΔOAB,

$\angle AOB = 90°$

$AB^2 = OA^2 + OB^2$

$\Rightarrow \frac{p^2}{4} = x^2 + y^2$

$\Rightarrow p^2 = 4x^2 + 4y^2$ ...(i)

and $2x + 2y = m$

On squaring both sides,

$4x^2 + 4y^2 + 8xy = m^2$

$\Rightarrow p^2 + 8xy = m^2$

$\Rightarrow 8xy = m^2 - p^2$

$\Rightarrow 4xy = \frac{1}{2}(m^2 - p^2)$

$\therefore$ Area of the rhombus

$= \frac{1}{2} \times AC \times BD$

$= \frac{1}{2} \times 2x \times 2y = \frac{1}{2} \times 4xy$

$= \frac{1}{2} \times \frac{1}{2}(m^2 - p^2)$

$= \frac{1}{4}(m^2 - p^2)$ sq. units

11. (4) Volume of lead

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

If the thickness of gold be x cm, then

Volume of gold

$= \frac{4}{3}\pi\left((2 + x)^3 - 2^3\right)$ cu.cm

$\therefore \frac{4}{3}\pi\left((2 + x)^3 - 2^3\right)$

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

$\Rightarrow (2 + x)^3 - 2^3 = 2^3$

$\Rightarrow (2 + x)^3 = 8 + 8 = 16$

$\Rightarrow (2 + x)^3 = 2^3.2$

$\Rightarrow 2 + x = 2 \times \sqrt[3]{2}$

$\Rightarrow 2 + x = 2 \times 1.259 = 2.518$

$\therefore x = 2.518 - 2 = 0.518$ cm

12. (4) Radius of larger sphere $= R$ units

$\therefore$ Its volume $= \frac{4}{3}\pi R^3$ cu. units

Volume of smaller cone

$= \frac{1}{3}\pi R^3$ cubic units

Volume of smaller sphere

$= \frac{1}{3}\pi R^3$

$\therefore \frac{4}{3}\pi r^3 = \frac{1}{3}\pi R^3$

$\Rightarrow r^3 = \frac{R^3}{4}$

$\Rightarrow r = \frac{R}{\sqrt[3]{4}}$

$\therefore$ Surface area of smaller sphere : Surface area of larger sphere

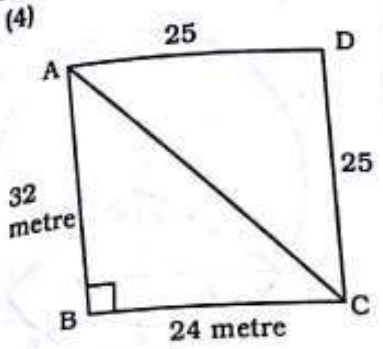
$= 4\pi r^2 : 4\pi R^2$

$= r^2 : R^2$

$= \left(\frac{R}{\sqrt[3]{4}}\right)^2 : R^2 = 1 : \left(\sqrt[3]{4}\right)^2$

$= 1 : \left((2^2)^{\frac{1}{3}}\right)^2 = 1 : 2^{\frac{4}{3}}$

13. (4)



$AC = \sqrt{AB^2 + BC^2}$

$= \sqrt{32^2 + 24^2}$

$= \sqrt{1024 + 576}$

$= \sqrt{1600} = 40$ metre

$\therefore$ Area of ΔABC

$= \frac{1}{2} \times BC \times AB$

$= \frac{1}{2} \times 24 \times 32$

$= 384$ sq. metre

Semi-peri meter of ΔADC (s)

$= \frac{25 + 25 + 40}{2}$

$= \frac{90}{2} = 45$ metre

$\therefore$ Area of ΔADC

$= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{45(45-25)(45-25)(45-40)}$

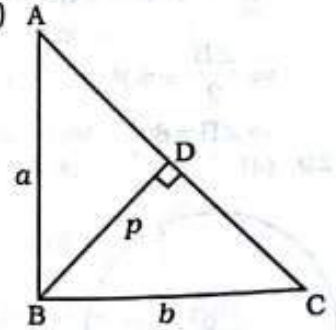
$= \sqrt{45 \times 20 \times 20 \times 5} = 20 \times 15$

$= 300$ sq. metre

$\therefore$ Area of the plot $= 384 + 300$

$= 684$ sq.metre

14. (3)



$BD \perp AC$

$AB \perp BC$

Hypotenuse of ΔABC

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

$= \sqrt{a^2 + b^2}$

Area of $\Delta ABC = \frac{1}{2} \times AB \times BC$

$= \frac{1}{2} \times AC \times BD$

$\Rightarrow AB \times BC = AC \times BD$

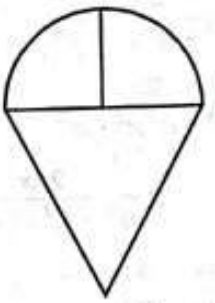
$\Rightarrow ab = \sqrt{a^2 + b^2} \times p$

On squaring both sides,

$a^2b^2 = (a^2 + b^2)\, p^2$

$\therefore p^2 = \frac{a^2b^2}{a^2 + b^2}$

15. (1)



Volume of hemisphere $= \frac{2}{3}\pi r^3$,

Where r = radius = 7 cm.

$= \left(\frac{2}{3} \times \frac{22}{7} \times 7 \times 7 \times 7\right)$ cu.cm.

Volume of conical part

$= \frac{1}{3}\pi r^2 h$

$[\because r = h]$

$= \left(\frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 7\right)$ cu.cm.

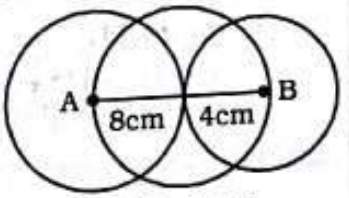
$\therefore$ Volume of ice-cream

$= \frac{2}{3} \times \frac{22}{7} \times 7^3 + \frac{1}{3} \times \frac{22}{7} \times 7^3$

$= \frac{22}{7} \times 7^3 = 22 \times 7^2$

$= 1078$ cu.cm.

16. (1)



Diameter $= AB = 8 + 4$

$= 12$ units

Radius $= \frac{12}{2} = 6$ units

$\therefore$ Area of circle $= \pi r^2 = \pi \times 6^2$

$= 36\pi$ sq. units

17. (2) $a^2 + b^2 + c^2 = ab + bc + ca$

$\Rightarrow a^2 + b^2 + c^2 - ab - bc - ca = 0$

On multiplying by 2,

$2a^2 + 2b^2 + 2c^2 - 2ab - 2bc - 2ca = 0$

$\Rightarrow a^2 + b^2 - 2ab + b^2 + c^2 - 2bc + c^2 + a^2 - 2ac = 0$

$\Rightarrow (a-b)^2 + (b-c)^2 + (c-a)^2 = 0$

$\Rightarrow a - b = 0$

$\Rightarrow a = b$

$b - c = 0 \Rightarrow b = c$

$c - a = 0 \Rightarrow c = a$

$\therefore \frac{a+c}{b} = \frac{2a}{a} = 2$

18. (1) $ab + bc + ca = 0$

$\Rightarrow ab + ca = -bc$

$\therefore a^2 - bc = a^2 + ab + ac$

$= a(a + b + c)$

Similarly,

$b^2 - ac = b(a + b + c)$

$c^2 - ab = c(a + b + c)$

$\therefore \frac{1}{a^2 - bc} + \frac{1}{b^2 - ca} + \frac{1}{c^2 - ab}$

$= \frac{1}{a(a+b+c)} + \frac{1}{b(a+b+c)} + \frac{1}{c(a+b+c)}$

$= \frac{1}{(a+b+c)}\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$

$= \frac{1}{a+b+c}\left(\frac{bc + ca + ab}{abc}\right)$

$= \frac{1}{a+b+c} \times \frac{0}{abc} = 0$

19. (4) $\left(2 + \sqrt{3}\right)a = \left(2 - \sqrt{3}\right)b = 1$

$\Rightarrow a = \frac{1}{2 + \sqrt{3}}$

$\therefore \frac{1}{a} = 2 + \sqrt{3}$

Similarly,

$b = \frac{1}{2 - \sqrt{3}}$

$\frac{1}{b} = 2 - \sqrt{3}$

$\therefore \frac{1}{a} + \frac{1}{b} = 2 + \sqrt{3} + 2 - \sqrt{3} = 4$

20. (2) $3x + \frac{3}{x} = 1$

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

On cubing both sides,

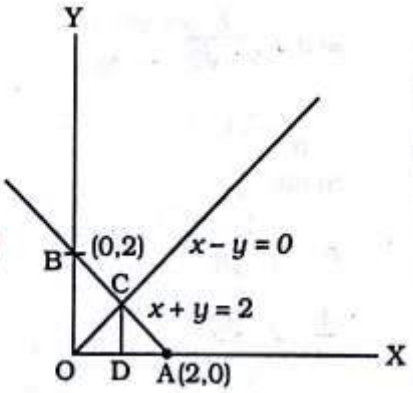
$$x^3+\frac{1}{x^3}+3\left(x+\frac{1}{x}\right)=\frac{1}{27}$$

$$\Rightarrow x^3+\frac{1}{x^3}+3\times\frac{1}{3}=\frac{1}{27}$$

$$\Rightarrow x^3+\frac{1}{x^3}+1=\frac{1}{27}$$

21. (1) $a^2+4b^2+4b-4ab-2a-8$
$=a^2+4b^2-4ab-2a+4b-8$
$=(a-2b)^2-2(a-2b)-8$
Let $(a-2b)=x$
$\therefore$ Expression $=x^2-2x-8$
$=x^2-4x+2x-8$
$=x(x-4)+2(x-4)$
$=(x-4)(x+2)$
$=(a-2b-4)(a-2b+2)$

22. (1) On putting $x=0$ in $x+y=2$,
$0+y=2\Rightarrow y=2$
$\therefore$ Point of intersection on y-axis $=(0,2)$
Again, putting $y=0$ in $x+y=2$,
$x=2$
$\therefore$ Point of intersection on x-axis $=(2,0)$
$x-y=0$ will pass through origin and be equally inclined to axes.



On putting $x=y$ in $x+y=2$,
$2y=2\Rightarrow y=1$
$\therefore$ CD = 1
OA = 2

Area of $\Delta OAC=\frac{1}{2}\times OA\times CD$

$=\frac{1}{2}\times2\times1=1$ sq. unit

23. (4) $\frac{1}{a^2+ax+x^2}-\frac{1}{a^2-ax+x^2}+\frac{2ax}{a^4+a^2x^2+x^4}$
$=\frac{a^2-ax+x^2-a^2-ax-x^2}{(a^2+ax+x^2)(a^2-ax+x^2)}+\frac{2ax}{a^4+a^2x^2+x^4}$
$=\frac{-2ax}{a^4+a^2x^2+x^4}+\frac{2ax}{a^4+a^2x^2+x^4}=0$

24. (2) $\frac{3x}{2y}=\frac{21}{22}$

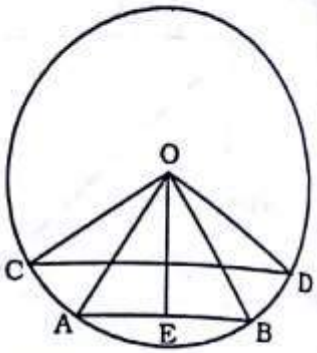
$\Rightarrow\frac{x}{y}=\frac{21}{22}\times\frac{2}{3}=\frac{7}{11}$

$\Rightarrow\frac{x}{7}=\frac{y}{11}=k$
$\therefore 4x+5y=83$
$\Rightarrow 4\times7k+5\times11k=83$
$\Rightarrow 28k+55k=83$
$\Rightarrow 83k=83\Rightarrow k=1$
$\therefore x=7, y=11$
$\therefore y-x=11-7=4$

25. (2) $x=11$ (Given)
$\therefore x^5-12x^4+12x^3-12x^2+12x-1$
$=x^5-(11+1)x^4+(11+1)x^3-(11+1)x^2+(11+1)x-1$
$=x^5-11x^4-x^4+11x^3+x^3-11x^2-x^2+11x+x-1$
When $x=11$,
$=11^5-11^5-11^4+11^4+11^3-11^3-11^2+11^2+11-1=10$

26. (3) $p=99$ (Given)
$\therefore p(p^2+3p+3)=p^3+3p^2+3p$
$=p^3+3p^2+3p+1-1$
$=(p+1)^3-1=(99+1)^3-1$
$=(100)^3-1=999999$

27. (1)



Radius of circle $=r$ units
In ΔOCD, $\angle COD=90°$
$\therefore CD^2=OC^2+OD^2$
$\Rightarrow b^2=r^2+r^2=2r^2$ ...(i)
In ΔOAB,
$OE\perp AB$
$\angle OAB=60°$

$AE=\frac{a}{2}$

$\therefore\cos60°=\frac{AE}{OA}$

$\Rightarrow\frac{1}{2}=\frac{\frac{a}{2}}{r}$

$\Rightarrow\frac{1}{2}=\frac{a}{2r}\Rightarrow a=r$ ...(ii)

From equations (i) and (ii),
$b^2=2a^2$
$\Rightarrow b=\sqrt{2}a$

28. (2) $\angle A+\angle B+\angle C=180°$ ...(i)

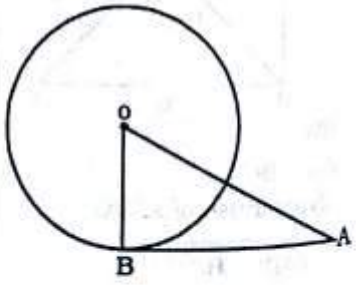
$\angle A+\frac{\angle B}{2}+\angle C=140°$ ...(ii)

By equation (i) − (ii),

$\frac{\angle B}{2}=180°-140°$

$\Rightarrow\frac{\angle B}{2}=40°$
$\Rightarrow\angle B=80°$

29. (4)



SOLVED PAPER-23

$OB = 6$ cm

$OA = 10$ cm

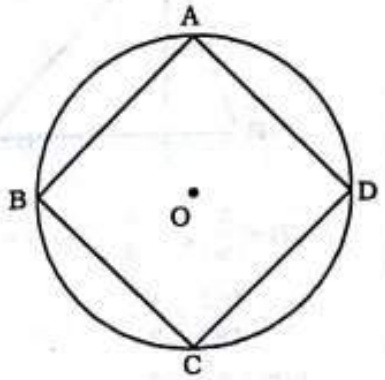
$\angle OBA = 90°$

$\therefore AB = \sqrt{OA^2 - OB^2}$

$= \sqrt{10^2 - 6^2} = \sqrt{100 - 36}$

$= \sqrt{64} = 8$ cm

30. (2)



The sum of opposite angles of a concyclic quadrilateral is 180°.

$\therefore \angle A + C = 180°$

$\Rightarrow 4x + 5y = 180°$ ...(i)

$\angle B + \angle D = 180°$

$\Rightarrow 7x + y = 180°$ ...(ii)

By equation (ii) × 5 – (i),

$35x + 5y = 900°$

$4x + 5y = 180°$

$- \quad - \quad -$

$31x = 720$

$x = \frac{720}{31}$

From equation (ii),

$7x + y = 180°$

$\Rightarrow 7 \times \frac{720}{31} + y = 180°$

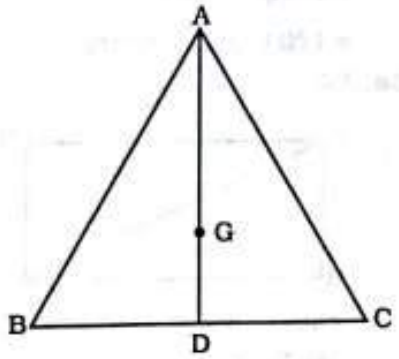
$\Rightarrow y = 180 - \frac{5040}{31}$

$= \frac{5580 - 5040}{31} = \frac{540}{31}$

$\therefore x : y = \frac{720}{31} : \frac{540}{31}$

$= 4 : 3$

31. (2)



$AB = 10$ cm

$BD = 5$ cm

$\angle ADB = 90°$

$\therefore AD = \sqrt{AB^2 - BD^2}$

$= \sqrt{10^2 - 5^2} = \sqrt{100 - 25}$

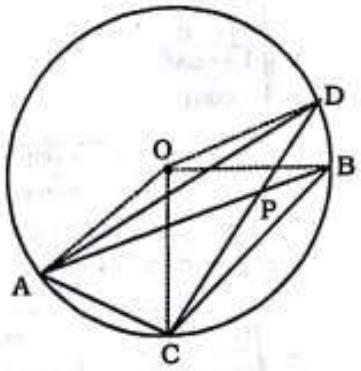
$= \sqrt{75}$

$= 5\sqrt{3}$ cm

$AG = \frac{2}{3}AD = \frac{2}{3} \times 5\sqrt{3}$

$= \frac{10}{\sqrt{3}}$ cm

32. (4)



$\angle AOD = 100°$

$\therefore \angle ACD = \angle ACP = \frac{100}{2} = 50°$

(The angle subtended at the centre is twice to that of angle at the circumference by the same arc)

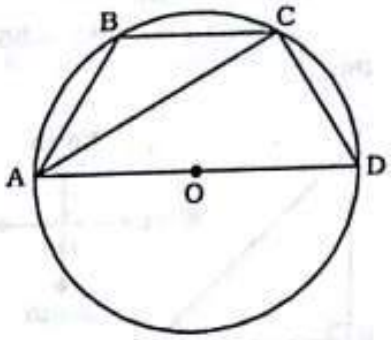
Again, $\angle BOC = 70°$

$\therefore \angle BAC = \frac{70}{2} = 35° = \angle PAC$

$\therefore \angle APC = 180° - 50° - 35°$

$= 95°$

33. (3)



In ΔACD

$\angle DAC = 55°$

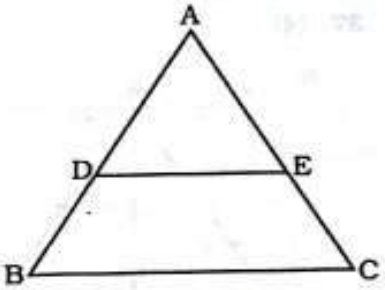
$\angle ACD = 90°$

$\angle D = 180° - 55° - 90° = 35°$

$\therefore \angle ABC + \angle ADC = 180°$

$\Rightarrow \angle ABC = 180° - 35° = 145°$

34. (3)



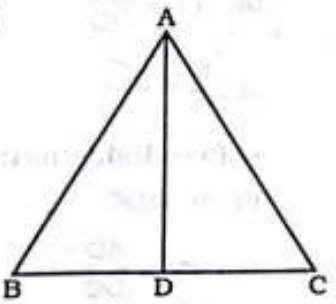
$\frac{AB}{AD} = \frac{2}{1}$

$\Delta ADE \sim \Delta ABC$

$\frac{AB}{AD} = \frac{BC}{DE} = \frac{2}{1}$

$\therefore \frac{DE}{BC} = \frac{1}{2}$

35. (2)



$BD = DC$

$AB = AC$

$\therefore \angle ADB = \angle ADC = 90°$

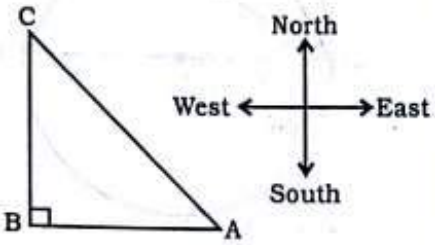
$\angle ABC = 35°$

In ΔABD,

$\angle BAD + \angle ABD = 90°$

$\therefore \angle BAD = 90° - 35° = 55°$

36. (2)



$\angle ABC = 90°$

AB = 24 metre , BC = 10metre

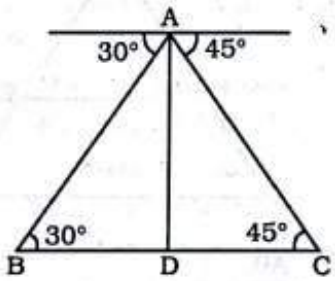
$\therefore AC = \sqrt{AB^2 + BC^2}$

$= \sqrt{24^2 + 10^2}$

$= \sqrt{576 + 100} = \sqrt{676}$

= 26 metre

37. (4)



AD is tower and B and C are two objects,

$\angle ABD = 30°$ and $\angle ACD = 45°$

AD = 180 metre

From ΔABD,

$\tan 30° = \frac{AD}{BD}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{180}{BD}$

$\Rightarrow BD = 180\sqrt{3}$ metre

From ΔADC,

$\tan 45° = \frac{AD}{DC}$

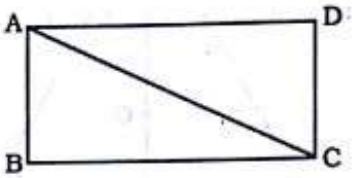
$\Rightarrow 1 = \frac{180}{DC} \Rightarrow DC = 180$ metre

$\therefore BC = BD + DC$

$= 180\sqrt{3} + 180$

$= 180(\sqrt{3} + 1)$ metre

38. (3)



$\angle ACD = 45°$

$\angle BAC = 45°$

$\therefore (\tan^2 \angle CAD + 1).\sin^2 \angle BAC$

$= (\tan^2 45° + 1)\sin^2 45°$

$= (1 + 1) \times \left(\frac{1}{\sqrt{2}}\right)^2 = 2 \times \frac{1}{2} = 1$

39. (2) $\tan x = \sin 45° . \cos 45° + \sin 30°$

$= \frac{1}{\sqrt{2}} . \frac{1}{\sqrt{2}} + \frac{1}{2} = \frac{1}{2} + \frac{1}{2} = 1$

$\therefore \tan x = \tan 45° \Rightarrow x = 45°$

40. (3) $\sqrt{\frac{\sec\theta - 1}{\sec\theta + 1}} = \sqrt{\frac{\frac{1}{\cos\theta} - 1}{\frac{1}{\cos\theta} + 1}}$

$= \sqrt{\frac{\frac{1 - \cos\theta}{\cos\theta}}{\frac{1 + \cos\theta}{\cos\theta}}}$

$= \sqrt{\frac{1 - \cos\theta}{1 + \cos\theta}} = \sqrt{\frac{(1 - \cos\theta)(1 - \cos\theta)}{(1 + \cos\theta)(1 - \cos\theta)}}$

(Rationalising the numerator and the denominator)

$= \sqrt{\frac{(1 - \cos\theta)^2}{1 - \cos^2\theta}} = \sqrt{\frac{(1 - \cos\theta)^2}{\sin^2\theta}}$

$= \frac{1 - \cos\theta}{\sin\theta} = \frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta}$

$= \operatorname{cosec}\theta - \cot\theta$.

41. (2) Let the angles be A and B where A > B

$\therefore A + B = 135°$

and, $A - B$

$= \frac{\pi}{12} = \frac{\pi}{12} \times \frac{180°}{\pi} = 15°$

On adding

$A + B + A - B$

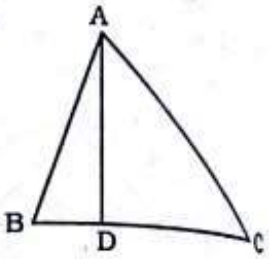
$= 135° + 15° = 150°$

$\Rightarrow 2A = 150° \Rightarrow A = \frac{150}{2} = 75°$

$\therefore A + B = 135°$

$\Rightarrow B = 135° - 75° = 60°$

42. (3)



$\angle B = \frac{\pi}{3}, \angle = \frac{\pi}{4}$

and $\frac{BD}{DC} = \frac{1}{3}$

From ΔABD,

$\frac{BD}{\sin BAD} = \frac{AD}{\sin ABD}$

$\Rightarrow \frac{BD}{\sin BAD} = \frac{AD}{\sin\frac{\pi}{3}}$

$\Rightarrow \frac{BD}{\sin BAD} = \frac{AD}{\frac{\sqrt{3}}{2}}$

$\Rightarrow AD = \frac{\sqrt{3}}{2} . \frac{BD}{\sin BAD}$ ...(i)

From ΔADC,

$\frac{CD}{\sin DAC} = \frac{AD}{\sin ACD}$

$\Rightarrow \frac{CD}{\sin DAC} = \frac{AD}{\sin\frac{\pi}{4}}$

$\Rightarrow AD = \frac{1}{\sqrt{2}} . \frac{CD}{\sin DAC}$ ...(ii)

From equations (i) and (ii),

$\frac{\sqrt{3}}{2} . \frac{BD}{\sin BAD} = \frac{1}{\sqrt{2}} . \frac{CD}{\sin DAC}$

$\Rightarrow \frac{\sin BAD}{\sin DAC} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{\sqrt{2}}} \times \frac{BD}{CD}$

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$\Rightarrow \frac{\sin BAD}{\sin DAC} = \frac{\sqrt{3}}{2} \times \sqrt{2} \times \frac{1}{3}$

$= \frac{1}{\sqrt{2} \times \sqrt{3}} = \frac{1}{\sqrt{6}}$

43. (1) $\sin 3A = \cos (A - 26°)$

$\Rightarrow \cos (90° - 3A) = \cos (A - 26°)$

$\Rightarrow 90° - 3A = A - 26°$

$\Rightarrow 90° + 26° = 3A + A$

$\Rightarrow 4A = 116$

$\Rightarrow A = \frac{116}{4} = 29°$

44. (1) $\sec^2\theta - \frac{\sin^2\theta - 2\sin^4\theta}{2\cos^4\theta - \cos^2\theta}$

$= \sec^2\theta - \frac{\sin^2\theta(1 - 2\sin^2\theta)}{\cos^2\theta(2\cos^2\theta - 1)}$

$= \sec^2\theta - \frac{\sin^2\theta(1 - 2(1 - \cos^2\theta))}{\cos^2\theta(2\cos^2\theta - 1)}$

$= \sec^2\theta - \tan^2\theta \frac{(2\cos^2\theta - 1)}{2\cos^2\theta - 1}$

$= \sec^2\theta - \tan^2\theta = 1$

45. (3) $x = a(\sin\theta + \cos\theta)$ and $y = b(\sin\theta - \cos\theta)$

$\Rightarrow \frac{x}{a} = \sin\theta + \cos\theta$ and

$\frac{y}{b} = \sin\theta - \cos\theta$

$\therefore \frac{x^2}{a^2} + \frac{y^2}{b^2} = (\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2$

$= \sin^2\theta + \cos^2\theta + 2\sin\theta.\cos\theta + \sin^2\theta + \cos^2\theta - 2\sin\theta . \cos\theta$

$= 2(\sin^2\theta + \cos^2\theta) = 2$

46. (4) $\sin 5\theta = \cos 20°$

$\Rightarrow \sin 5\theta = \sin (90 - 20)$

$= \sin 70°$

$\Rightarrow 5\theta = 70°$

$\Rightarrow \theta = \frac{70}{5} = 14°$

47. (4) Required number = (LCM of 15, 20, 36 and 48) + 3

2	15,	20,	36,	48
2	15,	10,	18,	24
3	15,	5,	9,	12
5	5,	5,	3,	4
	1,	1,	3,	4

$\therefore$ LCM $= 2 \times 2 \times 3 \times 5 \times 3 \times 4$

$= 720$

$\therefore$ Required number

$= 720 + 3 = 723$

48. (3) Sum of all multiples of 3 upto 50

$= 3 + 6 + ... + 48$

$= 3(1 + 2 + 3 + ... + 16)$

$= \frac{3 \times 16(16 + 1)}{2} = 3 \times 8 \times 17$

$= 408$

$\left[\because 1 + 2 + 3 + ... + n = \frac{n(n+1)}{2}\right]$

49. (1) $a = 64$ and $b = 289$

$\therefore \sqrt{a} = \sqrt{64} = 8$ and

$\sqrt{b} = \sqrt{289} = 17$

$\therefore \left(\sqrt{\sqrt{a} + \sqrt{b}} - \sqrt{\sqrt{b} - \sqrt{a}}\right)^{\frac{1}{2}}$

$= \left(\sqrt{8 + 17} - \sqrt{17 - 8}\right)^{\frac{1}{2}}$

$= \left(\sqrt{25} - \sqrt{9}\right)^{\frac{1}{2}}$

$= (5 - 3)^{\frac{1}{2}} = (2)^{\frac{1}{2}}$

50. (1) $x^2 + 6x + 8 = x^2 + 4x + 2x + 8$

$= x(x + 4) + 2(x + 4)$

$= (x + 2)(x + 4)$

$x^2 + 3x + 2 = x^2 + 2x + x + 2$

$= x(x + 2) + 1(x + 2)$

$= (x + 2)(x + 1)$

First expression $\times$ Second expression = HCF $\times$ LCM

$\Rightarrow (x^2 + 3x + 2) \times$ Second expression

$= (x^2 + 6x + 8)(x + 1) \times (x + 1)$

$\Rightarrow (x + 2)(x + 1) \times$ Second expression

$= (x + 2)(x + 4)(x + 1)(x + 1)$

$\Rightarrow$ Second expression

$= \frac{(x + 2)(x + 4)(x + 1)(x + 1)}{(x + 2)(x + 1)}$

$= (x + 4)(x + 1)$

$= x^2 + 4x + x + 4 = x^2 + 5x + 4$

51. (3) $n(A \cup B)$

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

$= 40 + 26 - 16 = 50$

52. (3)

2	6 40 09 | 253
2	4
45	240
5	225
503	1509
3	1509
506	×

$\therefore \sqrt{64009} = 253$

53. (2)

5	625
5	125
5	25
	5

$\therefore 625 = 5 \times 5 \times 5 \times 5 = 5^3 \times 5$

For the smallest cube number, 625 should be divided 5.

$625 \div 5 = 125 = 5^3$

54. (1) Distance covered in 2nd minute $= 90 - 50 = 40$ metre

Distance covered in 3rd minute

$= 130 - 90 = 40$ metre

$\therefore$ Required distance

$= 50 + 40 \times 14$

$= 50 + 560 = 610$ metre

55. (3) Required distance = LCM of 63, 70 and 77 cm.

= 6930 cm.

Illustration :

7	63,	70,	77
	9,	10,	11

$\therefore$ LCM $= 7 \times 9 \times 10 \times 11$

$= 6930$

56. (4) Required number = HCF of 200 and 320 = 40

Illustration :

200) 320 (1
200
120) 200 (1
120
80) 120 (1
80
40) 80 (2
80
×

57. (2) Work done by B

$= 1-\frac{19}{23}=\frac{23-19}{23}=\frac{4}{23}$

$\therefore (A+C):B=\frac{19}{23}:\frac{4}{23}=19:4$

$\therefore$ Sum of ratios $= 19+4=23$

$\therefore$ B's share

$=\frac{4}{23}\times 575 = \text{Rs. } 100$

58. (1) According to the question,

1 man = 2 women = 4 boys

$\therefore$ 1 man + 1 woman + 1 boy

$= (4+2+1)$ boys $= 7$ boys

$\therefore M_1 D_1 = M_2 D_2$

$\Rightarrow 7\times 7 = 1\times D_2$

$\Rightarrow D_2 =$ days

59. (3) Remaining work

$=1-\frac{1}{8}=\frac{7}{8}$

(A + B)'s 1 day's work

$=\frac{1}{6}+\frac{1}{12}=\frac{2+1}{12}=\frac{3}{12}=\frac{1}{4}$

$\therefore$ Time taken in doing $\frac{7}{8}$ part of work $=\frac{7}{8}\times 4=\frac{7}{2}$

$=3\frac{1}{2}$ days

60. (2) $M_1 D_1 T_1 = M_2 D_2 T_2$

$\Rightarrow 15\times 20\times 8 = 20\times 12\times T_2$

$\Rightarrow T_2=\frac{15\times 20\times 8}{20\times 12}=10$ hours

61. (2) $M_1 D_1 = M_2 D_2$

$\Rightarrow 9\times 20 = M_2\times 15$

$\Rightarrow M_2=\frac{9\times 20}{15}=12$ pipes

Note : Same relation as men and days is applicable

62. (4) (Raj + Ram)'s 1 day's work

$=\frac{1}{10}$

Raj's 1 day's work $=\frac{1}{12}$

$\therefore$ Ram's 1 day's work

$=\frac{1}{10}-\frac{1}{12}=\frac{6-5}{60}=\frac{1}{60}$

$\therefore$ Required time = 60 days

63. (3) Marked price = Rs. x and cost price = Rs. y.

$\therefore$ 50% of x = 90% of y

$\Rightarrow \frac{x\times 50}{100}=\frac{y\times 90}{100}$

$\Rightarrow y=\frac{x\times 50}{90}=\text{Rs. }\frac{5}{9}x$

$=\frac{5}{9}$th of marked price.

64. (2) Marked price

= Rs. (7710 + 1285)

= Rs. 8995

If discount = x%, then

x% of 8995 = 1285

$\Rightarrow \frac{8995\times x}{100}=1285$

$\Rightarrow x=\frac{1285\times 100}{8995}=\frac{100}{7}=14\frac{2}{7}\%$

65. (1) C.P. of cycle = Rs. x

$\therefore 840\times\frac{90}{100}=\frac{x\times 126}{100}$

$\Rightarrow x\times 126 = 840\times 90$

$\Rightarrow x=\frac{840\times 90}{126}=\text{Rs. } 600$

66. (4) Marked price of article = Rs. x

$\therefore$ C.P. of article = Rs. $\frac{2x}{5}$

S.P. of article $=\frac{x\times 90}{100}$

$=\text{Rs. }\frac{9x}{10}$

Gain $=\frac{9x}{10}-\frac{2x}{5}=\frac{9x-4x}{10}$

$=\frac{5x}{10}=\frac{x}{2}$

$\therefore$ Gain per cent $=\frac{\text{Gain}\times 100}{\text{C.P.}}$

$=\frac{\frac{x}{2}\times 100}{\frac{2x}{5}}=\frac{5\times 100}{4}$

$= 125\%$

67. (1) Amount lent at 8% rate of interest = Rs. x

$\therefore$ Amount lent at $\frac{4}{3}$% rate of interest = Rs. $(20{,}000-x)$

$\therefore$ S.I. $=\frac{\text{Principal}\times\text{Rate}\times\text{Time}}{100}$

$\therefore \frac{x\times 8\times 1}{100}+\frac{(20{,}000-x)\times\frac{4}{3}\times 1}{100}$

$= 800$

$\Rightarrow \frac{2x}{25}+\frac{20{,}000-x}{75}=800$

$\Rightarrow \frac{6x+20{,}000-x}{75}=800$

$\Rightarrow 5x+20{,}000 = 75\times 800$

$= 60{,}000$

$\Rightarrow 5x = 60{,}000-20{,}000 = 40{,}000$

$\Rightarrow x=\frac{40{,}000}{5}=\text{Rs. } 8000$

68. (2) In 20 litres of mixture,

Alcohol $\Rightarrow \frac{20\times 20}{100}=4$ litres

Water $\Rightarrow$ 20 - 4 = 16 litres

On adding 4 litres of water,

Quantity of water $\Rightarrow 16+4$

= 20 litres

Quantity of mixture = 24 litres

$\therefore$ Required per cent

$=\frac{4}{24}\times 100=\frac{50}{3}=16\frac{2}{3}\%$

69. (1) Son : wife = 3 : 1 = 9 : 3

Wife : daughter = 3 : 1

$\therefore$ Son : wife : daughter

= 9 : 3 : 1

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Sum of ratios = 9 + 3 + 1 = 13

If total wealth be Rs. x, then

Son's share – daughter's share = Rs. 10,000

$$\Rightarrow \frac{9x}{13} - \frac{x}{13} = 10{,}000$$

$$\Rightarrow \frac{9x - x}{13} = 10{,}000$$

$$\Rightarrow 8x = 13{,}00{,}00$$

$$\Rightarrow x = \frac{13{,}00{,}00}{8} = \text{Rs. } 16250$$

70. (4) Capacity of each container = x litre (let)

In first container,

Milk = $\frac{3x}{4}$ litres,

Water = $\frac{x}{4}$ litres

In second container,

Milk = $\frac{5x}{7}$ litres,

Water = $\frac{2x}{7}$ litres

On mixing both,

Quantity of milk = $\frac{3x}{4} + \frac{5x}{7}$

$$= \frac{21x + 20x}{28} = \frac{41x}{28} \text{ litres}$$

Quantity of water = $\frac{x}{4} + \frac{2x}{7}$

$$= \frac{7x + 8x}{28} \text{ litres} = \frac{15x}{28} \text{ litres}$$

∴ Required ratio

$$= \frac{41x}{28} : \frac{15x}{28} = 41 : 15$$

71. (*) Numbers are x and y

$\therefore x + y = 25$

$x - y = 20$

On adding,

$2x = 45$

$$\Rightarrow x = \frac{45}{2} = 22.5$$

From equation (i),

$22.5 + y = 25$

$\Rightarrow y = 25 - 22.5 = 2.5$

∴ Required ratio = 22.5 : 2.5 = 9 : 1

72. (1) Journey on foot = x km

Journey on cycle = $(80 - x)$ km

$$\therefore \frac{x}{8} + \frac{80 - x}{16} = 7$$

$$\Rightarrow \frac{2x + 80 - x}{16} = 7$$

$\Rightarrow x + 80 = 16 \times 7 = 112$

$\Rightarrow x = 112 - 80 = 32$ km.

73. (1) Required average

$$= \frac{8 \times 3 + 20 \times 2 + 26 \times m + 29 \times 1}{3 + 2 + m + 1}$$

$$\Rightarrow 17 = \frac{24 + 40 + 26m + 29}{6 + m}$$

$\Rightarrow 17(6 + m) = 93 + 26m$

$\Rightarrow 102 + 17m = 93 + 26m$

$\Rightarrow 26m - 17m = 102 - 93$

$\Rightarrow 9m = 9 \Rightarrow m = 1$

74. (2) Total annual expenditure of the family = Rs. $(4 \times 2570 + 3 \times 2490 + 5 \times 3030)$

= Rs. (10280 + 7470 + 15150)

= Rs. 32900

Total income

= Rs. (32900 + 5320)

= Rs. 38220

∴ Required average monthly income = $\frac{38220}{12}$ = Rs. 3185

75. (4) Increase in ages of five members in 3 years

= (3 × 5) years = 15 years

As average age remains same,

∴ Required difference = 15 years

76. (3) Total expenditure of man in a year

= Rs. (4 × 1800 + 8 × 2000)

= Rs. (7200 + 16000)

= Rs. 23200

Total annual income

= (23200 + 5600)

= Rs. 28800

∴ Average monthly income

$$= \frac{28800}{12} = \text{Rs. } 2400$$

77. (2) Required mean

$$= \frac{1 \times 1 + 2 \times 2 + 3 \times 3 + 4 \times 4 + 5 \times 5 + 6 \times 6 + 7 \times 7}{1 + 2 + 3 + 4 + 5 + 6 + 7}$$

$$= \frac{1 + 4 + 9 + 16 + 25 + 36 + 49}{28}$$

$$= \frac{140}{28} = 5$$

78. (4) Required number = sum of six numbers – sum of five numbers

$= 6 \times 20 - 15 \times 5$

$= 120 - 75 = 45$

79. (2) First S.P. of article

$$= \frac{200 \times 90}{100} = \text{Rs. } 180$$

After decrease of 5%,

$$\text{S.P.} = \frac{180 \times 95}{100} = \text{Rs. } 171$$

80. (3) 20 items are broken out of 144 items.

∴ C.P. of 124 items

$$= \text{Rs.} \left(\frac{144 \times 90}{100}\right) = \text{Rs. } 129.60$$

Total S.P. = Rs. (1.20 × 124)

= Rs. 148.8

∴ Gain = Rs. (148.80 – 129.60)

= Rs. 19.20

∴ Gain per cent

$$= \frac{19.20}{129.60} \times 100 = 14.8\%$$

81. (1) C.P. of article = Rs. x

$$\text{S.P.} = \frac{120x}{100} = \text{Rs. } \frac{6x}{5}$$

$$\text{Gain} = \frac{6x}{5} - x = \frac{6x - 5x}{5}$$

$= \text{Rs. } \frac{x}{5}$

$\therefore$ Gain per cent

$= \frac{\text{Gain}}{\text{S.P.}} \times 100$

$= \frac{\frac{x}{5}}{\frac{6x}{5}} \times 100 = \frac{50}{3} = 16\frac{2}{3}\%$

82. (1) C.P. of article

$= \frac{100}{100 - \text{loss per cent}} \times \text{S.P.}$

$= \frac{100}{100-15} \times 102 = \text{Rs. } 120$

On selling at Rs. 134.40,

Gain = Rs. (134.4 – 120)

= Rs. 14.4

$\therefore$ Gain per cent

$= \frac{14.4}{120} \times 100 = 12\%$

83. (1) C.P. of first toy = Rs. x

C.P. of second toy = Rs. y

$\therefore \frac{x \times 112}{100} = 504$

$\Rightarrow x = \frac{504 \times 100}{112} = \text{Rs. } 450$

Again, $y \times \frac{96}{100} = 504$

$\Rightarrow y = \frac{504 \times 100}{96} = \text{Rs. } 525$

Total C.P. = Rs. (450 + 525)

= Rs. 975

Total S.P. = 2 × 504

= Rs. 1008

Gain = 1008 – 975 = Rs. 33

$\therefore$ Profit per cent $= \frac{33 \times 100}{975}$

$= \frac{44}{13} = 3\frac{5}{13}\%$

84. (4) For A,

C.P. of horse $= 4800 \times \frac{100}{80}$

= Rs. 6000

For B,

S.P. $= \frac{6000 \times 115}{100} = \text{Rs. } 6900$

B's profit = Rs. (6900 – 4800)

= Rs. 2100

85. (3) Single equivalent increase for 10% and 10%

$= \left(10 + 10 + \frac{10 \times 10}{100}\right)\% = 21\%$

Again, single equivalent increase for 21% and 10%

$= \left(21 + 10 + \frac{21 \times 10}{100}\right)\%$

$= 31 + 2.1 = 33.1\%$

Note : Volume of cube = $(\text{Edge})^3$

Hence, formula $\left(x + y + \frac{xy}{100}\right)\%$ should be used twice.

86. (4) Original price of article

= Rs. x per kg.

New price = Rs. $\frac{79x}{100}$ per kg

$\therefore \frac{100}{\frac{79x}{100}} - \frac{100}{x} = 3$

$\Rightarrow \frac{10000}{79x} - \frac{100}{x} = 3$

$\Rightarrow \frac{10000 - 7900}{79x} = 3$

$\Rightarrow \frac{2100}{79x} = 3$

$\Rightarrow \frac{700}{79x} = 1$

$\Rightarrow 79x = 700 \Rightarrow x = \frac{700}{79}$

$\therefore$ New price

$= \frac{79x}{100} = \frac{79}{100} \times \frac{700}{79}$

= Rs. 7 per kg

87. (1) Number to be added = x (let)

$\therefore \frac{320 \times 10}{100} + x = \frac{230 \times 30}{100}$

$\Rightarrow 32 + x = 69$

$\Rightarrow x = 69 - 32 = 37$

88. (1) Increase in first year = 10%

Decrease in 2nd year = 10%

Effective result

$= \left(10 - 10 - \frac{10 \times 10}{100}\right)\%$

$= -1\%$

Increase in 3rd year = 10%

$\therefore$ Effective result

$= \left(10 - 1 - \frac{10 \times 1}{100}\right)\%$

$= (9 - 0.1)\% = 8.9\%$ (increase)

89. (1) Length of each train

= x metre

Relative speed = 46 – 36

= 10 kmph

$= \left(10 \times \frac{5}{18}\right)$ m/sec

$= \frac{25}{9}$ m/sec

$\therefore$ Time taken in crossing

$= \frac{\text{Length of both trains}}{\text{Relative speed}}$

$\Rightarrow 36 = \frac{2x}{\frac{25}{9}}$

$\Rightarrow 2x = 36 \times \frac{25}{9} = 100$

$\Rightarrow x = \frac{100}{2} = 50$ metre

90. (4) Distance covered by car in 2 hours

$= \frac{300 \times 40}{100} = 120$ km

Remaining distance

= 300 – 120 = 180 km

Remaining time = 4 – 2

= 2 hours

$\therefore$ Required speed = $\frac{180}{2}$

= 90 kmph

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Original speed of car $= \frac{120}{2}$

$= 60$ kmph

$\therefore$ Required increase in speed

$= 90 - 60 = 30$ kmph

91. (1) Speed of train = 54 kmph

$= \left(\frac{54 \times 5}{18}\right)$ m/sec $= 15$ m/sec

Required time

$= \frac{\text{Length of trains}}{\text{Speed of train}}$

$= \frac{300}{15} = 20$ seconds

92. (2) Time taken in covering 5 Km $= \frac{5}{10} = \frac{1}{2}$ hour

$= 30$ minutes

That person will take rest for four times.

$\therefore$ Required time

$= (30 + 4 \times 5)$ minutes

$= 50$ minutes

93. (4) Amount borrowed = Rs. x

$\therefore$ Interest to be paid $= \frac{x \times 3}{100}$

$= \text{Rs. } \frac{3x}{100}$

Case II,

Rate $= \frac{5}{2}\%$ per half year

Time = 2 half years

$\therefore$ C.I. $= P\left[\left(1 + \frac{R}{100}\right)^T - 1\right]$

$= x\left[\left(1 + \frac{5}{200}\right)^2 - 1\right]$

$= x\left[\left(1 + \frac{1}{40}\right)^2 - 1\right]$

$= x\left[\left(\frac{41}{40}\right)^2 - 1\right]$

$= x\left(\frac{1681}{1600} - 1\right)$

$= x\left(\frac{1681 - 1600}{1600}\right) = \text{Rs. } \frac{81x}{1600}$

Difference $= \frac{81x}{1600} - \frac{3x}{100}$

$= \frac{81x - 48x}{1600}$

$= \text{Rs. } \frac{33x}{1600}$

$\therefore \frac{33x}{1600} = 330$

$\Rightarrow x = \frac{1600 \times 330}{33} = \text{Rs. } 16000$

94. (2) Present worth of bike

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

$= 62500\left(1 - \frac{4}{100}\right)^2$

$= 62500\left(1 - \frac{1}{25}\right)^2$

$= 62500\left(\frac{25 - 1}{25}\right)^2$

$= \frac{62500 \times 24 \times 24}{25 \times 25}$

$= \text{Rs. } 57600$

95. (4) Principal = Rs. P (let)

$\therefore$ C.I. $= P\left[\left(1 + \frac{R}{100}\right)^T - 1\right]$

$\Rightarrow 510 = P\left[\left(1 + \frac{25}{200}\right)^2 - 1\right]$

$\Rightarrow 510 = P\left[\left(1 + \frac{1}{8}\right)^2 - 1\right]$

$\Rightarrow 510 = P\left[\left(\frac{9}{8}\right)^2 - 1\right]$

$\Rightarrow 510 = P\left(\frac{81}{64} - 1\right)$

$\Rightarrow 510 = P\left(\frac{81 - 64}{64}\right)$

$\Rightarrow 510 = \frac{17P}{64}$

$\Rightarrow P = \frac{510 \times 64}{17} = \text{Rs. } 1920$

$\therefore$ S.I.

$= \frac{\text{Principal} \times \text{Time} \times \text{Rate}}{100}$

$= \frac{1920 \times 2 \times 25}{100 \times 2} = \text{Rs. } 480$

96. (3) Number of wrist watches sold in 2010 = 28.7 lakhs

Number of table clocks sold in 2010 = 22.3 lakhs

$\therefore$ Required per cent

$= \left(\frac{28.7 - 22.3}{22.3}\right) \times 100$

$= \frac{6.4}{22.3} \times 100 = 28.7\%$

97. (4) Required ratio = 3.5 : 9.5

= 7 : 19

98. (2) Required per cent

$= \frac{30.7 - 9.5}{30.7} \times 100$

$= \frac{21.2 \times 100}{30.7} = 69.05\%$

99. (4) Here, decrease is evident from bar diagram.

Wrist watches : 21.3 $\Rightarrow$ 28.7 lakhs

Table clocks 9.5 $\Rightarrow$ 22.3 lakhs

Wall clocks 30.7 $\Rightarrow$ 32.7 lakhs

100. (1) Percentage increase in the sales of table clocks

$= \frac{(22.3 - 9.5)}{9.5} \times 100$

$= \frac{12.8}{9.5} \times 100 = 135$

□□□