

SSC

Combined Graduate Level Tier-II Exam

Held on: 01.08.2010

- A General, while arranging his men, who were 6000 in number, in the form of a square, found that there were 71 men left over. How many were arranged in each row?

(a) 73 (b) 77
(c) 87 (d) 93
- A number, when divided successively by 4, 5 and 6, leaves remainders 2, 3 and 4 respectively. The least such number is

(a) 50 (b) 53
(c) 19 (d) 214
- A number, when divided by 296, gives 75 as the remainder. If the same number is divided by 37 then the remainder will be

(a) 1 (b) 2
(c) 19 (d) 31
- The square root of

$$\frac{(0.75)^3}{1 \cdot 0.75} \cdot 0.75 \cdot (0.75)^2 \cdot 1$$

(a) 1 (b) 2
(c) 3 (d) 4
- The sum and product of two numbers are 12 and 35 respectively. The sum of their reciprocals will be

(a) $\frac{1}{3}$ (b) $\frac{1}{5}$ (c) $\frac{12}{35}$ (d) $\frac{35}{12}$
- If $a^2 \cdot b^2 \cdot \frac{1}{a^2} \cdot \frac{1}{b^2}$, then the value of $a^2 + b^2$ will be

(a) 1 (b) $1\frac{1}{2}$ (c) 2 (d) $2\frac{1}{2}$
- If $(x - \frac{1}{x})^2 = 3$, then $(x^3 - \frac{1}{x^3})^2$ is equal to

(a) 3 (b) 2
(c) 1 (d) 0
- $\frac{0.1}{0.2} \cdot \frac{0.1}{0.2} \cdot \frac{0.1}{0.2} \cdot \frac{0.02}{0.04} \cdot \frac{0.02}{0.04} \cdot \frac{0.02}{0.04}$ is equal to

(a) 0.125 (b) 0.250
(c) 0.500 (d) 0.855
- If $x - \frac{1}{x} = 2$, then the value of $x^{100} - \frac{1}{x^{100}}$ is

(a) 2 (b) 0
(c) 1 (d) -2
- If $x^3 + 3x^2 + 3x = 7$, then x is equal to

(a) 2 (b) $\sqrt[3]{6}$
(c) 1 (d) -1
- If $2x - \frac{2}{x} = 1$, then the value of $x^3 - \frac{1}{x^3}$ is

(a) $\frac{13}{8}$ (b) $\frac{11}{8}$ (c) $\frac{11}{8}$ (d) $\frac{13}{8}$
- The greatest number among $\sqrt{5}, \sqrt[3]{4}, \sqrt[5]{2}, \sqrt[7]{3}$ is

(a) $\sqrt[3]{4}$ (b) $\sqrt[7]{3}$
(c) $\sqrt{5}$ (d) $\sqrt[5]{2}$

Solved Paper

13. $\sqrt[3]{(13.608)^2 (13.392)^2}$ is equal to
 (a) 0.6 (b) 0.06
 (c) 1.8 (d) 2.6
14. $\frac{1}{1} \frac{1}{2} \frac{1}{2} \frac{1}{3} \frac{1}{3} \frac{1}{4} \dots \frac{1}{99} \frac{1}{100}$ is equal to:
 (a) $\frac{1}{9900}$ (b) $\frac{99}{100}$ (c) $\frac{100}{99}$ (d) $\frac{1000}{99}$
15. The sum of all the digits of the numbers from 1 to 100 is
 (a) 5050 (b) 903
 (c) 901 (d) 900
16. A shopkeeper sells sugar in such a way that the selling price of 950g of sugar is the same as the cost price of 1 kg of sugar. What is his gain per cent?
 (a) $5\frac{5}{19}$ (b) $5\frac{1}{5}$ (c) 5 (d) $4\frac{1}{19}$
17. A person bought a horse and a carriage for Rs. 20000. Later, he sold the horse at 20% profit and the carriage at 10% loss. Thus, he gained 2% in the whole transaction. The cost price of the horse was
 (a) Rs. 7200 (b) Rs. 7500
 (c) Rs. 8000 (d) Rs. 9000
18. A sells an article to B at 15% profit. B sells it to C at 10% loss. If C pays Rs. 517.50 for it then A purchased it at
 (a) Rs. 500 (b) Rs. 750
 (c) Rs. 1000 (d) Rs. 1250
19. An article is sold at a certain fixed price. By selling it at $\frac{2}{3}$ of that price, one loses 10%. The gain per cent on selling it at the original price is
 (a) 20 (b) $33\frac{1}{3}$
 (c) $\frac{200}{9}$ (d) 40
20. A sells an article to B for Rs. 45,000 losing 10% in the transaction. B sells it to C at a price which would have given a profit of 10% to A. By what per cent does B gain?
 (a) $\frac{75}{2}$ (b) $\frac{100}{3}$ (c) $\frac{200}{9}$ (d) $\frac{150}{7}$
21. The cost price of an article is 80% of its marked price for sale. How much per cent does the tradesman gain after allowing a discount of 12%?
 (a) 20 (b) 12
 (c) 10 (d) 8
22. A merchant has announced 25% rebate on prices of ready-made garments at the time of sale. If a purchase needs to have a rebate of Rs. 400, then how many shirts, each costing Rs. 320, should he purchase?
 (a) 10 (b) 7
 (c) 6 (d) 5
23. A merchant purchases a wristwatch for Rs. 450 and fixes its list price in such a way that after allowing a discount of 10%, he earns a profit of 20%. Then the list price (in rupees) of the wristwatch is
 (a) 500 (b) 600
 (c) 750 (d) 800
24. A reduction of 10% in the price of tea enables a dealer to purchase 25 kg more tea for Rs. 22500. What is the reduced price per kg of tea?
 (a) Rs. 70 (b) Rs. 80
 (c) Rs. 90 (d) Rs. 100
25. Ram donated 4% of his income to a charity and deposited 10% of the rest in a Bank. If now he has Rs. 8640 left with him, then his income is
 (a) Rs. 12,500 (b) Rs. 12,000
 (c) Rs. 10,500 (d) Rs. 10,000
26. If the length of a rectangle is increased by 10% and its breadth is decreased by 10%, then its area
 (a) decreases by 1% (b) increases by 1%
 (c) decreases by 2% (d) remains unchanged

27. Three spherical balls of radius 1 cm, 2 cm and 3 cm are melted to form a single spherical ball. In the process, the loss of material is 25%. The radius of the new ball is
 (a) 6 cm (b) 5 cm
 (c) 3 cm (d) 2 cm
28. If $A : B = 2 : 3$, $B : C = 4 : 5$ and $C : D = 5 : 9$, then $A : D$ is equal to
 (a) 11 : 17 (b) 8 : 27
 (c) 5 : 9 (d) 2 : 9
29. If the length of a rectangle is increased in the ratio 6 : 7 and its breadth is diminished in the ratio 5 : 4 then its area will be diminished in the ratio
 (a) 17 : 16 (b) 15 : 14
 (c) 9 : 8 (d) 8 : 7
30. 7 years ago, the ages (in years) of A and B were in the ratio 4 : 5; and 7 years hence they will be in the ratio 5 : 6. The present age of B is
 (a) 56 years (b) 63 years
 (c) 70 years (d) 77 years
31. Two numbers are such that their difference, their sum and their product are in the ratio of 1 : 7 : 24. The product of the numbers is
 (a) 24 (b) 36
 (c) 48 (d) 60
32. A, B, C are partners in a business. During a particular year, A received one third of the profit, B received one fourth of the profit and C received the remaining Rs. 5000. How much amount of money did A receive?
 (a) Rs. 1000 (b) Rs. 3000
 (c) Rs. 4000 (d) Rs. 5000
33. Three horses are tethered at 3 corners of a triangular plot of land having sides 20m, 30m and 40m each with a rope of length 7m. The area (in m^2) of the region of this plot, which can be grazed by the horses, is
 (Use $\frac{22}{7}$)
- (a) $\frac{77}{3}$ (b) 75 (c) 77 (d) 80
34. A wire, when bent in the form of a square, encloses a region of area 121 cm^2 . If the same wire is bent into the form of a circle, then the area of the circle is (Use $\frac{22}{7}$)
 (a) 150 cm^2 (b) 152 cm^2
 (c) 154 cm^2 (d) 159 cm^2
35. The ratio of the area of a sector of a circle to the area of the circle is 1 : 4. If the area of the circle is 154 cm^2 , the perimeter of the sector is
 (a) 20 cm (b) 25 cm
 (c) 36 cm (d) 40 cm
36. The length of the diagonal of a cube is 6 cm. The volume of the cube (in cm^3) is
 (a) $18\sqrt{3}$ (b) $24\sqrt{3}$
 (c) $28\sqrt{3}$ (d) $30\sqrt{3}$
37. If a sphere of radius r is divided into four identical parts, then the total surface area of the four parts is
 (a) $4 r^2$ square unit (b) $2 r^2$ square unit
 (c) $8 r^2$ square unit (d) $3 r^2$ square unit
38. A sum of money, deposited at some rate per cent per annum of compound interest, doubles itself in 4 years. In how many years will it become 16 times of itself at the same rate?
 (a) 16 (b) 12
 (c) 10 (d) 8
39. What is the difference between the compound interest and simple interest on Rs. 4000 at 5% per annum for 2 years?
 (a) 10 (b) 11
 (c) 20 (d) 100
40. The simple and compound interests on a sum of money for 2 year are Rs. 8400 and Rs. 8652 respectively. The rate of interest per annum is
 (a) 6% (b) 7.5% (c) 9% (d) 4.5%

Solved Paper

41. A man can row against the current three-fourth of a kilometre in 15 minutes and returns the same distance in 10 minutes. The ratio of his speed to that of the current is
 (a) 3 : 5 (b) 5 : 3
 (c) 1 : 5 (d) 5 : 1
42. Two places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at a constant speed, they meet in 5 hours. If the cars travel towards each other, they meet in 1 hour. What is the speed of the car running faster ?
 (a) 60 km/hr. (b) 50 km/hr.
 (c) 40 km/hr. (d) 32 km/hr.
43. A can complete a piece of work in 12 days. B is 60% more efficient than A. The number of days, that B will take to complete the same work, is
 (a) 6 (b) $7\frac{1}{2}$ (c) 8 (d) $8\frac{1}{2}$
44. Two pipes can fill an empty tank separately in 24 minutes and 40 minutes respectively and a third pipe can empty 30 gallons of water per minute. If all the three pipes are open, empty tank becomes full in one hour. The capacity of the tank (in gallons) is
 (a) 800 (b) 600
 (c) 500 (d) 400
45. A batsman, in his 12th innings, makes a score of 63 runs and thereby increases his average score by 2. The average of his score after 12th innings is
 (a) 41 (b) 42
 (c) 34 (d) 35
46. The greatest number, that divides 43, 91 and 183 so as to leave the same remainder in each case, is
 (a) 9 (b) 8
 (c) 4 (d) 3
47. $\frac{\sqrt{7}}{\sqrt{16} \cdot 6\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{16} \cdot 6\sqrt{7}}$ is equal to
 (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{5}$
48. The sum of the areas of the 10 squares, the lengths of whose sides are 20 cm, 21 cm, ..., 29 cm respectively is
 (a) 6085 cm² (b) 8555 cm²
 (c) 2470 cm² (d) 11025 cm²
49. The square root of $\frac{9.5 \ 0.0085 \ 18.9}{0.0017 \ 1.9 \ 2.1}$ is
 (a) 15 (b) 45
 (c) 75 (d) 225
50. If $2x \cdot \frac{1}{3x} = 6$, then $3x \cdot \frac{1}{2x}$ is equal to
 (a) 4 (b) 8
 (c) 9 (d) 12
51. If $x = \sqrt{2} \cdot 1^{\frac{1}{2}}$ then the value of $(x^2 - \frac{1}{x^2})$ is
 (a) 2 (b) $2\sqrt{2}$
 (c) $2\sqrt{2}$ (d) 2
52. $\frac{3}{4}(1 - \frac{1}{3})(1 - \frac{2}{5})(1 - \frac{2}{5})(1 - \frac{6}{7})(1 - \frac{12}{13})$ is equal to
 (a) $\frac{2}{13}$ (b) $\frac{1}{7}$ (c) $\frac{1}{6}$ (d) $\frac{1}{5}$
53. $\frac{(0.87)^3 \cdot (0.13)^3}{(0.87)^2 \cdot (0.13)^2 \cdot (0.87) \cdot (0.13)}$ is equal to
 (a) $\frac{1}{2}$ (b) 2 (c) 1 (d) $2\frac{1}{2}$
54. If $x^2 + y^2 - 2x + 6y + 10 = 0$, then the value of $(x^2 + y^2)$ is
 (a) 4 (b) 6
 (c) 8 (d) 10

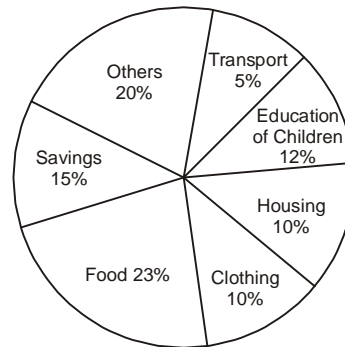
Solved Paper

70. Two numbers are respectively $12\frac{1}{2}\%$ and 25% more than a third number. The first number is how much per cent of the second number?
 (a) 90 (b) 87.5
 (c) 25 (d) 12.5
71. Population of a town increases 2.5% annually but is decreased by 0.5% every year due to migration. What will be the percentage of increase in 2 years?
 (a) 5 (b) 4.04
 (c) 4 (d) 3.96
72. 72% of the students of a certain class took Biology and 44% took Mathematics. If each student took at least one of Biology or Mathematics and 40 students took both of these subjects, the total number of students in the class is
 (a) 200 (b) 240
 (c) 250 (d) 320
73. Rs. 1050 are divided among A, B and C in such a way that the share of A is $\frac{2}{5}$ of the combined share of B and C. A will get
 (a) Rs. 200 (b) Rs. 300
 (c) Rs. 320 (d) Rs. 420
74. The sides of a right-angled triangle forming right angle are in the ratio 5 : 12. If the area of the triangle is 270 cm^2 , then the length of the hypotenuse is
 (a) 39 cm (b) 42 cm
 (c) 45 cm (d) 51 cm
75. Two numbers are in the ratio 5 : 6. If their H.C.F is 4, then their L.C.M. will be
 (a) 90 (b) 96
 (c) 120 (d) 150
76. If $a + b + c = 1$ and $ab + bc + ca = \frac{1}{3}$ then $a : b : c$ is
 (a) 1 : 2 : 2 (b) 2 : 1 : 2
 (c) 1 : 1 : 1 (d) 1 : 2 : 1
77. A and B enter into partnership with capitals in the ratio 5 : 6. At the end of 8 months A withdraws his capital. They received profits in the ratio 5 : 9. B invested the capital for
 (a) 6 months (b) 8 months
 (c) 10 months (d) 12 months
78. What is the length of the radius of the circum-circle of the equilateral triangle, the length of whose side is $6\sqrt{3}\text{ cm}$?
 (a) $6\sqrt{3}\text{ cm}$ (b) 6 cm
 (c) 5.4 cm (d) $3\sqrt{6}\text{ cm}$
79. If the measure of a diagonal and the area of a rectangle are 25 cm and 168 cm^2 respectively, what is the length of the rectangle?
 (a) 31 cm (b) 24 cm
 (c) 17 cm (d) 7 cm
80. The number of coins, each of radius 0.75 cm and thickness 0.2 cm, to be melted to make a right circular cylinder of height 8 cm and radius 3 cm, is
 (a) 640 (b) 600 (c) 500 (d) 480
81. If the radius of a sphere is increased by 2m, its surface-area is increased by 704 m^2 . What is the radius of the original sphere?
 (Use $\frac{22}{7}$)
 (a) 16 m (b) 15 m (c) 14 m (d) 13 m
82. A right circular cylinder is circumscribing a hemisphere such that their bases are common. The ratio of their volumes is
 (a) 1 : 3 (b) 1 : 2
 (c) 2 : 3 (d) 3 : 4
83. A man invested $\frac{1}{3}$ of his capital at 7%, $\frac{1}{4}$ at 8% and the remaining at 10% rate of simple interest. If his annual income from interests is Rs. 561, the capital invested was
 (a) Rs. 6000 (b) Rs. 5600
 (c) Rs. 6600 (d) Rs. 7200

84. The compound interest on Rs. 6250 at 12% per annum for 1 year, compounded half-yearly is
 (a) Rs. 772.50 (b) Rs. 772
 (c) Rs. 672.50 (d) Rs. 672
85. A sum of money lent at compound interest amounts to Rs. 1460 in 2 years and to Rs. 1606 in 3 years. The rate of interest per annum is
 (a) 12% (b) 11%
 (c) 10.5% (d) 10%
86. If A travels to his school from his house at the speed of 3 km/hr. then he reaches the school 5 minutes late. If he travels at the speed of 4 km/hr, he reaches the school 5 minutes earlier than school time. The distance of his school from his house is
 (a) 1 km (b) 2 km
 (c) 3 km (d) 4 km
87. A train travelling with a speed of 60 km/hr catches another train travelling in the same direction and then leaves it 120 m behind in 18 seconds. The speed of the second train is
 (a) 26 km/hr (b) 35 km/hr
 (c) 36 km/hr (d) 63 km/hr
88. A and B together can complete a piece of work in 12 days and B and C together in 15 days. If A is twice as good a workman as C, then in how many days will be alone complete the same work?
 (a) 30 (b) 25
 (c) 24 (d) 20
89. 4 men and 6 women together can complete a work in 8 days while 3 men and 7 women together can complete it in 10 days. 20 women working together will complete it in
 (a) 36 days (b) 32 days
 (c) 24 days (d) 20 days
90. The average of two numbers A and B is 20, that of B and C is 19 and of C and A it is 21. What is the value of A?
 (a) 24 (b) 22
 (c) 20 (d) 18

Directions (91-95): The pie chart given below, shows the expenditure on various items and savings of a family during the year 2009. Study the pie chart and answer these questions.

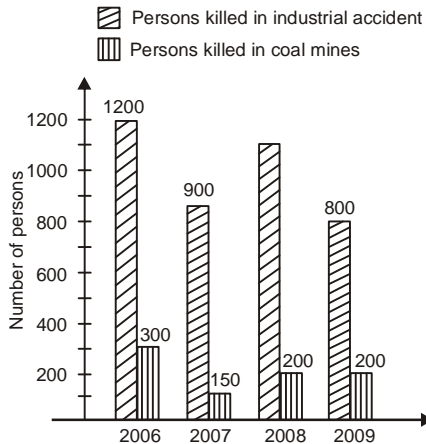
PERCENTAGE OF MONEY SPENT ON VARIOUS ITEMS AND SAVINGS BY A FAMILY DURING 2009



91. If the total income of the family for the year 2009 was Rs. 1,50,000 then the difference between the expenditures on housing and transport was
 (a) Rs. 15,000 (b) Rs. 10,000
 (c) Rs. 12,000 (d) Rs. 7,500
92. Maximum expenditure of the family other than on food, was on
 (a) Housing (b) Clothing
 (c) Others (d) Education of children
93. The savings of the family for the year were equal to the expenditure on
 (a) Food (b) Housing
 (c) Education of children (d) Clothing
94. The percentage of the income which was spent on clothing, education of children and transport together is
 (a) 17 (b) 20
 (c) 22 (d) 27
95. If the total income of the family was Rs. 1,50,000 then the money spent on food was
 (a) Rs. 20,000 (b) Rs. 23,000
 (c) Rs. 30,000 (d) Rs. 34,500

Solved Paper

Directions (96-100): Study the bar diagram and answer these questions.



96. The number of persons killed in coal mines in 2006 was what per cent of those killed in industrial accidents in that year ?
 (a) 4 (b) 25
 (c) 36 (d) 300
97. In which year, minimum number of persons were killed in industrial accidents and coal mines together?
 (a) 2006 (b) 2007
 (c) 2008 (d) 2009
98. In which year, maximum number of persons were killed in industrial accidents other than those killed in coal mines?
 (a) 2006 (b) 2007
 (c) 2008 (d) 2009
99. In which years, minimum number of persons were killed in coal mines other than those killed in industrial accidents?
 (a) 2006 (b) 2007
 (c) 2008 (d) 2009
100. In a year, on average, how many persons were killed in industrial accidents and coal mines together ?
 (a) 121.25 (b) 1212
 (c) 1212.5 (d) 1000

ANSWERS

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

EXPLANATIONS

1. Number of men arranged in the form of a square
 $= 6000 - 71 = 5929$
 Number of men arranged in each row
 $= \sqrt{5929} = 77$
2. 4 x Remainder
 $5y - 2$
 $6z - 3$
 $1 - 4$
 $z = 6 \times 1 + 4 = 10$
 $y = 5 \times 10 + 3 = 53$
 $x = 4 \times 53 + 2 = 214$
4. $\frac{(0.75)^3}{1 \ 0.75} [(0.75)^2 \ 0.75 \ 1 \ 1]$

$$= \frac{(0.75)^3 (1 - 0.75)[(0.75)^2 - 0.75 + 1 - 1^2]}{1 - 0.75}$$

$$= \frac{(0.75)^3 - 1^3 - (0.75)^3}{0.25}$$

$$[(a - b)(a^2 + ab + b^2) = a^3 - b^3]$$

$$= \frac{1}{1 - 0.75} = \frac{1}{0.25} = \frac{100}{25} = 4$$

$$\text{Square root} = \sqrt{4} = 2$$

$$5. \quad \begin{aligned} x + y &= 12 && \dots(i) \\ xy &= 35 && \dots(ii) \end{aligned}$$

$$\frac{x}{xy} = \frac{y}{y} = \frac{1}{x} = \frac{12}{35}$$

$$6. \quad a^2 - b^2 = \frac{1}{a^2} - \frac{1}{b^2} = 4$$

$$a^2 - \frac{1}{a^2} - b^2 + \frac{1}{b^2} = 4$$

$$\left(a - \frac{1}{a}\right)^2 - 2 + \left(b - \frac{1}{b}\right)^2 - 2 = 4$$

$$\left(a - \frac{1}{a}\right)^2 + \left(b - \frac{1}{b}\right)^2 = 0$$

$$a - \frac{1}{a} = 0, \quad b - \frac{1}{b} = 0$$

$$a = b = +1$$

$$a^2 + b^2 = 1 + 1 = 2.$$

$$7. \quad \left(x - \frac{1}{x}\right)^2 = 3$$

$$x - \frac{1}{x} = \sqrt{3}$$

$$\text{Now, } x^3 - \frac{1}{x^3}$$

$$= \left(x - \frac{1}{x}\right)^3 - 3x \cdot \frac{1}{x} \left(x - \frac{1}{x}\right)$$

$$= \sqrt{3}^3 - 3\sqrt{3}$$

$$= 3\sqrt{3} - 3\sqrt{3} = 0$$

$$8. \quad \text{If } 0.1 = 1 \text{ then, } 0.2 = 2a \\ \text{and } 0.02 = b \text{ then, } 0.04 = 2b$$

Expression

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

$$= \frac{a^3 \ b^3}{8a^3 \ 8b^3} = \frac{a^3 \ b^3}{8(a^3 \ b^3)} = \frac{1}{8} = 0.125$$

$$10. \quad x^3 + 3x^2 + 3x = 7$$

$$x^3 + 3x^2 + 3x + 1 = 7 + 1 = 8$$

$$(x + 1)^3 = 2^3$$

$$x + 1 = 2$$

$$x = 1$$

$$11. \quad 2x - \frac{2}{x} = 1$$

$$x - \frac{1}{x} = \frac{1}{2} \dots(i)$$

$$x^3 - \frac{1}{x^3}$$

$$= \left(x - \frac{1}{x}\right)^3 - 3x \cdot \frac{1}{x} \left(x - \frac{1}{x}\right)$$

$$= \left(\frac{1}{2}\right)^3 - 3 \cdot \frac{1}{2}$$

$$= \frac{1}{8} - \frac{3}{2} = \frac{1 - 12}{8} = \frac{-11}{8}$$

$$12. \quad \text{LCM of the orders of the surds} = \text{LCM of } 2, 3, 5 \text{ and } 7 = 210$$

$$\frac{1}{5^2} = \frac{105}{5^{210}} = 5^{105} \cdot \frac{1}{210}$$

Solved Paper

$$4^{\frac{1}{3}} = 4^{\frac{70}{210}} = 4^{70} \frac{1}{210}$$

$$2^{\frac{1}{5}} = 2^{\frac{42}{210}} = 2^{42} \frac{1}{210}$$

$$3^{\frac{1}{7}} = 3^{\frac{30}{210}} = 3^{30} \frac{1}{210}$$

The largest number

$$= 5^{\frac{1}{2}} = \sqrt{5}$$

13. Expression

$$= \sqrt[3]{(13.608)^2 (13.392)^2}$$

$$= \sqrt[3]{(13.608 \ 13.392)(13.608 \ 13.392)}$$

$$= \sqrt[3]{27 \ 0.216}$$

$$= \sqrt[3]{\frac{27 \ 216}{1000}}$$

$$= \frac{3 \ 6}{10} = 1.8$$

16. Profit per cent

$$= \frac{\text{True weight} - \text{False weight}}{\text{False weight}} \times 100$$

$$= \frac{1000 - 950}{950} \times 100$$

$$= \frac{100}{19} = 5 \frac{5}{19}$$

17. If the GP of horse be Rs. x, then

CP of carriage = Rs. (20000 - x)

$$x \times \frac{120}{100} + (20000 - x) \times \frac{90}{100}$$

$$= 20000 \times \frac{102}{100}$$

$$120x + 180000 - 90x$$

$$= 204000$$

$$30x = 204000 - 180000$$

$$= 240000$$

$$x = \frac{240000}{30} = \text{Rs. } 8000$$

18. If an article is sold to B at x% profit/loss and B sells the same to C at y% profit/loss, then C's C.P.

$$= \text{A's CP} \left(\frac{100 + x}{100} \right) \left(\frac{100 + y}{100} \right)$$

$$\text{A's CP} = \text{C's CP}$$

$$\left(\frac{100}{100 + 15} \right) \left(\frac{100}{100 + 10} \right)$$

$$= 517.50 \times \frac{100}{115} \times \frac{100}{90} = \text{Rs. } 500$$

19. Let the C.P. of the article be Rs. 100.

$$\text{S.P. of the article} \times \frac{2}{3} = 90$$

S.P. of the article

$$= \frac{90 \times 3}{2} = 135$$

Profit per cent at the original price = 35

20. A's C.P.

$$= 45000 \times \frac{100}{90} = \text{Rs. } 50000$$

B's S.P.

$$= 50000 \times \frac{110}{100}$$

$$= \text{Rs. } 55000$$

B's profit per cent

$$= \frac{10000}{45000} \times 100 = \frac{200}{9}$$

21. C.P. of the article = Rs. 100

Marked price

$$= \frac{100 - 100}{80} = \text{Rs. } 125$$

SP after the discount

$$= \text{Rs.} \left(\frac{125 - 88}{100} \right) = \text{Rs. } 110$$

Gain per cent = 10

23. If the marked price of the wrist watch be Rs. x, then

$$x \cdot \frac{90}{100} = \frac{450 - 120}{100} = 540$$

$$x = \frac{540 \cdot 100}{90} = \text{Rs. } 600$$

24. Let the original price of tea be Rs. x/kg

$$\text{New price} = \text{Rs.} \left(\frac{9x}{10} \right) / \text{kg}$$

$$\frac{22500}{\frac{9x}{10}} - \frac{22500}{x} = 25$$

$$22500 \left(\frac{10}{9x} - \frac{1}{x} \right) = 25$$

$$22500 \left(\frac{10 - 9}{9x} \right) = 25$$

$$22500 = 25 \times 9x$$

$$x = \frac{22500}{25 \cdot 9} = 100$$

New price

$$= \frac{9}{10} \cdot 100 = \text{Rs. } 90 \text{ per kg.}$$

25. Let Ram's income = Rs. 100.

Donation to charity = Rs. 4

Amount deposited in bank

$$= \frac{96 - 10}{100} = \text{Rs. } 9.6$$

$$\text{Savings} = 100 - 13.6 = \text{Rs. } 86.4$$

$$\text{Q Rs. } 86.4 = 100$$

$$\text{Rs. } 8640 = \frac{100}{86.4} \cdot 8640$$

$$= \text{Rs. } 10000$$

26. Effect on area

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

$$= -1\%$$

Here, negative sign shows decrease.

27. Volume of the new ball

$$= \frac{3}{4} \cdot \frac{4}{3} (r_1^3 - r_2^3 - r_3^3)$$

$$= (1^3 - 2^3 + 3^3)$$

$$= (1 - 8 + 27)$$

$$= 36 \text{ cubic cm.}$$

$$\frac{4}{3} r^3 = 36$$

$$r^3 = \frac{36 \cdot 3}{4} = 27$$

$$r = \sqrt[3]{27} = 3 \text{ cm}$$

30. 7 years ago, A's age = 4x years and B's age = 5x years

$$\frac{4x - 14}{5x - 14} = \frac{5}{6}$$

$$25x + 70 = 24x + 84$$

$$x = 84 - 70 = 14$$

B's present age

$$= 5x + 7 = 5 \times 14 + 7 = 77 \text{ years}$$

32. Total profit $\times \left(1 - \frac{1}{3} - \frac{1}{4} \right) = 5000$

$$\text{Total profit} \times \left(\frac{12 - 4 - 3}{12} \right) = 5000$$

Total profit

Solved Paper

$$= \frac{5000 \times 12}{5} = \text{Rs. } 12000$$

$$\text{A's share} = \text{Rs. } \left(\frac{1}{3} \times 12000 \right)$$

$$= \text{Rs. } 4000$$

34. Side of the square

$$= \sqrt{121} = 11 \text{ cm}$$

$$\text{Length of the wire} = 4 \times 11$$

$$= 44 \text{ cm}$$

$$2r = 44$$

$$2 \times \frac{22}{7} \times r = 44$$

$$r = 7 \text{ cm}$$

$$\text{Area of circle} = r^2$$

$$= \frac{22}{7} \times 7 \times 7$$

$$= 154 \text{ sq. cm.}$$

36. If the edge of the cube be x cm then,

$$\sqrt{3}x = 6$$

$$x = \frac{6}{\sqrt{3}} = 2\sqrt{3} \text{ cm}$$

$$\text{Volume of the cube} = (\text{edge})^3$$

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

$$= 24\sqrt{3} \text{ cm}^3$$

37. Required total surface area

$$= 4r^2 + 4 \times r^2$$

$$= 8r^2 \text{ sq. unit}$$

39. Difference

$$= \text{Principal} \left(\frac{r}{100} \right)^2 = 4000 \left(\frac{5}{100} \right)^2 = \text{Rs. } 10$$

40. Difference = Rs. (8652 - 8400) = Rs. 252

$$\text{Rate} = \frac{2 \times \text{Difference}}{\text{S.I.}} \times 100$$

$$= \frac{2 \times 252}{8400} \times 100 = 6\%$$

43. Ratio of their efficiency

$$= 100 : 160 = 5 : 8$$

$$\text{Ratio of time taken} = 8 : 5$$

$$\text{Time taken by B}$$

$$= 12 \times \frac{5}{8} = \frac{15}{2} = 7\frac{1}{2} \text{ days}$$

44. Capacity of the tank = x gallons.

Part of the tank filled in 1 minute

$$= \frac{x}{24} - \frac{x}{40} = 30$$

$$60 \left(\frac{x}{24} - \frac{x}{40} \right) = 30$$

$$\frac{x}{24} - \frac{x}{40} = \frac{30}{60} = 30$$

$$\frac{5x - 3x}{120} = 30$$

$$\frac{x}{20} = 30 \Rightarrow x = 600 \text{ gallons}$$

45. Average of the batsman upto 11th innings

$$= 63 - 12 \times 2 = 39$$

$$\text{Required average} = 39 + 2 = 41$$

46. Required number

$$= \text{HCF of } (91 - 43), (183 - 91) \text{ and } (183 - 43)$$

$$= \text{HCF of } 48, 92 \text{ and } 140 = 4$$

47. Expression

$$= \frac{\sqrt{7}}{\sqrt{16} \times 6\sqrt{7} \times \sqrt{16} \times 6\sqrt{7}}$$

$$= \frac{\sqrt{7}}{\sqrt{9} \times 7 \times 2 \times 3 \times \sqrt{7} \times \sqrt{9} \times 7 \times 2 \times 3 \times \sqrt{7}}$$

$$= \frac{\sqrt{7}}{(3 \times \sqrt{7}) \times (3 \times \sqrt{7})}$$

$$= \frac{\sqrt{7}}{3 \sqrt{7} \cdot 3 \sqrt{7}} = \frac{1}{2}$$

$$\begin{aligned} 48. \text{ Required sum} &= 20^2 + 21^2 + \dots + 29^2 \\ &= (1^2 + 2^2 + \dots + 29^2) - (1^2 + 2^2 + \dots + 19^2) \\ &= \frac{29(29+1)(2 \cdot 29+1)}{6} - \frac{19(19+1)(2 \cdot 19+1)}{6} \end{aligned}$$

$$= \frac{Q \cdot 1^2 + 2^2 + \dots + n^2}{6} = \frac{n(n+1)(2n+1)}{6}$$

$$= 8555 - 2470$$

$$= 6085 \text{ sq.cm.}$$

49. Expression

$$= \frac{9.5 \cdot 0.0085 \cdot 18.9}{0.0017 \cdot 1.9 \cdot 2.1}$$

$$= 225$$

Required square root

$$= \sqrt{225} = 15$$

$$51. x = \sqrt{2} + 1^{\frac{1}{2}}$$

$$x - 2 = \sqrt{2} + 1$$

$$x^2 = \frac{1}{\sqrt{2} + 1} = \frac{1}{\sqrt{2} + 1} \cdot \frac{\sqrt{2} - 1}{\sqrt{2} - 1}$$

$$= \sqrt{2} - 1$$

$$\frac{1}{x^2} = \sqrt{2} - 1$$

$$x^2 \cdot \frac{1}{x^2} = \sqrt{2} - 1 \cdot \sqrt{2} - 1 = 2$$

52. Expression

$$= \frac{3}{4} \cdot \frac{4}{3} \cdot \frac{5}{3} \cdot \frac{3}{5} \cdot \frac{13}{7} \cdot \frac{1}{13} = \frac{1}{7}$$

53. If $0.87 = a$ and $0.13 = b$ then,

$$\text{Expression} = \frac{a^3 \cdot b^3}{a^2 \cdot b^2 \cdot ab}$$

$$= \frac{(a+b)(a^2+b^2+ab)}{a^2 \cdot b^2 \cdot ab}$$

$$= a + b = 0.87 + 0.13 = 1$$

$$54. x^2 - 2x + y^2 + 6y + 10 = 0$$

$$x^2 - 2x + 1 + y^2 + 6y + 9 = 0$$

$$(x-1)^2 + (y+3)^2 = 0$$

$$= x-1=0 \quad x=1$$

$$\text{and, } y+3=0 \quad y=-3$$

$$x^2 + y^2 = 1 + 9 = 10$$

$$55. \sqrt{7} \cdot \sqrt{5} = \frac{\sqrt{7} \cdot \sqrt{5} \cdot \sqrt{7} \cdot \sqrt{5}}{\sqrt{7} \cdot \sqrt{5}}$$

$$= \frac{2}{\sqrt{7} \cdot \sqrt{5}}$$

Similarly,

$$\sqrt{5} \cdot \sqrt{3} = \frac{2}{\sqrt{5} \cdot \sqrt{3}}$$

$$\sqrt{9} \cdot \sqrt{7} = \frac{2}{\sqrt{9} \cdot \sqrt{7}}$$

$$\sqrt{11} \cdot \sqrt{9} = \frac{2}{\sqrt{11} \cdot \sqrt{9}}$$

$$\text{Largest number} = \sqrt{5} \cdot \sqrt{3}$$

because its denominator is the smallest.

$$56. \frac{1}{x^3} \cdot \frac{1}{y^3} = \frac{1}{z^3}$$

Cubing both sides, we have,

$$\left(\frac{1}{x^3}\right)^3 + \left(\frac{1}{y^3}\right)^3 + 3 \cdot \frac{1}{x^3} \cdot \frac{1}{y^3} \cdot \left(\frac{1}{x^3}\right)^{\frac{1}{3}} \cdot \left(\frac{1}{y^3}\right)^{\frac{1}{3}} = z$$

$$x + y + 3 \cdot x^{\frac{1}{3}} \cdot y^{\frac{1}{3}} \cdot z^{\frac{1}{3}} = z$$

$$(x + y - z) = 3 \cdot x^{\frac{1}{3}} \cdot y^{\frac{1}{3}} \cdot z^{\frac{1}{3}}$$

67. CP of article = Rs.

$$\begin{aligned} & \text{Marked price} \\ & = \frac{130x}{100} = \text{Rs. } \frac{13x}{10} \end{aligned}$$

S.P.

$$= \frac{13x}{10} \times \frac{85}{100} = \text{Rs. } \frac{221x}{200}$$

$$\frac{221x}{200} \times x = 84 \quad \frac{221x}{200} = 84$$

$$x = \frac{84 \times 200}{221} = \text{Rs. } 800$$

68. Marked price = Rs. . then

$$\frac{x}{100} \times 95 = \frac{95}{100} \times 110 \quad x = \text{Rs. } 110$$

69. (*) Initial expenditure of Krishnamurthy

$$= 15000 \times \frac{80}{100} = \text{Rs. } 12000$$

New income

$$= \frac{15000}{100} \times 120 = \text{Rs. } 18000$$

New expenditure

$$= \frac{12000}{100} \times 120 = \text{Rs. } 14400$$

New savings = 18000 - 14400

= Rs. 3600

Note: It is not an answer choice.

70. First number

$$= 100 \times \frac{25}{2} = \frac{225}{2}$$

Second number = 125

Required percentage

$$= \frac{225}{2 \times 125} \times 100 = 90$$

71. Percentage of increase

$$= \left(2 \times 2 \times \frac{2}{100} \right) \% = 4.04\%$$

72. Percentage of students opting for both subjects

$$= 72 + 44 - 100 = 16$$

If the total number of students be x , then

$$\frac{x}{100} \times 16 = 40 \quad x = \frac{4000}{16} = 250$$

73. A : B + C = 2 : 5

$$A's \text{ share} = \frac{2}{7} \times 1050 = \text{Rs. } 300$$

75. Numbers = $5x$ and $6x$

$$\text{HCF} = x = 4$$

$$\text{LCM} = 5 \times 6 \times x$$

$$= 5 \times 6 \times 4 = 120$$

76. $a + b + c = 1$,

$$ab + bc + ca = \frac{1}{3}$$

$$a^2 + b^2 + c^2$$

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

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

$$\text{Clearly, } a = b = c = \frac{1}{3}$$

$$a : b : c = 1 : 1 : 1$$

77. If B invested for y months. then

$$\frac{5}{6} \times \frac{8}{y} = \frac{5}{9}$$

$$y = 12 \text{ months.}$$

79. $l^2 + b^2 = 625$... (i)

$$lb = 168 \quad \dots \text{(ii)}$$

$$(l + b)^2 = l^2 + b^2 + 2lb$$

$$= 625 + 2 \times 168 = 961$$

Solved Paper

$$l + b = \sqrt{961} = 31 \quad \dots(\text{iii})$$

$$(l + b)^2 = l^2 + b^2 + 2lb$$

$$= 625 + 168 \times 2 = 289$$

$$l - b = \sqrt{289} = 17 \quad \dots(\text{iv})$$

From equations (iii) and (iv),
 $2l = 48$

$$l = \frac{48}{2} = 24 \text{ cm}$$

80. Volume of the cylinder = r^2h
 $= \pi \times 32 \times 8 = 72 \pi \text{ cm}^3$
 Volume of one coin
 $= \pi \times (0.75)^2 \times 0.2$
 Number of coins
 $= \frac{72 \pi}{\pi \times 0.75 \times 0.75 \times 0.2} = 640$

81. $4(r + 2)^2 - 4r^2 = 704$

$$(r + 2)^2 - r^2 = \frac{704}{4}$$

$$r^2 + 4r + 4 - r^2 = \frac{704}{4}$$

$$4r + 4 = 176$$

$$4r = 176 - 4 = 172$$

$$r = 43 \text{ metre}$$

82. Required ratio = Volume of hemi-sphere :
 Volume of cylinder

$$= \frac{2}{3} r^3 : r^3 = 2 : 3$$

84. $T = 2$ half years
 Rate = 6%

$$= CI = P \left(1 + \frac{r}{100}\right)^n$$

$$= 6250 \left(1 + \frac{6}{100}\right)^2$$

$$= 6250 \times 0.1236 = \text{Rs. } 772.5$$

85. $1460 = P \left(1 + \frac{R}{100}\right)^2 \quad \dots(\text{i})$

$$1606 = P \left(1 + \frac{R}{100}\right)^3 \quad \dots(\text{ii})$$

Dividing equation (ii) by (i)

$$1 + \frac{R}{100} = \frac{1606}{1460}$$

$$\frac{R}{100} = \frac{1606}{1460} - 1$$

$$= \frac{146}{1460} = \frac{1}{10}$$

86. If the distance between the school and home be x km, then

$$\frac{x}{3} - \frac{x}{4} = \frac{10}{60} \quad \frac{x}{12} = \frac{1}{6}$$

$$x = \frac{1}{6} \times 12 = 2 \text{ km}$$

87. $60 \text{ kmph} = \left(\frac{60 \times 5}{18}\right) \text{ m/sec}$

$$= \frac{50}{3} \text{ m/sec}$$

If the speed of second train be x m/sec, then

$$\frac{50}{3} - x = \frac{120}{18} = \frac{20}{3}$$

$$x = \frac{50}{3} - \frac{20}{3} = 10 \text{ m/sec}$$

$$= \left(\frac{10 \times 18}{5}\right) \text{ kmph}$$

$$= 36 \text{ kmph}$$

89. $8 \times 4m + 6w \times 8$
 $10 \times 3m + 7 \times 10w$

- $2m = 22w$
 $1m = 11w$
 $4m + 6w = 50w$
 $M_1D_1 = M_2D_2$
 $50 \times 8 = 20 \times D_2$
 $D_2 = \frac{50 \times 8}{20} = 20 \text{ days}$
90. $A + B = 40$
 $B + C = 38$
 $C + A = 42$
 On adding,
 $2(A + B + C) = 40 + 38 + 42 = 120$
 $A + B + C = 60$
 $A = (A + B + C) - (B + C)$
 $= 60 - 38 = 22$
91. Expenditure on housing and transport
 $= 150000 \times \frac{10}{100}$
 $= \text{Rs. } 15000$
92. It is obvious from the pie chart.
 Food 23%, Others 20%
93. Housing 15%
 Savings 15%
94. Required percentage
 $= 10 + 12 + 5$
 $= 27\%$
95. Expenditure on food
 $= \text{Rs.} \left(\frac{150000 \times 23}{100} \right)$
 $= \text{Rs. } 34500$
96. Required percentage
 $= \frac{300}{1200} \times 100 = 25$
97. Number of persons killed in 2009
 $= 800 + 200 = 1000$
98. It is obvious from the bar diagram.
 Required number of the dead = 1200
99. It is obvious from the bar diagram.
 Required number of the dead = 150
100. Required average
 $= \frac{1500 + 1050 + 1300 + 1000}{4}$
 $= \frac{4850}{4} = 1212.5$