EXPLANATIONS

TYPE-I

1. (3) According to question,

$$A \times \frac{80}{100} = B \times \frac{50}{100}$$

$$\therefore B = \frac{A \times 80}{50} = 1.6A$$

$\therefore$ B = 160% of A

$\therefore$ x = 160

2. (4) According to question,

$$y = \frac{100 \times 100}{80} \text{ of } x$$

$\therefore$ y = 125% of x

3. (1) $\frac{8x}{100} = \frac{4y}{100}$

$\Rightarrow y = 2x$

$\therefore$ 20% of x = 10% of y.

4. (4) Let x be the multiplicand.

$$\therefore \text{ Error } = \frac{5}{3}x - \frac{3}{5}x$$

$$= \frac{25x - 9x}{15} = \frac{16x}{15}$$

$\therefore$ Percentage error

$$= \frac{\frac{16x}{15}}{\frac{5}{3}x} \times 100$$

$$= \frac{16x}{15} \times \frac{3}{5x} \times 100 = 64\%$$

5. (3) p% of p = 36

$$\Rightarrow \frac{p}{100} \times p = 36$$

$\Rightarrow p^2 = 3600$

$\Rightarrow p = 60$

6. (3) Let 2 be x% of 50

$\Rightarrow$ x% of 50 = 2

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

$\therefore$ x = 4

7. (4) Let x % of $\frac{1}{3} = \frac{2}{3}$

$$\Rightarrow x\% = \frac{2 \times 3}{3} = 2 \Rightarrow x = 200\%$$

8. (1) 0.15% of $33\frac{1}{3}\%$ of ₹ 10000

$$= \frac{0.15}{100} \times \frac{100}{300} \times 10000 = ₹5$$

9. (2) 30% of x = 72

$$\therefore x = \frac{72 \times 100}{30} = 240$$

10. (4) 15% of (A + B)
= 25% of (A – B)

$$\Rightarrow \frac{15}{100}(A + B) = \frac{25}{100}(A - B)$$

$\Rightarrow$ 15 (A + B) = 25 (A – B)

$\Rightarrow$ 15 A + 15 B = 25A – 25 B

$\Rightarrow$ 10 A = 40 B

$\Rightarrow$ A = 4 B

Now, let x% of B is equal to A

$$\therefore \frac{x}{100} \times B = A \Rightarrow \frac{x}{100} \times B = 4B$$

$\therefore$ x = 400%

11. (4) 20% of 25% of 300

$$= \frac{20}{100} \times \frac{25}{100} \times 300$$

$$= \frac{1}{5} \times \frac{1}{4} \times 300 = 15$$

12. (2) x% of $\frac{25}{2} = 150$

$$\Rightarrow \frac{x}{100} \times \frac{25}{2} = 150$$

$$\Rightarrow \frac{x}{8} = 150$$

$\Rightarrow$ x = 150 × 8 = 1200

13. (1) 50% of (x – y)
= 30% of (x + y)

$$\Rightarrow \frac{1}{2}(x - y) = \frac{3}{10}(x + y)$$

$$\Rightarrow \frac{x}{2} - \frac{3x}{10} = \frac{3}{10}y + \frac{y}{2}$$

$$\Rightarrow \frac{5x - 3x}{10} = \frac{3y + 5y}{10}$$

$$\Rightarrow \frac{x}{5} = \frac{4y}{5}$$

$\therefore$ x = 4y

$\Rightarrow y = \frac{x}{4}$ or $\frac{x}{4} \times 100\% = 25x$

Obviously, y is 25% of x

14. (3) $P \times \frac{50}{100} = Q \times \frac{25}{100}$

$\Rightarrow$ P × 50 = Q × 25

$$\Rightarrow P = \frac{Q \times 25}{50} \Rightarrow P = \frac{Q}{2}$$

P = Q x %

$$\therefore Q \times \frac{x}{100} = \frac{Q}{2}$$

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

15. (2) 20% of A = 50% of B

$$\Rightarrow 2A = 5B \Rightarrow A = \frac{5B}{2}$$

Let B is x % of A.

$$\therefore \frac{5B}{2} \times \frac{x}{100} = B$$

$$\Rightarrow x = \frac{200}{5} = 40\%$$

16. (4) Since 18% of the students neither play football nor cricket. It means 82% of the students either play football or cricket or both.

Using set theory

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

$\Rightarrow 82 = 40 + 50 - n(A \cap B)$

$\Rightarrow n(A \cap B) = 90 - 82 = 8$

$\therefore$ 8% students play both games.

17. (2) $\frac{20(P + Q)}{100} = \frac{50}{100}(P - Q)$

$$\Rightarrow \frac{P + Q}{P - Q} = \frac{5}{2}$$

$$\Rightarrow \frac{2P}{2Q} = \frac{5 + 2}{5 - 2}$$

[By componendo & dividendo]

$$\Rightarrow \frac{P}{Q} = \frac{7}{3} \text{ or } 7 : 3$$

18. (1) Let x % × 0.1 = 0.01

$$\Rightarrow \frac{x}{100} \times 0.1 = 0.01$$

$$\Rightarrow x = \frac{0.01 \times 100}{0.1} = 10$$

19. (1) Required percentage

$$= \frac{65}{2000} \times 100 = \frac{13}{4}$$

[$\because$ 2kg = 2000g]

20. (3) 1% = $\frac{1}{100}$

$$\therefore \frac{1}{100} \times \frac{1}{2} = \frac{1}{200} = 0.005$$

21. (2) 1 hour 45 minutes

$= 1\frac{3}{4}$ hours = $\frac{7}{4}$ hours

1 day = 24 hours

$\therefore$ Required per cent

$$= \frac{\frac{7}{4}}{24} \times 100$$

$$= \frac{7}{4 \times 24} \times 100$$

= 7.292%

22. (3) Required percentage

$= \frac{1.14}{1.9} \times 100 = 60\%$

23. (4) Required percentage

$= \frac{32}{80} \times 100 = 40\%$

24. (2) $A \times \frac{90}{100} = \frac{B \times 30}{100}$

$\Rightarrow A \times 3 = B$

$\Rightarrow A \times x\% = A \times 3$

$\Rightarrow \frac{x}{100} = 3 \Rightarrow x = 300$

25. (4) $\frac{A \times 90}{100} = \frac{B \times 30}{100}$

$\Rightarrow 3A = B$

$\Rightarrow 3A = A \times \frac{2x}{100}$

$\Rightarrow 300 = 2x \Rightarrow x = 150$

26. (4) $A \times \frac{30}{100} + \frac{B \times 40}{100} = \frac{B \times 80}{100}$

$\Rightarrow A \times 30 = B \times 40$

$\Rightarrow \frac{A}{B} = \frac{40}{30} = \frac{4}{3}$

$\Rightarrow \frac{B}{A} = \frac{3}{4}$

$\Rightarrow \frac{B}{A} \times 100 = \frac{3}{4} \times 100 = 75\%$

27. (1) $(A + B) \times \frac{40}{100}$

$= (A - B) \times \frac{60}{100}$

$\Rightarrow 2(A + B) = 3(A - B)$

$\Rightarrow 2A + 2B = 3A - 3B$

$\Rightarrow A = 5B$

$\therefore \frac{2A - 3B}{A + B} = \frac{10B - 3B}{5B + B}$

$= \frac{7B}{6B} = \frac{7}{6}$

28. (4) $0.1\% = \frac{0.1}{100} = 0.001$

29. (4) Required percentage

$= \frac{70}{3.5 \times 1000} \times 100 = 2\%$

30. (4) $\frac{1}{3}$ of $1206 = 1206 \times \frac{1}{3} = 402$

$\therefore$ Required percent

$= \frac{402}{134} \times 100 = 300\%$

31. (1) $a \times \frac{120}{100} = b \times \frac{80}{100}$

$\Rightarrow \frac{b}{a} = \frac{120}{80} = \frac{3}{2}$

$\therefore \frac{b + a}{b - a} = \frac{\frac{b}{a} + 1}{\frac{b}{a} - 1} = \frac{\frac{3}{2} + 1}{\frac{3}{2} - 1} = \frac{\frac{5}{2}}{\frac{1}{2}} = 5$

32. (1) $(A + B) \times \frac{20}{100} = B \times \frac{50}{100}$

$\Rightarrow \frac{A + B}{5} = \frac{B}{2}$

$\Rightarrow 2A + 2B = 5B$

$\Rightarrow 2A = 3B$

$\Rightarrow \frac{2A}{B} = 3$ or $2A = 3B$

$\therefore \frac{2A - B}{2A + B} = \frac{2\frac{A}{B} - 1}{2\frac{A}{B} + 1} = \frac{3 - 1}{3 + 1}$

$= \frac{2}{4} = \frac{1}{2} = \frac{3B - B}{3B + B} = \frac{2B}{4B}$

33. (2) $\frac{ax}{100} = \frac{by}{100}$

$\Rightarrow b = \frac{ax}{y}$

$\therefore z\%$ of $b = \frac{ax}{y} \times \frac{z}{100}$

$= \frac{xz}{y}\%$ of a

34. (1) $60 \times 60 \times \frac{y}{100}$

$= 1$ minute 12 seconds

$\Rightarrow 36y = 72 \Rightarrow y = 2$

35. (4) Required percentage

$= \frac{72}{3.6 \times 1000} \times 100 = 2\%$

36. (3) Let the total number of employees be x.

$\therefore x \times \frac{69}{100} = 20700$

$\Rightarrow x = \frac{20700 \times 100}{69} = 30000$

37. (3) Required percentage

$= \frac{24}{40} \times 100 = 60\%$

38. (1) $x \times \frac{125}{100} = 100$

$\Rightarrow x = \frac{100 \times 100}{125} = 80$

39. (3) $x \times \frac{83}{100} = 498$

$\Rightarrow x = \frac{498 \times 100}{83} = 600$

40. (4) Let C = 100

Then, A = 150

B = 125

$\therefore$ Required percentage

$= \frac{150 - 125}{125} \times 100 = 20\%$

41. (2) If the number of trees in the garden be x, then

$x \times \frac{60}{100} \times \frac{25}{100} \times \frac{20}{100} = 1500$

$\Rightarrow x \times \frac{3}{5} \times \frac{1}{4} \times \frac{1}{5} = 1500$

$\Rightarrow x = \frac{1500 \times 5 \times 4 \times 5}{3}$

$= 50000$

42. (2) Males $= 25000 \times \frac{4}{5} = 20000$

Females = 5000

Educated males

$= 20000 \times \frac{95}{100} = 19000$

Educated females

$= \frac{5000 \times 60}{100} = 3000$

Total educated persons

= 22000

$\therefore$ Required per cent

$= \frac{22000}{25000} \times 100 = 88\%$

43. (4) Required number

$= \frac{240 \times 25}{100} - \frac{160 \times 15}{100}$

$= 60 - 24 = 36$

44. (3) First part = ₹ x and second part = ₹ y.

$$\therefore \quad \frac{x \times 80}{100} = \frac{y \times 60}{100} + 3$$

$$\Rightarrow \quad \frac{4x}{5} = \frac{3y}{5} + 3$$

$\Rightarrow 4x - 3y = 15$ ...(i)

Again,

$$\frac{4y}{5} = \frac{9x}{10} + 6$$

$\Rightarrow 8y = 9x + 60$

$\Rightarrow 8y - 9x = 60$ ...(ii)

By equation (i) × 8 + (ii) × 3,

$32x - 24y = 120$

$24y - 27x = 180$

$5x = 300 \Rightarrow x = 60$

From equation (i)

$4 \times 60 - 3y = 15$

$\Rightarrow 3y = 240 - 15 = 225$

$$\Rightarrow y = \frac{225}{3} = 75$$

$\therefore x + y = 60 + 75 = 135$

45. (3) Group A = 40%

$$\text{Group B} = \frac{60 \times 75}{100} = 45\%$$

Group C = 15%

If the total number of students be x, then

$$\frac{x \times 15}{100} = 12$$

$$\Rightarrow x = \frac{12 \times 100}{15} = 80$$

46. (3) After taking away respective balls,

Number of balls in the box

= 75 + 25 + 50 = 150

$\therefore$ Percentage of black balls

$$= \frac{50}{150} \times 100$$

$$= \frac{100}{3} = 33\frac{1}{3}\%$$

47. (2) $\because$ S.P. of a dozen pairs of socks

$$= \frac{180 \times 80}{100} = ₹\ 144$$

$\therefore$ S.P. of 1 pair of socks

$$= \frac{144}{12} = ₹\ 12$$

$\therefore$ No of pairs available for ₹ 48 $= \frac{48}{12} = 4$

48. (1) Let the number be x.

$$\therefore \quad \frac{3}{5} \times \frac{60}{100} \times x = 36$$

$$\Rightarrow x = \frac{36 \times 5 \times 5}{3 \times 3} = 100$$

49. (2) $\frac{P - Q}{2} = (P + Q) \times \frac{30}{100}$

$\Rightarrow 5(P - Q) = (P + Q) \times 3$

$\Rightarrow 5P - 3P = 5Q + 3Q$

$\Rightarrow 2P = 8Q$

$$\Rightarrow \quad P = 4Q = 4 \times \frac{P \times x}{100}$$

$$\Rightarrow \quad \frac{4x}{100} = 1 \Rightarrow x = 25$$

50. (3) Let greater number be x.

$\therefore$ Smaller number = $150 - x$

According to the question,

$$\frac{40 \times x}{100} = \frac{60(150 - x)}{100}$$

$\Rightarrow 2x = 3 \times 150 - 3x$

$\Rightarrow 5x = 3 \times 150$

$\Rightarrow x = 90$

51. (3) Let the number be x. According to the question

80% of x + 80 = x

$$\Rightarrow \frac{80x}{100} + 80 = x$$

$$\Rightarrow \frac{4x}{5} + 80 = x$$

$$\Rightarrow \frac{x}{5} = 80 \Rightarrow x = 400$$

52. (4) Suppose number be x

20% of x = 120

$$x \times \frac{20}{100} = 120$$

$$x = \frac{120 \times 100}{20} = 600$$

$$600 \times 120\% = 600 \times \frac{120}{100} = 720$$

53. (2) Let the number be x. Then

x – 60% of x = 60

$\Rightarrow$ x – 0.60x= 60

$\Rightarrow$ 0.4x = 60

$$\Rightarrow \quad x = \frac{60}{0.4} \Rightarrow x = \frac{600}{4}$$

x = 150

$\therefore$ The number is 150

54. (3) Let number be x.

$\therefore$ According to question,

75% of x + 75 = x

$$\frac{3x}{4} + 75 = x \Rightarrow x - \frac{3x}{4} = 75$$

x = 75 × 4 = 300

55. (4) Let the third number be x,

According to the question;

$$\text{First number} = \frac{20}{100} \times x = \frac{x}{5}$$

$$\text{Second number} = \frac{50}{100} \times x = \frac{x}{2}$$

$\therefore$ Required percentage

$$= \frac{\frac{x}{5} \times 100}{\frac{x}{2}} = \frac{x}{5} \times \frac{2}{x} \times 100 = 40\%$$

56. (4) **Rule :** If two numbers are respectively x% and y% less than the third number, first number as a percentage of second is $\frac{100 - x}{100 - y} \times 100\%$

$\therefore$ Required percentage

$$= \frac{100 - 25}{100 - 20} \times 100\%$$

$$= \frac{75}{80} \times 100\% = 93.75\%$$

57. (4) According to question

$$x + \frac{x \times 150}{100} = 150$$

$$\Rightarrow x + \frac{3}{2}x = 150$$

$\Rightarrow 2x + 3x = 2 \times 150 = 300$

$\Rightarrow 5x = 300 \Rightarrow x = 60$

58. (1) Let the number be x.

According to the question,

$$x \times \frac{18}{100} = 75 \times \frac{12}{100}$$

$$\Rightarrow x = \frac{75 \times 12}{18} = 50$$

59. (2) Let the numbers be x and y and $x > y$.

According to the question,

$$6\frac{1}{2}\% \text{ of } x = 8\frac{1}{2}\% \text{ of } y$$

$$\text{or } \frac{13}{2}\% \text{ of } x = \frac{17}{2}\% \text{ of } y$$

or $13x = 17y$

$$\text{or } x = \frac{17}{13}y$$

$$\therefore \frac{17}{13}y - y = 1660$$

or $\frac{17y-13y}{13}=1660$

or $4y = 1660 \times 13$

or $y=\frac{1660\times13}{4}=5395$

60. (3) If the number be x, then

$x\times\frac{75}{100}+75=x$

$\Rightarrow \frac{3x}{4}+75=x$

$\Rightarrow x-\frac{3x}{4}=75$

$\Rightarrow \frac{x}{4}=75$

$\Rightarrow x = 4 \times 75 = 300$

$\therefore$ 40% of 300

$=\frac{300\times40}{100}=120$

61. (1) Number to be added $= x$ (let)

$\therefore \frac{320\times10}{100}+x = \frac{230\times30}{100}$

$\Rightarrow 32 + x = 69$

$\Rightarrow x = 69 - 32 = 37$

62. (1) X is 20% less than Y.
If Y = 100, X = 80

$\therefore \frac{Y-X}{Y}=\frac{100-80}{100}$

$=\frac{20}{100}=\frac{1}{5}$

$\frac{X}{X-Y}=\frac{80}{80-100}$

$=\frac{80}{-20}=-4$

63. (1) 1% of 1% of 25% of 1000

$=1000\times\frac{25}{100}\times\frac{1}{100}\times\frac{1}{100}$

$= 0.025$

64. (1) $\frac{120\times25}{100}+\frac{380\times40}{100}$

$= 637 \times ?$

$\Rightarrow 30 + 152 = 637 \times ?$

$\Rightarrow 182 = 637 \times ?$

$\Rightarrow ? = \frac{182}{637}=\frac{2}{7}$

65. (2) Population of the illiterate in the village
$= (100 - 30)\%$ of 6600

$=\frac{6600\times70}{100}=4620$

66. (1) 8% of x = 4% of y

$\Rightarrow x\times\frac{8}{100}=\frac{y\times4}{100}$

$\Rightarrow x=\frac{4}{8}y=\frac{y}{2}$

$\therefore$ 20% of $x=\frac{20}{100}$ of $\frac{y}{2}$

$=\frac{10}{100}$ of y

$=$ 10% of y

67. (2) Let the number be x.

$\therefore x\times\frac{3}{4}\times\frac{4}{5}\times\frac{40}{100}=48$

$\Rightarrow x\times\frac{3}{5}\times\frac{2}{5}=48$

$\Rightarrow x=\frac{48\times5\times5}{3\times2}=200$

$\therefore$ 1% of 200

$=200\times\frac{1}{100}=2$

68. (1) Required sum

$=\frac{24.2\times16}{100}+\frac{2.42\times10}{100}$

$= 3.872 + 0.242$

$= 4.114$

69. (2) x% of 15 hours = 18 seconds
$\Rightarrow x$% of $15 \times 60 \times 60$ seconds = 18 seconds

$\Rightarrow \frac{15\times60\times60\times x}{100}=18$

$\Rightarrow x=\frac{18}{15\times6\times6}=\frac{1}{30}\%$

70. (3) $80\times\frac{y}{100}\times\frac{x}{100}$

$=\frac{900\times25}{100}$

$\Rightarrow \frac{xy\times80}{10000}=9\times25$

$\Rightarrow xy=\frac{9\times25\times10000}{80}$

$= 28125$

71. (1) Required time $=\frac{35\times100}{140}$

$= 25$ days

72. (2) According to the question,

$\frac{60A}{100}=\frac{30B}{100}$

$\Rightarrow \frac{3A}{5}=\frac{3B}{10}=\frac{3}{10}\times\frac{40}{100}$ C

$\Rightarrow \frac{3A}{5}=\frac{3C}{25}=\frac{3}{25}\times A\times\frac{x}{100}$

$\Rightarrow \frac{3}{5}=\frac{3x}{2500}$

$\Rightarrow 5x = 2500$

$\Rightarrow x=\frac{2500}{5}=500$

73. (4) Total staff strength in the office = 100 (let)
Females = 40
Males = 60

Married females $=\frac{40\times70}{100}=28$

Unmarried females = 40 – 28 = 12
Unmarried males = 30
$\therefore$ Unmarried staff
= 30 + 12 = 42
i.e. 42%

74. (3) Let the number be x.
According to the question,

$\frac{x\times50}{100}+50=x$

$\Rightarrow \frac{x}{2}+50=x$

$\Rightarrow x-\frac{x}{2}=50$

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

$\Rightarrow x = 100$

75. (4) Let the required amount be Rs. x.
According to the question,

$90\times83\frac{1}{3}\%=x\times60\%$

$\Rightarrow 90\times\frac{250}{3}=x\times60$

$\Rightarrow x=\frac{30\times250}{60}=$ Rs. 125

76. (1) Let the whole number be x.
According to the question,
51% of x = 714

$\Rightarrow \frac{x\times51}{100}=714$

$\Rightarrow x=\frac{714\times100}{51}=1400$

$\therefore$ 25% of 1400

$=\frac{1400\times25}{100}=350$

77. (3) Initial price of eggs = Rs. x per dozen (let).

New price = Rs. $\frac{3x}{4}$ per dozen

According to the question,

$$\frac{162}{\frac{3x}{4}} - \frac{162}{x} = 2$$

$$\Rightarrow \frac{162 \times 4}{3x} - \frac{162}{x} = 2$$

$$\Rightarrow \frac{216}{x} - \frac{162}{x} = 2$$

$$\Rightarrow \frac{54}{x} = 2$$

$\Rightarrow 2x = 54$

$\Rightarrow x$ = Rs. 27 per dozen

78. (2) Required per cent

$$= \frac{30}{24 \times 60} \times 100 \approx 2.083$$

79. (4) Initial number of mangoes = 300

Number of remaining mangoes = 300 – 75 = 225

Required per cent

$$= \frac{225}{300} \times 100 = 75\%$$

80. (1) Required per cent

$$= \left(\frac{3.5}{7.5} \times 100\right)$$

$$= \frac{3500}{75} = \frac{140}{3}$$

$$= 46\frac{2}{3}\%$$

81. (3) Discount percent

$$= \frac{1}{5} \times 100 = 20\%$$

82. (2) B's income = Rs. 100

$\therefore$ A's income = Rs. 125

$\therefore$ Required percent

$$= \frac{125 - 100}{125} \times 100$$

$$= \frac{2500}{125} = 20\%$$

83. (2) 1 day = 24 hours = (24 × 60) minutes

$\therefore$ Required per cent

$$= \frac{36}{24 \times 60} \times 100 = 2.5\%$$

84. (2) Let the larger number be x.

$\therefore$ Smaller number

$$= \frac{25x}{100} = \frac{x}{4}$$

According to the question,

$$x - \frac{x}{4} = 12$$

$$\Rightarrow \frac{3x}{4} = 12$$

$\Rightarrow 3x = 12 \times 4$

$$\Rightarrow x = \frac{12 \times 4}{3} = 16$$

85. (3) Initial number of students in the class = x

According to the question,

$$x \times \frac{120}{100} = 66$$

$$\Rightarrow x = \frac{66 \times 100}{120} = 55$$

86. (3) Required per cent

$$= \left(\frac{20}{100 + 20}\right) \times 100$$

$$= \frac{2000}{120} = \frac{50}{3} = 16\frac{2}{3}\%$$

87. (2) Number of goats before flood = x (let)

According to the question,

$$x \times \frac{88}{100} \times \frac{95}{100} = 8360$$

$$\Rightarrow x = \frac{8360 \times 100 \times 100}{88 \times 95}$$

$= 10000$

88. (3) Let, C = 100

$$\therefore B = 100 \times \frac{25}{100} = 25$$

$$\therefore A = \frac{20}{100} \times 25 = 5$$

$\therefore x\%$ of C = 5

$$\Rightarrow \frac{x}{100} \times 100 = 5$$

$\Rightarrow x = 5$

89. (3) Number of boys in the school

$$= \frac{1500 \times 56}{100} = 840$$

Number of girls = (1500 – 840) = 660

Monthly fee of each boy = Rs. 540

Monthly fee of each girl

$$= \text{Rs. } \left(\frac{540 \times 75}{100}\right) = \text{Rs. } 405$$

$\therefore$ Total monthly fee of boys and girls

= Rs. (840 × 540 + 660 × 405)

= Rs. (453600 + 267300)

= Rs. 720900

90. (1) Percentage of children = (100 – 54 – 32)% = 14%

According to the question,

$\because$ 14% ≡ 196

$$\therefore 1\% \equiv \frac{196}{14} = 14$$

$\therefore$ 54% ≡ 54 × 14 = 756 men

91. (2) Expression

$$= \frac{25}{4}\% \text{ of } 1600 + \frac{25}{2}\% \text{ of } 800$$

$$= \frac{1600 \times 25}{400} + \frac{800 \times 25}{200}$$

= 100 + 100 = 200

92. (3) Required percent

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

93. (3) Required per cent

$$= \frac{40}{80} \times 100 = 50$$

94. (4) Correct answer

$$= 1 - \left(\frac{1}{4} + \frac{1}{5}\right)$$

$$= 1 - \left(\frac{5+4}{20}\right)$$

$$= 1 - \frac{9}{20} = \frac{11}{20}$$

Incorrect answer = 0.45 = $\frac{45}{100}$

$$= \frac{9}{20}$$

Error = $\frac{11}{20} - \frac{9}{20} = \frac{2}{20} = \frac{1}{10}$

Percentage error = $\left(\frac{\frac{1}{10}}{\frac{11}{20}}\right) \times 100$

$$= \frac{1}{10} \times \frac{20}{11} \times 100 = \frac{200}{11}\%$$

TYPE-II

1. (1) Let y be 100.

$\therefore x = 75$

$\therefore$ Required percentage

$$= \frac{25 \times 100}{75} = \frac{100}{3} = 33\frac{1}{3}\%$$

Aliter : Using Rule 9,

Required percentage

$$= \frac{25}{(100 - 25)} \times 100\%$$

$$= \frac{25}{75} \times 100\%$$

$$= 33\frac{1}{3}\%$$

2. (1) Using Rule 8,
Required per cent decrease

$$= \frac{10}{100+10} \times 100$$

$$= \frac{10}{110} \times 100 = 9\frac{1}{11}\%$$

3. (4) Using Rule 8,
If the first value is r% more than the second value, then second is $\left[\frac{r}{100+r} \times 100\right]$% less than the first value.
Here r = 10%.
∴ Required percentage

$$= \frac{10}{110} \times 100 = \frac{100}{11} = 9\frac{1}{11}\%$$

4. (2) Using Rule 9,
Required percentage

$$= \frac{20}{100-20} \times 100 = 25\%$$

5. (3) Using Rule 8,
Required percentage

$$= \frac{25}{100+25} \times 100 = 20\%$$

6. (1) Let the larger number be x
⇒ According to question,
x – 20 = 20% of x

$$\text{or, } x - 20 = \frac{x}{5}$$

$$\text{or, } x - \frac{x}{5} = 20$$

or, 5x – x = 20 × 5
or, 4x = 20 × 5
⇒ x = 5 × 5 = 25

7. (4) y is 10% more than 125

$$= 125 \times \frac{110}{100} = 137.5 = y$$

and x is 10% less than y

$$x = \frac{90}{100} \times y = \frac{90}{100} \times 137.5$$

= 123.75

8. (4) If the third number is 100, then the numbers are $100 + \frac{25}{2} = \frac{225}{2}$ and 125 respectively.
∴ First number as a percentage of the second

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

Rule : If two numbers are respectively x% and y% more than a third number the first as a percent of second is

$$\frac{100+x}{100+y} \times 100\%$$

9. (2) Required number

$$= 60\% \text{ of } 90 = \frac{90 \times 60}{100} = 54$$

10. (1) Third number = 100
First number = 70
Second number = 63
∴ Required percentage

$$= \frac{7}{70} \times 100 = 10$$

11. (2) Let the number be x

then, $x \times \frac{90}{100} = 30$

$$\Rightarrow x = \frac{3000}{90} = \frac{100}{3} = 33\frac{1}{3}$$

12. (3) According to the question,
Required difference

$$= \text{Rs. } \left(312 \times \frac{200}{3}\% - 200\right)$$

$$= \text{Rs. } \left(312 \times \frac{200}{300} - 200\right)$$

$$= \text{Rs. } (208 - 200) = \text{Rs. } 8$$

13. (1) Let B's income be Rs. 100.
∴ A's income = Rs. 125
∴ Required per cent

$$= \left(\frac{100}{125} \times 100\right) = 80\%$$

14. (2) Required per cent

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

$$= \frac{50}{100+50} \times 100$$

$$= \frac{100}{3} = 33\frac{1}{3}\%$$

15. (3) Required per cent

$$= \frac{40}{100-40} \times 100$$

$$= \frac{40 \times 100}{60} = \frac{200}{3} = 66\frac{2}{3}\%$$

16. (2) Required per cent

$$= \left(-\frac{x^2}{100}\right)\%$$

$$= -\frac{10 \times 10}{100} = -1\%$$

Negative sign shows decrease.

17. (3) Length of Y = 1 foot
∴ Length of X = 5 feet
Required per cent

$$= \left(\frac{5-1}{5}\right) \times 100 = 80\%$$

TYPE-III

1. (2) Savings $= 100\% - 66\frac{2}{3}\%$

$= 33\frac{1}{3}\%$ ∵ $33\frac{1}{3}\% \equiv$ ₹ 1200

$$\therefore 100\% \equiv \frac{1200}{100} \times 3 \times 100$$

= ₹ 3600
∴ Expenses = 3600 – 1200
= ₹ 2400

Aliter : Using Rule 20,
Here, R = ₹ 1200

$$x = 66\frac{2}{3}\%$$

Monthly income

$$= \frac{100}{100 - 66\frac{2}{3}} \times 1200$$

$$= \frac{100}{100 - \frac{200}{3}} \times 1200$$

$$= \frac{300}{100} \times 1200 = ₹\ 3600$$

Expenses = Income – savings
= 3600 – 1200 = 2400

2. (2) Suppose income of A = ₹ 100
∴ Income of B = ₹ 125
Income of C = ₹ 150
∴ Required percentage

$$= \frac{50 \times 100}{100} = 50\%$$

3. (3) Using Rule 9,
Required percentage

$$= \frac{x}{100-x} \times 100$$

$$= \frac{40}{60} \times 100 = \frac{200}{3}$$

= 66.66%

4. (2) Using Rule 8,

Tricky approach

Required answer

$$= \left(\frac{20}{100+20} \times 100\right)\%$$

$$= \left(\frac{20}{120} \times 100\right)\% = \frac{50}{3}\% = 16\frac{2}{3}\%$$

5. (1) Using Rule 8,

Tricky approach

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

$$= \left(\frac{1000}{110}\right)\% = \left(\frac{100}{11}\right)\% = 9\frac{1}{11}\%$$

Note : If A is r% more than B, then B is

$\left(\frac{r}{100+r} \times 100\right)\%$ less than A.

6. (1) Using Rule 8,

Tricky approach

$$\text{Required \%} = \frac{R \times 100}{100 \pm R}$$

$$\therefore \text{ Required \%} = \frac{12.5 \times 100}{100 + 12.5}$$

$$= \frac{1250}{112.5} = \frac{100}{9} = 11\frac{1}{9}$$

7. (3) Let A's income = ₹ a
and B's income = ₹ b
$a \times 60\% = b \times 75\%$
$\Rightarrow a \times 4 = 5 \times b$

$$\Rightarrow \frac{b}{a} = \frac{4}{5}$$

Now, $b = a \times x\%$

$$\Rightarrow \frac{b}{a} = \frac{x}{100} \Rightarrow \frac{x}{100} = \frac{4}{5}$$

$$\Rightarrow x = \frac{4}{5} \times 100 = 80$$

8. (4) Let income be ₹ 100
$\therefore$ Sum given to elder son
= 20% of ₹ 100 = ₹ 20
Remaining Sum = Rs. 80
Sum given to younger son
= 30% of ₹ 80 = ₹ 24
Remaining sum
= Rs. (80 – 24) = Rs. 56
Sum given to the trust
= 10% of ₹ 56 = ₹ 5.6
$\therefore$ Remaining sum
= ₹ (56 – 5.6) = ₹ 50.4
$\therefore$ When ₹ 50.4 remains, total income = ₹ 100
$\therefore$ When ₹ 10080 remains, total income

$$= \frac{100 \times 10080}{50.4} = ₹\ 20000$$

Aliter : Using Rule 20,
Here, R = ₹ 10080
x = 20%,
y = 30%
and z = 10%
Monthly income

$$= \frac{100}{100 - (20 + 24 + 5.6)} \times 10080$$

$$= \frac{1008000}{100 - 49.6}$$

$$= \frac{1008000}{50.4} = 20{,}000$$

9. (2) Radha's total percentage expenditure
= (40 + 20 + 10 + 10)% = 80%
Percentage savings
=100 – 80 = 20%
Now, 20% of her total salary
= 1500

$$\text{Her total salary} = \frac{1500 \times 100}{20}$$

= ₹ 7500
Aliter : Using Rule 20,
Here,
Monthly income

$$= \frac{100}{100 - (40 + 20 + 10 + 10)} \times 1500$$

$$= \frac{150000}{100 - 80}$$

$$= \frac{150000}{20} = ₹\ 7500$$

10. (3) Suppose monthly income = ₹ x
Then, $\frac{8}{3}\%$ of $x = 72$

$$\Rightarrow x \times \frac{8}{300} = 72$$

$$\Rightarrow \frac{72 \times 300}{8} = ₹\ 2700$$

11. (2) Let the required income be ₹ x
Average monthly income

$$= ₹\left(\frac{80800}{16}\right) = ₹\ 5050$$

$\therefore x = 120\%$ of 5050

$$= ₹\left(\frac{120}{100} \times 5050\right) = ₹\ 6060$$

12. (4) Using Rule 8,
Required percentage

$$= \frac{25}{100 + 25} \times 100 = 20\%$$

13. (1) Let man's salary be ₹ x.
$\therefore$ His expenditure on items of daily use

$$= \frac{25}{2}\% \text{ of } x$$

$$= \frac{25 \times x}{200} = \frac{x}{8}$$

So, remaining amount

$$= x - \frac{x}{8} = ₹\ \frac{7x}{8}$$

Expenditure on house rent

$$= 30\% \text{ of } ₹\ \frac{7x}{8}$$

$$= \frac{30}{100} \times \frac{7x}{8} = ₹\ \frac{21x}{80}$$

Now, remaining amount

$$= \frac{7x}{8} - \frac{21x}{80}$$

$$= \frac{70x - 21x}{80} = ₹\ \frac{49x}{80}$$

According to the question,

$$\therefore \frac{49x}{80} = 2940$$

$$\Rightarrow x = \frac{2940 \times 80}{49}$$

= ₹ 4800
Aliter : Using Rule 20,
His salary

$$= \frac{100 \times 2940}{100 - \left(\frac{25}{2} + 26.25\right)}$$

$$= \frac{100 \times 2940}{100 - (12.5 + 26.25)}$$

$$= \frac{294000}{61.25} = ₹\ 4800$$

14. (3) Original savings
= ₹ (13500 – 9000)
= ₹ 4500
New income = 114% of ₹ 13500
= ₹ (114 × 135)
= ₹ 15390
New expenditure
= 107% of ₹ 9000
= ₹ (107 × 90)

= ₹ 9630
New savings
= ₹ (15390 – 9630)
= ₹ 5760
∴ Percentage increase in savings

$$= \frac{5760 - 4500}{4500} \times 100$$

$$= \frac{1260}{45} = 28\%$$

15. (2) Using Rule 9,
Required percentage of increase

$$= \frac{r}{100 - r} \times 100$$

$$= \frac{20}{100 - 20} \times 100$$

$$= \frac{20}{80} \times 100 = 25\%$$

16. (3) 10% of A = 15% of B
= 20% of C
⇒ 10A = 15B = 20C

$$\Rightarrow \frac{10A}{60} = \frac{15B}{60} = \frac{20C}{60}$$

$$\Rightarrow \frac{A}{6} = \frac{B}{4} = \frac{C}{3}$$

∴ A : B : C = 6 : 4 : 3
∴ $6x + 4x + 3x = 7800$
⇒ $13x = 7800$

$$\Rightarrow x = \frac{7800}{13} = 600$$

∴ B's income = $4x$
= 600 × 4 = ₹ 2400

17. (3) Using Rule 9,

Tricky approach

Required percentage

$$= \frac{25}{100 - 25} \times 100 = \frac{100}{3} = 33\frac{1}{3}\%$$

18. (2) Using Rule 8,

Tricky approach

Required percentage

$$= \left(\frac{50}{100 + 50} \times 100\right)\%$$

$$= \frac{50}{150} \times 100$$

$$= \frac{100}{3} = 33\frac{1}{3}\%$$

19. (1) Let Tulsiram's salary be ₹ x.

$$\therefore \quad \frac{x \times 4}{100} = 720$$

$$\Rightarrow \quad x = \frac{720 \times 100}{4}$$

= ₹ 18000
∴ Kashyap's salary

$$= ₹ \left(\frac{100}{120} \times 18000\right) = ₹ 15000$$

20. (2) Let B's salary = ₹ 100
∴ C's salary = ₹ 400
and A's salary = ₹ 40
∴ Required percentage

$$= \frac{40}{400} \times 100 = 10\%$$

21. (2) Using Rule 9,

Tricky approach

Required percentage

$$= \frac{50}{100 - 50} \times 100 = 100\%$$

Otherwise ⇒ Let's B income
= ₹ 100 Þ A income = ₹ 50.

$$\text{Required } \% = \frac{100 - 50}{50} \times 100$$

= 100%

22. (2) Using Rule 8,
∴ Required percentage

$$= \frac{20}{100 + 20} \times 100$$

$$= \frac{50}{3} = 16\frac{2}{3}\%$$

23. (3) Basic pay of the employee

$$= 11925 \times \frac{100}{265} = ₹ 4500$$

24. (2) Using Rule 8,
Required percentage

$$= \frac{25}{100 + 25} \times 100 = \frac{25}{125} \times 100$$

= 20%

25. (3) Effective change

$$= (-25 + 25 - \frac{25 \times 25}{100})\%$$

= –6.25%
The negative sign shows decrease.
Aliter : Using Rule 3,
Percentage decrease

$$= \frac{a^2}{100}\% = \frac{(25)^2}{100}$$

$$= \frac{625}{100} = 6.25\%$$

26. (2) If Shyam's salary be ₹ x, then

$$\frac{22 \times x}{100} = 1540$$

$$\Rightarrow x = \frac{1540 \times 100}{22} = ₹ 7000$$

∴ Ram's savings

$$= \frac{14 \times 7000}{100} = ₹ 980$$

27. (1) Using Rule 8,
Required percentage

$$= \frac{25}{125} \times 100 = 20\%$$

28. (3) Let man's income = ₹ 100
Savings = 100 – 75 = ₹ 25
New income = ₹ 120
Savings

$$= 120 - \frac{75 \times 115}{100} = 120 - \frac{345}{4}$$

$$= \frac{480 - 345}{4} = ₹ \frac{135}{4}$$

Increase in savings

$$= \frac{135}{4} - 25 = ₹ \frac{35}{4}$$

∴ Percentage increase

$$= \frac{\frac{35}{4}}{25} \times 100 = 35\%$$

29. (3) Let Nitin's initial salary be 100
After 10% reduction,
New salary = 90% of 100 = ₹ 90
Again after 10% increase

$$\text{New salary} = \frac{90 \times 110}{100} = ₹ 99$$

∴ Percentage decrease =1 %

30. (2) Suppose monthly income of the man is Rs. x.
Expenditure on food

$$= 40\% \text{ of } x = ₹ \frac{2x}{5}$$

$$\text{Remaining amount} = x - \frac{2x}{5}$$

$$= ₹ \frac{3x}{5}$$

Expenditure on transport

$$= \frac{1}{3} \times \frac{3x}{5} = ₹ \frac{x}{5}$$

Remaining amount

$$= \frac{3x}{5} - \frac{x}{5} = \frac{2x}{5}$$

According to question

$$\frac{1}{2} \times \frac{2x}{5} = 4500$$

∴ $x = 4500 \times 5 = ₹ 22,500$

31. (1) If the monthly income of A is ₹ x, then

$$\frac{x \times 80}{100} = 6000$$

$$\Rightarrow x = \frac{6000 \times 100}{80} = ₹ 7500$$

$\therefore$ Savings = 7500 – 6000
= ₹ 1500

32. (2) Using Rule 3,
Change in salary
$= -\frac{10 \times 10}{100} = -1\%$
Negative sign shows decrease.

33. (4) If the total salary of Kishan be ₹ x, then
$x \times \frac{33}{100} = 2310$
$\Rightarrow x = \frac{2310 \times 100}{33}$ = ₹ 7000

34. (4) Salary of clerk in 1974
$= \frac{3660 \times 100}{100 + 20}$ = ₹ 3050

35. (4) Total percentage of expenditure
$= \left(20 + \frac{80 \times 70}{100}\right)\%$ = 76%
If total income be ₹ x, then
$x \times \frac{24}{100} = 1800$
$\Rightarrow x = \frac{1800 \times 100}{24}$ = ₹ 7500
Aliter : Using Rule 20,
His monthly income
$= \frac{1800}{100 - (20 + 56)} \times 100$
$= \frac{180000}{100 - 76}$
$= \frac{180000}{24}$ = ₹ 7500

36. (3) Arbind's income = ₹ 100
Expenditure = ₹ 75
Savings = ₹ 25
New income = ₹120
Expenditure = 75 + 7.5 = ₹ 82.5
Savings = 120 – 82.5 = ₹ 37.5
Required percentage
$= \frac{37.5 - 25}{25} \times 100$ = 50%

37. (1) Man's previous salary
$= 24000 \times \frac{100}{120}$ = ₹ 20000

38. (2) Using Rule 9,
Required per cent increase
$= \left(\frac{r}{100 - r} \times 100\right)\%$
$= \frac{10}{100 - 10} \times 100 = \frac{100}{9}$
$= 11\frac{1}{9}\%$

39. (4) Using Rule 8,
Required percentage
$= \frac{R}{100 + R} \times 100$
$= \frac{50}{100 + 50} \times 100$
$= \frac{50}{150} \times 100$
$= \frac{100}{3} = 33\frac{1}{3}\%$

40. (2) Pecentage of expenditure on food and education
= 35 + 5 = 40%
If the monthly salary of X be Rs. x, then
$\frac{x \times 40}{100}$ = 17600
$\Rightarrow x \times 40 = 17600 \times 100$
$\Rightarrow x = \frac{1760000}{40}$ = ₹ 44000

41. (1) A's monthly salary = Rs. x
$\therefore$ B's monthly salary
= Rs. (40000 – x)
A spends 85% of his income.
$\therefore$ A's savings = $\frac{15x}{100}$ = Rs. $\frac{3x}{20}$
B's savings = (40000 – x) $\times \frac{5}{100}$
= Rs. $\left(\frac{40000 - x}{20}\right)$
$\therefore \frac{3x}{20} = \frac{40000 - x}{20}$
$\Rightarrow 3x = 40000 - x$
$\Rightarrow 4x = 40000$
$\Rightarrow x = \frac{40000}{4}$ = Rs. 10000

42. (3) C's monthly salary
$= \frac{600000}{12}$ = Rs. 50000
B's monthly salary
$= \frac{50000 \times 40}{100}$
= Rs. 20000
$\frac{1}{4}$ of A's monthly salary
$= \frac{20000 \times 80}{100}$
$\Rightarrow$ A's monthly salary
= Rs. (16000 × 4)
= Rs. 64000

43. (1) Let the third number be 100.
$\therefore$ First number = 70
Second number = 63
Required percent
$= \frac{70 - 63}{70} \times 100$
$= \frac{7}{70} \times 100 = 10\%$

44. (2) Man's income = Rs. 100 (let).
$\therefore$ Expenditure = Rs. 75
Savings = Rs. 25
New income = Rs. 120
Expenditure = $\frac{75 \times 110}{100}$
= Rs. 82.5
Savings = Rs. (120 – 82.5)
= Rs. 37.5
$\therefore$ Required percentage
$= \left(\frac{37.5 - 25}{25}\right) \times 100$
$= \frac{12.5 \times 100}{25} = 50\%$

45. (2) Let Ram Babu's salary be Rs. x.
Remaining amount after donations to charity
= Rs. $\frac{97x}{100}$
After depositing money in the bank,
Remaining amount
$= \frac{97x}{100} \times \frac{88}{100}$
$\therefore \frac{97x \times 88}{10000} = 12804$
$\Rightarrow x = \frac{12804 \times 10000}{97 \times 88}$
= Rs. 15000

46. (3) Amount with Soham
= Rs. x (let).
$\therefore$ Amount with Mukesh
= Rs. $2x$
Amount with Pankaj = $\frac{100x}{150}$
= Rs. $\frac{2x}{3}$
$\therefore$ Soham : Mukesh : Pankaj = x : $2x$: $\frac{2x}{3}$ = 3 : 6 : 2
Sum of the terms of ratio
= 3 + 6 + 2 = 11

∴ Amount with Mukesh

$= \text{Rs.} \left(\frac{6}{11} \times 330\right)$

= Rs. 180

47. (2) Let man's income be Rs. 100.
∴ Expenditure = Rs. 75
Savings = Rs. 25
Case–II,
Man's income = Rs. 120

$\text{Expenditure} = \left(\frac{75 \times 110}{100}\right)$

= Rs. 82.5
Savings = 120 – 82.5 = Rs. 37.5
∴ Percentage increase

$= \left(\frac{37.5 - 25}{25}\right) \times 100$

$= \frac{12.5}{25} \times 100 = 50\%$

48. (1) Christy's income = Rs. x (let)
Amount given to orphanage

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

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

Remaining amount after depositing in bank

$= 80\% \text{ of } \frac{9x}{10}$

$= \text{Rs. } \left(\frac{9x}{10} \times \frac{80}{100}\right)$

$= \text{Rs. } \frac{18x}{25}$

According to the question,

$\frac{18x}{25} = 7200$

$\Rightarrow 18x = 25 \times 7200$

$\Rightarrow x = \frac{25 \times 7200}{18} = \text{Rs. } 10000$

49. (2) Let the number of male employees in the firm be x and that of female employees be y.
According to the question,

$\frac{5200 \times x + 4200 \times y}{x + y} = 5000$

$\Rightarrow 52x + 42y = 50\ (x + y)$
$\Rightarrow 52x + 42y = 50x + 50y$
$\Rightarrow 52x - 50x = 50y - 42y$
$\Rightarrow 2x = 8y$
$\Rightarrow x = 4y$

∴ $x + y = 4y + y = 5y$
∴ Required percent

$= \frac{y}{5y} \times 100$

= 20%

50. (*) $22 : 25 = \frac{22}{25} \times 100 = 88\%$

∴ Percentage effect

$= \left(88 - \frac{80}{3} - \frac{88 \times 80}{300}\right)\%$

$= \left(88 - \frac{80}{3} - \frac{704}{30}\right)\%$

$= \left(\frac{2640 - 800 - 704}{30}\right)\%$

$= \frac{1136}{30} = 37.86\%$ increase

51. (3) Mahesh's income
= Rs. 100 (let).
∴ Mohan's income = Rs. 250
Required per cent

$= \left(\frac{250 - 100}{250}\right) \times 100\%$

$= \left(\frac{1500}{25}\right)\% = 60\%$

52. (1) Let person's income be Rs. 100.
Expenses = Rs. 60
Savings = Rs. 40
New income = Rs. 120

$\text{Expenses} = \text{Rs. } \left(\frac{120 \times 70}{100}\right)$

= Rs. 84
Savings = Rs. (120 – 84)
= Rs. 36
∴ Required percent decrease

$= \frac{40 - 36}{40} \times 100 = \frac{400}{40} = 10\%$

53. (1) Q,s salary = Rs. 100 (let).
∴ P's salary = 125
∴ Required per cent

$= \left(\frac{125 - 100}{125}\right) \times 100$

$= \frac{25 \times 100}{125} = 20\%$

54. (2) Required per cent

$= \left(\frac{40}{100 - 40}\right) \times 100$

$= \frac{4000}{60} = \frac{200}{3} = 66\frac{2}{3}\%$

55. (1) Effect on percentage

$= -\frac{x^2}{100}\%$

$= \left(\frac{-50 \times 50}{100}\right)\%$

= –25%
Negative sign shows decrease.

56. (4) Let the man's income be Rs. x.
According to the question,

$x \times \frac{15}{100} = 75$

$\Rightarrow x = \frac{75 \times 100}{15} = \text{Rs. } 500$

57. (3) B's salary = Rs. 100 (let)
∴ A's salary = Rs. 130

∴ Required percent $= \frac{30}{130} \times 100$

$= \frac{300}{13} = 23.07\%$

58. (2) Number of officers = x.
Number of remaining employees = y.
According to the question,
$8840\ (x + y) = 15000x + 8000y$
$\Rightarrow 8840x + 8840y$
$= 15000x + 8000y$
$\Rightarrow 15000x - 8840x$
$= 8840y - 8000y$
$\Rightarrow 6160x = 840y$

$\Rightarrow \frac{x}{y} = \frac{840}{6160} = \frac{84}{616} = \frac{3}{22}$

∴ Required per cent

$= \frac{3}{25} \times 100 = 12\%$

59. (2) Let annual salary of Sachdev before increase be Rs. x.
According to the question,

$x \times \frac{105}{100} = 15120$

$\Rightarrow x = \frac{15120 \times 100}{105}$

= Rs. 14400
∴ Required monthly salary

$= \text{Rs. } \left(\frac{14400}{12}\right) = \text{Rs. } 1200$

TYPE-IV

1. (1) Let B = 100
∴ According to question,
A is 40% greater than B.
∴ A = 140
∴ B is 20% less than C
∴ 0.8C = 100
∴ C = 125
∴ A : C = 140 : 125 = 28 : 25

2. (1) 10% of m = 20% of n

$$\Rightarrow \frac{10}{100}\times m = \frac{20}{100}\times n$$

$$\Rightarrow \frac{m}{n} = \frac{10}{5} = \frac{2}{1}$$

∴ m : n = 2 : 1

3. (1) 5 : 4 when expressed as per cent $= \frac{5}{4}\times 100 = 125\%$

4. (3) Let the number of boys and girls in the college be $3x$ and $2x$ respectively. Number of minor boys

$$= 3x \times \frac{80}{100} = \frac{12x}{5}$$

Number of minor girls

$$= 2x \times \frac{75}{100} = \frac{3x}{2}$$

Total number of minor students

$$= \frac{12x}{5} + \frac{3x}{2}$$

$$= \frac{24x + 15x}{10} = \frac{39x}{10}$$

Required percentage

$$= \frac{39x}{10\times 5x}\times 100 = 78\%$$

(As total students = $3x + 2x$)

5. (4) Let the number of boys and girls be $4x$ and x respectively.
Number of boys who hold scholarship.

$$= \frac{75}{100}\times 4x = 3x$$

and number of girls who hold scholarship

$$= \frac{70\times x}{100} = \frac{7x}{10}$$

Number of students who do not hold scholarship

$$= 5x - 3x - \frac{7x}{10} = 2x - \frac{7x}{10}$$

$$= \frac{20x - 7x}{10} = \frac{13x}{10}$$

The required percentage

$$= \frac{\frac{13x}{10}}{5x}\times 100$$

$$= \frac{13x}{10\times 5x}\times 100 = 26\%$$

6. (1) Let the numbers be $2x$ and $3x$.
According to the question,

$$\left(\frac{20}{100}\times 2x\right) + 20$$

$$= \left(\frac{10}{100}\times 3x\right) + 25$$

$$\Rightarrow \frac{2x}{5} + 20 = \frac{3x}{10} + 25$$

$$\Rightarrow \frac{2x}{5} - \frac{3x}{10} = 25 - 20$$

$$\Rightarrow \frac{4x - 3x}{10} = 5 \Rightarrow x = 50$$

∴ The smaller number
$= 2x = 100$

7. (3) Let the third number be 100.
∴ First number = 120
Second number = 150
∴ Required ratio

$$= \frac{120}{150} = \frac{4}{5} \text{ or } 4 : 5$$

8. (3) Let the numbers be x and y and x is greater than y. Then
$x - y = 45\%$ of $(x + y)$

$$\Rightarrow x - y = \frac{45}{100}(x + y)$$

$$\Rightarrow x - y = \frac{9}{20}(x + y)$$

$\Rightarrow 20x - 20y = 9x + 9y$
$\Rightarrow 20x - 9x = 20y + 9y$
$\Rightarrow 11x = 29y$

$$\Rightarrow \frac{x}{y} = \frac{29}{11}$$

or 29 : 11

9. (4) 30% of A = 25% of B
$\Rightarrow$ 30 A = 25 B
$\Rightarrow$ A : B = 25 : 30 = 5 : 6
Again,
25% of B = 20% of C
$\Rightarrow$ 25 B = 20C
$\Rightarrow$ 5B = 4C
$\Rightarrow$ B : C = 4 : 5
∴ A : B : C = 5 × 4 : 4 × 6 : 6 × 5
= 20 : 24 : 30 = 10 : 12 : 15

10. (2) Let number of boys be x.

Then, $x + \frac{120}{100}x = 66$

$$\Rightarrow x + \frac{6x}{5} = 66$$

$$\Rightarrow \frac{5x + 6x}{5} = 66$$

$$\Rightarrow x = \frac{66\times 5}{11} = 30$$

∴ Number of girls
= 66 – 30 = 36
∴ New ratio = 30 : (36 + 4)
= 30 : 40 = 3 : 4

11. (4) Let the number of boys $= 3x$ and that of girls $= 2x$
Number of boys who do not hold scholarship = 80% of $3x$

$$= 3x \times \frac{80}{100} = \frac{12x}{5}$$

Number of girls who do not hold scholarship

$$= 2x \times \frac{70}{100} = \frac{14x}{10}$$

∴ Number of students who do not hold scholarship

$$= \frac{12x}{5} + \frac{14x}{10} = \frac{24x + 14x}{10}$$

$$= \frac{38x}{10}$$

∴ Required percentage

$$= \frac{\frac{38x}{10}}{5x}\times 100$$

$$= \frac{38}{10\times 5}\times 100 = 76\%$$

12. (4) Let the initial expenses on rice, fish and oil be ₹ $12x$, ₹ $17x$ and ₹ $3x$ respectively.
∴Total expenditure
= ₹ $(12x + 17x + 3x)$
= ₹ $32\ x$
After increase,
Expenditure on rice

$$= \frac{120}{100}\times 12x = ₹\ 14.4x$$

Expenditure on fish

$= \frac{130}{100} \times 17x$ = ₹ 22.1x

Expenditure on oil

$= \frac{150}{100} \times 3x$ = ₹ 4.5x

Total expenditure
= ₹ (14.4 x + 22.1x + 4.5 x)
= ₹ 41 x
Increase = ₹ (41x – 32x)
= ₹ 9x
∴ Percentage increase

$= \frac{9x}{32x} \times 100 = \frac{225}{8} = 28\frac{1}{8}\%$

13. (4) 20 % of A = 30 % of B

$= \frac{1}{6}$ of C

$\Rightarrow \frac{20A}{100} = \frac{30B}{100} = \frac{C}{6}$

$\Rightarrow \frac{A}{5} = \frac{B}{\frac{10}{3}} = \frac{C}{6} = k$ (let)

$\Rightarrow$ A = 5k, B = $\frac{10}{3}k$, C = 6 k

∴ A : B : C = 5k : $\frac{10k}{3}$: 6 k

= 15 : 10 : 18

14. (2) Increased train fare

$= ₹ \left(\frac{120}{100} \times 30\right)$ = ₹ 36

Increased bus fare

$= ₹ \left(\frac{110}{100} \times 20\right)$ = ₹ 22

∴ Required ratio = 36 : 22
= 18 : 11

15. (1) Let the numbers be x and y where $x > y$. Then,

$x - y = \frac{15}{100}(x + y)$

$\Rightarrow x - y = \frac{3}{20}(x + y)$

$\Rightarrow$ 20x – 20y = 3x + 3y
$\Rightarrow$ 20x – 3x = 20y + 3y

$\Rightarrow 17x = 23y \Rightarrow \frac{x}{y} = \frac{23}{17}$

16. (3) The raised price = $\frac{120}{100}$ of the former price
∴ The householder must now consume $\frac{100}{120}$ of the original amount
∴ The reduction in consumption

$= \left(1 - \frac{100}{120}\right)$ of the original consumption = $\frac{1}{6}$ of the original consumption
i.e. 1 : 6
Aliter : Using Rule 8,
Required percentage

$= \left(\frac{20}{100 + 20}\right) \times 100$

$= \frac{20}{120} \times 100$

$= \frac{100}{6}\%$

Required ratio = 1 : 6

17. (2) Let Rama's expenditure = 5x
Savings = 3x
∴ Rama's income = 5x + 3x = 8x
After increase,

Rama's income = $\frac{112}{100} \times 8x$

= 8.96 x
Rama's expenditure

$= \frac{5x \times 115}{100} = 5.75x$

Rama's savings
= (8.96x – 5.75x)
= 3.21x
∴ Rama's saving per cent

$= \left(\frac{3.21x - 3x}{3x}\right) \times 100$

$= \frac{0.21}{3} \times 100 = 7$

18. (4) Let the numbers be 4x and 5x. After corresponding increase or decrease,
Required ratio

$= 4x \times \frac{120}{100} : 5x \times \frac{80}{100}$

= 12x : 10x
= 6 : 5

19. (4) $\frac{A \times 60}{100} = B \times \frac{3}{4}$

$\Rightarrow A \times \frac{3}{5} = B \times \frac{3}{4}$

$\Rightarrow \frac{A}{B} = \frac{3}{4} \times \frac{5}{3} = 5 : 4$

20. (1) Let C = 100
∴ B = 80

$A = \frac{80 \times 160}{100} = 128$

∴ A : C = 128 : 100 = 32 : 25

21. (2) (B – A) × $\frac{30}{100}$ = (B + A) × $\frac{18}{100}$

∴ $\frac{B - A}{B + A} = \frac{18}{30} = \frac{3}{5}$

By componendo and dividendo,

$\frac{2B}{-2A} = \frac{3 + 5}{3 - 5} = \frac{8}{-2} = \frac{4}{-1}$

$\Rightarrow \frac{B}{A} = \frac{4}{1}$

$\Rightarrow$ A : B = 1 : 4

22. (1) Boys = 30, Girls = 20 (let)
Boys getting no scholarship = 24
Girls getting no scholarship = 15
Sum = 24 + 15 = 39
∴ Required percentage

$= \frac{39}{50} \times 100 = 78\%$

23. (4) Let the first number be x and second number be y.

∴ $y - \frac{60x}{100} = \frac{52y}{100}$

$\Rightarrow$ 100y – 60x = 52y
$\Rightarrow$ 48y = 60x

∴ $\frac{x}{y} = \frac{48}{60} = \frac{4}{5}$ or 4 : 5

24. (2) Women = $\frac{43}{83} \times 311250$

= 161250
Men = 311250 – 161250
= 150000
∴ Total number of literate persons

$= \frac{161250 \times 8}{100} + 150000 \times \frac{24}{100}$

= 12900 + 36000 = 48900

25. (3) 7x – 5x = 200
$\Rightarrow$ 2x = 200 $\Rightarrow$ x = 100
∴ Price of a pair of shoes
= 5x = 5 × 100 = ₹ 500

26. (1) $x \times \frac{15}{100} = y \times \frac{20}{100}$

$\Rightarrow x \times 15 = y \times 20$

$\Rightarrow \frac{x}{y} = \frac{20}{15} = \frac{4}{3} = 4 : 3$

27. (1) Boys in school = $2x$

Girls = $3x$

Students who are not scholarship holders :

Boys $\Rightarrow \frac{2x \times 75}{100} = \frac{6x}{4}$

Girls $\Rightarrow \frac{3x \times 70}{100} = \frac{21x}{10}$

Total students who donot hold scholarship = $\frac{6x}{4} + \frac{21x}{10}$

$= \frac{30x + 42x}{20} = \frac{72x}{20} = \frac{18x}{5}$

$\therefore$ Required percentage

$= \frac{\frac{18x}{5}}{5x} \times 100 = 72\%$

28. (1) Numbers $\Rightarrow$ A and B

$\therefore \frac{A \times 5}{100} + \frac{B \times 4}{100}$

$= \frac{2}{3}\left(\frac{A \times 6}{100} + \frac{B \times 8}{100}\right)$

$\Rightarrow 5A + 4B = \frac{12A + 16B}{3}$

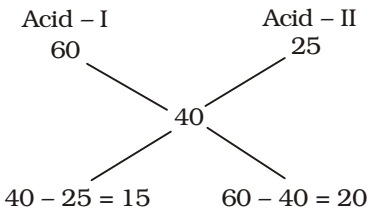
$\Rightarrow 15A + 12B = 12A + 16B$

$\Rightarrow 15A - 12A = 16B - 12B$

$\Rightarrow 3A = 4B$

$\Rightarrow \frac{A}{B} = \frac{4}{3} = 4 : 3$

29. (3) By alligation,



$\therefore$ Required ratio = 15 : 20

= 3 : 4

30. (4) 50% of x = 30% of y

$\Rightarrow \frac{x \times 50}{100} = \frac{y \times 30}{100}$

$\Rightarrow \frac{x}{y} = \frac{30}{50} = \frac{3}{5} = 3 : 5$

31. (2) Boys in the village = $3x$

Girls in the village = $2x$

Villagers who appeared in the examination

$= \frac{3x \times 30}{100} + \frac{2x \times 70}{100}$

$= \frac{9x}{10} + \frac{14x}{10} = \frac{23x}{10}$

Villagers who did not appear in the examination

$= \frac{3x \times 70}{100} + \frac{2x \times 30}{100}$

$= \frac{21x}{10} + \frac{6x}{10} = \frac{27x}{10}$

$\therefore$ Required ratio = $\frac{23x}{10} : \frac{27x}{10}$

= 23 : 27

32. (4) C.P. of 1 litre of milk= Rs. 100

$\therefore$ Mixture sold for Rs. 125

$= \frac{125}{100} = \frac{5}{4}$ litre

$\therefore$ Quantity of water = $\frac{5}{4} - 1$

$= \frac{1}{4}$ litre

$\therefore$ Required ratio = $\frac{1}{4} : 1$

= 1 : 4

33. (1) Percentage of syrup

$= \frac{3}{4} \times 100 = 75\%$

34. (1) Let the numbers be $5x$ and $4x$ respectively

According to the question,

$5x \times \frac{40}{100} = 12$

$\Rightarrow 2x = 12 \Rightarrow x = 6$

$\therefore$ $4x$ का 50% = $4 \times 6 \times \frac{1}{2} = 12$

35. (2) According to the question,

$x \times \frac{10}{100} = 3 \times y \times \frac{15}{100}$

$\Rightarrow 10x = 45y$

$\Rightarrow \frac{x}{y} = \frac{45}{10} = \frac{9}{2}$

36. (2) Required per cent

$= \frac{11}{10} \times 100 = 110\%$

37. (2) Let the number of students in school be 100.

Boys $\Rightarrow$ 60

Girls $\Rightarrow$ 40

Students who do not hold scholarship :

Boys $\Rightarrow \frac{60 \times 80}{100} = 48$

Girls $\Rightarrow \frac{40 \times 75}{100} = 30$

Required answer = 48 + 30

= 78 i.e., 78%

38. (2) According to the question,

A × 35% = B × 25%

$\Rightarrow \frac{A}{B} = \frac{25}{35} = \frac{5}{7}$

TYPE-V

1. (2) Glycerine in mixture

= 40 litres

Water = 10 litres

Let x litres of pure glycerine is mixed with the mixture.

$\therefore \frac{40 + x}{50 + x} = \frac{95}{100} = \frac{19}{20}$

$\Rightarrow 800 + 20x = 950 + 19x$

$\Rightarrow x = 950 - 800 = 150$ litres.

2. (4) Alcohol in original solution

$= \frac{40}{100} \times 5 = 2$ litres

Water in original solution

= 3 litres

On adding 1 litre water, water becomes 4 litres.

Now, 6 litres of solution contains 2 litres of alcohol.

$\therefore$ 100 litres of solution contains

$= \frac{2}{6} \times 100$

$= \frac{100}{3} = 33\frac{1}{3}\%$ alcohol.

3. (1) In 12 litres salt solution,

$\text{Salt} = \frac{7 \times 12}{100} = 0.84$ units

$\text{Water} = \frac{93 \times 12}{100} = 11.16$ units

After evaporation,
Percentage of salt

$= \frac{0.84}{8} \times 100 = 10.5\,\%$

4. (2) In 60 litres of solution, Water

$= \frac{60 \times 20}{100}$ = 12 litres

On adding x litres of water,

$\frac{12 + x}{60 + x} \times 100 = 40$

$\Rightarrow 60 + 5x = 120 + 2x$
$\Rightarrow 3x = 60$
$\Rightarrow x = 20$ litres

5. (2) Sugar in original solution

$= \frac{75 \times 30}{100} = 22.5$ gm

Let x gm of sugar be mixed.

$\therefore \frac{22.5 + x}{75 + x} \times 100 = 70$

$\Rightarrow 2250 + 100x = 75 \times 70 + 70x$
$\Rightarrow 2250 + 100x = 5250 + 70x$
$\Rightarrow 30x = 5250 - 2250 = 3000$

$\Rightarrow x = \frac{3000}{30} = 100$ gm

6. (3) In 30% alcohol solution,

$\text{Alcohol} = \frac{30}{100} \times 6 = 1.8$ litres

Water = 4.2 litres
On mixing 1 litre of pure alcohol,
Percentage of water

$= \frac{4.2}{7} \times 100 = 60\%$

7. (2) In 4 kg of ore, iron = 0.9 kg.
$\therefore$ Quantity of ore for 60 kg of iron

$= \frac{60 \times 4}{0.9}$

= 266.67 kg

8. (4) Let x ml of water be added.

$\therefore \frac{20 + x}{100 + x} \times 100 = 50$

$\Rightarrow 40 + 2x = 100 + x$
$\Rightarrow x = 60$ ml

9. (1) In 1 litre i.e. 1000 ml of mixture,
Alcohol = 700 ml.
Water = 300 ml.
Let x ml of alcohol is mixed.

$\therefore \frac{300}{1000 + x} \times 100 = 15$

$\Rightarrow 1000 + x = 2000$
$\Rightarrow x = 1000$ ml.

10. (4) In 10 litres of first type of liquid,

$\text{Water} = \frac{1}{5} \times 10 = 2$ litres

In 4 litres of second type of liquid,

$\text{Water} = 4 \times \frac{35}{100} = \frac{7}{5}$ litres

Total amount of water

$= 2 + \frac{7}{5} = \frac{17}{5}$ litres

Required percentage

$= \frac{\frac{17}{5}}{14} \times 100$

$= \frac{170}{7} = 24\frac{2}{7}\%$

11. (4) Water content in 40 litres of

$\text{mixture} = 40 \times \frac{10}{100}$

= 4 litres
$\therefore$ Milk content = 40 – 4
= 36 litres
Let x litres of water is mixed.

Then, $\frac{4 + x}{40 + x} = \frac{20}{100}$

$\Rightarrow \frac{4 + x}{40 + x} = \frac{1}{5}$

$\Rightarrow 20 + 5x = 40 + x$
$\Rightarrow 4x = 20 \Rightarrow x = 5$ litres

12. (2) $\text{Alcohol} = \left(\frac{15}{100} \times 400\right)$ml

= 60 ml.
Water = 340 ml.
Let x ml of alcohol be added.

Then, $\frac{60 + x}{400 + x} \times 100 = 32$

or $\frac{60 + x}{400 + x} = \frac{32}{100} = \frac{8}{25}$

or $1500 + 25x = 3200 + 8x$
or $17x = 1700$
or $x = 100$ ml

13. (2) Initial quantity of gold

$= \frac{50 \times 80}{100} = 40$ gm

Let 'x' gm be mixed.

$(40 + x) = (50 + x) \times \frac{95}{100}$

$\Rightarrow 40 + x = (50 + x) \times \frac{19}{20}$

$\Rightarrow 800 + 20x = 950 + 19x$
$\Rightarrow x = 150$ gm

14. (3) In 200 litres of mixture,

Quantity of milk $= \frac{85}{100} \times 200$

= 170 litres
Quantity of water = 30 litres
Let the quantity of additional milk added be x litres.
According to the question,

$\frac{170 + x}{200 + x} \times 100 = 87.5$

$\Rightarrow (170 + x) \times 100$
$= 17500 + 87.5x$
$\Rightarrow 100x - 87.5x$
$= 17500 - 17000$
$\Rightarrow 12.5x = 500$

$\Rightarrow x = \frac{500}{12.5} = 40$ litres

15. (2) Let x litres of first mixture is mixed with y litres of the second mixture.
According to the question,

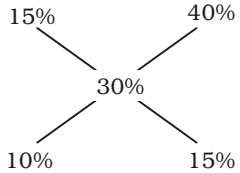
$\frac{x \times \frac{30}{100} + y \times \frac{50}{100}}{x \times \frac{70}{100} + y \times \frac{50}{100}} = \frac{45}{55}$

$\Rightarrow \frac{0.3x + 0.5y}{0.7x + 0.5y} = \frac{9}{11}$

$\Rightarrow 6.3x + 4.5y = 3.3x + 5.5y$
$\Rightarrow 6.3x - 3.3x = 5.5y - 4.5y$
$\Rightarrow 3x = y$

$\Rightarrow \frac{x}{y} = 1:3$

16. (1) Solution I Solution II



$\therefore$ Required ratio = 10 : 15 = 2 : 3

17. (2) Alcohol $= 15 \times \frac{1}{5} = 3$ litres

Water $= 15 \times \frac{4}{5} = 12$ litres

$\therefore$ Required percentage

$= \frac{3}{15+3} \times 100$

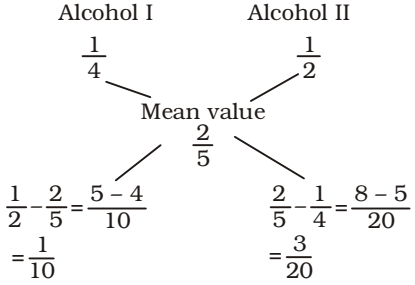
$= \frac{50}{3} = 16\frac{2}{3}\%$

18. (2) $\because$ 12 kg copper is contained in 100 kg of alloy

69 kg copper is contained in

$\therefore \frac{100}{12} \times 69 = 575$ kg of alloy

19. (3)



$\therefore$ Required ratio $= \frac{1}{10} : \frac{3}{20}$

$= 2 : 3$

20. (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

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

21. (3) In 300 gm of solution,

Sugar $= \frac{300 \times 40}{100} = 120$ gm.

Let x gm of sugar be mixed.

According to the question,

$\frac{120 + x}{300 + x} = \frac{1}{2}$

$\Rightarrow 240 + 2x = 300 + x$

$\Rightarrow 2x - x = 300 - 240$

$\Rightarrow x = 60$ gm.

22. (2) Quantity of sugar in the solution $= \frac{3 \times 60}{100} = 1.8$ units

On adding 1 litre of water,

$\therefore$ Required percent

$= \frac{1.8}{4} \times 100 = 45\%$

23. (2) In 32 litres of solution,

Alcohol $= \frac{32 \times 20}{100} = 6.4$ litres

Water $= 32 - 6.4 = 25.6$ litres

On adding 8 litres of water,

Required percent $= \frac{6.4}{40} \times 100 =$ 16%

TYPE-VI

1. (3) Using Rule 8,

Tricky approach

Required percentage decrease

$= \frac{\text{Increase}}{100 + \text{Increase}} \times 100$

$= \frac{20}{100 + 20} \times 100$

$= \frac{100}{6} = 16\frac{2}{3}\%$

2. (1) Using Rule 8,
Required answer

$= \frac{10}{(100 + 10)} \times 100$

$= \frac{10}{110} \times 100 = \frac{100}{11}\% = 9\frac{1}{11}\%$

3. (1) Using Rule 8,
Required reduction in consumption

$= \frac{x}{100 + x} \times 100\%$

where x = 25

$= \frac{25}{100 + 25} \times 100 = 20\%$

4. (3) Using Rule 8,
Reduction in consumption

$= \left\{\frac{R}{100 + R} \times 100\right\}\%$

$= \left(\frac{20}{120} \times 100\right)\%$

$= \frac{50}{3}\% = 16\frac{2}{3}\%$

5. (2) Let the CP of each article = ₹ 100 and consumption = 100 units
Initial expenditure
= ₹ (100 × 100) = ₹ 10000
New price of article = ₹ 80
Consumption = 120 units
Expenditure = ₹ (120 × 80)
= ₹ 9600
Decrease = ₹ (10000 – 9600)
= ₹ 400
$\therefore$ Percentage decrease

$= \frac{400 \times 100}{10000} = 4\%$

Aliter : Using Rule 3,
Required percentage decrease

$= \frac{20^2}{100}\%$

= 4% decreases

6. (2) Using Rule 8,
If the price of a commodity increases by R%, then reduction in consumption, not to increase the expenditure is given by

$\left(\frac{R}{100 + R} \times 100\right)\%$

$= \frac{15}{100 + 15} \times 100 = \frac{15}{115} \times 100$

$= \frac{300}{23} = 13\frac{1}{23}\%$

7. (2) Using Rule 8,
Required fractional decrease

$= \frac{R}{100 + R} = \frac{50}{100 + 50} = \frac{1}{3}$

8. (4) Using Rule 8,
Percentage decrease

$= \frac{25}{125} \times 100 = 20\%$

9. (4) Using Rule 9,
Required increase percent

$= \frac{40}{100 - 40} \times 100$

$= \frac{40}{60} \times 100 = \frac{200}{3} = 66\frac{2}{3}\%$

10. (4) Using Rule 8,
Required percentage decrease

$$= \frac{20}{100+20} \times 100$$

$$= \frac{50}{3} = 16\frac{2}{3}\%$$

11. (2) Using Rule 2,
Percentage increase

$$= \frac{7.50-6}{6} \times 100 = 25\,\%$$

$\therefore$ Percentage decrease in consumption $= \frac{25}{125} \times 100 = 20\%$

12. (2) Using Rule 4,
Percentage effect

$$= \left(20 - 20 + \frac{20 \times -20}{100}\right)\%$$

$= -4\%$
Negative sign shows decrease.

13. (2) If the reduction in consumption be x%, then

$$60 - x - \frac{60x}{100} = 0$$

$$\Rightarrow\ 60 - x - \frac{3x}{5} = 0$$

$\Rightarrow\ 300 - 5x - 3x = 0$
$\Rightarrow\ 8x = 300$

$$\Rightarrow\ x = \frac{300}{8} = 37.5\%$$

Aliter : Using Rule 8,
Required percentage

$$= \frac{60}{160} \times 100\%$$

$$= \frac{300}{8} = \frac{75}{2} = 37.5\%$$

14. (4) Using Rule 8,
Required per cent

$$= \frac{25 \times 100}{125} = 20\,\%$$

15. (2) Using Rule 8,
Percentage decrease in the consumption of petrol

$$= \left(\frac{20}{100+20} \times 100\right)\%$$

$$= \frac{50}{3} = 16\frac{2}{3}\%$$

TYPE-VII

1. (3) Total candidates
$= 1000 + 800 = 1800$
The candidates who are passed

$$= 1000 \times \frac{60}{100} + 800 \times \frac{50}{100}$$

$= 600 + 400 = 1000$
The number of candidates who failed $= 1800 - 1000 = 800$
$\therefore$ Required percent

$$= \frac{800}{1800} \times 100 = 44.4\%$$

Aliter : Using Rule 25,
Percentage of passed students

$$= \left(\frac{B.b + G.g}{B+G}\right)\%$$

$$= \frac{1000 \times 60 + 800 \times 50}{1000 + 800}$$

$$= \frac{60000 + 40000}{1800}$$

$$= \frac{100000}{1800}$$

$$= \frac{500}{9} = 55.5$$

$\therefore$ Percentage of failed students
$= 100 - 55.5 = 44.4\%$

2. (3) Let the maximum marks be x.
According to question,
20% of $x + 5$ = 30% of $x - 20$
$\Rightarrow$ (30 –20)% of $x = 25$

$$\Rightarrow\ x = \frac{25 \times 100}{10} = 250$$

$\therefore$ Passing marks
$= 20\%$ of $250 + 5 = 55$
$\therefore$ % Passing marks

$$= \frac{55}{250} \times 100 = 22\%$$

Aliter : Using Rule 22,
Here, m = 30%, n = 20%, p = 5 and q = 20
$\therefore$ Maximum marks

$$= \frac{100}{(n-m)} \times (p+q)$$

$$= \frac{100}{(30-20)} \times (5+20)$$

$$= \frac{100 \times 25}{10} = 250$$

Passing marks
$= 20\%$ of $250 + 5 = 55$
$\therefore$ % of passing marks

$$= \frac{55}{250} \times 100 = 22\%$$

3. (3) **Tricky approach**
According to question,
40% $\Rightarrow$ 220 + 20
or 40% $\Rightarrow$ 240

$$\therefore\ 100\% \Rightarrow \frac{240}{40} \times 100 = 600$$

Aliter : Using Rule 24,
a = 40%, b = 220, c = 20

$$\text{Total Marks} = \frac{100(220+20)}{40}$$

$$= \frac{100 \times 240}{40} = 600$$

4. (3) Let the total marks be x.
According to the question,
25% of x + 40 = 33% of x
$\Rightarrow$ (33 – 25)% of x = 40
$\Rightarrow$ 8% of x = 40

$$\Rightarrow x = \frac{40 \times 100}{8} = 500$$

5. (1) Let the marks obtained by first student be x.
$\therefore$ Marks obtained by second student $= x + 9$
Sum of their marks
$= 2x + 9$
As given,
$x + 9 = 56\%$ of $(2x + 9)$

$$\Rightarrow x + 9 = \frac{56}{100} \times (2x+9)$$

$$\Rightarrow x + 9 = \frac{14}{25} \times (2x+9)$$

$\Rightarrow 25x + 225 = 28x + 126$
$\Rightarrow 3x = 225 - 126$

$$\Rightarrow x = \frac{99}{3} = 33$$

$\therefore$ Marks obtained are 42 and 33.

6. (1) Let marks obtained by Supriyo $= x$

$$\therefore\ \frac{9x}{10} = 81 \Rightarrow x = \frac{81 \times 10}{9} = 90$$

7. (3) Let the maximum marks be x.
According to the question,
40% of $x = 90 + 10$

$$\Rightarrow x = \frac{100 \times 100}{40} = 250$$

Aliter : Using Rule 24,
a = 40%, b = 90, c = 10
Maximum marks

$$= \frac{(b+c)}{a} \times 100$$

$$= \frac{(90+10)}{40} \times 100 = 250$$

8. (1) n (M) = 65, n (P) = 48, n(M∩P) = 30
∴ n(M∪P)= n(M) + n(P) – n(M∩P)
= 65 + 48 – 30 = 83
∴ Per cent of students passed = 83
∴ Per cent of students failed= 17
Method 2 :
Students passed only in Math
= 65 – 30 = 35%
Students passed only in Physics
= 48 – 30 = 18%
∴ Total passing %
= 35 + 18 + 30 = 83%
∴ Failed = 100 – 83 = 17%

9. (3) Let the number of students in the class be 100.
∴ Number of students in Biology = 72 and number of students in Maths = 44.
∴ Number of students opting for both subjects
= 72 + 44 – 100 = 16
∵ When 16 students opt for both subjects, total number of students = 100
∴ When 40 students opt for both subjects, total number of students $= \frac{100}{16} \times 40 = 250$

10. (1) Let the maximum marks be x.

$$\therefore \frac{x \times 33}{100} = 125 + 40 = 165$$

$$\Rightarrow x = \frac{165 \times 100}{33} = 500$$

Aliter : Using Rule 24,
a = 33%, b = 125, c = 40
Maximum marks

$$= \frac{(b+c)}{a} \times 100$$

$$= \frac{(125+40)}{33} \times 100$$

$$= \frac{165 \times 100}{35} = 500$$

11. (2) Let maximum marks be x, then,

$$\frac{36 \times x}{100} = 113 + 85 = 198$$

$$\Rightarrow x = \frac{198 \times 100}{36} = 550$$

Aliter : Using Rule 24,
a = 36%, b = 113, c = 85
Maximum marks

$$= \frac{(b+c) \times 100}{a}$$

$$= \frac{(113+85) \times 100}{36}$$

$$= \frac{198 \times 100}{36} = 550$$

12. (2) 46% of 500

$$= \frac{500 \times 46}{100} = 230$$

$$32\% \text{ of } 300 = \frac{300 \times 32}{100} = 96$$

Required marks = 230 – 96 = 134
Let x% of 200 = 134

$$\Rightarrow \frac{200 \times x}{100} = 134$$

$$\Rightarrow 2x = 134$$

$$\Rightarrow x = \frac{134}{2} = 67\%$$

13. (2) A = 360;

$$B = \frac{360 \times 100}{90} = 400$$

$$C = \frac{400 \times 100}{125} = 320$$

$$D = \frac{320 \times 100}{80} = 400$$

∴ Required percentage

$$= \frac{400}{500} \times 100 = 80\%$$

14. (4) Failed candidates

$$= \frac{1100 \times 50}{100} + \frac{900 \times 60}{100}$$

= 550 + 540 = 1090
∴ Required percentage

$$= \frac{1090}{2000} \times 100 = 54.5\%$$

Aliter : Using Rule 25,
B = 1100, b = 50%, G = 900, g = 40%
Percentage of failed candidates

$$= \frac{(Bb+Gg)}{B+G}\%$$

$$= \frac{1100 \times 50 + 900 \times 40}{1100 + 900}$$

$$= \frac{55000 + 36000}{2000}$$

$$= \frac{91}{2} = 45.5\%$$

15. (2) Successful boys in English or Maths or both
= 80 + 85 – 75 = 90%
Unsuccessful boys = 10%
∴ Total number of boys

$$= \frac{100}{10} \times 45 = 450$$

16. (2) 25% of students pass in at least one subject i.e.; they pass in one or both subjects.
∴ % of students who don't pass or fail in both subjects
= (100 – 25)% = 75%

17. (1) The percentage of students who pass in one or two or both subjects
= 60 + 70 – 40 = 90
∴ Percentage of failed students
= 100 – 90 = 10%

18. (3) Let total number of candidates = 100
70 candidates passed in English and 30 failed in it.
80 candidates passed in Maths and 20 failed in it.
10 candidates failed in English and Maths both.
∴ Out of 30 failed in English, 10 failed in Maths also.
∴ 30 – 10 = 20 failed in English alone.
Similarly,
20 – 10 = 10 failed in Maths alone.
∴ Total number of failures
= 20 + 10 + 10 = 40
∴100 – 40 = 60 candidates passed in both subjects.
Now, if 60 candidates pass, total strength = 100
∴ For 144 candidates, total strength $= \frac{100}{60} \times 144 = 240$

19. (4) Difference of percentages of maximum marks obtained by two candidates = 32% – 20% = 12%
Difference of scores between two candidates = 30 +42 = 72
∴ 12% of maximum marks = 72
∴ Maximum marks

$$= \frac{72 \times 100}{12} = 600$$

∴ Pass marks = 20% of 600 + 30
= 120 + 30 = 150
∴ Required percentage

$$= \frac{150}{600} \times 100 = 25\%$$

Aliter : Using Rule 22,
n = 32%, m=20%, p=30, q = 42.

$$\text{Full Marks} = \frac{100}{n - m} \times (p + q)$$

$$= \frac{100}{(32 - 20)} \times (30 + 42)$$

$$= \frac{100}{32} \times 72 = 600$$

Pass marks =20% of 600 + 30
= 120 + 30 = 150
∴ Required percentage

$$= \frac{150}{600} \times 100 = 25\%$$

20. (4) Total number of students = 640 + 360 = 1000
Number of successful boys = 60% of 640 = 384
Number of successful girls = 80% of 360 = 288
Total number of successful students = 384 + 288 = 672
Number of unsuccessful students = 1000 – 672 = 328
∴ Required percentage

$$= \frac{328 \times 100}{1000} = 32.8\%$$

Aliter : Using Rule 25,
B = 640, G = 360,
b = 60%, g = 80%
Percentage of passed students

$$= \left(\frac{Bb + Gg}{B + G}\right)\%$$

$$= \frac{640 \times 60 + 360 \times 80}{640 + 360}$$

$$= \frac{38400 + 28800}{1000}$$

$$= \frac{67200}{1000} = 67.2\%$$

∴ % of failed students
= 100 – 67.2%
= 32.8%

21. (3) Let total number of students = 100
Number of failures in Maths = 34
Number of failures in English = 42
Number of failures in both subjects = 20
Number of failures in Maths or English or both
= 34 + 42 – 20 = 56
Number of students who passed in both subjects
= 100 – 56 = 44
The required percentage = 44%
Aliter : Using Rule 23,
a = 34%, b = 42%, c = 20%
Passed candidates in both the subjects
= 100 – (a + b – c)
= 100 – (34 + 42 – 20)
= 100 – 56 = 44%

22. (2) Difference of percentage
= (40 – 30)% = 10%
Difference of marks = 6 + 6= 12
∵ 10% of total marks = 12

$$\text{Total marks} = \frac{12 \times 100}{10} = 120$$

Aliter : Using Rule 22,
Here, m = 30%, n = 40%,
p = 6, q = 6.
∴ Maximum Marks

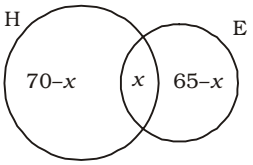
$$= \frac{100}{(n - m)} \times (p + q)$$

$$= \frac{100}{(40 - 30)} \times (6 + 6)$$

$$= \frac{100}{10} \times 12 = 120$$

23. (3) Let the total number of students = 100
∴ Number of students who failed in Hindi or English or both
= 52 + 42 – 17 = 77
∴ Number of students who passed in both subjects
= 100 – 77 = 23%
∴ Required percentage = 23
Aliter : Using Rule 23,
a = 52%, b = 42%, c = 17%
Passed candidates
= 100 – (52 + 42 – 17)
= 100 – (94 – 17)
= 100 – 77 = 23%

24. (2) Let total number of students = 100
∴ 27 students speak none of the two languages.
It means only 73 students speak either Hindi or English or both.
Let x students speak both languages.



∴ 73 = 70 – x + x + 65 – x
⇒ x = 70 + 65 – 73 = 62%

25. (2) Clearly, 75 candidates qualify
∴ 75% of appearing candidates = 450
∴ Number of appearing candidates

$$= \frac{450 \times 100}{75} = 600$$

26. (1) Number of students passed in first year = 75
Number of students passed in second year $= \frac{60 \times 75}{100} = 45$
Total number of passed students
= 75+45=120
Total number of appeared students =175
∴ Required percentage

$$= \frac{120}{175} \times 100 = 68\frac{4}{7}\%$$

27. (4) Let the maximum marks be x.
According to the question,
35% of x = 200 +10

$$\Rightarrow \frac{35x}{100} = 210$$

$$\Rightarrow x = \frac{210 \times 100}{35} = 600$$

Aliter : Using Rule 24,
a = 35%, b = 200, c = 10
Maximum Marks

$$= \frac{100 \times (b + c)}{a}$$

$$= \frac{100(200 + 10)}{35}$$

= 600 Marks

28. (1) Let the full marks in that examination were x.
According to the question,

$$\frac{30x}{100}+5=\frac{40x}{100}-10$$

$$\Rightarrow \frac{4x}{10}-\frac{3x}{10}=10+5$$

$$\Rightarrow \frac{x}{10}=15$$

$\therefore x = 150$
$\therefore$ Minimum pass marks

$$\frac{30}{100}\times 150+5=50$$

Aliter : Using Rule 22,
m = 30%, n = 40%,
p = 5, q = 10.
Maximum marks

$$=\frac{100}{(n-m)}\times(p+q)$$

$$=\frac{100}{(40-30)}\times(5+10)=150$$

$\therefore$ Minimum passing marks

$$=150\times\frac{30}{100}+5$$

= 45 + 5 = 50

29. (4) Let the total number of candidates = x
$\therefore$ Number of candidates passed in English = $0.6x$
Number of candidates passed in Maths = $0.7x$
Number of candidates failed in both subjects = $0.2x$
Number of candidates passed in atleast one subject
$= x - 0.2x = 0.8x$
$\therefore 0.6x + 0.7x - 2500 = 0.8x$
$\Rightarrow 1.3x - 0.8x = 2500$
$\Rightarrow 0.5x = 2500$

$$\Rightarrow x=\frac{2500}{0.5}=5000$$

30. (3) Let the maximum marks in the examination = x.
According to the question,

$$\frac{40x}{100}-\frac{30x}{100}=50$$

$$\Rightarrow \frac{10x}{100}=50$$

$$\Rightarrow x=\frac{50\times 100}{10}=500$$

Aliter : Using Rule 22,
m = 30%, n = 40%, p = 25 and q = 25
$\therefore$ Maximum marks

$$=\frac{100}{(n-m)}\times(p+q)$$

$$=\frac{100}{(40-30)}\times(25+25)$$

= 500

31. (1) Let total candidates be 'x'
Percentage of the candidates passing in English or Mathematics or both
$= n(E) + n(M) - n(E \cap M)$
= 80 + 85 − 73 = 92
$\Rightarrow$ Percentage of candidates who failed in both the subjects
= 100 − 92 = 8 or 8%

32. (1) Percentage of students who failed in Maths or English or both
= (25 + 35 − 10)% = 50%
$\therefore$ Required percentage
= (100 − 50)% = 50%
Aliter : Using Rule 23,
a = 35%, b = 25% and c = 10%
$\therefore$ Passed candidates in both the subjects.
= 100 − (a + b − c)%
= 100 − (35 + 25 − 10)%
= 100 − 50 = 50%

33. (1) If the total number of students be x, then
7% of x = 259

$$\Rightarrow \frac{x\times 7}{100}=259$$

$$\Rightarrow x=\frac{259\times 100}{7}=3700$$

34. (3) If the total number of students be x, then

$$x=\frac{90x}{100}+\frac{85x}{100}-150$$

$\Rightarrow 100x = 90x + 85x - 15000$
$\Rightarrow 175x - 100x = 15000$
$\Rightarrow 75x = 15000$
$\Rightarrow x = 200$

35. (1) Required percentage

$$=\frac{40\times 100+50\times 90+60\times 80}{40+50+60}$$

$$=88\frac{2}{3}\%$$

36. (2) If D gets 100 marks, then
Marks obtained by C = 125
Marks obtained by B

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

Marks obtained by A

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

$$\because 100=\frac{125\times 125\times 90}{10000}$$

$$\therefore 320=\frac{125\times 125\times 90\times 320}{1000000}$$

= 450

37. (2) Total examinees
= 80 + 60 = 140
Total successful examinees

$$=\frac{80\times 60}{100}+\frac{60\times 80}{100}$$

= 48 + 48 = 96.
$\therefore$ Required percent

$$=\frac{96}{140}\times 100=\frac{480}{7}=68\frac{4}{7}\%$$

Aliter : Using Rule 25,
Let us take B = 80, G = 60 and b = 60%, g = 80%
$\therefore$ Percentage of passed candidates

$$=\left(\frac{Bb+Gg}{B+G}\right)\%$$

$$=\left(\frac{80\times 60+60\times 80}{80+60}\right)\%$$

$$=\frac{9600}{140}$$

$$=\frac{480}{7}=68\frac{4}{7}\%$$

38. (4) $n(A \cup B)$

$= n(A) + n(B) - n(A \cap B)$
= 19 + 10 − 7 = 22%
i.e. 22% of students are unsuccessful in either one or two subjects.
$\therefore$ Percentage of successful students = 100 − 22 = 78%
Aliter : Using Rule 24,
a = 19%, b = 10%, c = 7%
Passed students in both the subjects
= 100 − (a + b − c)
= 100 − (19 + 10 − 7)
= 100 − 22 = 78%

39. (2) Successful students in both classes

$$=\frac{20\times 80}{100}+\frac{30\times 60}{100}$$

= 16 + 18 = 34

∴ Required percentage

$= \frac{34}{50} \times 100 = 68\%$

OR

Required percentage

$= \frac{20 \times 80 + 30 \times 60}{50}$

$= \frac{1600 + 1800}{50} = \frac{3400}{50}$

$= 68\%$

Aliter : Using Rule 25,

Let us take B = 20, G = 30, b = 80%, g = 60%

∴ Required percentage

$= \frac{Bb + Gg}{B + G}$

$= \left(\frac{20 \times 80 + 30 \times 60}{20 + 30}\right)\%$

$= \left(\frac{1600 + 1800}{50}\right)\%$

$= \frac{3400}{50}\% = 68\%$

40. (4) Failures in English
= 100 − 75 = 25
Failures in Maths = 100–60 = 40
Failures in both subjects = 25
Failures in English only
= 25 − 25 = 0
Failures n Maths only
= 40 − 25 = 15
Failures in one or both subjects
= 25 + 15 = 40
Percentage of successfuls
= 100 − 40 = 60
Let total students be x.

$\therefore x \times \frac{60}{100} = 240$

$\Rightarrow x = \frac{240 \times 100}{60} = 400$

41. (4) Maximum marks in the examination = x (let)

$\therefore \frac{40x}{100} - \frac{30x}{100} = 12 + 28$

$\Rightarrow \frac{10x}{100} = 40 \Rightarrow x = 40 \times 10$

$= 400$

Aliter : Using Rule 22,

Here, m = 30%, n = 40%, p = 12, q = 28

∴ Maximum marks

$= \frac{100}{(n - m)} \times (p + q)$

$= \frac{100}{(40 - 30)} \times (12 + 28)$

$= \frac{100 \times 40}{10} = 400$

42. (4) Total marks scored in all three subjects

$= \frac{300 \times 70}{100} = 210$

∴ Marks scored in third subject
= 210 − 60 − 80 = 70

43. (4) Let total marks in the exam be x.
According to the question,

$\frac{x \times 36}{100} = 190 + 35 = 225$

$\Rightarrow x \times 36 = 225 \times 100$

$\Rightarrow x = \frac{225 \times 100}{36} = 625$

Aliter : Using Rule 24,

a = 36%, b = 190, c = 35

Total marks $= \frac{(b + c) \times 100}{a}$

$= \frac{(190 + 35) \times 100}{36}$

$= \frac{225 \times 100}{36}$

$= \frac{25 \times 100}{4} = 625$

44. (3) Let the full marks of exam be x.
According to the question,

$\frac{x \times 32}{100} - \frac{x \times 20}{100} = 30 + 42$

$\Rightarrow \frac{12x}{100} = 72$

$\Rightarrow x = \frac{72 \times 100}{12} = 600$

∴ Minimum marks to pass

$= \frac{600 \times 20}{100} + 30$

$= 120 + 30 = 150$

∴ Required percentage

$= \frac{150}{600} \times 100 = 25\%$

Aliter : Using Rule 22,

Here, m = 20%, n = 32%, p = 30 and q = 42

Full Marks $= \frac{100}{(n - m)} \times (p + q)$

$= \frac{100}{(32 - 20)} \times (30 + 42)$

$= \frac{100 \times 72}{12} = 600$

∴ Passing Marks
= 20% of 600 + 30

$= \frac{20 \times 600}{100} + 30$

= 120 + 30 = 150

∴ Pass percentage $= \frac{150}{600} \times 100$

= 25%

45. (3) Percentage of students who pass in one or two or both subjects = 73 + 70 − 64 = 79%
∴ Unsuccessful students
⇒ 100 − 79 = 21%
If the total number of examinees be x, then
21% of x = 6300

$\Rightarrow x \times \frac{21}{100} = 6300$

$\Rightarrow x = \frac{6300 \times 100}{21} = 30000$

46. (2) Let the number of students with less than 75% attendance = y
Total students in school = x
According to the question,

$\frac{x}{10} + \frac{y}{5} = y$

$\Rightarrow \frac{x}{10} = y - \frac{y}{5} = \frac{4y}{5}$

$\Rightarrow \frac{x}{2} = 4y \Rightarrow \frac{y}{x} = \frac{1}{8}$

$\Rightarrow \frac{y}{x} \times 100 = \frac{100}{8} = 12.5\%$

47. (1) Number of students who wear spectacles

$= \frac{1400 \times 25}{100} = 350$

$\therefore$ Girls who wear spectacles

$= \left(1 - \frac{2}{7}\right)$ of 350

$= 350 \times \frac{5}{7} = 250$

48. (2) Percentage of boys = 60%

$\therefore$ Percentage of girls = 40%

Boys : Girls = 60 : 40 = 3 : 2

Number of girls = 812

$\therefore$ Number of boys

$= \frac{3}{2} \times 812 = 1218$

49. (1) Marks scored by A :

First subject $\Rightarrow \frac{900 \times 72}{100} = 648$

Second subject $\Rightarrow \frac{700 \times 80}{100}$

= 560

Total marks scored = 648 + 560 = 1208

Total maximum marks = 900 + 700 = 1600

$\therefore$ Required per cent

$= \frac{1208}{1600} \times 100 = 75.5\%$

50. (4) Percentage of failures either in 1 subject or both subjects = (35 + 45 – 20)% = 60%

$\therefore$ Percentage of the successful = (100– 60)% = 40%

51. (3) Total marks of 50 students = 50 × 70 = 3500

Total marks of 25 students = 25 × 60 = 1500

Total marks of 24 students = 24 × 80 = 1920

$\therefore$ Marks obtained by last student = 3500 – 1500 – 1920 = 80 i.e, 80%

52. (3) Let marks obtained by the first student be x.

$\therefore$ Marks obtained by the second student = $x - 9$

According to the question,

$x = 56\%$ of $(x + x - 9)$

$\Rightarrow x = \frac{(2x - 9) \times 56}{100}$

$\Rightarrow 100x = 112x - 504$

$\Rightarrow 112x - 100x = 504$

$\Rightarrow 12x = 504$

$\Rightarrow x = \frac{504}{12} = 42$

$\therefore$ Marks obtained by the second student = 42 – 9 = 33

53. (3) Maximum marks of examination = x (let)

According to the question,

25% of x = 47 + 43

$\Rightarrow \frac{x \times 25}{100} = 90$

$\Rightarrow \frac{x}{4} = 90 \Rightarrow x = 4 \times 90 = 360$

TYPE-VIII

1. (1) Using Rule 4,

Change in his salary

$= \left(20 - 20 - \frac{20 \times 20}{100}\right)\%$

$= \left(-\frac{400}{100}\right)\% = -4\%$

i.e. 4% decrease

Note : If A is first increased by x% and then decreased by y% the net % change

$= \left(x - y - \frac{xy}{100}\right)\%$

If the result is positive, the change indicates increase and if the result is negative, the change indicates decrease.

2. (3) Using Rule 4,

Net % change

$= \left(A + B + \frac{AB}{100}\right)\%$

Here, A = 20%, B = – 10%

$\therefore$ Net % change

$= 20 - 10 - \frac{200}{100}$

= 10 – 2= 8%

+ ve sign shows increase

3. (3) Using Rule 3,

Tricky approach

Required change

$= \frac{(10)^2}{100}\%$ decrease

= 1% decrease

4. (2) Using Rule 6,

A single equivalent reduction to reduction series of x%, y%

$= \left(x + y - \frac{xy}{100}\right)\%$

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

$= (20 - 1)\% = 19\%$

5. (1) The net change in price

$= \left(-25 + 20 - \frac{25 \times 20}{100}\right)\%$

= (–25 + 20 – 5)% = – 10%

Negative sign shows decrease.

6. (2) Let the price of the article be ₹ 100 and the daily sale be 100 units.

$\therefore$ Revenue day = 100 × 100 = ₹ 10000

New receipts = 75 × 130 = ₹ 9750

Decrease = ₹ (10000 – 9750) = ₹ 250

$\therefore$ % decrease

$= \frac{250}{10000} \times 100 = 2\frac{1}{2}\%$

Aliter : Using Rule 5,

Required change

$= \left(a - b - \frac{ab}{100}\right)\%$

$= \left(30 - 25 - \frac{30 \times 25}{100}\right)\%$

$= \left(5 - \frac{15}{2}\right) = -2.5\%$

$= 2\frac{1}{2}\%$ decrease.

7. (3) Using Rule 7,

Tricky approach

Single equivalent percentage increase in price

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

8. (4) Using Rule 7,

Tricky Approach

Effective increase percentage

$= \left(10 + 20 + \frac{20 \times 10}{100}\right)\% = 32\%$

$\therefore x \times \frac{132}{100} = 33$

$\Rightarrow x = \frac{33 \times 100}{132} =$ ₹ 25

9. (2) Using Rule 7,
Effective percentage increase

$$=\left(20+20+\frac{20\times 20}{100}\right)\% = 44\%$$

10. (4) Using Rule 4,
Net change

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

$= -1\%$ = 1% decrease

11. (3) Using Rule 7,
Required percentage increase

$$=\left(10+20+\frac{10\times 20}{100}\right)\% = 32\%$$

12. (1) Using Rule 5,
Required effect

$$= \left(80-20-\frac{80\times 20}{100}\right)\%$$

$= (60 - 16)\% = 44\%$
Positive sign shows increase.

13. (3) Using Rule 7,
Net effect

$$=\left(x+y+\frac{xy}{100}\right)\%$$

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

Negative sign shows decrease.

14. (4) Using Rule 5,
Required per cent effect

$$= \left(20-25-\frac{20\times 25}{100}\right)\%$$

$=(-5 - 5)\% = -10\%$
Negative sign shows decrease

15. (2) Using Rule 7,
Percentage effect

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

$\therefore$ Increase = ₹ 21

16. (2) Original fraction $= \frac{x}{y}$

$$\therefore \frac{\frac{120}{100}x}{y\times\frac{80}{100}} = \frac{4}{5}$$

$$\Rightarrow \frac{120x}{80y} = \frac{4}{5} \Rightarrow \frac{6x}{4y} = \frac{4}{5}$$

$$\Rightarrow \frac{x}{y} = \frac{4}{5}\times\frac{4}{6} = \frac{8}{15}$$

17. (3) Let original fraction be $\frac{x}{y}$

According to the question,

$$\frac{\frac{120}{100}x}{\frac{95y}{100}} = \frac{5}{2} \Rightarrow \frac{120x}{95y} = \frac{5}{2}$$

$$\Rightarrow \frac{x}{y} = \frac{5}{2}\times\frac{95}{120} = \frac{95}{48}$$

18. (2) Using Rule 4,
Effective value

$$= \left(x+y+\frac{xy}{100}\right)\%$$

$$=\left(25-25-\frac{25\times 25}{100}\right)\%$$

[Here, $x = 25$, $y = -25$]

$= -6.25\% = 6\frac{1}{4}\%$ decreased

(Negative value shows decrease).

19. (3) Larger number = x and smaller number = $520 - x$

$$\therefore \frac{96x}{100} = \frac{(520-x)}{100}\times 112$$

$\Rightarrow 96x = 520 \times 112 - 112x$
$\Rightarrow 112x + 96x = 520 \times 112$
$\Rightarrow 208x = 520 \times 112$

$$\Rightarrow x = \frac{520\times 112}{208} = 280$$

$\therefore$ Smaller number
$= 520 - 280 = 240$

20. (3) If the original price of article be ₹ x, then

$$x \times \frac{80}{100} \times \frac{130}{100} = 416$$

$$\Rightarrow x = \frac{416\times 100\times 100}{80\times 130} = ₹\ 400$$

Aliter : Using Rule 5,
Let the number be x
The number increases by

$$\left(-20+30-\frac{20\times 30}{100}\right)\% = 4\%$$

$$\Rightarrow \quad x + \frac{4x}{100} = 416$$

$$\frac{104x}{100} = 416$$

$$\boxed{x = 400}$$

21. (3) If the number be x, then

$$x \times \frac{245}{200} = 98$$

$$\Rightarrow x = \frac{98\times 200}{245} = 80$$

22. (4) Let the original price be ₹100
New price after 10% decrease
= ₹ 90
In order to restore the price to its original value, it must be increased by ₹ 10
% increase

$$= \frac{10}{90}\times 100 = \frac{100}{9} = 11\frac{1}{9}\%$$

Aliter : Using Rule 9,
Required %

$$= \frac{10}{100-10}\times 100\%$$

$$= \frac{100}{9}\% = 11\frac{1}{9}\%$$

23. (1) Clearly, 75% of the number = 225

$$\therefore \text{ Number} = \frac{225\times 100}{75} = 300$$

Again, 125% of 300 = 375
Hence, the number should be increased by 25%

24. (1) Let the number be 100.
After 20% increase, number = 120
After 20% increase of 120, number

$$= 120\times\frac{120}{100} = 144$$

$\therefore$ Per cent decrease

$$= \frac{44}{144}\times 100$$

$$= \frac{275}{9} = 30\frac{5}{9}\%$$

Aliter : Using Rule 7 and Rule 8,
Increase %

$$= \left(20+20+\frac{20\times 20}{100}\right)\% = 44\%$$

Required %

$$= \left(\frac{44}{100+44}\right)\times 100\%$$

$$= \frac{4400}{144}\%$$

$$= \frac{275}{9}\% = 30\frac{5}{9}\%$$

25. (4) Let the original number of employees be 100 and wages per head be ₹ 100.
Total wages = ₹ (100 × 100)
= ₹ 10000
New number of employees = 125
New wages per head = ₹ 75
Total new wages
= ₹ (125 × 75) = ₹ 9375
Decrease
= ₹ (10000 – 9375)
= ₹ 625
∴ Percentage decrease

$$= \frac{625}{10000} \times 100$$

$$= \frac{625}{100} = \frac{25}{4}\%$$

26. (2) Let original number be x.

$$\therefore \frac{90}{100}x \times \frac{110}{100} = x - 50$$

$$\Rightarrow \frac{99x}{100} = x - 50$$

$$\Rightarrow x - \frac{99x}{100} = 50$$

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

$$\Rightarrow x = 5000$$

Aliter : Using Rule 3,
Let the number be x

Decrease % = $\frac{10^2}{100}\%$ = 1%

⇒ x – 1% of x = x – 50

$$\frac{x}{100} = 50$$

$$\Rightarrow \boxed{x = 5000}$$

27. (3) Let the income be ₹ x and the rate of income tax be y %
According to the question,

$$\frac{xy \times 1.19}{100} - \frac{xy}{100} = \left(x - \frac{xy}{100}\right) \times \frac{1}{100}$$

$$\Rightarrow 1.19\,xy - xy = x - \frac{xy}{100}$$

$$\Rightarrow 0.19\,y = 1 - \frac{y}{100}$$

$$\Rightarrow \frac{y}{100} + 0.19y = 1 \Rightarrow y\left(\frac{1+19}{100}\right) = 1$$

$$\Rightarrow y = \frac{100}{20} = 5\%$$

28. (3) Man's income = ₹ 100 (let)
Expenditure = ₹ 75
Savings = ₹ 25
New income = $\frac{100 \times 120}{100}$
=₹ 120
New expenditure = $\frac{75 \times 110}{100}$ = ₹ 82.5
Savings = 120 – 82.5 = ₹ 37.5
Increase in savings = 37.5 – 25
= ₹ 12.5
∴ Increase per cent

$$= \frac{12.5}{25} \times 100 = 50\ \%$$

29. (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%
Aliter : Using Rule 14,
Increase % in volume

$$= \left(3 \times 10 + \frac{3 \times 10^2}{100} + \frac{10^3}{(100)^2}\right)\%$$

$$= \left(30 + 3 + \frac{1}{10}\right) = 33.1\%$$

Note : Volume of cube = $(\text{Edge})^3$
Hence, formula $\left(x + y + \frac{xy}{100}\right)\%$ should be used twice.

30. (1) Using Rule 4,
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%
∴ Effective result

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

= (9 – 0.1)% = 8.9% (increase)

31. (4) Let the number be x.
∴ (20 + 25)% of x = 36

$$\Rightarrow \frac{45x}{100} = 36$$

$$\Rightarrow x = \frac{36 \times 100}{45} = 80$$

32. (3) Effective percentage

$$= \left(-20 + 20 - \frac{20 \times 20}{100}\right) = -4\%$$

If the number be x, then
4% of x = 20

$$\Rightarrow x \times \frac{4}{100} = 20$$

$$\Rightarrow x = \frac{20 \times 100}{4} = 500$$

Aliter : Using Rule 3,
Let the number be x

Decrease % = $\frac{20^2}{100}$ = 4%

x – 4% of x = x – 20

$$\frac{4x}{100} = +20$$

$$x = 500$$

33. (2)

Initial value $\xrightarrow{\text{increasing value}}$

$\frac{P \times x}{100} \rightarrow$ increased value $\rightarrow P + \frac{Px}{100}$

$$= P\left(\frac{100 + x}{100}\right)$$

∴ Required answer

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

34. (4) Effective percentage decrease

$$= \left(x + y + \frac{xy}{100}\right)\%$$

$$= \left(-10 - 20 + \frac{(-10) \times (-20)}{100}\right)\%$$

= (– 30 + 2)% = –28%

35. (1) Cost of edible oil = 100 per kg.
Consumption = 1 kg.
Again,
New price = 125 per kg.
Consumption = 0.8 kg.
Expenditure = Rs. (125 × 0.8)
= Rs. 100

OR

Percentage effect

$$= \left(x + y + \frac{xy}{100}\right)\%$$

$$= \left(25 - 20 - \frac{25 \times 20}{100}\right)\% = 0\%$$

TYPE-IX

1. (4) Let the total number of votes be 100.
Number of uncast votes = 8
∴ Number of votes polled = 92
Number of votes obtained by the winner = 48
∴ Number of votes obtained by the loser = 92 – 48 = 44
If the difference of win be 4 votes, total voters = 100
∴ When the difference be 1100 votes, total voters

$$= \frac{100}{4} \times 1100 = 27500$$

Aliter : Using Rule 21,
Here, x = 1100, A = 48
∴ Total number of votes

$$= \frac{50 \times x}{50 - A}$$

$$= \frac{50 \times 1100}{50 - 48}$$

$$= \frac{50 \times 1100}{2}$$

$$= 25 \times 1100 = 27500$$

2. (3) Let the total number of voters enrolled be x.

Number of votes polled

$$= 75\% \text{ of } x = \frac{3x}{4}$$

Number of valid votes

$$= \frac{3x}{4} - \frac{2}{100} \times \frac{3x}{4} = \frac{3x}{4} - \frac{3x}{200}$$

$$= \frac{147x}{200}$$

Now, 75% of $\frac{147x}{200} = 9261$

or $\frac{3}{4}$ of $\frac{147x}{200} = 9261$

or $x = \frac{9261 \times 4 \times 200}{3 \times 147} = 16800$

3. (3) Difference of percentage of votes = 60% – 40% = 20%
∴ 20% of total votes = 14000
∴ 60% of total votes

$$= \frac{14000}{20} \times 60 = 42000$$

4. (4) Let total employees = 100
∴ Required percentage

$$= \frac{40 \times 40}{100} + \frac{60 \times 60}{100}$$

= 16 + 36 = 52%

5. (3) Let votes polled = x

$$\therefore \quad x \times \left(\frac{60 - 40}{100}\right) = 298$$

$$\Rightarrow x \times \frac{1}{5} = 298$$

$$\Rightarrow x = 298 \times 5 = 1490$$

Aliter : Using Rule 26,
Total number of votes

$$= \frac{50 \times 298}{50 - 40} = 1490$$

6. (4) Number of valid votes

$$= 104000 \times \frac{98}{100} = 101920$$

∴ Valid votes received by the candidate

$$= \frac{101920 \times 55}{100} = 56056$$

7. (2) If the number of votes polled be x, then

$$\frac{x \times 20}{100} = 1600$$

$$\Rightarrow x = \frac{1600 \times 100}{20} = 8000$$

Aliter : Using Rule 26,
Total number of votes

$$= \frac{50 \times 1600}{50 - 60} = 8000$$

(–ve sign wil be neglected)

8. (2) Vote percentage of third candidate
= 100 – 40 – 36 = 24%
∴ Votes got by third candidate

$$= \frac{36000 \times 24}{100} = 8640$$

9. (3) Total votes polled = x
∴ (57 – 43)% of x = 42000

$$\Rightarrow x \times \frac{14}{100} = 42000$$

$$\Rightarrow x = \frac{42000 \times 100}{14} = 300000$$

Aliter : Using Rule 26,
Total number of votes

$$= \frac{50 \times 42000}{50 - 57}$$

$$= \frac{50 \times 42000}{-7} = 300000$$

(–ve sign will be neglected)

10. (4) Total number of votes polled = x

$$\therefore \frac{x \times 84}{100} - \frac{x \times 16}{100} = 476$$

$$\Rightarrow \frac{68x}{100} = 476$$

$$\Rightarrow x = \frac{476 \times 100}{68} = 700$$

Aliter : Using Rule 26,
Total number of votes

$$= \frac{50 \times 476}{50 - 84}$$

$$= \frac{50 \times 476}{34}$$

(–ve sign will be neglected)
= 700

11. (4) Number of valid votes = x (let)
∴ (62 – 38)% of x = 7200

$$\Rightarrow x \times \frac{24}{100} = 7200$$

$$\Rightarrow x = \frac{7200 \times 100}{24} = 30000$$

Aliter : Using Rule 26,
Total number of votes

$$= \frac{50 \times 7200}{(50 - 38)}$$

= 50 × 600 = 30000

12. (2) Total number of votes polled = x (let)
According to the question,

$$\frac{x \times 62}{100} - \frac{x \times (100 - 62)}{100} = 144$$

$$\Rightarrow \frac{62x}{100} - \frac{38x}{100} = 144$$

$$\Rightarrow \frac{24x}{100} = 144$$

$$\Rightarrow 24x = 144 \times 100$$

$$\Rightarrow x = \frac{144 \times 100}{24} = 600$$

Aliter : Using Rule 26,

Total number of votes

$= \frac{50 \times 144}{(50-62)}$

$= \frac{50 \times 144}{12}$

(–ve sign will be neglected)

$= 600$

13. (2) Total voters in the list = x

Votes got by the winner

$= \frac{47x}{100}$

Votes got by the loser

$= x - \frac{x}{10} - 60 - \frac{47x}{100}$

$= \frac{9x}{10} - \frac{47x}{100} - 60$

$= \frac{90x - 47x}{100} - 60$

$= \frac{43x}{100} - 60$

According to the question,

$\frac{47x}{100} - \frac{43x}{100} + 60 = 308$

$\Rightarrow \frac{4x}{100} = 308 - 60 = 248$

$\Rightarrow x = \frac{248 \times 100}{4} = 6200$

14. (2) Total votes polled = x

According to the question,

(60 – 40)% of x = 298

$\Rightarrow x \times \frac{20}{100} = 298$

$\Rightarrow \frac{x}{5} = 298$

$\Rightarrow x = 298 \times 5 = 1490$

TYPE-X

1. (3) Using Rule 17,

Required population after two years

$= 180000\left(1 + \frac{10}{100}\right)^2$

$= 180000 \times \frac{11}{10} \times \frac{11}{10} = 217800$

2. (1) If the present worth of the equipment be ₹ 100, then its price after 3 years

$= 100 \times \left(\frac{80}{100}\right)^3 = ₹\ 51.2$

$\therefore$ Depriciation = 48.8%

Aliter : Using Rule 18,

Let the price of equipment be ₹ 100

Its price after 3 years.

$= 100\left(1 - \frac{20}{100}\right)^3$

$= 100 \times \left(\frac{80}{100}\right)^3 = ₹\ 51.2$

Depriciation = 48.8%

3. (3) Using Rule 17,

$P = P_0\left(1 + \frac{R}{100}\right)^T$

$= 64000\left(1 + \frac{5}{200}\right)^3$

$= 64000\left(\frac{41}{40}\right)^3$

$= \frac{64000 \times 41 \times 41 \times 41}{40 \times 40 \times 40}$

$= 68921$

4. (1) Using Rule 18,

Suppose the value of property two years ago was ₹ x

According to question

$\therefore x\left(1 - \frac{10}{100}\right)^2 = 8100$

$\Rightarrow x\left(\frac{90}{100}\right)^2 = 8100$

$\Rightarrow x = \frac{8100 \times 10 \times 10}{9 \times 9}$

$= ₹\ 10000$

5. (1) Using Rule 18,

Let the present population be P.

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

$= 62500 \times \frac{24}{25} \times \frac{24}{25} = 57600$

6. (3) Using Rule 17,

Required population

$= 50000\left(1 + \frac{4}{100}\right)^2$

$= 50000 \times \frac{26}{25} \times \frac{26}{25} = 54080$

7. (2) Using Rule 17,

Let the man's annual salary in 2006 be ₹ x.

$\therefore \frac{110x}{100} = 880000$

$\Rightarrow x = \frac{880000 \times 100}{110} = ₹\ 800000$

8. (1) Using Rule 17,

Population of the village two years ago

$= \frac{P}{\left(1 + \frac{R}{100}\right)^2} = \frac{67600}{\left(1 + \frac{4}{100}\right)^2}$

$= \frac{67600 \times 25 \times 25}{26 \times 26} = 62500$

9. (1) Using Rule 18,

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

$= 200000\left(1 - \frac{5}{100}\right)^2$

$= 200000 \times \frac{19}{20} \times \frac{19}{20}$

$= ₹\ 180500$

10. (4) Using Rule 18,

Value of the property 3 years ago

$= \frac{P}{\left(1 - \frac{R}{100}\right)^T} = \frac{411540}{\left(1 - \frac{5}{100}\right)^3}$

$= \frac{411540 \times 20 \times 20 \times 20}{19 \times 19 \times 19}$

$= ₹\ 480000$

11. (2) Using Rule 17,

Population of town

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

$= 64000\left(1 + \frac{10}{100}\right)^3$

$= 64000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$

$= 85184$

12. (2) Using Rule 17,
Present population

$= 10000\left(1-\frac{20}{100}\right)^2$

$= 10000 \times \frac{4}{5} \times \frac{4}{5} = 6400$

13. (2) Required percent

$= \frac{1}{4}\times 3+\frac{2}{3}\times 5+\left(1-\frac{1}{4}-\frac{2}{3}\right)\times 11$

$= \frac{3}{4}+\frac{10}{3}+\frac{11}{12}=\frac{9+40+11}{12}=5\%$

14. (3) Using Rule 28,
Required price of the machine

$= 6250\left(1-\frac{10}{100}\right)\left(1-\frac{20}{100}\right)\left(1-\frac{30}{100}\right)$

$= 6250 \times \frac{90}{100} \times \frac{80}{100} \times \frac{70}{100}$

= ₹ 3150

15. (4) Using Rule 18,
Required value

$= 50000\left(1-\frac{10}{100}\right)^2$

$= 50000 \times \frac{9\times 9}{100}$ = ₹ 40500

16. (1) Using Rule 18,
If the price of machine 3years ago be ₹ x. then

$729 = x\left(1-\frac{10}{100}\right)^3$

$\Rightarrow 729 = x \times \left(\frac{9}{10}\right)^3$

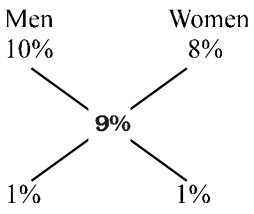
$\Rightarrow x$ = ₹ 1000

17. (1) Using Rule 17,
Required Raman's salary

$= \frac{100}{100+5} \times 1806$

$= \frac{100}{105} \times 1806$ = ₹ 1720

18. (1) **By Alligation Rule**



$\therefore$ Men : Women = 1 : 1

$\therefore$ Number of men

$= \frac{1}{2} \times 8000 = 4000$

19. (3) Let the number of males = x

$\therefore$ Number of females= 9800 – x

According to the question,

$x \times \frac{108}{100} + (9800 - x) \times \frac{105}{100} = 10458$

$\Rightarrow 108\ x + 9800 \times 105 - 105x = 1045800$

$\Rightarrow 3x + 1029000 = 1045800$

$\Rightarrow 3x = 1045800 - 1029000 = 16800$

$\Rightarrow x = \frac{16800}{3} = 5600$

20. (1) Using Rule 17,
Population in the beginning of the year

$= \frac{\text{Population after 3 years}}{\left(1+\frac{\text{Rate}}{100}\right)^{\text{Time}}}$

$= \frac{10000}{\left(1+\frac{25}{100}\right)^3} = \frac{10000}{\left(\frac{5}{4}\right)^3}$

$= \frac{10000 \times 64}{125} = 5120$

21. (4) If the number of men be 100, then

Number of women = 90

$\therefore$ Required per cent

$= \frac{100}{90} \times 100 \approx 111\%$

22. (1) Using Rule 17,
Required population

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

$= 500000\left(1+\frac{4}{100}\right)^3$

$= 500000 \times \left(1+\frac{1}{25}\right)^3$

$= 500000 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25}$

= 562432

23. (2) Using Rule 17,
If the population of village two years ago be P_0, then

$P = P_0\left(1+\frac{R}{100}\right)^T$

$\Rightarrow 4410 = P_0\left(1+\frac{5}{100}\right)^2$

$\Rightarrow 4410 = P_0\left(1+\frac{1}{20}\right)^2$

$\Rightarrow 4410 = P_0\left(\frac{21}{20}\right)^2$

$\Rightarrow 4410 = \frac{441P_0}{400}$

$\Rightarrow P_0 = \frac{4410 \times 400}{441} = 4000$

24. (1) Value of TV after one year
= 21000 × (100 – 5)%

$= \frac{21000 \times 95}{100}$ = Rs. 19950

25. (3) Using Rule 7,
Single equivalent increase for 20% and 20%

$= \left(20+20+\frac{20\times 20}{100}\right)\%$

= 44%

Single equivalent increase for 44% and 20%

$= \left(44+20+\frac{44\times 20}{100}\right)\%$

= (64 + 8.8) % = 72.8%

26. (2) Population of town = 1000

Males $\Rightarrow$ 600

Females $\Rightarrow$ 400

Literate males

$\Rightarrow \frac{600 \times 20}{100} = 120$

Total literate inhabitants

$= \frac{1000 \times 25}{100} = 250$

$\therefore$ Literate females
= 250 – 120 = 130

$\therefore$ Required percent

$= \frac{130}{400} \times 100 = 32.5\%$

27. (4) Using Rule 17,
If the rate of increase per annum be R%, then

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

$$\Rightarrow 48400 = 40000\left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \frac{484}{400} = \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow \frac{121}{100} = \left(\frac{11}{10}\right)^2 = \left(1+\frac{R}{100}\right)^2$$

$$\Rightarrow 1+\frac{R}{100} = \frac{11}{10}$$

$$\Rightarrow \frac{R}{100} = \frac{11}{10} - 1 = \frac{1}{10}$$

$$\Rightarrow R = \frac{100}{10} = 10\% \text{ per annum}$$

28. (3) Using Rule 18,

$$A = P\left(1-\frac{R}{100}\right)^3$$

$$\Rightarrow 7290 = P\left(1-\frac{10}{100}\right)^3 = P\left(\frac{9}{10}\right)^3$$

$$\Rightarrow 7290 = P \times \frac{9}{10} \times \frac{9}{10} \times \frac{9}{10}$$

$$\Rightarrow P = \frac{7290\times10\times10\times10}{9\times9\times9}$$

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

29. (1) Using Rule 17,

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

$$\Rightarrow 9261 = P_o\left(1+\frac{5}{100}\right)^3$$

$$\Rightarrow 9261 = P_o\left(1+\frac{1}{20}\right)^3$$

$$\Rightarrow 9261 = P_o\left(\frac{21}{20}\right)^3$$

$$\Rightarrow P_o = \frac{9261\times20\times20\times20}{21\times21\times21}$$

$$= 8000$$

30. (2) Using Rule 28,
Original population of village = x (let)
According to the question,

$$x\times\frac{95}{100}\times\frac{80}{100} = 4655$$

$$\Rightarrow x = \frac{4655\times100\times100}{95\times80}$$

$$= 6125$$

31. (1) In the village,
Females = 3000
Males = 9000 – 3000 = 6000
After respective increases,
Population of village

$$= 3000\times\frac{105}{100} + \frac{6000\times107.5}{100}$$

$$= 3150 + 6450 = 9600$$

32. (2) Let the population of the city be 100.
Total illiterate people = 40
Poor people = 60
Rich people = 40
Illiterate rich people

$$= \frac{40\times10}{100} = 4$$

$\therefore$ Illiterate poor people
$= 40 - 4 = 36$
$\therefore$ Required per cent

$$= \frac{36}{60}\times100 = 60\%$$

33. (3) Population of city after two years

$$= P\left(1+\frac{R_1}{100}\right)\left(1+\frac{R_2}{100}\right)$$

$$= 20000\left(1+\frac{20}{100}\right)\left(1+\frac{30}{100}\right)$$

$$= 20000\times\frac{120}{100}\times\frac{130}{100} = 31200$$

34. (1) Let the total population of village be x.
According to the question,

$$\frac{x\times14}{100} = 574$$

$$\Rightarrow x = \frac{574\times100}{14} = 4100$$

TYPE-XI

1. (3) 10 per cent of ₹ 837

$$= \frac{10}{100}\times837 = ₹\ 83.7$$

$\therefore$ Reduced per kg price

$$= \frac{83.7}{6.2} = ₹\ 13.50$$

Aliter : Using Rule 31,
Reduced price per kg

$$= \frac{10\times837}{100\times6.2} = ₹\ 13.50$$

2. (2) Let the original price of sugar = ₹ x /kg.
Reduced price of sugar
= 80% of x

$$= \frac{x\times80}{100} = ₹\ \frac{4x}{5}\text{ kg}$$

$$\therefore \frac{36}{\frac{4x}{5}} - \frac{36}{x} = \frac{1}{2}$$

$$\Rightarrow \frac{45}{x} - \frac{36}{x} = \frac{1}{2}$$

$$\Rightarrow \frac{9}{x} = \frac{1}{2}$$

$\Rightarrow x = 9\times2 = ₹\ 18$/Kg
Aliter : Using Rule 31,

$$\text{New price} = \frac{20\times36}{100\times\frac{500}{100}} = ₹\ 14.4$$

Let the original price be Rs x
A.T.Q.

$$x - \frac{20x}{100} = 14.4$$

$$\frac{80x}{100} = 14.4$$

$$x = \frac{144}{8} \quad x = 18$$

$\therefore$ Original price = ₹ 18

3. (4) Reduced price of 6.2kg of sugar
= 10% of ₹ 1116
= ₹ 111.6
$\therefore$ Reduced price per kg

$$= ₹\left(\frac{111.6}{6.2}\right) = ₹\ 18$$

Aliter : Using Rule 31,

$$\text{New price} = \frac{10 \times 1116}{100 \times 6.2}$$

$$= \frac{1116}{62} = ₹\ 18$$

4. (2) Let the original price of sugar be ₹ x/kg.

$$\therefore \text{ New price} = ₹\ \frac{9x}{10} \text{ /kg}$$

$$\therefore \quad \frac{270}{\frac{9x}{10}} - \frac{270}{x} = 1$$

$$\Rightarrow \quad \frac{300}{x} - \frac{270}{x} = 1 \Rightarrow \frac{30}{x} = 1$$

$$\Rightarrow \quad x = ₹\ 30 \text{ /kg}$$

Aliter : Using Rule 31,

$$\text{New price} = \frac{10 \times 270}{100 \times 1} = ₹\ 27$$

Let the original price be Rs. x

$$\Rightarrow x - \frac{10x}{100} = 27$$

$$\frac{90x}{100} = 27$$

$$x = \frac{2700}{90}$$

$$x = 30$$

$\therefore$ Original price = ₹ 30 per kg.

5. (2) Let the original price of apples be ₹ x/ dozen

$$\therefore \text{ New price} = ₹\ \frac{4x}{5} \text{/dozen}$$

$$\therefore \quad \frac{54}{\frac{4x}{5}} - \frac{54}{x} = \frac{10}{12}$$

$$\Rightarrow \quad 54\left(\frac{5}{4x} - \frac{1}{x}\right) = \frac{5}{6}$$

$$\Rightarrow \quad 54\left(\frac{5-4}{4x}\right) = \frac{5}{6}$$

$$\Rightarrow \quad \frac{54}{4x} = \frac{5}{6} \Rightarrow 4x = \frac{54 \times 6}{5}$$

$$\therefore \quad \frac{4x}{5} = \frac{54 \times 6}{5 \times 5} = ₹\ 12.96$$

Aliter : Using Rule 31,

$$\text{Reduced price} = \frac{20 \times 54}{100 \times \frac{10}{12}}$$

$$= \frac{1080}{1000} \times 12$$

$$= ₹\ 12.96 \text{ per kg}$$

6. (3) The original price of 1 egg = ₹ x

$$\text{Present price} = ₹\ \frac{3}{2}x$$

$$\therefore \quad \frac{24}{x} - \frac{24}{\frac{3x}{2}} = 4$$

$$\Rightarrow \frac{24}{x}\left(1 - \frac{2}{3}\right) = 4$$

$$\Rightarrow \frac{8}{x} = 4 \Rightarrow x = 2$$

$\therefore$ Present price of eggs per dozen = $12 \times \frac{3}{2} \times 2$ = ₹ 36

Aliter : Using Rule 31,

$$\text{New price} = \frac{50 \times 24}{100 \times \frac{4}{12}}$$

$$= ₹\ 36$$

7. (1) Original price of wheat = ₹ x /kg.

New price of wheat

$$= ₹\ \frac{4x}{5} \text{ /kg}$$

$$\therefore \quad \frac{320}{\frac{4x}{5}} - \frac{320}{x} = 5$$

$$\Rightarrow \quad 320\left(\frac{5}{4x} - \frac{1}{x}\right) = 5$$

$$\Rightarrow \quad 320\left(\frac{5-4}{4x}\right) = 5$$

$$\Rightarrow \quad \frac{320}{4x} = 5$$

$$\Rightarrow x = \frac{320}{4 \times 5} = ₹\ 16$$

Aliter : Using Rule 31,

$$\text{New price} = \frac{20 \times 320}{100 \times 5}$$

$$= \frac{1280}{100} = ₹\ 12.8$$

Let the original price be ₹ x per kg.

$$\Rightarrow \quad x - \frac{20x}{100} = 12.8$$

$$80x = 12.8 \times 100$$

$$x = \frac{1280}{80}$$

$$x = 16 \text{ per kg.}$$

8. (4) Original rate = ₹ x per egg

$$\text{New rate} = ₹\ \frac{6x}{5} \text{ per egg}$$

$$\therefore \quad \frac{24}{x} - \frac{24 \times 5}{6x} = 2$$

$$\Rightarrow \quad \frac{24}{x} - \frac{20}{x} = 2$$

$$\Rightarrow \quad \frac{4}{x} = 2 \Rightarrow x = 2$$

$\therefore$ New rate = ₹ $\frac{12}{5}$ per egg.

$\therefore$ Rate per dozen of eggs

$$= ₹\ \left(\frac{12}{5} \times 12\right) = ₹\ 28.80$$

Aliter : Using Rule 31,

New price/present price

$$= \frac{20 \times 24}{100 \times \frac{2}{12}} = ₹\ 28.80$$

9. (4) Let original price of rice per kg = ₹ x (let)

$\therefore$ New price of rice per kg

$$= ₹\ \frac{3x}{4}$$

$$\therefore \quad \frac{600}{\frac{3x}{4}} - \frac{600}{x} = 10$$

$$\Rightarrow \quad 600\left(\frac{4}{3x} - \frac{1}{x}\right) = 10$$

$$\Rightarrow \quad 600\left(\frac{4-3}{3x}\right) = 10$$

$$\Rightarrow \quad \frac{600}{3x} = 10$$

$$\Rightarrow \quad x = \frac{600}{30} = ₹\ 20$$

$$\therefore \text{ New price} = \frac{3x}{4} = \frac{3 \times 20}{4}$$

$$= ₹\ 15/\text{kg}$$

Method 2 :

Quicker Approach

If the price of an article is reduced by a% and buyer gets c kg more for some ₹ b, the new price per kg of article = $\frac{ab}{100 \times c}$

$= \frac{25 \times 600}{100 \times 10}$ = ₹ 15

Aliter : Using Rule 31,
Reduced price per kg

$= \frac{25 \times 600}{100 \times 10}$ = ₹ 15

10. (1) Using Rule 1,
Percentage decrease

$= \frac{0.25}{1.25} \times 100 = 20\%$

11. (3) If the number be x, then

$x - 15 = \frac{4x}{5}$

$\Rightarrow 5x - 75 = 4x \Rightarrow x = 75$

$\therefore$ 40% of 75 $= \frac{75 \times 40}{100} = 30$

12. (4) Original price of article
= ₹ x per kg.

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

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

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

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

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

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

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

$\therefore$ New price

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

= ₹ 7 per kg

Aliter : Using Rule 31,
Reduced price per kg.

$= \frac{21 \times 100}{100 \times 3}$ = ₹ 7

13. (1) Let the original price of sugar be Rs. x per kg.

Reduced price

= Rs. $\frac{80x}{100}$ = Rs. $\frac{4x}{5}$ per kg.

According to the question,

$\frac{160}{\frac{4x}{5}} - \frac{160}{x} = 8$

$\Rightarrow \frac{40 \times 5}{x} - \frac{160}{x} = 8$

$\Rightarrow \frac{200}{x} - \frac{160}{x} = 8$

$\Rightarrow \frac{40}{x} = 8$

$\Rightarrow 8x = 40$

$\Rightarrow x = \frac{40}{8}$ = 5 per kg.

Reduced Price

$= \frac{4x}{5} = \frac{4 \times 5}{5}$ = Rs. 4 per kg

Aliter : Using Rule 31,
Reduced price per kg.

$= \frac{21 \times 160}{100 \times 8}$ = Rs. 4

14. (4) Required percentage change

$= \left(10 - 20 + \frac{10 \times (-20)}{100}\right)\%$

= –12% Negative sign shows decrease.

Aliter : Using Rule 4,
Required percentage

$= \left(10 - 20 - \frac{10 \times 20}{100}\right)$

= (–10 – 2)
= 12% decrease.

15. (2) Required per cent

$= \frac{x}{100 + x} \times 100$

where x = 60%

$= \frac{60}{160} \times 100 = \frac{75}{2} = 37\frac{1}{2}\%$

16. (2) Let original price of sugar be Rs. x per kg.

New price

= Rs. $\left(\frac{120x}{100}\right)$ = Rs. $\left(\frac{6x}{5}\right)$ per kg.

According to the question,

$\frac{50}{x} - \frac{50}{\frac{6x}{5}} = 2$

$\Rightarrow \frac{50}{x} - \frac{50 \times 5}{6x} = 2$

$\Rightarrow \frac{50}{x} - \frac{125}{3x} = 2$

$\Rightarrow \frac{150 - 125}{3x} = 2$

$\Rightarrow 6x = 25$

$\Rightarrow x$ = Rs. $\frac{25}{6}$ kg.

$\therefore$ Required quantity of sugar

$= \frac{50}{x}$

$= \frac{50}{\frac{25}{6}} = \frac{50 \times 6}{25} = 12$ kg.

17. (4) Required per cent

$= \frac{\text{Decrease\%}}{100 - \text{Decrease\%}} \times 100$

$= \frac{10}{100 - 10} \times 100 = \frac{100}{9}$

$= 11\frac{1}{9}\%$

18. (2) Required percentage increase

$= \frac{x}{100 - x} \times 100$

$= \left(\frac{20}{100 - 20}\right) \times 100$

$= \frac{20}{80} \times 100 = 25\%$

19. (1) Original price of sugar
= Rs. x/kg. (let)

New price = Rs. $\frac{120x}{100}$ per kg.

= Rs. $\frac{6x}{5}$ per kg.

According to the question,

$$\frac{120}{x} - \frac{120}{\frac{6x}{5}} = 4$$

$$\Rightarrow \frac{120}{x} - \frac{120 \times 5}{6x} = 4$$

$$\Rightarrow \frac{120}{x} - \frac{100}{x} = 4$$

$$\Rightarrow \frac{30}{x} - \frac{25}{x} = 1$$

$$\Rightarrow \frac{5}{x} = 1$$

$\Rightarrow x$ = Rs. 5 per kg.

20. (3) Original price of building = Rs. 100 (let)

$\therefore$ Its price in 2001 = Rs. 80

Its price in 2002 = Rs. 60

Required percentage decrease

$$= \left(\frac{80-60}{80}\right) \times 100$$

$$= \frac{200}{8} = 25\%$$

TYPE-XII

1. (2) Percentage of boys = 100% – 70% = 30%

Let total no. of students be x

$\therefore$ According to question,

30% of x = 510

$$\therefore x = \frac{510}{30} \times 100 = 1700$$

2. (2) 40% of students = 972

$\therefore$ 60% of students

$$= \frac{972}{40} \times 60 = 1458$$

3. (1) Number of boys

$$= \frac{70}{30} \times 504 = 1176$$

4. (2) **Tricky approach**

Required sum

= 0.5% of 19000

$$= 19{,}000 \times \frac{0.5}{100}$$

$$= 19{,}000 \times \frac{5}{1000} = ₹\ 95$$

5. (4) Remaining height

$$\left(192 - \frac{125}{2}\% \text{ of } 192\right)$$

= 192 – 120 = 72 m

$\therefore$ Required distance (distance covered in second hour) then,

$$= \frac{25}{2}\% \text{ of } 72$$

$$= \frac{25 \times 72}{2 \times 100} = 9 \text{ m}$$

6. (3) Water in 100 kg fresh fruit = 68%

Water in dry fruit = 20%

Decrease = 48%

$\therefore$ Dry fruit obtained

= 100 – 48 = 52 kg.

7. (3) The net tax rate

$$= \left(30 + 30 \times \frac{10}{100}\right)\% = 33\%$$

8. (4) Let z have x

$\therefore$ Money with Y $= \frac{3}{2}x$ and

Money with X = $3x$

$$\therefore 3x + \frac{3x}{2} + x = 3 \times 110$$

$$\Rightarrow \frac{6x + 3x + 2x}{2} = 330$$

$\Rightarrow 11\ x = 2 \times 330$

$\Rightarrow x = \frac{2 \times 330}{11} = 60$ $\therefore$ Money with X = $3x$ = ₹ (3×60) = ₹180

9. (1) If a number is x% more than other, then the other number is less than the first number by

$$\frac{x}{100+x} \times 100\%$$

$\therefore$ Required answer

$$= \frac{500}{100+500} \times 100 = \frac{500}{600} \times 100$$

$$= \frac{250}{3} = 83\frac{1}{3}$$

Method 2 : Let $q = x$, $p = 6x$.

$p - q = 6x - x = 5x$

$$\text{In \%} = \frac{5x}{6x} \times 100 = 83\frac{1}{3}\%$$

10. (3) Let x = 10 and y = 10

$\therefore xy^2 = 10 \times 10 \times 10 = 1000$ units

Decreasing values of x and y by 20%,

Expression = $xy^2 = 8 \times 8 \times 8$ = 512

Decrease= 1000–512 = 488 units

Percentage decrease

$$= \frac{488}{1000} \times 100 = 48.8\%$$

11. (1)Using Rule 30,

If two numbers are respectively x% and y% more than a third number, the first as a per cent of second is

$$= \frac{100+x}{100+y} \times 100 = \frac{110}{125} \times 100$$

= 88%

12. (2) Let sum of money be x.

$$\therefore \frac{11}{2}\% \text{ of } x = 220$$

$$\Rightarrow x = \frac{220 \times 200}{11} = 4000$$

$$\therefore 3\frac{1}{2}\% \text{ of } 4000 = \frac{7}{2} \times \frac{4000}{100}$$

= ₹ 140

13. (1) Let the total number of workers in the factory be x.

$$\therefore x \times \frac{60}{100} \times \frac{75}{100} = 1350$$

$\Rightarrow x$

$$= \frac{1350 \times 100 \times 100}{60 \times 75} = 3000$$

14. (4) Let the third number = 100.

$\therefore$ First number = 70

Second number = 63

$\therefore$ Required per cent

$$= \frac{70-63}{70} \times 100 = 10\%$$

15. (1) Let Rani's weight be x kg.

$\therefore$ Meena's weight = $4x$ kg.

Tara's weight = $\frac{5x}{2}$ kg.

$\therefore$ Required percentage

$$= \frac{4x}{\frac{5x}{2}} \times 100 = 160\%$$

16. (2) Number of people who have the saving habit

$$= \frac{2500 \times 60}{100} = 1500$$

$\therefore$ Number of shareholders

= (100 – 62)% of 1500

$$= \frac{1500 \times 38}{100} = 570$$

17. (3) Using Rule 18,

Let the original price of the article be ₹ x.

According to the question,

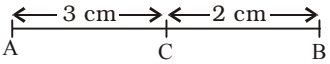
$$5832 = x\left(1 - \frac{10}{100}\right)^3$$

$\Rightarrow 5832 = x \times \left(\frac{9}{10}\right)^3$

$x = \frac{5832 \times 10 \times 10 \times 10}{9 \times 9 \times 9}$

= ₹ 8000

18. (4)



Increase in AC = 6%

$\therefore$ Increased AC $= \frac{106}{100} \times 3$

= 3.18 cm

$\therefore$ Decreased CB = 5 – 3.18

= 1.82 cm.

$\therefore$ Decrease = 2 – 1.82

= 0.18 cm

$\therefore$ Percentage decrease

$= \frac{0.18}{2} \times 100 = 9\%$

19. (2) $\because$ 24 = 100%

$\therefore 22 = \frac{100}{24} \times 22 = 91\frac{2}{3}\%$

20. (1) Let the number of boys be x and that of girls be y.

Then, $71x + 73y = 71.8\ (x + y)$

$\Rightarrow 71.8x - 71x = 73y - 71.8y$

$\Rightarrow 0.8x = 1.2y$

$\Rightarrow \frac{x}{y} = \frac{1.2}{0.8} = \frac{12}{8} = \frac{3}{2}$

$\therefore \frac{x}{y} + 1 = \frac{3}{2} + 1 \Rightarrow \frac{x+y}{y} = \frac{5}{2}$

$\therefore$ Percentage of girls

$= \frac{y}{x+y} \times 100 = \frac{2}{5} \times 100 = 40\%$

21. (2) Let the number of books in shelf B be 100.

$\therefore$ Number of books in shelf A = 80

On transferring 25% i.e. $\frac{1}{4}$ of books of shelf A to shelf B.

B = 100 + 20 = 120

Again, on transferring $\frac{1}{4}$ of books of shelf B to shelf A.

$A = 60 + \frac{120}{4} = 90$

$\therefore$ Required percentage

$= \frac{90}{180} \times 100 = 50\%$

22. (2) Total revenue earned

$= ₹\left(9900 \times \frac{20}{100} \times 10 + 9900 \times \frac{80}{100} \times 20\right)$

= ₹ (19800 + 158400)

= ₹ 178200

23. (2) Let Tina's weight = 1 kg

Lina's weight = 2 kg

Neha's weight = 1.4kg

Mina's weight = 1.8 kg.

$\therefore \frac{1.8x}{100} = 1.4$

$\Rightarrow x = \frac{1.4 \times 100}{1.8} = \frac{700}{9} = 77\frac{7}{9}$

24. (1) Let the number of seats initially in the cinema hall be 100 and the cost of each ticket be ₹ 100.

$\therefore$ Total revenue = 100 × 100

= ₹ 10000

In second condition,

Number of seats = 125

Cost of each ticket = ₹ 110

$\therefore$ New revenue

= 125 × 110 = ₹ 13750

Increase in revenue collection

= ₹. (13750 – 10000) = ₹ 3750

$\therefore$ Percentage increase

$= \frac{3750}{10000} \times 100 = 37.5\%$

Aliter : % Increase in revenue

$= \left(x + y + \frac{xy}{100}\right)\%$

$= \left(25 + 10 + \frac{25 \times 10}{100}\right)\% = 37.5\%$

25. (4) Total amount = ₹ x

$\therefore x - \frac{x}{5} - \frac{4x}{5} \times \frac{5}{100} - 120$

= 1400

$\Rightarrow x - \frac{x}{5} - \frac{x}{25} = 1520$

$\Rightarrow \frac{25x - 5x - x}{25} = 1520$

$\Rightarrow \frac{19x}{25} = 1520$

$\Rightarrow x = \frac{1520 \times 25}{19}$ = ₹ 2000

$\therefore$ Expenditure on transport

$= \frac{1}{25} \times 2000$ = ₹ 80

26. (3) Let the total number of employees be x.

$\therefore \quad x \times \frac{69}{100} = 20700$

$\Rightarrow x = \frac{20700 \times 100}{69} = 30000$

27. (4) Let the fruit seller had originally x apples.

According to the question;

x – 40% of x = 420

$\Rightarrow x - \frac{40}{100} \times x = 420$

$\Rightarrow x - \frac{2x}{5} = 420$

$\Rightarrow \frac{5x - 2x}{5} = 420$

$\Rightarrow \frac{3x}{5} = 420$

$\therefore x = \frac{420 \times 5}{3} = 700$

Method–2 :

60% = 420 (Directly)

$\therefore$ 100% = $420 \times \frac{100}{60} = 700$

28. (3) Let third number = 100

First number = 120

Second number = 150

Required percentage

$= \frac{120}{150} \times 100 = 80\%$

Aliter : Using Rule 30,

Required percentage

$= \left(\frac{100 + 20}{100 + 50}\right) \times 100\%$

$= \frac{120}{150} \times 100\%$

$= \frac{4}{5} \times 100\%$

= 80%

29. (2) The batsman scored 3 × 4 + 8 × 6 = 60 runs by boundaries and sixes respectively. Then,

Runs scored by running

= 110 – 60 = 50

$\therefore$ Required percentage

$= \frac{50}{110} \times 100 = \frac{500}{11}$

$= 45\frac{5}{11}\%$

30. (4) Let the initial value be A.

When it is increased by r% it becomes :

A + r% of A $= \frac{A(r + 100)}{100}$

Now, when it is decreased by r%, it becomes

$\frac{A(r + 100)}{100} - r\%$ of

$$\frac{A(r+100)}{100}$$

$$= \frac{A(r+100)}{100}\left(1-\frac{r}{100}\right)$$

$$= \frac{A(r+100)(100-r)}{10000}$$

$$\therefore A\left(\frac{10000-r^2}{10000}\right)=1$$

$$\Rightarrow A = ₹\frac{10000}{(10000-r^2)}$$

31. (4) $y = \frac{110}{100}\times 125 = 137.5$

$\therefore x = 90\%$ of y

$$= \frac{90\times 137.5}{100} = 123.75$$

32. (4) Error = 5.5 minutes

$\therefore$ Error per cent

$$= \frac{5.5}{3\times 60+40}\times 100 = 2.5 \text{ per cent}$$

33. (2) Per cent of families having either a cow or a buffalo or both = 60 + 30 – 15 = 75

It means 25 per cent of families do not have a cow or a buffalo.

$\therefore$ Required number of families

$$= 25\% \text{ of } 96 = 96\times\frac{25}{100} = 24$$

34. (3) Let the amount invested at 6% = ₹ x

$\therefore$ Amount invested at 5%

= ₹ $(10000 - x)$

According to the question,

$$\frac{(10000-x)\times 5}{100}-\frac{x\times 6}{100}=76.50$$

$\Rightarrow 50000 - 5x - 6x = 7650$

$\Rightarrow 50000 - 11x = 7650$

$\Rightarrow 11x = 50000 - 7650 = 42350$

$$\Rightarrow x = \left(\frac{42350}{11}\right) = ₹\ 3850$$

35. (1) Kites of ₹ 20 are available for ₹ 19.

Hence, discount = 5%

i.e. $\frac{1}{20}\times 100$

If one gets kites of ₹ 20 for ₹ 18, discount = 10%

$\therefore$ Required answer

20 kites $\rightarrow$ 2 kites

27 kites $\rightarrow = \frac{2}{20}\times 27 \approx 3$

36. (3) First part = ₹ x and second part = ₹ y.

According to question,

$$\frac{x\times 80}{100}=\frac{y\times 60}{100}+3$$

$$\Rightarrow \frac{4x}{5}=\frac{3y}{5}+3$$

$\Rightarrow 4x - 3y = 15$ ...(i)

Again,

$$\frac{4y}{5}=\frac{9x}{10}+6$$

$\Rightarrow \quad 8y = 9x + 60$

$\Rightarrow \quad 8y - 9x = 60$ ...(ii)

By equation (i) × 8 + (ii) × 3,

$32x - 24y = 120$

$24y - 27x = 180$

$5x = 300 \Rightarrow x = 60$

From equation (i)

$4 \times 60 - 3y = 15$

$\Rightarrow 3y = 240 - 15 = 225$

$$\Rightarrow y = \frac{225}{3} = 75$$

$\therefore x + y = 60 + 75 = 135$

37. (2) Value of ₹ 100 stock = ₹ 108

$\because$ Income on investing ₹ 108 = ₹ $\frac{25}{2}$

$\therefore$ Income on investment of ₹ 27000

$$= ₹\left(\frac{25}{2\times 108}\times 27000\right)$$

= ₹ 3125

$\therefore$ Gain per cent

$$= \frac{3125}{27000}\times 100$$

$$= \frac{625}{54} = 11\frac{31}{54}\%$$

38. (3) Required mass of lead

$$= 8000 \times \frac{60}{100} \times \left(1-\frac{3}{400}\right)$$

$$= 8000 \times \frac{60}{100} \times \frac{397}{400}$$

= 4764 kg.

39. (4) According to the question,

$$x + y = (x^2 + y^2) \times \frac{1}{5}$$

Again, $x + y = (x^2 - y^2) \times \frac{1}{4}$

$$\therefore \frac{x^2+y^2}{5} = \frac{x^2-y^2}{4}$$

$\Rightarrow 5x^2 - 5y^2 = 4x^2 + 4y^2$

$\Rightarrow 5x^2 - 4x^2 = 5y^2 + 4y^2$

$\Rightarrow x^2 = 9y^2$

$\Rightarrow x = 3y$

$$\therefore \frac{x+y}{x^2} = \frac{x^2+y^2}{5x^2}$$

$$= \frac{9y^2+y^2}{5\times 9y^2} = \frac{10y^2}{45y^2} = \frac{2}{9}$$

40. (3) Let the total number of eggs bought be x.

10% of eggs are rotten.

$$\therefore \text{ Remaining eggs} = \frac{90x}{100}$$

$$= \frac{9x}{10}$$

After giving 80% of eggs to the neighbour,

$$\text{Remaining eggs} = \frac{9x\times 20}{10\times 100}$$

$$= \frac{9x}{50}$$

According to the question,

$$\frac{9x}{50} = 36 \Rightarrow 9x = 36\times 50$$

$$\Rightarrow x = \frac{36\times 50}{9} = 200$$

41. (4) Amount with man in the beginning = Rs. x (let).

Amount given to son and daughter = 80%.

Remaining amount

$$= 20\% \text{ of } x = \text{Rs. } \frac{x}{5}$$

Remaining amount after donations to trust

$$= \frac{x}{5}\times\frac{20}{100} = \text{Rs. } \frac{x}{25}$$

$$\therefore \frac{x}{25} = 16000$$

$\Rightarrow x = 16000 \times 25 = \text{Rs. } 400000$

42. (3) Let the business man's present earning be Rs. x.

According to the question,

$$x\times\frac{125}{100}\times\frac{96}{100}\times\frac{125}{100}\times\frac{96}{100}\times\frac{125}{100}$$

$= 72000$

$$\Rightarrow x\times\frac{5}{4}\times\frac{24}{25}\times\frac{5}{4}\times\frac{24}{25}\times\frac{5}{4}$$

$= 72000$

$$\Rightarrow x\times\frac{9}{5} = 72000$$

$$\Rightarrow x = \frac{72000\times 5}{9} = \text{Rs. } 40000$$

43. (3) Number of blood cells in first 6 hours

$$= 40000\left(1+\frac{10}{100}\right)^2\left(1-\frac{10}{100}\right)\left(1+\frac{5}{100}\right)^2$$

$$= 40000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{9}{10} \times \frac{21}{20} \times \frac{21}{20} = 480249 \approx 48025$$

44. (2) Let 100 pairs of shoes be bought for Rs. 100.

New budget = Rs. 160

New price = Rs. 1.20 pair of shoes

$\therefore$ Number of shoes bought

$$= \frac{160}{1.2} = \frac{1600}{12}$$

$$= \frac{400}{3} = 133\frac{1}{3}$$

$\therefore$ Percentage increase

$$= 33\frac{1}{3}\%$$

45. (3) Average of set A

$$= \frac{27+28+30+32+33}{5}$$

$$= \frac{150}{5} = 30$$

Case II,

$$\text{New average} = \frac{30\times 130}{100} = 39$$

$\therefore$ 150 + k = 39 × 6 = 234

$\Rightarrow$ k = 234 – 150 = 84

46. (2) Initial amount with the man = Rs. x (let).

Remaining amount after first bet

$$= \text{Rs. } \frac{x}{4}$$

Remaining amount after second bet = Rs. $\frac{x}{16}$

Remaining amount after third bet

$$= \text{Rs. } \frac{x}{64}$$

$$\therefore \frac{x}{16} = 2 \Rightarrow x = 2 \times 64$$

= Rs. 128

47. (2) Initial number of soldiers in the army = x

According to the question,

$$x \times \frac{90}{100} \times \frac{90}{100} \times \frac{90}{100}$$

= 729000

$$\Rightarrow x = \frac{729000\times 1000}{9\times 9\times 9}$$

= 1000000

48. (4) Required percentage decrease $= \left(\frac{25-21}{25}\right) \times 100$

$$= \frac{400}{25} = 16\%$$

49. (2) Required number of workers

$$= 8000 \times \frac{105}{100} \times \frac{110}{100} \times \frac{120}{100}$$

= 11088

50. (4) 1% ≡ 100 basis points

$\therefore$ 82.5% ≡ 8250 basis points

and 62.5% ≡ 6250 basis points

$\therefore$ Required difference

= 8250 – 6250

= 2000 basis points

51. (4) Percentage increase in sales

$$= \left(\frac{51300-41800}{41800}\right) \times 100$$

$$= \frac{9500}{418} = \frac{250}{11} = 22\frac{8}{11}\%$$

52. (1) Defective parts of 120 machine parts

$$= \frac{120\times 5}{100} = 6$$

Defective parts of 80 machine parts

$$= \frac{80\times 10}{100} = 8$$

Total defective parts

= 6 + 8 = 14

$\therefore$ Required percent

$$= \frac{14}{200} \times 100 = 7\%$$

53. (3) Error = (1.55 – 1.5) metre

= 0.55 metre

$$\therefore \text{ Error per cent} = \frac{0.05}{1.5} \times 100$$

$$= \frac{50}{15} = \frac{10}{3} = 3\frac{1}{3}\%$$

54. (1) Duty payment :

Laptop $\Rightarrow$ Rs. $\left(\frac{210000\times 10}{100}\right)$

= Rs. 21000

Mobile phone

$\Rightarrow$ Rs. $\left(\frac{100000\times 8}{100}\right)$

= Rs. 8000

Television set

$\Rightarrow$ Rs. $\left(\frac{150000\times 5}{100}\right)$

= Rs. 7500

Total Duty Payment

= Rs. (21000 + 8000 + 7500)

= Rs. 36500

55. (2) Initial amount with the person = Rs. x (let)

After an expense of $\frac{15}{2}\%$.

Remaining amount

$$= \left(100-\frac{15}{2}\right)\% \text{ of } x.$$

$$= \left(\frac{200-15}{2}\right)\% \text{ of } x$$

$$= \text{Rs. } \frac{185x}{200} = \text{Rs. } \frac{37x}{40}$$

After an expense of 75% of it,

$$\text{Remaining amount} = \frac{37x}{40\times 4}$$

$$= \text{Rs. } \frac{37x}{160}$$

According to the question,

$$\frac{37x}{160} = 370 \Rightarrow 37x = 370 \times 160$$

$$\Rightarrow x = \frac{370\times 160}{37} = \text{Rs. } 1600$$

56. (3) Let the number of matches played between India and Pakistan in the first case be x.

Number of wins by Pakistan

$$= \frac{60x}{100} = \frac{3x}{5}$$

According to the question,

$$\frac{\frac{3x}{5}}{x+30} = \frac{30}{100}$$

$$\Rightarrow \frac{3x}{5(x+30)} = \frac{3}{10}$$

$$\Rightarrow \frac{x}{x+30} = \frac{1}{2}$$

$\Rightarrow 2x = x + 30$

$\Rightarrow x = 30$

$\therefore$ Total number of matches

= 30 + 30 = 60

❑❑❑

TEST YOURSELF

1. The value of a car at the beginning of a year is 10% less than the value of the same car at the beginning of the previous year. If the car is valued at Rs. 1,45,800 on 1st January, 2000, what was its value on 1st January, 1997 ?

(1) Rs. 200000 (2) Rs. 250000

(3) Rs. 185000 (4) None of these

2. In an examination 42% of the candidates failed in physics, 24% of the candidates failed in Chemistry and 14% of the candidates failed in both the subjects. If 72 candidates passed in both, find the total number of candidates in the examination.

(1) 120 (2) 130

(3) 150 (4) 160

3. The number of students appeared from a school for the Madhyamik Examination in three consecutive years are in the ratio 7 : 8 : 10 and 75%, 87.5% and 93.75% of the students of respective years were successful. What is the percentage of students who were successful during these three years taken together ?

(1) 85.5% (2) 86.5%

(3) 87% (4) 88.5%

4. An alloy contains 89% of copper; find how much copper is to be mixed to a sample of alloy so as to get 44 kgs of a new metal having 90% copper in it.

(1) 2 kg (2) 3 kg

(3) 2.5 kg (4) 4 kg

5. If the numerator of a fraction is increased by 150% and the denominator of the fraction is increased by 300% the resultant fraction is $\frac{5}{18}$. What is the original fraction?

(1) $\frac{4}{9}$ (2) $\frac{8}{9}$

(3) $\frac{6}{9}$ (4)None of these

6. An alloy of gold and silver weighs 50 gms. It contains 80% gold. How much gold should be added to the alloy so that percentage of gold is increased to 90?

(1) 45 gm (2) 40 gm

(3) 50 gm (4) None of these

7. 5% of income of A is equal to 15% of income of B and 10% of income of B is equal to 20% of income of C. If income of C is ₹ 2000, then total income of A, B and C is:

(1) 26,000 (2) 16,000

(3) 18,000 (4) 20,000

8. The population of a town is 10,000. If the males increases by 5% and the females by 6%, the population will be 10,540. How many females are there?

(1) 4000 (2) 4500

(3) 4800 (4) 5400

9. A reduction of 21% in the price of wheat enables a person to buy 10.5 kg more for ₹100. What is the reduced price per kg ?

(1) ₹ 2 (2) ₹ 3

(3) ₹ 2.50 (4) ₹ 3.50

10. Mahima secured 50% marks in Hindi, 60% in English and 70% in Maths as well as in science. What were her total marks if the maximum marks obtainable in each of these 4 subjects was 50?

(1) 175 (2) 150

(3) 125 (4) None of these

11. When 50 is subtracted from 50% of a number, result is 50. The number is :

(1) 150 (2) 400

(3) 200 (4) 300

12. A person makes a profit of ₹ 60000 in his business. 40% of the profit he reinvests in his business for its diversification. Of the remaining profit he distributes 30% as bonus to his employees, 20% he denotes in charity and rest on advertisement. Find the amount spent on advertisement.

(1) ₹ 18000 (2) ₹ 12000

(3) ₹ 16000 (4) ₹ 20000

13. If 60% of students in a school are boys and the total number of girls in the school is 460, find the number of boys in the school.

(1) 680 (2) 690

(3) 700 (4) 720

14. Find the total output of a coalmine, if after 24% wastage the net output is 68,400 tonnes.

(1) 95000 tonnes

(2) 85000 tonnes

(3) 90000 tonnes

(4) None of these

15. If A's salary is 50% more than B's then by what per cent B's salary is less than A's salary ?

(1) 50 % (2) 25%

(3) 23% (4) 33.3%

16. Quicklime contains 28.6% of oxygen by weight. Determine the weight of oxygen in 750 gm quicklime.

(1) 214.5 gm (2) 224.5 gm

(3) 234.5 gm (4) 235.5 gm

17. Price of a commodity has increased by 60%. By what per cent must a consumer reduce the consumption of the commodity so as not to increase the expenditure ?

(1) 35.5 % (2) 37.5 %

(3) 38.5 % (4) 25%

18. Sohan saves 14% of his salary while George saves 22%. If both get the same salary and George saves ₹ 1540, find the savings of Sohan.

(1) ₹ 950 (2) ₹ 960

(3) ₹ 980 (4) ₹ 990

19. In a quarterly examination, a student secured 30% marks and failed by 12 marks. In the same examination, another student secured 40% marks and got 28 marks more than bare minimum marks to pass. Find the pass percentage.

(1) 24% (2) 28%

(3) 25% (4) 33%

20. In an election between two candidates A and B, A got 65% of the total votes cast and won the election by 2748 votes. Find the total number of votes cast if no vote is declared invalid.

(1) 9160 (2) 9260

(3) 9060 (4) 9360

21. In an examination, 40% marks are required to pass. A obtains 10% less than the number of marks required to pass. B obtains $11\frac{1}{9}\%$ less than A and C, $41\frac{3}{17}$ per cent less than the number of marks obtained by A and B together. Marks obtained by C is

(1) 42 (2) 40

(3) 38 (4) 36

22. A reduction of 25% in the price of apples would enable a purchaser to get 2 kg apples more for Rs. 240. Find the original price per kg of apples.

(1) ₹ 35 (2) ₹ 30

(3) ₹ 40 (4) None of these

23. 10% of the soldiers of an army are killed in the battle. 10% of the remaining soldiers died of disease and 10% of the remaining men were disabled. Now only 729000 soldiers are left in the army. How many soldiers were there in all in the army in the beginning?

(1) 990000 (2) 9900000

(3) 9800000 (4) 1000000

24. From the salary of an officer 10% is deducted as house rent; 15% of the rest he spends on children's education; 10% of the balance he spends on clothes. After this expenditure, he is left with ₹ 2754. Find his salary.

(1) ₹ 4500 (2) ₹ 4000

(3) ₹ 4200 (4) None of these

25. The tax on an article decreases by 10% and its consumption increases by 10%. Find the effect per cent on its revenue.

(1) 1% increase (2) 2% decrease

(3) 1% decrease (4) 2% increase

26. In a direct election between two contestants for the post of secretary, 4% of the total votes cast are declared to be illegal. One contestant secures 55% of the valid votes and wins with a majority of 240 votes, find the total number of votes cast.

(1) 3500 (2) 2400

(3) 2200 (4) 2500

SHORT ANSWERS

1. (1)	**2.** (3)	**3.** (2)	**4.** (4)
5. (1)	**6.** (3)	**7.** (3)	**8.** (1)
9. (3)	**10.** (3)	**11.** (3)	**12.** (1)
13. (2)	**14.** (3)	**15.** (4)	**16.** (1)
17. (2)	**18.** (3)	**19.** (4)	**20.** (1)
21. (2)	**22.** (3)	**23.** (4)	**24.** (2)
25. (3)	**26.** (4)		

EXPLANATIONS

1. (1) Clearly, if the car is valued at Rs. 90 in 2000, it was valued at Rs. 100 in 1999.

$\therefore$ Value of the car in 1999

$= \frac{145800 \times 100}{90}$

In this way, value of car in 1997

$= \frac{145800 \times 100 \times 100 \times 100}{90 \times 90 \times 90}$

= Rs. 200000

2. (3) Percentage of students failed only in :

Physics = 42 – 14 = 28

Chemistry = 24 – 14 = 10

$\therefore$ Percentage of students who failed in Physics or Chemistry or both = 28 + 10 + 14 = 52

$\therefore$ Percentage of candidates who passed

= 100 – 52 = 48

If the total number of students be x, then

$x \times \frac{48}{100} = 72$

$\Rightarrow x = \frac{72 \times 100}{48} = 150$

3. (2) Number of successful students :

First Year $\Rightarrow \frac{7x \times 75}{100} = \frac{21x}{4}$

$= 5.25x$

Second year $\Rightarrow \frac{8x \times 87.5}{100} = 7x$

Third year $\Rightarrow \frac{10x \times 93.75}{100}$

$= 9.375x$

Total successful students

$= 21.625x$

Required percentage

$= \frac{21.625x}{25x} \times 100 = 86.5\%$

4. (4) In 100 gm of alloy,

Copper = 89 gm.

Let x gm. of copper be mixed.

$\frac{89 + x}{11} = \frac{90}{10}$

$\Rightarrow x = 99 - 89 = 10$gm

To get 44 kg of new alloy, copper to be mixed

$= \frac{44 \times 1000 \times 100}{1100} = 4$ kg.

5. (1) Let original fraction be $\frac{x}{y}$.

$\therefore \frac{x \times 250}{y \times 400} = \frac{5}{18}$

$\Rightarrow \frac{x}{y} = \frac{5}{18} \times \frac{400}{250} = \frac{4}{9}$

6. (3) In original alloy,

Gold = 40 gm

Silver = 10 gm

Let x gm of gold is added.

$\therefore \frac{40 + x}{50 + x} = \frac{90}{100} = \frac{9}{10}$

$\Rightarrow 400 + 10x = 450 + 9x$

$\Rightarrow x = 50$ gm.

7. (3) $\frac{A \times 5}{100} = \frac{B \times 15}{100}$

$\Rightarrow \frac{A}{B} = \frac{15}{5} = \frac{3}{1}$

Again, $\frac{B \times 10}{100} = \frac{C \times 20}{100}$

$\Rightarrow \frac{B}{C} = \frac{2}{1}$

$\therefore$ A : B = 3 : 1 = 6 : 2

B : C = 2 : 1

$\therefore$ A : B : C = 6 : 2 : 1

$\therefore$ Total income = 9 × 2000

= Rs. 18000

8. (1) If the number of women be x, then men = 10000 – x

$\therefore \frac{x \times 6}{100} + \frac{(10000 - x) \times 5}{100}$

$= 10540 - 10000 = 540$

$\Rightarrow 6x + 50000 - 5x = 54000$

$\Rightarrow x = 4000$

9. (1) Original price of wheat = Rs. x /kg.

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

$\therefore \frac{100}{\frac{79x}{100}} - \frac{100}{x} = 10.5$

$\Rightarrow 100\left(\frac{100-79}{79x}\right)=10.5$

$\Rightarrow 100 \times 21 = 10.5 \times 79x$

$\Rightarrow \frac{79x}{100} = \frac{21}{10.5}$ = Rs.2.50 per kg

10. (3) Total marks obtained
= 25 + 30 + 70 = 125

11. (3) If the number be x, then

$\frac{x}{2} - 50 = 50$

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

$\Rightarrow x = 200$

12. (1) Total profit = ₹ 60000
Amount reinvested in business
= 40% of ₹ 60000
= ₹ 24000
Remaining amount of the profit
= 60% of ₹ 60000
= ₹ 36000
Bonus to employees
= 30% of ₹ 36000
= ₹ 10800
Donation for charity
= 20% of ₹ 36000 = ₹ 7200
Amount spent on advertisement
= ₹ (36000 – 10800 – 7200)
= ₹ 18000

13. (2) Let the total number of students be x.
Given,Number of boys

$= \frac{60}{100}x$. ..... (i)

Number of girls = 460
$\Rightarrow$ Number of boys = x – 460
..... (ii)
From equations (i) and (ii),

$\Rightarrow x - 460 = \frac{60x}{100}$

$\Rightarrow 460 = \frac{40}{100}x$

$\Rightarrow x = \frac{460 \times 100}{40} = 1150$

$\therefore$ Number of boys = 1150 – 460
= 690.

14. (3) Let the total output be x tonnes.
Then, net output

$= x - \frac{24}{100} \times x = \frac{76x}{100}$

$\Rightarrow \frac{76}{100}x = 68{,}400$

$\Rightarrow x = \frac{68{,}400 \times 100}{76}$

= 90,000 tonnes.

15. (4) Let the salary of B = ₹ 100.
Then, salary of A

$= 100 + \frac{50}{100} \times 100$ = ₹. 150

$\therefore$ B's salary is ₹ 50 less than A's salary.
$\therefore$ Percentage of B's income less than A $= \frac{50}{150} \times 100$

$= \frac{100}{3} = 33\frac{1}{3}\%$.

Hence, B's salary is less than A's salary by 33.3%.

16. (1) 100 gm quicklime contains oxygen = 28.6 gm.
$\therefore$ 1 gm quicklime contains oxygen $= \frac{28.6}{100}$
Hence, 750 gm quicklime contains

oxygen $= \frac{28.6}{100} \times 750$

= 214.5 gm.
Hence, weight of oxygen in 750 gm quicklime is 214.5 gm.

17. (2) Let the price of commodity be ₹ x per kg.
Increase in price = 60%
$\therefore$ Increased price of 1 kg
= ₹ 1.6x
If ₹ 1.6x is price of 1 kg

x is price of $\frac{x}{(1.6)x} = \frac{10}{16}$kg

$\therefore$ In order to keep the expenditure same, consumption should be reduced by

$1 - \frac{10}{16} = \frac{16-10}{16} = \frac{6}{16}$kg

Percentage reduction in consumption

$= \frac{6}{16} \times 100 = \frac{75}{2}$ = 37.5%

18. (3) Let the total salary of each of them = ₹ x.

Sohan saves = ₹. $\frac{14}{100}x$

and George saves

$= \frac{22}{100}x = 1540$

$\Rightarrow x$ = ₹ 7000

$\therefore$ Sohan saves $= \frac{14}{100} \times 7000$

= ₹ 980

19. (4) Let the maximum marks be x.
A student scored = $\frac{30}{100}x$, and failed by 12 marks.

$\therefore$ Passing marks = $\frac{30}{100}x + 12$

Another student scored = $\frac{40}{100}x$ and got 28 marks more than passing marks.

$\therefore$ Passing marks = $\frac{40}{100}x - 28$

$\Rightarrow \frac{30}{100}x + 12 = \frac{40}{100}x - 28$

$\Rightarrow \frac{10}{100}x = 40 \Rightarrow x = 400$

$\therefore$ Maximum marks = 400
Hence, Passing marks

$= \frac{30}{100} \times 400 + 12 = 132$

$\therefore$ Pass percentage

$= \frac{132}{400} \times 100$ = 33%

The pass percentage = 33%

20. (1) Let the total number of votes cast = x.
Number of votes got by
A = $\frac{65}{100}x$ ..... (i)
$\Rightarrow$ B got

$= x - \frac{65}{100}x = \frac{100x - 65x}{100} = \frac{35}{100}x$

A won the election by 2748 votes.
$\therefore$ Number of votes for A

$= \frac{35}{100}x + 2748$ ..... (ii)

Form equations (i) and (ii),

$\Rightarrow \frac{65}{100}x = \frac{35}{100}x + 2748$

$\Rightarrow \frac{30x}{100} = 2748$

$\Rightarrow x = \frac{2748 \times 100}{30} = 9160$

$\therefore$ Total number of votes cast
= 9160

21. (2) Suppose the maximum marks = 100
$\therefore$ Marks required to pass = 40
$\because$ A gets 10% less than pass marks.
$\therefore$ Marks secured by

A = $\frac{40 \times 90}{100} = 36$

$\because$ B gets $11\frac{1}{9}\%$ marks less than A.

$\therefore$ Marks secured dy B

$= \frac{36 \times \left(100 - 11\frac{1}{9}\right)}{100}$

$= \frac{36 \times \left(\frac{900-100}{9}\right)}{100}$

$= 36 \times \frac{800}{9} \times \frac{1}{100} = 32$

Total marks obtained by A and B = 36 + 32 = 68

$\because$ C gets $41\frac{3}{17}\%$ marks less than the marks obtained by A and B together.

$\therefore$ C's marks

$\frac{68 \times \left(100 - 41\frac{3}{17}\right)}{100}$

$= \frac{68 \times \left(100 - \frac{700}{17}\right)}{100}$

$= \frac{68 \times \frac{1000}{17}}{100}$

$= 68 \times \frac{1000}{17} \times \frac{1}{100} = 40$

22. (3) Let the original price be ₹ x per kg.

Reduction in price = ₹ $\frac{25}{100}x$

$\therefore$ Reduced price = $x - \frac{25}{100}x$

$= \frac{75}{100}x$ .... (i)

With ₹ 240, purchaser can purchase 2 kg more apples.

Now, 25% of 240

$= \frac{25}{100} \times 240$ = ₹ 60

$\Rightarrow$ Reduced price of 2 kg of apples = Rs. 60

$\therefore$ Reduced price of 1 kg of apples = ₹ 30 .... (ii)

From equations (i) and (ii),

$\frac{75}{100} \times x = 30$

$\Rightarrow x = \frac{30 \times 100}{75}$ = ₹40

The original price of 1 kg apples = Rs. 40.

23. (4) Let the total number of soldiers in all in the army in the beginning = 100.

$\therefore$ Number of soldiers killed in the battle

$= \frac{10}{100} \times 100 = 10$

$\therefore$ Remaining soldiers

= 100 – 10 = 90

Number of soldiers who died of disease = $\frac{10}{100} \times 90 = 9$

$\therefore$ Remaining soldiers = 90–9= 81

Number of disabled soldiers

$= \frac{10}{100} \times 81 = \frac{81}{10}$

$\therefore$ Remaining soldiers

$= 81 - \frac{81}{10} = \frac{810-81}{10} = \frac{729}{10}$

$\therefore$ If $\frac{729}{10}$ soldiers are left, then total number of soldiers = 100

$\therefore$ If 1 soldier is left, then total number of soldiers

$= \frac{100 \times 10}{729}$

$\because$ If 729000 soldiers are left, then total number of soldiers

$= \frac{100 \times 10 \times 729000}{729} = 1000000$.

24. (2) Let the salary be ₹ 100. Then, House rent = ₹ 10; Balance = ₹ (100 – 10) = ₹ 90.

Expenditure on children's education = 15% of ₹ 90

$= \frac{15 \times 90}{100} =$ ₹ $\frac{27}{2}$

Balance now = $\left(90 - \frac{27}{2}\right)$

$= \left(\frac{180-27}{2}\right) =$ ₹ $\frac{153}{2}$

Expenditure on clothes

$= \left(10\% \text{ of } \frac{153}{2}\right) =$ ₹ $\left(\frac{153}{20}\right)$

Now, balance

$= \left(\frac{153}{2} - \frac{153}{20}\right) =$ ₹ $\frac{1377}{20}$

If last balance is ₹ $\frac{1377}{20}$, then salary = ₹ 100.

If last balance is ₹ 2754, then salary

= ₹ $\left(\frac{100 \times 20}{1377} \times 2754\right)$

= ₹ 4000.

25. (3) Let the original consumption be 1 unit & tax on it be ₹ 100.

So, revenue = ₹ (100 × 1) = ₹ 100.

New consumption

$= \left(\frac{110}{100} \times 1\right) = \frac{11}{10}$ units.

Now, tax on 1 unit = ₹ 90

Tax on $\frac{11}{10}$ units

$= \left(90 \times \frac{11}{10}\right) =$ ₹ 99.

$\therefore$ Decrease in revenue = 1 %.

26. (4) Suppose total number of votes cast = x.

$\therefore$ Number of illegal votes = 4% of $x = \frac{4x}{100} = \frac{x}{25}$

$\therefore$ Number of valid votes

$= x - \frac{x}{25} = \frac{25x-x}{25} = \frac{24x}{25}$

Votes secured by the contestant who is defeated

$= \frac{24x}{25} - \frac{24x}{25} \times \frac{55}{100}$

$= \frac{24x}{25}\left(1 - \frac{55}{100}\right) = \frac{24x}{25} \times \frac{45}{100}$

According to the question,

$\frac{24x}{25} \times \frac{55}{100} - 240 = \frac{24x}{25} \times \frac{45}{100}$

$\Rightarrow \frac{24x}{25}\left(\frac{55}{100} - \frac{45}{100}\right) = 240$

$\Rightarrow \frac{24x}{25} \cdot \frac{10}{100} = 240$

$\Rightarrow \frac{24x}{250} = 240$

$\Rightarrow x = \frac{250 \times 240}{24} = 2500$

$\therefore$ Total number of votes cast = 2500