10. PERCENTAGE

IMPORTANT FACTS AND FORMULAE

I. **Concept of Percentage** : By a certain *percent*, we mean that many hundredths. Thus, x percent means x hundredths, written as $x\%$.

To express $x\%$ as a fraction : We have, $x\% = \dfrac{x}{100}$.

Thus, $20\% = \dfrac{20}{100} = \dfrac{1}{5}$; $48\% = \dfrac{48}{100} = \dfrac{12}{25}$, etc.

To express $\dfrac{a}{b}$ as a percent : We have, $\dfrac{a}{b} = \left(\dfrac{a}{b} \times 100\right)\%$.

Thus, $\dfrac{1}{4} = \left(\dfrac{1}{4} \times 100\right)\% = 25\%$; $0.6 = \dfrac{6}{10} = \dfrac{3}{5} = \left(\dfrac{3}{5} \times 100\right)\% = 60\%$.

II. If the price of a commodity increases by $R\%$, then the reduction in consumption so as not to increase the expenditure is

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

If the price of a commodity decreases by $R\%$, then the increase in consumption so as not to decrease the expenditure is

$$\left[\frac{R}{(100 - R)} \times 100\right]\%$$

III. **Results on Population** : Let the population of a town be P now and suppose it increases at the rate of $R\%$ per annum, then :

1. Population after n years $= P\left(1 + \dfrac{R}{100}\right)^n$.

2. Population n years ago $= \dfrac{P}{\left(1 + \dfrac{R}{100}\right)^n}$.

IV. **Results on Depreciation** : Let the present value of a machine be P. Suppose it depreciates at the rate of $R\%$ per annum. Then :

1. Value of the machine after n years $= P\left(1 - \dfrac{R}{100}\right)^n$.

2. Value of the machine n years ago $= \dfrac{P}{\left(1 - \dfrac{R}{100}\right)^n}$.

V. If A is $R\%$ more than B, then B is less than A by

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

If A is $R\%$ less than B, then B is more than A by

$$\left[\frac{R}{(100 - R)} \times 100\right]\%.$$

SOLVED EXAMPLES

Ex. 1. *Express each of the following as a fraction :*

    (i) *56%*   (ii) *4%*   (iii) *0.6%*   (iv) *0.08%*

Sol.   (i) $56\% = \dfrac{56}{100} = \dfrac{14}{25}$.   (ii) $4\% = \dfrac{4}{100} = \dfrac{1}{25}$.

    (ii) $0.6\% = \dfrac{0.6}{100} = \dfrac{6}{1000} = \dfrac{3}{500}$.   (iv) $0.08\% = \dfrac{0.08}{100} = \dfrac{8}{10000} = \dfrac{1}{1250}$.

Ex. 2. *Express each of the following as a decimal :*

    (i) *6%*   (ii) *28%*   (iii) *0.2%*   (iv) *0.04%*

Sol.   (i) $6\% = \dfrac{6}{100} = 0.06$.   (ii) $28\% = \dfrac{28}{100} = 0.28$.

    (iii) $0.2\% = \dfrac{0.2}{100} = 0.002$.   (iv) $0.04\% = \dfrac{0.04}{100} = 0.0004$.

Ex. 3. *Express each of the following as rate percent :*

    (i) $\dfrac{23}{36}$ (ii) $6\dfrac{3}{4}$ (iii) *0.004*

Sol.   (i) $\dfrac{23}{36} = \left(\dfrac{23}{36} \times 100\right)\% = \left(\dfrac{575}{9}\right)\% = 63\dfrac{8}{9}\%$.

    (ii) $0.004 = \dfrac{4}{1000} = \left(\dfrac{4}{1000} \times 100\right)\% = 0.4\%$.

    (iii) $6\dfrac{3}{4} = \dfrac{27}{4} = \left(\dfrac{27}{4} \times 100\right)\% = 675\%$.

Ex. 4. *Evaluate :*

    (i) *28% of 450 + 45% of 280*   (Bank P.O. 2003)

    (ii) $16\dfrac{2}{3}\%$ *of 600 gm* $- 33\dfrac{1}{3}\%$ *of 180 gm*   (R.R.B. 1998)

Sol.   (i) 28% of 450 + 45% of 280 $= \left(\dfrac{28}{100} \times 450 + \dfrac{45}{100} \times 280\right) = (126 + 126) = 252$.

    (ii) $16\dfrac{2}{3}\%$ of 600 gm $- 33\dfrac{1}{3}\%$ of 180 gm

    $= \left[\left(\dfrac{50}{3} \times \dfrac{1}{100} \times 600\right) - \left(\dfrac{100}{3} \times \dfrac{1}{100} \times 180\right)\right]$ gm $= (100 - 60)$ gm $= 40$ gm.

Ex. 5. (i) *2 is what percent of 50 ?*   (S.S.C. 2000)

    (ii) $\dfrac{1}{2}$ *is what percent of* $\dfrac{1}{3}$ *?*   (S.S.C. 2002)

    (iii) *What percent of 7 is 84 ?*

    (iv) *What percent of 2 metric tonnes is 40 quintals ?*

    (v) *What percent of 6.5 litres is 130 ml ?*

Sol.   (i) Required percentage $= \left(\dfrac{2}{50} \times 100\right)\% = 4\%$.

    (ii) Required percentage $= \left(\dfrac{1}{2} \times \dfrac{3}{1} \times 100\right)\% = 150\%$.

    (iii) Required percentage $= \left(\dfrac{84}{7} \times 100\right)\% = 1200\%$.

(iv) 1 metric tonne = 10 quintals.

$\therefore$ Required percentage $= \left(\dfrac{40}{2 \times 10} \times 100\right)\% = 200\%.$

(v) Required percentage $= \left(\dfrac{130}{6.5 \times 1000} \times 100\right)\% = 2\%.$

Ex. 6. *Find the missing figures :*

(i) ?% of 25 = 2.125   (ii) 9% of ? = 63   (iii) 0.25% of ? = 0.04

Sol. (i) Let x% of 25 = 2.125. Then, $\dfrac{x}{100} \times 25 = 2.125 \iff x = (2.125 \times 4) = 8.5.$

(ii) Let 9% of x = 6.3. Then, $\dfrac{9}{100} x = 6.3 \iff x = \left(\dfrac{6.3 \times 100}{9}\right) = 70.$

(iii) Let 0.25% of x = 0.04. Then, $\dfrac{0.25}{100} x = 0.04 \iff x = \left(\dfrac{0.04 \times 100}{0.25}\right) = 16.$

Ex. 7. *Which is greatest in* $16\dfrac{2}{3}\%,\ \dfrac{2}{15}$ *and 0.17 ?*

Sol. $16\dfrac{2}{3}\% = \left(\dfrac{50}{3} \times \dfrac{1}{100}\right) = \dfrac{1}{6} = 0.166,\ \dfrac{2}{15} = 0.133.$ Clearly, 0.17 is the greatest.

Ex. 8. *If the sales tax be reduced from* $3\dfrac{1}{2}\%$ *to* $3\dfrac{1}{3}\%,$ *then what difference does it make to a person who purchases an article with marked price of Rs. 8400 ?*

(S.S.C. 2002)

Sol. Required difference $= \left(3\dfrac{1}{2}\% \text{ of Rs. } 8400\right) - \left(3\dfrac{1}{3}\% \text{ of Rs. } 8400\right)$

$= \left(\dfrac{7}{2} - \dfrac{10}{3}\right)\% \text{ of Rs. } 8400 = \dfrac{1}{6}\% \text{ of Rs. } 8400$

$= \text{Rs. } \left(\dfrac{1}{6} \times \dfrac{1}{100} \times 8400\right) = \text{Rs. } 14.$

Ex. 9. *An inspector rejects 0.08% of the meters as defective. How many will he examine to reject 2 ?*

(M.A.T. 2000)

Sol. Let the number of meters to be examined be x.

Then, 0.08% of x = 2 $\iff \left(\dfrac{8}{100} \times \dfrac{1}{100} \times x\right) = 2 \iff x = \left(\dfrac{2 \times 100 \times 100}{8}\right) = 2500.$

Ex. 10. *Sixty-five percent of a number is 21 less than four-fifth of that number. What is the number ?*

Sol. Let the number be x.

Then, $\dfrac{4}{5} x - (65\% \text{ of } x) = 21 \iff \dfrac{4}{5} x - \dfrac{65}{100} x = 21 \iff 15x = 2100 \iff x = 140.$

Ex. 11. *Difference of two numbers is 1660. If 7.5% of one number is 12.5% of the other number, find the two numbers.*

Sol. Let the numbers be x and y. Then, 7.5% of x = 12.5% of y $\iff x = \dfrac{125}{75} y = \dfrac{5}{3} y.$

Now, $x - y = 1660 \implies \dfrac{5}{3} y - y = 1660 \implies \dfrac{2}{3} y = 1660 \implies y = \left(\dfrac{1660 \times 3}{2}\right) = 2490.$

$\therefore$ One number = 2490, Second number $= \dfrac{5}{3} y = 4150.$

Ex. 12. *In expressing a length 81.472 km as nearly as possible with three significant digits, find the percentage error.* (S.S.C. 1997)

Sol. Error = (81.5 − 81.472) km = 0.028.

∴ Required percentage = $\left(\dfrac{0.028}{81.472} \times 100\right)\%$ = 0.034%.

Ex. 13. *In an election between two candidates, 75% of the voters cast their votes, out of which 2% of the votes were declared invalid. A candidate got 9261 votes which were 75% of the total valid votes. Find the total number of votes enrolled in that election.* (S.S.C. 2003)

Sol. Let the total number of votes enrolled be x. Then,

Number of votes cast = 75% of x. Valid votes = 98% of (75% of x).

∴ 75% of [98% of (75% of x)] = 9261

⇔ $\left(\dfrac{75}{100} \times \dfrac{98}{100} \times \dfrac{75}{100} \times x\right)$ = 9261 ⇔ $x = \left(\dfrac{9261 \times 100 \times 100 \times 100}{75 \times 98 \times 75}\right)$ = 16800.

Ex. 14. *Shobha's Mathematics Test had 75 problems i.e., 10 arithmetic, 30 algebra and 35 geometry problems. Although she answered 70% of the arithmetic, 40% of the algebra and 60% of the geometry problems correctly, she did not pass the test because she got less than 60% of the problems right. How many more questions she would have needed to answer correctly to earn a 60% passing grade?* (C.D.S. 2002)

Sol. Number of questions attempted correctly = (70% of 10 + 40% of 30 + 60% of 35)

= (7 + 12 + 21) = 40.

Questions to be answered correctly for 60% grade = 60% of 75 = 45.

∴ Required number of questions = (45 − 40) = 5.

Ex. 15. *If 50% of (x − y) = 30% of (x + y), then what percent of x is y?* (S.S.C. 2003)

Sol. 50% of (x − y) = 30% of (x + y) ⇔ $\dfrac{50}{100}(x - y) = \dfrac{30}{100}(x + y)$

⇔ 5 (x − y) = 3 (x + y) ⇔ 2x = 8y ⇔ x = 4y.

∴ Required percentage = $\left(\dfrac{y}{x} \times 100\right)\% = \left(\dfrac{y}{4y} \times 100\right)\%$ = 25%.

Ex. 16. *Mr. Jones gave 40% of the money he had, to his wife. He also gave 20% of the remaining amount to each of his three sons. Half of the amount now left was spent on miscellaneous items and the remaining amount of Rs. 12,000 was deposited in the bank. How much money did Mr. Jones have initially?*

Sol. Let the initial amount with Mr. Jones be Rs. x. Then,

Money given to wife = Rs. $\dfrac{40}{100} x$ = Rs. $\dfrac{2x}{5}$. Balance = Rs. $\left(x - \dfrac{2x}{5}\right)$ = Rs. $\dfrac{3x}{5}$.

Money given to 3 sons = Rs. $\left[3 \times \left(\dfrac{20}{100} \times \dfrac{3x}{5}\right)\right]$ = Rs. $\dfrac{9x}{25}$.

Balance = Rs. $\left(\dfrac{3x}{5} - \dfrac{9x}{25}\right)$ = Rs. $\dfrac{6x}{25}$.

Amount deposited in bank = Rs. $\left(\dfrac{1}{2} \times \dfrac{6x}{25}\right)$ = Rs. $\dfrac{3x}{25}$.

∴ $\dfrac{3x}{25}$ = 12000 ⇔ $x = \left(\dfrac{12000 \times 25}{3}\right)$ = 100000.

So, Mr. Jones initially had Rs. 1,00,000 with him.

Short-cut Method : Let the initial amount with Mr. Jones be Rs. x.

Then, $\frac{1}{2}$ [100 – (3 × 20)]% of (100 – 40)% of x = 12000.

$\Leftrightarrow$ $\frac{1}{2} \times \frac{40}{100} \times \frac{60}{100} \times x = 12000$ $\Leftrightarrow$ $\frac{3}{25} x = 12000$ $\Leftrightarrow$ $x = \left(\frac{12000 \times 25}{3}\right) = 100000$.

Ex. 17. *10% of the inhabitants of a village having died of cholera, a panic set in, during which 25% of the remaining inhabitants left the village. The population is then reduced to 4050. Find the number of original inhabitants.* (S.S.C. 2002)

Sol. Let the total number of original inhabitants be x.

Then, (100 – 25)% of (100 – 10)% of x = 4050

$\Leftrightarrow$ $\left(\frac{75}{100} \times \frac{90}{100} \times x\right) = 4050$ $\Leftrightarrow$ $\frac{27}{40} x = 4050$ $\Leftrightarrow$ $x = \left(\frac{4050 \times 40}{27}\right) = 6000$.

$\therefore$ Number of original inhabitants = 6000.

Ex. 18. *A salesman's commission is 5% on all sales upto Rs. 10,000 and 4% on all sales exceeding this. He remits Rs. 31,100 to his parent company after deducting his commission. Find the total sales.* (R.R.B. 2001)

Sol. Let his total sales be Rs. x. Now, (Total Sales) – (Commission) = Rs. 31,100.

$\therefore$ x – [5% of 10000 + 4% of (x – 10000)] = 31100

$\Leftrightarrow$ $x - \left[\frac{5}{100} \times 10000 + \frac{4}{100}(x - 10000)\right] = 31100$ $\Leftrightarrow$ $x - 500 - \frac{(x - 10000)}{25} = 31100$

$\Leftrightarrow$ $x - \frac{x}{25} = 31200$ $\Leftrightarrow$ $\frac{24x}{25} = 31200$ $\Leftrightarrow$ $x = \left(\frac{31200 \times 25}{24}\right) = 32500$.

$\therefore$ Total sales = Rs. 32,500.

Ex. 19. *Raman's salary was decreased by 50% and subsequently increased by 50%. How much percent does he lose ?* (Hotel Management, 2003)

Sol. Let original salary = Rs. 100.

New final salary = 150% of (50% of Rs. 100) = Rs. $\left(\frac{150}{100} \times \frac{50}{100} \times 100\right)$ = Rs. 75.

$\therefore$ Decrease = 25%.

Ex. 20. *Paulson spends 75% of his income. His income is increased by 20% and he increased his expenditure by 10%. Find the percentage increase in his savings.*

Sol. Let original income = Rs. 100. Then, expenditure = Rs. 75 and savings = Rs. 25.

New income = Rs. 120, New expenditure = Rs. $\left(\frac{110}{100} \times 75\right)$ = Rs. $\frac{165}{2}$.

New savings = Rs. $\left(120 - \frac{165}{2}\right)$ = Rs. $\frac{75}{2}$.

Increase in savings = Rs. $\left(\frac{75}{2} - 25\right)$ = Rs. $\frac{25}{2}$.

$\therefore$ Increase% = $\left(\frac{25}{2} \times \frac{1}{25} \times 100\right)$% = 50%.

Ex. 21. *The salary of a person was reduced by 10%. By what percent should his reduced salary be raised so as to bring it at par with his original salary ?*

(S.S.C. 2004)

Sol. Let the original salary be Rs. 100. New salary = Rs. 90.

Increase on 90 = 10. Increase on 100 = $\left(\frac{10}{90} \times 100\right)$% = $11\frac{1}{9}$%.

Ex. 22. *When the price of a product was decreased by 10%, the number sold increased by 30%. What was the effect on the total revenue ?*   (R.B.I. 2003)

Sol.   Let the price of the product be Rs. 100 and let original sale be 100 pieces.

Then, Total Revenue = Rs. (100×100) = Rs. 10000.

New revenue = Rs. (90×130) = Rs. 11700.

$\therefore$ Increase in revenue = $\left(\dfrac{1700}{10000} \times 100\right)\%$ = 17%.

Ex. 23. *If the numerator of a fraction be increased by 15% and its denominator be diminished by 8%, the value of the fraction is $\dfrac{15}{16}$. Find the original fraction.*

Sol.   Let the original fraction be $\dfrac{x}{y}$.

Then, $\dfrac{115\% \text{ of } x}{92\% \text{ of } y} = \dfrac{15}{16} \Rightarrow \dfrac{115x}{92y} = \dfrac{15}{16} \Rightarrow \dfrac{x}{y} = \left(\dfrac{15}{16} \times \dfrac{92}{115}\right) = \dfrac{3}{4}$.

Ex. 24. *In the new budget, the price of kerosene oil rose by 25%. By how much percent must a person reduce his consumption so that his expenditure on it does not increase?*

Sol.   Reduction in consumption = $\left[\dfrac{R}{(100 + R)} \times 100\right]\% = \left(\dfrac{25}{125} \times 100\right)\%$ = 20%.

Ex. 25. *The population of a town is 1,76,400. If it increases at the rate of 5% per annum, what will be its population 2 years hence ? What was it 2 years ago ?*

Sol.   Population after 2 years = $176400 \times \left(1 + \dfrac{5}{100}\right)^2 = \left(176400 \times \dfrac{21}{20} \times \dfrac{21}{40}\right) = 194481$.

Population 2 years ago = $\dfrac{176400}{\left(1 + \dfrac{5}{100}\right)^2} = \left(176400 \times \dfrac{20}{21} \times \dfrac{20}{21}\right) = 160000$.

Ex. 26. *The value of a machine depreciates at the rate of 10% per annum. If its present value is Rs. 1,62,000, what will be its worth after 2 years ? What was the value of the machine 2 years ago ?*

Sol.   Value of the machine after 2 years

= Rs. $\left[162000 \times \left(1 - \dfrac{10}{100}\right)^2\right]$ = Rs. $\left(162000 \times \dfrac{9}{10} \times \dfrac{9}{10}\right)$ = Rs. 131220.

Value of the machine 2 years ago

= Rs. $\left[\dfrac{162000}{\left(1 - \dfrac{10}{100}\right)^2}\right]$ = Rs. $\left(162000 \times \dfrac{10}{9} \times \dfrac{10}{9}\right)$ = Rs. 200000.

Ex. 27. *During one year, the population of a town increased by 5% and during the next year, the population decreased by 5%. If the total population is 9975 at the end of the second year, then what was the population size in the beginning of the first year?*
                                                                (Hotel Management, 2003)

Sol.   Population in the beginning of the first year

$= \dfrac{9975}{\left(1 + \dfrac{5}{100}\right)\left(1 - \dfrac{5}{100}\right)} = \left(9975 \times \dfrac{20}{21} \times \dfrac{20}{19}\right) = 10000$.

Ex. 28. *If A earns $33\frac{1}{3}$% more than B, how much percent does B earn less than A ?*

Sol. Required percentage $= \left[\dfrac{\left(\dfrac{100}{3}\right)}{\left(100+\dfrac{100}{3}\right)} \times 100\right]\% = \left(\dfrac{100}{400} \times 100\right)\% = 25\%$.

Ex. 29. *If A's salary is 20% less than B's salary, by how much percent is B's salary more than A's ?*

Sol. Required percentage $= \left[\dfrac{20}{(100-20)} \times 100\right]\% = 25\%$.

Ex. 30. *How many kg of pure salt must be added to 30 kg of 2% solution of salt and water to increase it to a 10% solution ?*   (M.A.T. 2004)

Sol. Amount of salt in 30 kg solution $= \left(\dfrac{2}{100} \times 30\right)$ kg $= 0.6$ kg.

Let x kg of pure salt be added.

Then, $\dfrac{0.6+x}{30+x} = \dfrac{10}{100} \Leftrightarrow 60 + 100x = 300 + 10x \Leftrightarrow 90x = 240 \Leftrightarrow x = \dfrac{8}{3} = 2\dfrac{2}{3}$.

Ex. 31. *Due to a reduction of $6\frac{1}{4}$% in the price of sugar, a man is able to buy 1 kg more for Rs. 120. Find the original and reduced rate of sugar.*

Sol. Let original rate be Rs. x per kg.

Reduced rate $=$ Rs. $\left[\left(100-\dfrac{25}{4}\right) \times \dfrac{1}{100} x\right] =$ Rs. $\dfrac{15x}{16}$ per kg.

$\therefore \quad \dfrac{120}{\dfrac{15x}{16}} - \dfrac{120}{x} = 1 \Leftrightarrow \dfrac{128}{x} - \dfrac{120}{x} = 1 \Leftrightarrow x = 8$.

So, original rate $=$ Rs. 8 per kg.

Reduced rate $=$ Rs. $\left(\dfrac{15}{16} \times 8\right)$ per kg $=$ Rs. 7.50 per kg.

Ex. 32. *In an examination, 35% of total students failed in Hindi, 45% failed in English and 20% in both. Find the percentage of those who passed in both the subjects.*

Sol. Let A and B be the sets of students who failed in Hindi and English respectively.

Then, n (A) $= 35$, n (B) $= 45$, n (A $\cap$ B) $= 20$.

So, n (A $\cup$ B) $= n$ (A) $+ n$ (B) $- n$ (A $\cap$ B) $= (35 + 45 - 20) = 60$.

$\therefore$ Percentage failed in Hindi or English or both $= 60\%$.

Hence, percentage passed $= (100 - 60)\% = 40\%$.

Ex. 33. *In an examination, 80% of the students passed in English, 85% in Mathematics and 75% in both English and Mathematics. If 40 students failed in both the subjects, find the total number of students.*

Sol. Let the total number of students be x.

Let A and B represent the sets of students who passed in English and Mathematics respectively.

Then, number of students passed in one or both the subjects

$= n$ (A $\cup$ B) $= n$ (A) $+ n$ (B) $- n$ (A $\cap$ B) $= 80\%$ of $x + 85\%$ of $x - 75\%$ of x

$= \left(\dfrac{80}{100} x + \dfrac{85}{100} x - \dfrac{75}{100} x\right) = \dfrac{90}{100} x = \dfrac{9}{10} x$.

∴   Students who failed in both the subjects $= \left(x - \frac{9x}{10}\right) = \frac{x}{10}$.

So, $\frac{x}{10} = 40$ or $x = 400$. Hence, total number of students = 400.

EXERCISE 10

(OBJECTIVE TYPE QUESTIONS)

Directions : Mark (✓) against the correct answer :

1. The ratio 5 : 4 expressed as a percent equals :   (S.S.C. 2000)
   (a) 12.5%   (b) 40%   (c) 80%   (d) 125%

2. 3.5 can be expressed in terms of percentage as :   (R.R.B. 1998)
   (a) 0.35%   (b) 3.5%   (c) 35%   (d) 350%

3. Half of 1 percent written as a decimal is :   (S.S.C. 1999)
   (a) 0.005   (b) 0.05   (c) 0.02   (d) 0.2

4. What is 15 percent of Rs. 34 ?   (I.M.T. 2002)
   (a) Rs. 3.40   (b) Rs. 3.75   (c) Rs. 4.50   (d) Rs. 5.10

5. 63% of $3\frac{4}{7}$ is :
   (a) 2.25   (b) 2.40   (c) 2.50   (d) 2.75

6. 88% of 370 + 24% of 210 − ? = 118   (Bank P.O. 2003)
   (a) 256   (b) 258   (c) 268   (d) 358

7. 860% of 50 + 50% of 860 = ?   (R.B.I. 2003)
   (a) 430   (b) 516   (c) 860   (d) 960

8. 45% of 750 − 25% of 480 = ?   (Bank P.O. 2002)
   (a) 216   (b) 217.50   (c) 236.50   (d) 245

9. 40% of 1640 + ? = 35% of 980 + 150% of 850   (S.B.I.P.O. 1997)
   (a) 372   (b) 842   (c) 962   (d) 1052

10. 218% of 1674 = ? × 1800
    (a) 0.5   (b) 4   (c) 6   (d) None of these

11. 60% of 264 is the same as :   (Hotel Management, 2001)
    (a) 10% of 44   (b) 15% of 1056   (c) 30% of 132   (d) None of these

12. 270 candidates appeared for an examination, of which 252 passed. The pass percentage is :
    (a) 80%   (b) $83\frac{1}{2}$%   (c) $90\frac{1}{3}$%   (d) $93\frac{1}{3}$%

13. 5 out of 2250 parts of earth is sulphur. What is the percentage of sulphur in earth ?
    (a) $\frac{11}{50}$ (b) $\frac{2}{9}$ (c) $\frac{1}{45}$ (d) $\frac{2}{45}$

14. What percent of 7.2 kg is 18 gms ?
    (a) .025%   (b) .25%   (c) 2.5%   (d) 25%

15. 0.01 is what percent of 0.1 ?   (S.S.C. 2000)
    (a) $\frac{1}{100}$ (b) $\frac{1}{10}$ (c) 10   (d) 100

16. What percent of Rs. 2650 is Rs. 1987.50 ?   (Hotel Management, 2002)
    (a) 60%   (b) 75%   (c) 80%   (d) 90%

17. What percent of a day is 3 hours ?   (R.R.B. 2003)

    (a) $12\frac{1}{2}$%   (b) $16\frac{2}{3}$%   (c) $18\frac{2}{3}$%   (d) $22\frac{1}{2}$%

18. It costs Re. 1 to photocopy a sheet of paper. However, 2% discount is allowed on all
    photocopies done after first 1000 sheets. How much will it cost to copy 5000 sheets
    of paper ?   (IGNOU, 2003)

    (a) Rs. 3920   (b) Rs. 3980   (c) Rs. 4900   (d) Rs. 4920

19. A housewife saved Rs. 2.50 in buying an item on sale. If she spent Rs. 25 for the item,
    approximately how much percent she saved in the transaction ?

    (a) 8%   (b) 9%   (c) 10%   (d) 11%

                                                                      (Section Officers', 2003)

20. How many litres of pure acid are there in 8 litres of a 20% solution ?

    (a) 1.4   (b) 1.5   (c) 1.6   (d) 2.4

21. Rajeev buys goods worth Rs. 6650. He gets a rebate of 6% on it. After getting the
    rebate, he pays sales tax @ 10%. Find the amount he will have to pay for the goods.

    (a) Rs. 6876.10   (b) Rs. 6999.20   (c) Rs. 6654   (d) Rs. 7000

                                                                               (M.A.T. 2002)

22. Which one of the following shows the best percentage ? (Hotel Management, 1996)

    (a) $\frac{384}{540}$ (b) $\frac{425}{500}$ (c) $\frac{570}{700}$ (d) $\frac{480}{660}$

23. 5% of (25% of Rs. 1600) is

    (a) Rs. 5   (b) Rs. 17.50   (c) Rs. 20   (d) Rs. 25

24. 0.15% of $33\frac{1}{3}$% of Rs. 10,000 is   (S.S.C. 2002)

    (a) Re. 0.05   (b) Rs. 5   (c) Rs. 105   (d) Rs. 150

25. 30% of 28% of 480 is the same as

    (a) 15% of 56% of 240   (b) 60% of 28% of 240
    (c) 60% of 56% of 240   (d) None of these

26. What is 25% of 25% equal to ?

    (a) 0.00625   (b) 0.0625   (c) 0.625   (d) 6.25

27. What percent is 3% of 5% ?

    (a) 15%   (b) 30%   (c) 50%   (d) 60%

28. 4598 is 95% of ?

    (a) 4800   (b) 4840   (c) 4850   (d) 4880

29. ?% of 360 = 129.6   (Bank P.O. 2002)

    (a) 36   (b) 64   (c) 72   (d) 77

30. ?% of 932 + 30 = 309.6   (Bank P.O. 2003)

    (a) 25   (b) 30   (c) 35   (d) 40

31. 45% of 1500 + 35% of 1700 = ?% of 3175   (Bank P.O. 2000)

    (a) 30   (b) 35   (c) 45   (d) None of these

32. 65% of ? = 20% of 422.50   (Bank P.O. 2003)

    (a) 84.5   (b) 130   (c) 139.425   (d) 200

33. An agent gets a commission of 2.5% on the sales of cloth. If on a certain day, he gets
    Rs. 12.50 as commission, the cloth sold through him on that day is worth

    (a) Rs. 250   (b) Rs. 500   (c) Rs. 750   (d) Rs. 1250

34. If Rs. 2800 is $\frac{2}{7}$ percent of the value of a house, the worth of the house (in Rs.) is :

                                                                                   (L.I.C. 2003)

    (a) 8,00,000   (b) 9,80,000   (c) 10,00,000   (d) 12,00,000

35. 15% of (?)% of 582 = 17.46
    (a) 2   (b) 10   (c) 20   (d) None of these

36. $\sqrt{784} + ? = 78\%$ of 500 :
    (a) 342   (b) 352   (c) 362   (d) 372

37. If 120 is 20% of a number, then 120% of that number will be :
    (a) 20   (b) 120   (c) 360   (d) 720
                                                  (Section Officers', 2003)

38. If 35% of a number is 175, then what percent of 175 is that number ?
    (a) 35%   (b) 65%   (c) 280%   (d) None of these

39. Two-fifth of one-third of three-seventh of a number is 15. What is 40 percent of that number ?   **(Bank P.O. 2002)**
    (a) 72   (b) 84   (c) 136   (d) 140   (e) None of these

40. The difference between a number and its two-fifth is 510. What is 10% of that number ?
    (a) 12.75   (b) 85   (c) 204   (d) None of these
                                                 (Bank P.O. 2003)

41. If 15% of 40 is greater than 25% of a number by 2, then the number is :
    (a) 12   (b) 16   (c) 24   (d) 32

42. Subtracting 40% of a number from the number, we get the result as 30. The number is :
    (a) 28   (b) 50   (c) 52   (d) 70

43. If 35% of a number is 12 less than 50% of that number, then the number is :
    (a) 40   (b) 50   (c) 60   (d) 80
                                                 (C.B.I. 1998)

44. The number which exceeds 16% of it by 42 is :   **(C.B.I. 1997)**
    (a) 50   (b) 52   (c) 58   (d) 60

45. What percentage of numbers from 1 to 70 have squares that end in the digit 1 ?
    (a) 1   (b) 14   (c) 20   (d) 21
                                                 (M.B.A. 2002)

46. By how much percent is four-fifth of 70 lesser than five-seventh of 112 ?
    (a) 24%   (b) 30%   (c) 36%   (d) 42%

47. If a number x is 10% less than another number y and y is 10% more than 125, then x is equal to :   **(S.S.C. 2002)**
    (a) 123.75   (b) 140.55   (c) 143   (d) 150

48. If 75% of a number is added to 75, then the result is the number itself. The number is :   **(Section Officers', 2001)**
    (a) 50   (b) 60   (c) 300   (d) 400

49. A number, when 35 is subtracted from it, reduces to its 80 percent. What is four-fifth of that number ?   **(B.S.R.B. 1998)**
    (a) 70   (b) 90   (c) 120   (d) 140

50. Which of the following multipliers will cause a number to be increased by 29.7% ?
    (a) 1.297   (b) 12.97   (c) 129.7   (d) 1297

51. The sum of two numbers is 2490. If 6.5% of one number is equal to 8.5% of the other, then the numbers are :   **(IGNOU, 2003)**
    (a) 989, 1501   (b) 1011, 1479   (c) 1401, 1089   (d) 1411, 1079

52. The sum of two numbers is $\frac{28}{25}$ of the first number. The second number is what percent of the first ?   **(Hotel Management, 1997)**
    (a) 12%   (b) 14%   (c) 16%   (d) 18%

53. If 25% of a number is subtracted from a second number, the second number reduces to its five-sixth. What is the ratio of the first number to the second number ?

    (a) 1 : 3   (b) 2 : 3   (c) 3 : 2   (d) Data inadequate

                                                        (S.B.I.P.O. 1999)

54. The difference of two numbers is 20% of the larger number. If the smaller number is 20, then the larger number is :   (S.S.C. 2000)

    (a) 25   (b) 45   (c) 50   (d) 80

55. When any number is divided by 12, then dividend becomes $\frac{1}{4}$th of the other number. By how much percent first number is greater than the second number ?

    (a) 150   (b) 200   (c) 300   (d) Data inadequate

                                                        (Bank P.O. 2000)

56. If one number is 80% of the other and 4 times the sum of their squares is 656, then the numbers are :   (Hotel Management, 1998)

    (a) 4, 5   (b) 8, 10   (c) 16, 20   (d) None of these

57. Two numbers A and B are such that the sum of 5% of A and 4% of B is two-third of the sum of 6% of A and 8% of B. Find the ratio of A : B.   (M.B.A. 2002)

    (a) 2 : 3   (b) 1 : 1   (c) 3 : 4   (d) 4 : 3

58. Three candidates contested an election and received 1136, 7636 and 11628 votes respectively. What percentage of the total votes did the winning candidate get ?

    (a) 57%   (b) 60%   (c) 65%   (d) 90%

                                                         (I.M.T. 2002)

59. The population of a town increased from 1,75,000 to 2,62,500 in a decade. The average percent increase of population per year is :   (C.B.I. 1997)

    (a) 4.37%   (b) 5%   (c) 6%   (d) 8.75%

60. A student multiplied a number by $\frac{3}{5}$ instead of $\frac{5}{3}$. What is the percentage error in the calculation ?   (S.S.C. 1999)

    (a) 34%   (b) 44%   (c) 54%   (d) 64%

61. A tempo is insured to the extent of $\frac{4}{5}$ of its original value. If the premium on it at the rate of 1.3 percent amounts to Rs. 910, the original value of the tempo is :

    (a) Rs. 78,500   (b) Rs. 80,000   (c) Rs. 82,500   (d) Rs. 87,500

62. When 15% is lost in grinding wheat, a country can export 30 lakh tons of wheat. On the other hand, if 10% is lost in grinding, it can export 40 lakh tons of wheat. The production of wheat in the country is :

    (a) 20 lakh tons   (b) 80 lakh tons   (c) 200 lakh tons   (d) 800 lakh tons

63. In a competitive examination in State A, 6% candidates got selected from the total appeared candidates. State B had an equal number of candidates appeared and 7% candidates got selected with 80 more candidates got selected than A. What was the number of candidates appeared from each State ?   (S.B.I.P.O. 2000)

    (a) 7600   (b) 8000   (c) 8400   (d) Data inadequate

64. The price of a car is Rs. 3,25,000. It was insured to 85% of its price. The car was damaged completely in an accident and the insurance company paid 90% of the insurance. What was the difference between the price of the car and the amount received ?

    (a) Rs. 32,500   (b) Rs. 48,750   (c) Rs. 76,375   (d) Rs. 81,250

                                                        (Bank P.O. 2003)

65. Gauri went to the stationers and bought things worth Rs. 25, out of which 30 paise went on sales tax on taxable purchases. If the tax rate was 6%, then what was the cost of the tax free items ? **(M.A.T. 2003)**

    (a) Rs. 15   (b) Rs. 15.70   (c) Rs. 19.70   (d) Rs. 20

66. A batsman scored 110 runs which included 3 boundaries and 8 sixes. What percent of his total score did he make by running between the wickets ? **(S.S.C. 2004)**

    (a) 45%   (b) $45\frac{5}{11}$%   (c) $54\frac{6}{11}$%   (d) 55%

67. After deducting a commission of 5%, a T.V. set costs Rs. 9595. Its marked price is :

    (a) Rs. 10,000   (b) Rs. 10,075   (c) Rs. 10,100   (d) Rs. 10,500

68. A fruit seller had some apples. He sells 40% apples and still has 420 apples. Originally, he had : **(S.S.C. 2003)**

    (a) 588 apples   (b) 600 apples   (c) 672 apples   (d) 700 apples

69. A person who spends $66\frac{2}{3}$% of his income is able to save Rs. 1200 per month. His monthly expenses (in Rs.) are : **(S.S.C. 1999)**

    (a) Rs. 1200   (b) Rs. 2400   (c) Rs. 3000   (d) Rs. 3200

70. In an examination, 35% of the students passed and 455 failed. How many students appeared for the examination ? **(S.S.C. 2000)**

    (a) 490   (b) 700   (c) 845   (d) 1300

71. In a market survey, 20% opted for product A whereas 60% opted for product B. The remaining individuals were not certain. If the difference between those who opted for product B and those who were uncertain was 720, how many individuals were covered in the survey ?

    (a) 1440   (b) 1800   (c) 3600   (d) Data inadequate

72. A student has to obtain 33% of the total marks to pass. He got 125 marks and failed by 40 marks. The maximum marks are : **(C.B.I. 2003)**

    (a) 300   (b) 500   (c) 800   (d) 1000

73. In an election a candidate who gets 84% of the votes is elected by a majority of 476 votes. What is the total number of votes polled ? **(Hotel Management, 2003)**

    (a) 672   (b) 700   (c) 749   (d) 848

74. In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that the other candidate got, was : **(R.R.B. 2003)**

    (a) 2700   (b) 2900   (c) 3000   (d) 3100

75. At an election involving two candidates, 68 votes were declared invalid. The winning candidate secures 52% and wins by 98 votes. The total number of votes polled is :

    (a) 2382   (b) 2450   (c) 2518   (d) None of these

76. 10% of the voters did not cast their vote in an election between two candidates. 10% of the votes polled were found invalid. The successful candidate got 54% of the valid votes and won by a majority of 1620 votes. The number of voters enrolled on the voters' list was : **(S.S.C. 2003)**

    (a) 25000   (b) 33000   (c) 35000   (d) 40000

77. 8% of the people eligible to vote are between 18 and 21 years of age. In an election, 85% of those eligible to vote, who were between 18 and 21, actually voted. In that election, the number of persons between 18 and 21, who actually voted, was what percent of those eligible to vote ? **(R.R.B. 1998)**

    (a) 4.2   (b) 6.4   (c) 6.8   (d) 8

78. In an election, 30% of the voters voted for candidate A whereas 60% of the remaining voted for candidate B. The remaining voters did not vote. If the difference between

those who voted for candidate A and those who did not vote was 1200, how many individuals were eligible for casting vote in that election ?

(a) 10,000   (b) 45,000   (c) 60,000   (d) 72,000

79. Two tailors X and Y are paid a total of Rs. 550 per week by their employer. If X is paid 120 percent of the sum paid to Y, how much is Y paid per week ?

(a) Rs. 200   (b) Rs. 250   (c) Rs. 300   (d) None of these
                                                                        (N.I.F.T. 2000)

80. While purchasing one item costing Rs. 400, I had to pay the sales tax at 7% and on another costing Rs. 6400, the sales tax was 9%. What percent of the sales tax I had to pay, taking the two items together on an average ?

(a) 8%   (b) $8\frac{13}{17}$%   (c) $8\frac{15}{17}$%   (d) $8\frac{1}{2}$%

81. A student secures 90%, 60% and 54% marks in test papers with 100, 150 and 200 respectively as maximum marks. The percentage of his aggregate is :

(a) 64   (b) 68   (c) 70   (d) None of these
                                                        (Hotel Management, 1999)

82. 1100 boys and 700 girls are examined in a test; 42% of the boys and 30% of the girls pass. The percentage of the total who failed is :

(a) 58%   (b) $62\frac{2}{3}$%   (c) 64%   (d) 78%

83. In a certain school, 20% of students are below 8 years of age. The number of students above 8 years of age is $\frac{2}{3}$ of the number of students of 8 years age which is 48. What is the total number of students in the school ?   (Bank P.O. 2003)

(a) 72   (b) 80   (c) 120   (d) 150   (e) None of these

84. In an examination, 5% of the applicants were found ineligible and 85% of the eligible candidates belonged to the general category. If 4275 eligible candidates belonged to other categories, then how many candidates applied for the examination ?

(a) 30,000   (b) 35,000   (c) 37,000   (d) None of these
                                                        (Hotel Management, 1998)

85. Two students appeared at an examination. One of them secured 9 marks more than the other and his marks was 56% of the sum of their marks. The marks obtained by them are :   (S.S.C. 2004)

(a) 39, 30   (b) 41, 32   (c) 42, 33   (d) 43, 34

86. If x is 90% of y, then what percent of x is y ?   (S.S.C. 1997)

(a) 90%   (b) $101\frac{1}{9}$%   (c) $111\frac{1}{9}$%   (d) 190%

87. x% of y is y% of :

(a) x   (b) 100x   (c) $\frac{x}{100}$ (d) $\frac{y}{100}$

88. If 20% of a = b, then b% of 20 is the same as :   (Hotel Management, 1998)

(a) 4% of a   (b) 5% of a   (c) 20% of a   (d) None of these

89. If x% of y is the same as $\frac{4}{5}$ of 80, then the value of xy is :

(a) 320   (b) 400   (c) 640   (d) None of these

90. If x% of y is 100 and y% of z is 200, then find a relation between x and z

(a) $z = \frac{x}{2}$ (b) $z = 2x$ (c) $z = \frac{x}{4}$ (d) $z = 4x$

                                                                        (S.S.C. 2002)

91. If $p\%$ of p is 36, then p is equal to :   (S.S.C. 2000)
    (a) 15   (b) 60   (c) 600   (d) 3600

92. If $x\%$ of y is equal to z, what percent of z is x ?   (S.S.C. 1999)

    (a) $\dfrac{y^2}{100}$ (b) $\dfrac{y}{100^2}$ (c) $\dfrac{100}{y}$ (d) $\dfrac{100^2}{y}$

93. If x is 80% of y, then what percent of $2x$ is y ?   (C.B.I. 1998)

    (a) 40%   (b) $62\dfrac{1}{2}\%$ (c) $66\dfrac{2}{3}\%$ (d) 80%

94. Subtracting 6% of x from x is equivalent to multiplying x by how much ?
    (a) 0.094   (b) 0.94   (c) 9.4   (d) 94

95. $(x\%$ of $y + y\%$ of $x) = ?$
    (a) $x\%$ of y (b) $y\%$ of x (c) 2% of xy (d) $xy\%$ of 3

96. If A is 150 percent of B, then B is what percent of $(A + B)$?

    (a) $33\dfrac{1}{3}\%$ (b) 40%   (c) $66\dfrac{2}{3}\%$ (d) 75%

97. If 8% of x = 4% of y, then 20% of x is :
    (a) 10% of y (b) 16% of y (c) 80% of y (d) None of these

98. If 20% of A = B and 40% of B = C, then 60% of $(A + B)$ is :
    (a) 30% of C   (b) 60% of C   (c) 75% of C   (d) None of these

99. If $x\%$ of a is the same as $y\%$ of b, then $z\%$ of b is :

    (a) $\dfrac{xy}{z}\%$ of a (b) $\dfrac{yz}{x}\%$ of a (c) $\dfrac{xz}{y}\%$ of a (d) None of these

100. If A = $x\%$ of y and B = $y\%$ of x, then which of the following is true ?
    (a) A is smaller than B.   (b) A is greater than B.
    (c) Relationship between A and B cannot be determined.
    (d) If x is smaller than y, then A is greater than B.
    (e) None of these   (Bank P.O. 2003)

101. $33\dfrac{1}{3}\%$ of a man's daily output is equal to 50% of a second man's daily output. If the
    second man turns out 1500 screws daily, then the first man's output in terms of
    making screws is :
    (a) 500   (b) 1000   (c) 2000   (d) 2250

Directions (*Questions 102 to 106*) : *A survey of magazine reading habits of the people living in five cities P, Q, R, S and T is summarised in a table given below. The Column I in the table gives percentage of magazine-readers in each city who read only one magazine a week. The Column II gives the total number of magazine-readers who read two or more magazines a week. Read the table and then answer these questions:*
                                                                    (S.S.C. 1999)

City	I	II
P	75	6000
Q	80	3500
R	60	3000
S	55	2700
T	25	4200

102. The city with the lowest number of magazine-readers is :
    (a) Q   (b) R   (c) S   (d) T
103. Which city has the highest number of magazine-readers who read only one magazine a week ?
    (a) P   (b) Q   (c) R   (d) S
104. The highest number of magazine-readers in any given city is :
    (a) 17500   (b) 18000   (c) 24000   (d) 30000
105. How many magazine-readers in city Q read only one magazine a week ?
    (a) 14000   (b) 18000   (c) 12500   (d) 16500
106. The total number of all the magazine-readers in the five cities who read only one magazine a week is :
    (a) 19400   (b) 24000   (c) 41200   (d) 42000
107. Rohit spends 40% of his salary on food, 20% on house rent, 10% on entertainment and 10% on conveyance. If his savings at the end of a month are Rs. 1500, then his monthly salary is :   (S.S.C. 2003)
    (a) Rs. 6000   (b) Rs. 7500   (c) Rs. 8000   (d) Rs. 10,000
108. Kunal spent Rs. 35,000 in buying raw materials, Rs. 40,000 in buying machinery and 20% of the total amount he had as cash with him. What was the total amount ?
    (a) Rs. 80,000   (b) Rs. 85,750   (c) Rs. 90,000   (d) Rs. 93,750
109. Gaurav spends 30% of his monthly income on food articles, 40% of the remaining on conveyance and clothes and saves 50% of the remaining. If his monthly salary is Rs. 18,400, how much money does he save every month ?
    (a) Rs. 3624   (b) Rs. 3864   (c) Rs. 4264   (d) Rs. 5888
110. A spider climbed $62\frac{1}{2}$% of the height of the pole in one hour and in the next hour it covered $12\frac{1}{2}$% of the remaining height. If the height of the pole is 192 m, then distance climbed in second hour is :   (Section Officers', 2003)
    (a) 3 m   (b) 5 m   (c) 7 m   (d) 9 m
111. A man spends 35% of his income on food, 25% on children's education and 80% of the remaining on house rent. What percent of his income he is left with ?
    (a) 8%   (b) 10%   (c) 12%   (d) 14%
112. From the salary of an officer, 10% is deducted as house rent, 20% of the rest, he spends on conveyance, 20% of the rest he pays as income tax and 10% of the balance, he spends on clothes. Then, he is left with Rs. 15,552. Find his total salary.
    (a) Rs. 25,000   (b) Rs. 30,000   (c) Rs. 35,000   (d) Rs. 40,000
                                                                          (L.I.C.A.A.O. 2003)
113. Aman gave 40% of the amount he had to Rohan. Rohan in turn gave one-fourth of what he received from Aman to Sahil. After paying Rs. 200 to the taxi driver out of the amount he got from Rohan, Sahil now has Rs. 600 left with him. How much amount did Aman have ?   (Bank P.O. 2000)
    (a) Rs. 4000   (b) Rs. 8000   (c) Rs. 12,000   (d) Data inadequate
114. Sameer spends 24% of his monthly income on food and 15% on the education of his children. Of the remaining salary, he spends 25% on entertainment and 20% on conveyance. He is now left with Rs. 10,736. What is the monthly salary of Sameer ?
    (a) Rs. 27,600   (b) Rs. 28,000   (c) Rs. 31,200   (d) Rs. 32,000
                                                                          (Bank P.O. 2004)
115. 405 sweets were distributed equally among children in such a way that the number of sweets received by each child is 20% of the total number of children. How many sweets did each child receive ?   (Bank P.O. 2003)
    (a) 9   (b) 15   (c) 18   (d) 45

116. The sum of the number of boys and girls in a school is 150. If the number of boys is x, then the number of girls becomes $x\%$ of the total number of students. The number of boys is : (S.S.C. 2002)
   (a) 40   (b) 50   (c) 60   (d) 90

117. In an examination of n questions, a student replied 15 out of the first 20 questions correctly. Of the remaining questions, he answered one-third correctly. All the questions have the same credit. If the student gets 50% marks, the value of n is :
   (a) 20   (b) 40   (c) 50   (d) 100

118. The salaries of A and B together amount to Rs. 2000. A spends 95% of his salary and B, 85% of his. If now, their savings are the same, what is A's salary ?
   (a) Rs. 750   (b) Rs. 1250   (c) Rs. 1500   (d) Rs. 1600

119. A's marks in Biology are 20 less than 25% of the total marks obtained by him in Biology, Maths and Drawing. If his marks in Drawing be 50, what are his marks in Maths ?
   (a) 40   (b) 45
   (c) 50   (d) Cannot be determined

120. A salesman is allowed $5\frac{1}{2}\%$ discount on the total sales made by him plus a bonus of $\frac{1}{2}\%$ on the sales over Rs. 10,000. If his total earnings were Rs. 1990, then his total sales (in Rs.) were : (C.B.I. 2003)
   (a) 30,000   (b) 32,000   (c) 34,000   (d) 35,000

121. In an examination, there are three papers and a candidate has to get 35% of the total to pass. In one paper, he gets 62 out of 150 and in the second 35 out of 150. How much must he get, out of 180, in the third paper to just qualify for a pass ?
   (a) 60.5   (b) 68   (c) 70   (d) 71
                                                         (R.R.B. 2002)

122. In a History examination, the average for the entire class was 80 marks. If 10% of the students scored 95 marks and 20% scored 90 marks, what was the average marks of the remaining students of the class ? (D.M.R.C. 2003)
   (a) 65.5   (b) 72.5   (c) 75   (d) 85

123. A scored 30% marks and failed by 15 marks. B scored 40% marks and obtained 35 marks more than those required to pass. The pass percentage is : (S.S.C. 2003)
   (a) 33%   (b) 38%   (c) 43%   (d) 46%

124. The price of a table is Rs. 400 more than that of a chair. If 6 tables and 6 chairs together cost Rs. 4800, by what percent is the price of the chair less than that of the table ?
   (a) $33\frac{1}{3}\%$ (b) 50%   (c) $66\frac{2}{3}\%$ (d) None of these

125. In a recent survey, 40% houses contained two or more people. Of those houses containing only one person, 25% were having only a male. What is the percentage of all houses, which contain exactly one female and no males ? (S.B.I.P.O. 2000)
   (a) 15   (b) 40   (c) 75
   (d) Can't be determined   (e) None of these

126. In a city, 40% of the people are illiterate and 60% are poor. Among the rich, 10% are illiterate. What percentage of the poor population is illiterate ?
   (a) 36%   (b) 40%   (c) 60%   (d) None of these

127. Of the 1000 inhabitants of a town, 60% are males of whom 20% are literate. If, of all the inhabitants, 25% are literate, then what percent of the females of the town are literate ? (M.A.T. 2003)
   (a) 22.5   (b) 27.5   (c) 32.5   (d) 37.5

128. $37\frac{1}{2}$% of the candidates in an examination were girls, 75% of the boys and $62\frac{1}{2}$% of the girls passed and 342 girls failed. The number of boys failed was :

(a) 350   (b) 360   (c) 370   (d) 380

(S.S.C. 2003)

129. $\frac{5}{9}$ part of the population in a village are males. If 30% of the males are married, the percentage of unmarried females in the total population is :

(a) 20%   (b) $27\frac{7}{9}$%   (c) 40%   (d) 70%

130. In a city, 35% of the population is composed of migrants, 20% of whom are from rural areas. Of the local population, 48% is female while this figure for rural and urban migrants is 30% and 40% respectively. If the total population of the city is 728400, what is its female population ?

(a) 324138   (b) 349680   (c) 509940   (d) None of these

131. The boys and girls in a college are in the ratio 3 : 2. If 20% of the boys and 25% of the girls are adults, the percentage of students who are not adults is :

(a) 58%   (b) 67.5%   (c) 78%   (d) 82.5%

132. A man bought a house for Rs. 5 lakhs and rents it. He puts $12\frac{1}{2}$% of each month's rent aside for repairs, pays Rs. 1660 as annual taxes and realises 10% on his investment thereafter. The monthly rent of the house is :

(a) Rs. 2460   (b) Rs. 2500   (c) Rs. 4920   (d) Rs. 5000

133. A debtor can pay 87 paise in the rupee, but if his creditors would take 20% of his debts, he could pay them and have Rs. 42 left. His debts and assets respectively are :

(a) Rs. 400, Rs. 520   (b) Rs. 500, Rs. 521

(c) Rs. 600, Rs. 522   (d) Rs. 1000, Rs. 525

134. If the price of a book is first decreased by 25% and then increased by 20%, then the net change in the price will be :   (S.S.C. 2003)

(a) No change   (b) 5% increase   (c) 5% decrease   (d) 10% decrease

135. The price of a shirt is increased by 15% and then reduced by 15%. The final price of the shirt :   (Hotel Management, 2002)

(a) does not change   (b) increases by 2.25%

(c) decreases by 2.25%   (d) None of these

136. A number is decreased by 10% and then increased by 10%. The number so obtained is 10 less than the original number. What was the original number ?   (S.S.C. 1999)

(a) 1000   (b) 1050   (c) 1500   (d) 2000

137. The price of an article was increased by r%. Later the new price was decreased by r%. If the latest price was Re. 1, then the original price was :   (S.S.C. 2004)

(a) Re. 1   (b) Rs. $\left(\dfrac{1-r^2}{100}\right)$

(c) Rs. $\dfrac{\sqrt{1-r^2}}{100}$ (d) Rs. $\left(\dfrac{10000}{10000-r^2}\right)$

138. Peter could save 10% of his income. But two years later when his income is increased by 20%, he could save the same amount only as before. By how much percent has his expenditure increased ?   (R.R.B. 2003)

(a) 22%   (b) $22\frac{2}{9}$%   (c) $23\frac{1}{3}$%   (d) 24%

139. Madan pays income tax at the rate of 10%. If his income increased by 10% and his tax rate increases to 15%, his net income would increase by Rs. 350. What is Madan's income ?

    (a) Rs. 8000   (b) Rs. 10,000   (c) Rs. 12,000   (d) Rs. 14,000

140. Mr. X, a businessman had the income in the year 2000, such that he earned a profit of 20% on his investment in the business. In the year 2001, his investment was less by Rs. 5000 but still had the same income (Income = Investment + Profit) as that in 2000. Thus, the percent profit earned in 2001 increased by 6%. What was his investment in 2000 ?   **(S.B.I.P.O. 2001)**

    (a) Rs. 1,02,000   (b) Rs. 1,05,000   (c) Rs. 1,50,500

    (d) Data inadequate   (e) None of these

141. What percent decrease in salaries would exactly cancel out the 20 percent increase ?

    (a) $16\frac{2}{3}$ (b) 18   (c) 20   (d) $33\frac{1}{3}$

                                                          (S.S.C. 2000)

142. A number is increased by 20% and then again by 20%. By what percent should the increased number be reduced so as to get back the original number ? **(S.S.C. 2004)**

    (a) $19\frac{11}{31}\%$ (b) $30\frac{5}{9}\%$ (c) 40%   (d) 44%

143. The price of a T.V. set is decreased by 25% as a result of which the sale increased by 20%. What will be the effect on the total revenue of the shop ? **(Bank P.O. 2003)**

    (a) No effect   (b) 5% decrease   (c) 5% increase

    (d) 10% increase   (e) None of these

144. The price of tea being increased by 20%, a man reduces his consumption by 20%. By how much percent will his expenses for tea be decreased ?   **(S.S.C. 2003)**

    (a) 2%   (b) 4%   (c) 6%   (d) 8%

145. Entry fee in an exhibition was Re. 1. Later, this was reduced by 25% which increased the sale by 20%. The percentage increase in the number of visitors is

    (a) 54   (b) 57   (c) 60   (d) 66

146. The income of a broker remains unchanged though the rate of commission is increased from 4% to 5%. The percentage of slump in business is :

    (a) 1%   (b) 8%   (c) 20%   (d) 80%

147. In a fraction, if numerator is increased by 40% and denominator is increased by 80%, then what fraction of the original is the new fraction ?   **(S.B.I.P.O. 2000)**

    (a) $\frac{1}{2}$ (b) $\frac{7}{9}$ (c) $\frac{7}{18}$ (d) Data inadequate

148. If the price of petrol is increased by 30%, by how much percent a car owner must reduce his consumption in order to maintain the same budget ?   **(S.S.C. 2000)**

    (a) 21%   (b) $21\frac{1}{3}\%$ (c) $23\frac{1}{13}\%$ (d) 33%

149. The price of wheat falls by 16%. By what percentage a person can increase the consumption of wheat so that his overall budget does not change ?   **(M.B.A. 2002)**

    (a) 16%   (b) 18%   (c) 18.5%   (d) 19%

150. The price of oil is increased by 25%. If the expenditure is not allowed to increase, the ratio between the reduction in consumption and the original consumption is

    (a) 1 : 3   (b) 1 : 4   (c) 1 : 5   (d) 1 : 6

151. If the price of sugar rises from Rs. 6 per kg to Rs. 7.50 per kg, a person, to have no increase in his expenditure on sugar, will have to reduce his consumption of sugar by

    (a) 15%   (b) 20%   (c) 25%   (d) 30%

152. Prices register an increase of 10% on foodgrains and 15% on other items of expenditure. If the ratio of an employee's expenditure on foodgrains and other items be 2 : 5, by how much should his salary be increased in order that he may maintain the same level of consumption as before, his present salary being Rs. 2590 ?

    (a) Rs. 323.75   (b) Rs. 350   (c) Rs. 360.50   (d) None of these

153. A district has 64000 inhabitants. If the population increases at the rate of $2\frac{1}{2}$% per annum, then the number of inhabitants at the end of 3 years will be (S.S.C. 2003)

    (a) 68911   (b) 68921   (c) 69200   (d) 70000

154. If inflation increases at a rate of 8% p.a., what will a Rs. 20 article cost at the end of two years ?   (Bank P.O. 1999)

    (a) Between Rs. 20 and Rs. 21   (b) Between Rs. 21 and Rs. 22

    (c) Between Rs. 22 and Rs. 23   (d) Between Rs. 23 and Rs. 24

155. The population of a town was 1,60,000 three years ago. If it increased by 3%, 2.5% and 5% respectively in the last three years, then the present population is :

    (a) 1,77,000   (b) 1,77,366   (c) 1,77,461   (d) 1,77,596

                                                      (IGNOU, 2003)

156. The population of a town 2 years ago was 62,500. Due to migration to big cities, it decreases every year at the rate of 4%. The present population of the town is :

    (a) 56,700   (b) 57,600   (c) 58,800   (d) 60,000

                                                      (S.S.C. 2004)

157. Depreciation applicable to an equipment is 20%. The value of the equipment 3 years from now will be less by :   (M.B.A. 2002)

    (a) 45%   (b) 48.8%   (c) 51.2%   (d) 60%

158. The population of a town increases by 5% annually. If its population in 2001 was 1,38,915, what it was in 1998 ?   (R.R.B. 2001)

    (a) 1,00,000   (b) 1,08,000   (c) 1,10,000   (d) 1,20,000

159. The value of a machine depreciates at the rate of 10% every year. It was purchased 3 years ago. If its present value is Rs. 8748, its purchase price was :

    (a) Rs. 10,000   (b) Rs. 11,372   (c) Rs. 12,000   (d) Rs. 12,500

                                              (A.A.O. Exam, 2003)

160. In the month of January, the Railway Police caught 4000 ticketless travellers. In February, the number rose by 5%. However, due to constant vigil by the Police and the Railway staff, the number reduced by 5% and in April it further reduced by 10%. The total number of ticketless travellers caught in the month of April was :

    (a) 3125   (b) 3255   (c) 3575   (d) 3591

                                                     (M.B.A. 1999)

161. The population of a variety of tiny bush in an experimental field increased by 10% in the first year, increased by 8% in the second year but decreased by 10% in the third year. If the present number of bushes in the experimental field is 26730, then the number of bushes in the beginning was :   (M.A.T. 2002)

    (a) 25000   (b) 27000   (c) 28000   (d) 24600

162. The production of a company has ups and downs every year. The production increases for two consecutive years consistently by 15% and in the third year it decreases by 10%. Again in the next two years it increases by 15% each year and decreases by 10% in the third year. If we start counting from the year 1998, approximately what will be the effect on production of the company in 2002 ?   (Bank P.O. 2002)

    (a) 27% increase   (b) 32% increase   (c) 37% increase

    (d) 42% increase   (e) 52% increase

163. The present population of a country estimated to be 10 crores is expected to increase to 13.31 crores during the next three years. The uniform rate of growth is :

    (a) 8%   (b) 10%   (c) 12.7%   (d) 15%

164. A building worth Rs. 1,33,100 is constructed on land worth Rs. 72,900. After how many years will the value of both be the same if land appreciates at 10% p.a. and building depreciates at 10% p.a. ?

    (a) $1\frac{1}{2}$ (b) 2   (c) $2\frac{1}{2}$ (d) 3

165. The population of a town increases 4% annually but is decreased by emigration annually to the extent of $(1/2)\%$. What will be the increase percent in 3 years ?

    (a) 9.8   (b) 10   (c) 10.5   (d) 10.8

166. The current birth rate per thousand is 32, whereas corresponding death rate is 11 per thousand. The net growth rate in terms of population increase in percent is given by :

    (a) 0.0021%   (b) 0.021%   (c) 2.1%   (d) 21%

167. The total population of a village is 5000. The number of males and females increases by 10% and 15% respectively and consequently the population of the village becomes 5600. What was the number of males in the village ?   **(Bank P.O. 2003)**

    (a) 2000   (b) 2500   (c) 3000   (d) 4000

168. A's income is 25% more than B's income. B's income in terms of A's income is :

    (a) 75%   (b) 80%   (c) 90%   (d) 96%

169. A's salary is 50% more than B's. How much percent is B's salary less than A's ?

    (a) 33%   (b) $33\frac{1}{4}\%$ (c) $33\frac{1}{3}\%$ (d) $33\frac{1}{2}\%$

                                                                (S.S.C. 2002)

170. If A's height is 40% less than that of B, how much percent B's height is more than that of A ?   (S.S.C. 2000)

    (a) $33\frac{1}{3}\%$ (b) 40%   (c) 60%   (d) $66\frac{2}{3}\%$

171. p is six times as large as q. The percent that q is less than p, is :

    (a) $16\frac{2}{3}$ (b) 60   (c) $83\frac{1}{3}$ (d) 90

172. Two numbers are less than a third number by 30% and 37% respectively. How much percent is the second number less than the first ?   (S.S.C. 2002)

    (a) 3%   (b) 4%   (c) 7%   (d) 10%

173. Two numbers are respectively $12\frac{1}{2}\%$ and 25% more than a third number. The first number as a percentage of the second number is :   (C.B.I. 2003)

    (a) 50   (b) 60   (c) 75   (d) 90

174. A's salary is 40% of B's salary which is 25% of C's salary. What percentage of C's salary is A's salary ?   (M.B.A. 2003)

    (a) 5%   (b) 10%   (c) 15%   (d) 20%

175. 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 C's income is Rs. 2000, then the total income of A, B and C is :

    (a) Rs. 6000   (b) Rs. 14,000   (c) Rs. 18,000   (d) Rs. 20,000

176. Peter earned 40% more money than Albert. Albert earned 20% less than Michael. Peter earned more than Michael by :   (S.S.C. 2003)

    (a) 10%   (b) 12%   (c) 20%   (d) 25%

177. Amit's monthly income is 30% more than that of Raunaq. Raunaq's monthly income is 20% less than that of Deepak. If the difference between the monthly incomes of Amit and Deepak is Rs. 800, what is the monthly income of Raunaq ? (**Bank P.O. 1999**)
   (a) Rs. 12,000   (b) Rs. 16,000   (c) Rs. 20,000
   (d) Data inadequate   (e) None of these

178. In an examination in which full marks were 800, A gets 20% more than B, B gets 20% more than C, and C gets 15% less than D. If A got 576, what percentage of full marks did D get (approximately) ? (**R.R.B. 1998**)
   (a) 45.7   (b) 51.2   (c) 58.8   (d) 61.7

179. In an examination, the percentage of students qualified to the number of students appeared from school A is 70%. In school B, the number of students appeared is 20% more than the students appeared from school A and the number of students qualified from school B is 50% more than the students qualified from school A. What is the percentage of students qualified to the number of students appeared from school B ?
   (a) 30%   (b) 70%   (c) 78.5%   (d) 87.5%
   (**Bank P.O. 1999**)

180. Fresh fruit contains 68% water and dry fruit contains 20% water. How much dry fruit can be obtained from 100 kg of fresh fruits ? (**S.S.C. 2004**)
   (a) 32 kg   (b) 40 kg   (c) 52 kg   (d) 80 kg

181. A large watermelon weighs 20 kg with 96% of its weight being water. It is allowed to stand in the sun and some of the water evaporates so that only 95% of its weight is water. Its reduced weight will be :
   (a) 16 kg   (b) 16.5 kg   (c) 17 kg   (d) 18 kg

182. How much pure alcohol has to be added to 400 ml of a solution containing 15% alcohol to change the concentration of alcohol in the mixture to 32% ? (**S.S.C. 2003**)
   (a) 60 ml   (b) 68 ml   (c) 100 ml   (d) 128 ml

183. Milk contains 5% water. What quantity of pure milk should be added to 10 litres of milk to reduce this to 2% ? (**Bank P.O. 2003**)
   (a) 5 litres   (b) 7 litres   (c) 15 litres
   (d) Cannot be determined   (e) None of these

184. The quantity of water (in ml) needed to reduce 9 ml shaving lotion containing 50% alcohol to a lotion containing 30% alcohol, is :
   (a) 4   (b) 5   (c) 6   (d) 7

185. To a sugar solution of 3 litres containing 40% sugar, one litre of water is added. The percentage of sugar in the new solution is :
   (a) $13\frac{1}{3}$%   (b) 15%   (c) 30%   (d) 33%

186. One type of liquid contains 20% water and the second type of liquid contains 35% of water. A glass is filled with 10 parts of first liquid and 4 parts of second liquid. The percentage of water in the new mixture in the glass is : (**C.B.I. 1997**)
   (a) 20%   (b) $24\frac{2}{7}$%   (c) 37%   (d) 40%

187. In some quantity of ghee, 60% is pure ghee and 40% is vanaspati. If 10 kg of pure ghee is added, then the strength of vanaspati ghee becomes 20%. The original quantity was : (**Hotel Management, 2003**)
   (a) 10 kg   (b) 15 kg   (c) 20 kg   (d) 25 kg

188. The weight of the container alone is 25% of the container filled with a certain fluid. When some fluid is removed, the weight of the container and remaining fluid is 50% of the original total weight. What fractional part of the liquid has been removed ?
   (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) $\frac{3}{4}$
   (**D.M.R.C. 2003**)

189. From a container having pure milk, 20% is replaced by water and the process is repeated thrice. At the end of the third operation, the milk is :   (S.S.C. 2003)
(a) 40% pure   (b) 50% pure   (c) 51.2% pure   (d) 58.8% pure

190. An empty fuel tank of a car was filled with A type petrol. When the tank was half-empty, it was filled with B type petrol. Again when the tank was half-empty, it was filled with A type petrol. When the tank was half-empty again, it was filled with B type petrol. What is the percentage of A type petrol at present in the tank ?
(a) 33.5%   (b) 37.5%   (c) 40%   (d) 50%
(Bank P.O. 2003)

191. A bag contains 600 coins of 25 p denomination and 1200 coins of 50 p denomination. If 12% of 25 p coins and 24% of 50 p coins are removed, the percentage of money removed from the bag is nearly :
(a) 15.6%   (b) 17.8%   (c) 21.6%   (d) 30%

192. The price of rice is reduced by 2%. How many kilograms of rice can now be bought for the money which was sufficient to buy 49 kg of rice earlier ?   (S.S.C. 2004)
(a) 48 kg   (b) 49 kg   (c) 50 kg   (d) 51 kg

193. A reduction of 21% in the price of wheat enables a person to buy 10.5 kg more for Rs. 100. What is the reduced price per kg ?
(a) Rs. 2   (b) Rs. 2.25   (c) Rs. 2.30   (d) Rs. 2.50

194. Due to an increase of 30% in the price of eggs, 3 eggs less are available for Rs. 7.80. The present rate of eggs per dozen is :   (N.I.F.T. 1997)
(a) Rs. 8.64   (b) Rs. 8.88   (c) Rs. 9.36   (d) Rs. 10.40

195. The price of sugar having gone down by 10%, Sharad can buy 6.2 kg more for Rs. 279. The difference between the original and the reduced price (per kg) is :
(a) Re. 0.50   (b) Re. 1   (c) Rs. 1.50   (d) Rs. 4.50

196. In an examination, 34% of the students failed in Mathematics and 42% failed in English. If 20% of the students failed in both the subjects, then the percentage of students who passed in both the subjects was :   (S.S.C. 2003)
(a) 44   (b) 50   (c) 54   (d) 56

197. 40% of the people read newspaper X, 50% read newspaper Y and 10% read both the papers. What percentage of the people read neither newspaper ?
(a) 10%   (b) 15%   (c) 20%   (d) 25%

198. Out of 450 students of a school, 325 play football, 175 play cricket and 50 neither play football nor cricket. How many students play both football and cricket ?
(a) 50   (b) 75   (c) 100   (d) 225
(S.S.C. 2004)

199. In a hotel, 60% had vegetarian lunch while 30% had non-vegetarian lunch and 15% had both types of lunch. If 96 people were present, how many did not eat either type of lunch ?   (S.S.C. 2000)
(a) 20   (b) 24   (c) 26   (d) 28

200. There are 600 boys in a hostel. Each plays either hockey or football or both. If 75% play hockey and 45% play football, how many play both ?
(a) 48   (b) 60   (c) 80   (d) 120

201. In a certain office, 72% of the workers prefer tea and 44% prefer coffee. If each of them prefers tea or coffee and 40 like both, the total number of workers in the office is :
(a) 200   (b) 240   (c) 250   (d) 320

202. In an examination, 65% students passed in Civics and 60% in History, 40% passed in both of these subjects. If 90 students failed in History and Civics both, then what is the total number of students ?   (R.R.B. 2003)
(a) 600   (b) 650   (c) 700   (d) 750

203. In an examination, 35% candidates failed in one subject and 42% failed in another subject while 15% failed in both the subjects. If 2500 candidates appeared at the examination, how many passed in either subject but not in both ?

    (a) 325   (b) 1175   (c) 2125   (d) None of these

ANSWERS

1. (d)	2. (d)	3. (a)	4. (d)	5. (a)	6. (b)	7. (c)	8. (b)	9. (c)
10. (d)	11. (b)	12. (d)	13. (b)	14. (d)	15. (c)	16. (b)	17. (a)	18. (d)
19. (b)	20. (c)	21. (a)	22. (b)	23. (c)	24. (b)	25. (b)	26. (b)	27. (d)
28. (b)	29. (a)	30. (b)	31. (d)	32. (b)	33. (b)	34 (b)	35. (c)	36. (c)
37. (d)	38. (d)	39. (e)	40. (b)	41. (b)	42. (b)	43. (d)	44. (a)	45. (c)
46. (b)	47. (a)	48. (c)	49. (d)	50. (a)	51. (d)	52. (a)	53. (b)	54. (a)
55. (b)	56. (b)	57. (d)	58. (a)	59. (b)	60. (b)	61. (d)	62. (c)	63. (b)
64. (c)	65. (c)	66. (b)	67. (c)	68. (d)	69. (b)	70. (b)	71. (b)	72. (b)
73. (b)	74. (a)	75. (c)	76. (a)	77. (c)	78. (c)	79. (b)	80. (c)	81. (a)
82. (b)	83. (c)	84. (a)	85. (c)	86. (c)	87. (a)	88. (a)	89. (d)	90. (b)
91. (b)	92. (d)	93. (b)	94. (b)	95. (c)	96. (b)	97. (a)	98. (d)	99. (c)
100. (e)	101. (d)	102. (d)	103. (a)	104. (c)	105. (a)	106. (c)	107. (b)	108. (d)
109. (b)	110. (d)	111. (a)	112. (b)	113. (b)	114. (d)	115. (a)	116. (c)	117. (c)
118. (c)	119. (d)	120. (c)	121. (d)	122. (c)	123. (a)	124. (c)	125. (e)	126. (c)
127. (c)	128. (d)	129. (b)	130. (d)	131. (c)	132. (c)	133. (c)	134. (d)	135. (c)
136. (a)	137. (d)	138. (b)	139. (b)	140. (b)	141. (a)	142. (b)	143. (e)	144. (b)
145. (c)	146. (c)	147. (b)	148. (c)	149. (d)	150. (c)	151. (b)	152. (d)	153. (b)
154. (d)	155. (b)	156. (b)	157. (b)	158. (d)	159. (c)	160. (d)	161. (a)	162. (c)
163. (b)	164. (d)	165. (d)	166. (c)	167. (c)	168. (b)	169. (c)	170. (d)	171. (c)
172. (d)	173. (d)	174. (b)	175. (c)	176. (b)	177. (b)	178. (c)	179. (d)	180. (b)
181. (a)	182. (c)	183. (c)	184. (c)	185. (e)	186. (b)	187. (a)	188. (c)	189. (c)
190. (b)	191. (c)	192. (c)	193. (a)	194. (c)	195. (a)	196. (a)	197. (c)	198. (c)
199. (b)	200. (d)	201. (c)	202. (a)	203. (b)				

SOLUTIONS

1. $5 : 4 = \dfrac{5}{4} = \left(\dfrac{5}{4} \times 100\right)\% = 125\%$.

2. $3.5 = \dfrac{35}{10} = \left(\dfrac{35}{10} \times 100\right)\% = 350\%$.

3. $\dfrac{1}{2}\% = \left(\dfrac{1}{2} \times \dfrac{1}{100}\right) = \dfrac{0.5}{100} = 0.005$.

4. 15% of Rs. 34 = Rs. $\left(\dfrac{15}{100} \times 34\right)$ = Rs. 5.10.

5. 63% of $3\dfrac{4}{7} = \left(\dfrac{63}{100} \times \dfrac{25}{7}\right) = \dfrac{4}{9} = 2.25$.

6. Let 88% of 370 + 24% of 210 − x = 118.

    Then, $x = \left(\dfrac{88}{100} \times 370\right) + \left(\dfrac{24}{100} \times 210\right) - 118 = 325.60 + 50.40 - 118 = 376 - 118 = 258$.

7. Given expression $= \left(\dfrac{860}{100} \times 50 + \dfrac{50}{100} \times 860\right) = 430 + 430 = 860.$

8. Given expression $= \left(\dfrac{45}{100} \times 750\right) - \left(\dfrac{25}{100} \times 480\right) = (337.50 - 120) = 217.50.$

9. Let 40% of $1640 + x = 35\%$ of $980 + 150\%$ of 850

Then, $x = 35\%$ of $980 + 150\%$ of $850 - 40\%$ of 1640

$= \left(\dfrac{35}{100} \times 980 + \dfrac{150}{100} \times 850\right) - \left(\dfrac{40}{100} \times 1640\right) = (343 + 1275 - 656)$

$= (1618 - 656) = 962.$

10. Let 218% of $1674 = x \times 1800.$ Then, $x = \left(\dfrac{218}{100} \times 1674 \times \dfrac{1}{1800}\right) = 2.0274.$

11. 60% of $264 = \left(\dfrac{60}{100} \times 264\right) = 158.40;$ 10% of $44 = \left(\dfrac{10}{100} \times 44\right) = 4.40;$

15% of $1056 = \left(\dfrac{15}{100} \times 1056\right) = 158.40;$ 30% of $132 = \left(\dfrac{30}{100} \times 132\right) = 39.60.$

∴ 60% of $264 = 15\%$ of $1056.$

12. Pass percentage $= \left(\dfrac{252}{270} \times 100\right)\% = \dfrac{280}{3}\% = 93\dfrac{1}{3}\%.$

13. Required percentage $= \left(\dfrac{5}{2250} \times 100\right)\% = \dfrac{2}{9}\%.$

14. Required percentage $= \left(\dfrac{18}{7200} \times 100\right)\% = \dfrac{1}{4}\% = 0.25\%.$

15. Required percentage $= \left(\dfrac{0.01}{0.1} \times 100\right)\% = \left(\dfrac{1}{10} \times 100\right)\% = 10\%.$

16. Required percentage $= \left(\dfrac{1987.50}{2650} \times 100\right)\% = \left(\dfrac{19875}{265} \times \dfrac{1}{100} \times 100\right)\% = 75\%.$

17. Required percentage $= \left(\dfrac{3}{24} \times 100\right)\% = \dfrac{25}{2}\% = 12\dfrac{1}{2}\%.$

18. Total cost = Rs. $[1 \times 1000 + (100 - 2)\%$ of $1 \times 4000]$
   = Rs. $(1000 + 0.98 \times 4000)$ = Rs. $(1000 + 3920)$ = Rs. 4920.

19. Actual price = Rs. $(25 + 2.50)$ = Rs. 27.50.

∴ Saving $= \left(\dfrac{2.50}{27.50} \times 100\right)\% = \dfrac{100}{11}\% = 9\dfrac{1}{11}\% = 9\%.$

20. Quantity of pure acid = 20% of 8 litres $= \left(\dfrac{20}{100} \times 8\right)$ litres = 1.6 litres.

21. Rebate = 6% of Rs. 6650 = Rs. $\left(\dfrac{6}{100} \times 6650\right)$ = Rs. 399.

Sales tax = 10% of Rs. $(6650 - 399)$ = Rs. $\left(\dfrac{10}{100} \times 6251\right)$ = Rs. 625.10.

∴ Final amount = Rs. $(6251 + 625.10)$ = Rs. 6876.10.

22. $\frac{384}{540} = \left(\frac{384}{540} \times 100\right)\% = 71\frac{1}{9}\%; \frac{425}{500} = \left(\frac{425}{500} \times 100\right)\% = 85\%;$

$\frac{570}{700} = \left(\frac{570}{700} \times 100\right)\% = 81\frac{3}{7}\%; \frac{480}{660} = \left(\frac{480}{660} \times 100\right)\% = 72\frac{8}{11}\%.$

$\therefore \frac{425}{500}$ shows the best percentage.

23. 5% of (25% of Rs. 1600) = Rs. $\left[\frac{5}{100} \times \left(\frac{25}{100} \times 1600\right)\right]$ = Rs. 20.

24. 0.15% of $33\frac{1}{3}$% of Rs. 10,000 = Rs. $\left[\frac{15}{100} \times \frac{1}{100} \times \left(\frac{100}{3} \times \frac{1}{100} \times 10000\right)\right]$ = Rs. 5.

25. Clearly, 60% of 28% of 240 = $\left(\frac{60}{100} \times \frac{28}{100} \times 240\right) = \left(\frac{30}{100} \times \frac{28}{100} \times 2 \times 240\right)$

$= \left(\frac{30}{100} \times \frac{28}{100} \times 480\right)$ = 30% of 28% of 480.

26. 25% of 25% = $\frac{25}{100} \times \frac{25}{100} = \frac{1}{16} = 0.0625.$

27. Required percentage = $\left(\frac{3\%}{5\%} \times 100\right)\% = \left[\frac{(3/100)}{(5/100)} \times 100\right]\% = 60\%.$

28. Let 95% of x = 4598. Then, $\frac{95}{100} \times x = 4598$ or $x = \left(4598 \times \frac{100}{95}\right) = 4840.$

29. Let x% of 360 = 129.6. Then, $\frac{x}{100} \times 360 = \frac{1296}{10}$ or $x = \left(\frac{1296}{10} \times \frac{100}{360}\right) = 36.$

30. Let x% of 932 + 30 = 309.6. Then, $\left(\frac{x}{100} \times 932\right) = 279.6$ or $x = \left(\frac{2796}{10} \times \frac{100}{932}\right) = 30.$

31. Let x% of 3175 = 45% of 1500 + 35% of 1700.

Then, $\frac{x}{100} \times 3175 = \left(\frac{45}{100} \times 1500 + \frac{35}{100} \times 1700\right) = 675 + 595 = 1270.$

$\Leftrightarrow x = \left(\frac{1270 \times 100}{3175}\right) = 40.$

32. Let 65% of x = 20% of 422.50.

Then, $\frac{65}{100} \times x = \left(\frac{20}{100} \times \frac{4225}{10}\right) \Leftrightarrow x = \left(\frac{845}{10} \times \frac{100}{65}\right) = 130.$

33. Let the total sale be Rs. x.

Then, 2.5% of x = 12.50 $\Leftrightarrow \left(\frac{25}{100} \times \frac{1}{100} \times x\right) = \frac{125}{10} \Leftrightarrow x = \left(\frac{125}{10} \times \frac{100 \times 10}{25}\right) = 500.$

34. Let the worth of the house be Rs. x.

Then, $\frac{2}{7}$% of x = 2800 $\Leftrightarrow \left(\frac{2}{7} \times \frac{1}{100} \times x\right) = 2800 \Leftrightarrow x = \left(\frac{2800 \times 100 \times 7}{2}\right) = 9,80,000.$

35. Let 15% of x% of 582 = 17.46.

Then, $\frac{15}{100} \times \frac{x}{100} \times 582 = \frac{1746}{100} \Leftrightarrow x = \left(\frac{1746}{100} \times \frac{100 \times 100}{15 \times 582}\right) = 20.$

36. Let $\sqrt{784} + x = 78\%$ of 500. Then, $x = \left(\frac{78}{100} \times 500\right) - \sqrt{784} = (390 - 28) = 362$.

37. Let the number be x.

   Then, 20% of $x = 120 \Leftrightarrow \left(\frac{20}{100} \times x\right) = 120 \Leftrightarrow x = \left(\frac{120 \times 100}{20}\right) = 600$.

   $\therefore\quad 120\%$ of $x = \left(\frac{120}{100} \times 600\right) = 720$.

38. Let the number be x.

   Then, 35% of $x = 175 \Leftrightarrow \left(\frac{35}{100} \times x\right) = 175 \Leftrightarrow x = \left(\frac{175 \times 100}{35}\right) = 500$.

   Now, let $y\%$ of $175 = 500$.

   Then, $\left(\frac{y}{100} \times 175\right) = 500 \Leftrightarrow y = \left(\frac{500 \times 100}{175}\right) = \frac{2000}{7} = 285\frac{5}{7}$.

39. Let the number be x. Then, $\frac{2}{5}$ of $\frac{1}{3}$ of $\frac{3}{7}$ of $x = 15 \Leftrightarrow x = \left(15 \times \frac{7}{3} \times 3 \times \frac{5}{2}\right) = \frac{525}{2}$.

   $\therefore\quad 40\%$ of $\frac{525}{2} = \left(\frac{40}{100} \times \frac{525}{2}\right) = 105$.

40. Let the number be x. Then, $x - \frac{2}{5}x = 510 \Leftrightarrow \frac{3}{5}x = 510 \Leftrightarrow x = \left(\frac{510 \times 5}{3}\right) = 850$.

   $\therefore\quad 10\%$ of $850 = 85$.

41. Let the number be x. Then,

   15% of $40 - 25\%$ of $x = 2 \Leftrightarrow \frac{25}{100}x = \left(\frac{15}{100} \times 40\right) - 2 \Leftrightarrow \frac{x}{4} = 4 \Leftrightarrow x = 16$.

42. Let the number be x. Then, $x - 40\%$ of $x = 30$

   $\Leftrightarrow x - \frac{40}{100}x = 30 \Leftrightarrow x - \frac{2}{5}x = 30 \Leftrightarrow \frac{3x}{5} = 30 \Leftrightarrow x = \left(\frac{30 \times 5}{3}\right) = 50$.

43. Let the number be x. Then, 50% of $x - 35\%$ of $x = 12$

   $\Leftrightarrow \frac{50}{100}x - \frac{35}{100}x = 12 \Leftrightarrow \frac{15}{100}x = 12 \Leftrightarrow x = \left(\frac{12 \times 100}{15}\right) = 80$.

44. Let the number be x. Then, $x - 16\%$ of $x = 42$

   $\Leftrightarrow x - \frac{16}{100}x = 42 \Leftrightarrow x - \frac{4}{25}x = 42 \Leftrightarrow \frac{21}{25}x = 42 \Leftrightarrow x = \left(\frac{42 \times 25}{21}\right) = 50$.

45. Clearly, the numbers which have 1 or 9 in the unit's digit, have squares that end in the digit 1. Such numbers from 1 to 70 are 1, 9, 11, 19, 21, 29, 31, 39, 41, 49, 51, 59, 61, 69.

   Number of such numbers = 14.

   $\therefore\quad$ Required percentage $= \left(\frac{14}{70} \times 100\right)\% = 20\%$.

46. $\frac{4}{5} \times 70 = 56$ and $\frac{5}{7} \times 112 = 80$.

   $\therefore\quad$ Required percentage $= \left(\frac{80-56}{80} \times 100\right)\% = \left(\frac{24}{80} \times 100\right)\% = 30\%$.

47. $y = 125 + 10\%$ of $125 = 125 + 12.50 = 137.50$.

   $\therefore\quad x = 137.50 - 10\%$ of $137.50 = 137.50 - 13.75 = 123.75$.

48. Let the number be x. Then,

75% of $x + 75 = x \Leftrightarrow x - \dfrac{75}{100}x = 75 \Leftrightarrow x - \dfrac{3}{4}x = 75 \Leftrightarrow \dfrac{x}{4} = 75 \Leftrightarrow x = 300$.

49. Let the number be x.

Then, $x - 35 = \dfrac{80}{100}x \Leftrightarrow x - \dfrac{80}{100}x = 35 \Leftrightarrow x = \dfrac{35 \times 100}{20} = 175 \Leftrightarrow \dfrac{4}{5}x = 140$.

50. Let the number be 100 and required multiplier be y.

Then, $100y = 129.7$ or $y = \dfrac{129.7}{100} = 1.297$.

51. Let the numbers be x and y. Then, 6.5% of $x = 8.5\%$ of $y \Leftrightarrow x = \dfrac{85}{65}y = \dfrac{17}{13}y$.

Now, $x + y = 2490 \Rightarrow \dfrac{17}{13}y + y = 2490 \Rightarrow \dfrac{30}{13}y = 2490 \Rightarrow y = \left(\dfrac{2490 \times 13}{30}\right) = 1079$.

$\therefore$ One number $= y = 1079$, other number $= \dfrac{17}{13}y = 1411$.

52. Let the numbers be x and y. Then,

$x + y = \dfrac{28}{25}x \Leftrightarrow y = \dfrac{28}{25}x - x \Leftrightarrow y = \dfrac{3}{25}x \Leftrightarrow \dfrac{y}{x} = \left(\dfrac{3}{25} \times 100\right)\% = 12\%$.

53. Let the numbers be x and y.

Then, $y - 25\%$ of $x = \dfrac{5}{6}y \Leftrightarrow y - \dfrac{5}{6}y = \dfrac{25}{100}x \Leftrightarrow \dfrac{y}{6} = \dfrac{x}{4} \Leftrightarrow \dfrac{x}{y} = \dfrac{4}{6} = \dfrac{2}{3}$.

54. Let the larger number be x.

Then, $x - 20 = \dfrac{20}{100}x \Leftrightarrow x - \dfrac{1}{5}x = 20 \Leftrightarrow \dfrac{4}{5}x = 20 \Leftrightarrow x = \left(20 \times \dfrac{5}{4}\right) = 25$.

55. Let the numbers be x and y. Then, $\dfrac{x}{12} = \dfrac{y}{4} \Leftrightarrow x = 3y$.

$\therefore$ Required percentage $= \left(\dfrac{x - y}{y} \times 100\right)\% = \left(\dfrac{2y}{y} \times 100\right)\% = 200\%$.

56. Let one number $= x$. Then, other number $= 80\%$ of $x = \dfrac{4}{5}$.

$\therefore 4\left[x^2 + \left(\dfrac{4}{5}x\right)^2\right] = 656 \Leftrightarrow x^2 + \dfrac{16}{25}x^2 = 164 \Leftrightarrow \dfrac{41}{25}x^2 = 164$

$\Leftrightarrow x^2 = \left(\dfrac{164 \times 25}{41}\right) = 100 \Leftrightarrow x = 100$.

So, the numbers are 10 and 8.

57. 5% of $A + 4\%$ of $B = \dfrac{2}{3}$ (6% of $A + 8\%$ of B)

$\Leftrightarrow \dfrac{5}{100}A + \dfrac{4}{100}B = \dfrac{2}{3}\left(\dfrac{6}{100}A + \dfrac{8}{100}B\right)$

$\Leftrightarrow \dfrac{1}{20}A + \dfrac{1}{25}B = \dfrac{1}{25}A + \dfrac{4}{75}B \Leftrightarrow \left(\dfrac{1}{20} - \dfrac{1}{25}\right)A = \left(\dfrac{4}{75} - \dfrac{1}{25}\right)B$

$\Leftrightarrow \dfrac{1}{100}A = \dfrac{1}{75}B \Leftrightarrow \dfrac{A}{B} = \dfrac{100}{75} = \dfrac{4}{3}$

58. Total number of votes polled = $(1136 + 7636 + 11628) = 20400$.

   $\therefore$ Required percentage = $\left(\dfrac{11628}{20400} \times 100\right)\% = 57\%$.

59. Increase in 10 years = $(262500 - 175000) = 87500$.

   Increase% = $\left(\dfrac{87500}{175000} \times 100\right)\% = 50\%$.

   $\therefore$ Required average = $\left(\dfrac{50}{10}\right)\% = 5\%$.

60. Let the number be x. Then, error = $\dfrac{5}{3}x - \dfrac{3}{5}x = \dfrac{16}{15}x$.

   Error% = $\left(\dfrac{16x}{15} \times \dfrac{3}{5x} \times 100\right)\% = 64\%$.

61. Let the original value of the tempo be Rs. x. Then,

   1.3% of $\dfrac{4}{5}$ of $x = 910$ $\Leftrightarrow$ $\dfrac{13}{10} \times \dfrac{1}{100} \times \dfrac{4}{5} \times x = 910$

   $\Leftrightarrow$ $x = \left(\dfrac{910 \times 10 \times 100 \times 5}{13 \times 4}\right) = 87500$.

62. Let the total production be x lakh tons. Then, 15% of x − 10% of x = $(40 - 30)$ lakh tons

   $\Leftrightarrow$ 5% of x = 10 lakh tons $\Leftrightarrow$ $x = \left(\dfrac{10 \times 100}{5}\right)$ = 200 lakh tons.

63. Let the number of candidates appeared from each state be x.

   Then, 7% of x − 6% of x = 80 $\Leftrightarrow$ 1% of x = 80 $\Leftrightarrow$ $x = 80 \times 100 = 8000$.

64. Amount paid to car owner = 90% of 85% of Rs. 3,25,000

   = Rs. $\left(\dfrac{90}{100} \times \dfrac{85}{100} \times 325000\right)$ = Rs. 2,48,625.

   $\therefore$ Required difference = Rs. $(325000 - 248625)$ = Rs. 76,375.

65. Let the amount of taxable purchases be Rs. x.

   Then, 6% of $x = \dfrac{30}{100}$ $\Leftrightarrow$ $x = \left(\dfrac{30}{100} \times \dfrac{100}{6}\right) = 5$.

   $\therefore$ Cost of tax free items = Rs. $[25 - (5 + 0.30)]$ = Rs. 19.70.

66. Number of runs made by running = $110 - (3 \times 4 + 8 \times 6) = 50$.

   $\therefore$ Required percentage = $\left(\dfrac{50}{110} \times 100\right)\% = 45\dfrac{5}{11}\%$.

67. Let the marked price be x.

   Then, x − 5% of $x = 9595$ $\Leftrightarrow$ 95% of $x = 9595$ $\Leftrightarrow$ $x = \left(\dfrac{9595 \times 100}{95}\right) = 10100$.

68. Suppose originally he had x apples.

   Then, $(100 - 40)\%$ of $x = 420$ $\Leftrightarrow$ $\dfrac{60}{100} \times x = 420$ $\Leftrightarrow$ $x = \left(\dfrac{420 \times 100}{60}\right) = 700$.

69. Let the monthly income be Rs. x.

   Then, $\left(100 - 66\dfrac{2}{3}\right)\%$ of $x = 1200$ $\Leftrightarrow$ $33\dfrac{1}{3}\%$ of $x = 1200$

   $\Leftrightarrow$ $\dfrac{100}{3} \times \dfrac{1}{100} \times x = 1200$ $\Leftrightarrow$ $x = 1200 \times 3 = 3600$.

   $\therefore$ Monthly expenses = Rs. $(3600 - 1200)$ = Rs. 2400.

70. Let the number of students appeared be x.

Then, 65% of $x = 455 \Leftrightarrow \dfrac{65}{100}x = 455 \Leftrightarrow x = \left(\dfrac{455 \times 100}{65}\right) = 700.$

71. Percentage of uncertain individuals $= [100 - (20 + 60)]\% = 20\%.$

   $\therefore$ 60% of $x - 20\%$ of $x = 720 \Leftrightarrow 40\%$ of $x = 720$

   $\Leftrightarrow \dfrac{40}{100}x = 720 \Leftrightarrow x = \left(\dfrac{720 \times 100}{40}\right) = 1800.$

72. Let the maximum marks be x.

   Then, 33% of $x = 125 + 40 \Leftrightarrow \dfrac{33}{100}x = 165 \Leftrightarrow x = \left(\dfrac{165 \times 100}{33}\right) = 500.$

73. Let the total number of votes polled be x.

   Then, votes polled by other candidate $= (100 - 84)\%$ of $x = 16\%$ of x.

   $\therefore$ 84% of $x - 16\%$ of $x = 476 \Leftrightarrow \dfrac{68}{100}x = 476 \Leftrightarrow x = \left(\dfrac{476 \times 100}{68}\right) = 700.$

74. Number of valid votes $= 80\%$ of $7500 = 6000.$

   Valid votes polled by other candidate $= 45\%$ of $6000 = \left(\dfrac{45}{100} \times 6000\right) = 2700.$

75. Let the number of valid votes be x.

   Then, 52% of $x - 48\%$ of $x = 98 \Leftrightarrow 4\%$ of $x = 98$

   $\Leftrightarrow \dfrac{4}{100}x = 98 \Leftrightarrow x = 98 \times 25 = 2450.$

   $\therefore$ Total number of votes polled $= (2450 + 68) = 2518.$

76. Let the total number of voters be x. Then, Votes polled $= 90\%$ of x.
   Valid votes $= 90\%$ of $(90\%$ of $x)$.

   $\therefore$ 54% of $[90\%$ of $(90\%$ of $x)] - 46\%$ of $[90\%$ of $(90\%$ of $x)] = 1620$

   $\Leftrightarrow$ 8% of $[90\%$ of $(90\%$ of $x)] = 1620$

   $\Leftrightarrow \dfrac{8}{100} \times \dfrac{90}{100} \times \dfrac{90}{100} \times x = 1620 \Leftrightarrow x = \left(\dfrac{1620 \times 100 \times 100 \times 100}{8 \times 90 \times 90}\right) = 25000.$

77. Let the number of persons eligible to vote be x. Then,
   Number of eligible persons between 18 and 21 $= 8\%$ of x.
   Number of persons between 18 and 21, who voted $= 85\%$ of $(8\%$ of $x)$

   $= \left(\dfrac{85}{100} \times \dfrac{8}{100} \times x\right) = \dfrac{68}{1000}x.$

   $\therefore$ Required percentage $= \left(\dfrac{68x}{1000} \times \dfrac{1}{x} \times 100\right)\% = 6.8\%.$

78. Let the number of persons eligible to vote be x.

   Then, voters who voted for A $= 30\%$ of x.

   Voters who voted for B $= 60\%$ of $(70\%$ of $x)$.

   $= \left(\dfrac{60}{100} \times \dfrac{70}{100} \times 100\right)\%$ of $x = 42\%$ of x.

   Voters who did not vote $= [100 - (30 + 42)]\%$ of $x = 28\%$ of x.

   $\therefore$ 30% of $x - 28\%$ of $x = 1200 \Leftrightarrow 2\%$ of $x = 1200 \Leftrightarrow x = \left(\dfrac{1200 \times 100}{2}\right) = 60000.$

79. Let the sum paid to Y per week be Rs. z. Then, $z + 120\%$ of $z = 550$

$\Leftrightarrow z + \dfrac{120}{100}z = 550 \Leftrightarrow \dfrac{11}{5}z = 550 \Leftrightarrow z = \left(\dfrac{550 \times 5}{11}\right) = 250.$

80. Total sales tax paid $= 7\%$ of Rs. $400 + 9\%$ of Rs. 6400

$$= Rs. \left(\dfrac{7}{100} \times 400 + \dfrac{9}{100} \times 6400\right) = Rs. (28 + 576) = Rs. 604.$$

Total cost of the items $= Rs. (400 + 6400) = Rs. 6800.$

∴ Required percentage $= \left(\dfrac{604}{6800} \times 100\right)\% = 8\dfrac{15}{17}\%.$

81. Total marks secured $= (90\%$ of $100 + 60\%$ of $150 + 54\%$ of $200)$

$$= \left(\dfrac{90}{100} \times 100 + \dfrac{60}{100} \times 150 + \dfrac{54}{100} \times 200\right) = (90 + 90 + 108) = 288.$$

Total maximum marks $= (100 + 150 + 200) = 450.$

∴ Aggregate percentage $= \left(\dfrac{288}{450} \times 100\right)\% = 64\%.$

82. Total number of students $= 1100 + 700 = 1800.$

Number of students passed $= (42\%$ of $1100 + 30\%$ of $700) = (462 + 210) = 672.$

Number of failures $= 1800 - 672 = 1128.$

∴ Percentage failure $= \left(\dfrac{1128}{1800} \times 100\right)\% = 62\dfrac{2}{3}\%.$

83. Let the number of students be x. Then,

Number of students of or above 8 years $= (100 - 20)\%$ of $x = 80\%$ of x.

∴ 80% of $x = 48 + \dfrac{2}{3}$ of $48 \Leftrightarrow \dfrac{80}{100}x = 80 \Leftrightarrow x = 100.$

84. Let the total number of applicants be x. Number of eligible candidates $= 95\%$ of x.

Eligible candidates of other categories $= 15\%$ of $(95\%$ of $x)$

$$= \left(\dfrac{15}{100} \times \dfrac{95}{100} \times x\right) = \dfrac{57}{400}x.$$

∴ $\dfrac{57}{400}x = 4275 \Leftrightarrow x = \left(\dfrac{4275 \times 400}{57}\right) = 30000.$

85. Let their marks be $(x + 9)$ and x.

Then, $x + 9 = \dfrac{56}{100}(x + 9 + x) \Leftrightarrow 25(x + 9) = 14(2x + 9) \Leftrightarrow 3x = 99 \Leftrightarrow x = 33.$

So, their marks are 42 and 33.

86. $X = \dfrac{90}{100}Y \Rightarrow X = \dfrac{9}{10}Y \Rightarrow Y = \dfrac{10}{9}X \Rightarrow \dfrac{Y}{X} = \dfrac{10}{9}.$

∴ Required percentage $= \left(\dfrac{Y}{X} \times 100\right)\% = \left(\dfrac{10}{9} \times 100\right)\% = 111\dfrac{1}{9}\%.$

87. $x\%$ of $y = \left(\dfrac{x}{100} \times y\right) = \left(\dfrac{y}{100} \times x\right) = y\%$ of x.

88. 20% of $a = b \Rightarrow \dfrac{20}{100}a = b.$

∴ $b\%$ of $20 = \left(\dfrac{b}{100} \times 20\right) = \left(\dfrac{20}{100}a \times \dfrac{1}{100} \times 20\right) = \dfrac{4}{100}a = 4\%$ of a.

89. $\frac{x}{100} \times y = \frac{4}{5} \times 80 \implies xy = 64 \times 100 = 6400$.

90. Clearly, $y\%$ of $z = 2\ (x\%$ of $y) \implies \frac{yz}{100} = \frac{2xy}{100} \implies z = 2x$.

91. $p\%$ of $p = 36 \iff \left(\frac{p}{100} \times p\right) = 36 \iff p^2 = 3600 \iff p = 60$.

92. $x\%$ of $y = z \implies \frac{x}{100} y = z \implies \frac{x}{z} = \frac{100}{y}$.

   $\therefore$ Required percentage $= \left(\frac{x}{z} \times 100\right)\% = \left(\frac{100}{y} \times 100\right)\% = \left(\frac{100^2}{y}\right)\%$.

93. $x = 80\%$ of $y \iff x = \frac{80}{100}y \iff \frac{y}{x} = \frac{5}{4} \iff \frac{y}{2x} = \frac{5}{8}$.

   $\therefore$ Required percentage $= \left(\frac{y}{2x} \times 100\right)\% = \left(\frac{5}{8} \times 100\right)\% = 62\frac{1}{2}\%$.

94. Let $x - 6\%$ of $x = xz$. Then, 94% of $x = xz \iff \frac{94}{100} x \times \frac{1}{x} = z \iff z = 0.94$.

95. $x\%$ of $y + y\%$ of $x = \frac{x}{100}y + \frac{y}{100}x = \frac{2xy}{100} = 2\%$ of xy.

96. $A = 150\%$ of $B \implies A = \frac{150}{100}B \implies \frac{A}{B} = \frac{3}{2} \implies \frac{A}{B} + 1 = \frac{3}{2} + 1$

   $\implies \frac{A + B}{B} = \frac{5}{2} \implies \frac{B}{A + B} = \frac{2}{5}$.

   $\therefore$ Required percentage $= \left(\frac{B}{A + B} \times 100\right)\% = \left(\frac{2}{5} \times 100\right)\% = 40\%$.

97. 8% of $x = 4\%$ of $y \implies \frac{8}{100}x = \frac{4}{100}y \implies x = \frac{1}{2}y$.

   $\therefore$ 20% of $x = 20\%$ of $\frac{1}{2}y = 10\%$ of y.

98. $\frac{20}{100}A = B$ and $\frac{40}{100}B = C \implies \frac{1}{5}A = B$ and $\frac{2}{5}B = C \implies A = 5B$ and $B = \frac{5}{2}C$

   $\implies A = \frac{25}{2}C$ and $B = \frac{5}{2}C$.

   $\therefore$ 60% of $(A + B) = \frac{60}{100}\left(\frac{25}{2}C + \frac{5}{2}C\right) = \frac{60 \times 15}{100}C = \frac{900}{100}C = 900\%$ of C.

99. $x\%$ of $a = y\%$ of $b \implies \frac{x}{100}a = \frac{y}{100}b \implies b = \left(\frac{x}{y}\right)a$.

   $\therefore$ $z\%$ of $b = \left(z\%\ \text{of}\ \frac{x}{y}\right)a = \left(\frac{xz}{y \times 100}\right)a = \left(\frac{xz}{y}\right)\%$ of a.

100. $x\%$ of $y = \left(\frac{x}{100} \times y\right) = \left(\frac{y}{100} \times x\right) = y\%$ of $x \implies A = B$.

101. Let the first man's output be x.

   Then, $33\frac{1}{3}\%$ of $x = 50\%$ of $1500 \iff \left(\frac{100}{3} \times \frac{1}{100} \times x\right) = 750 \iff x = 750 \times 3 = 2250$.

Questions 102-106

Let the number of magazine-readers in city P be x.

Then, $(100 - 75)\%$ of $x = 6000 \Leftrightarrow \dfrac{25}{100}x = 6000 \Leftrightarrow x = \left(\dfrac{6000 \times 100}{25}\right) = 24000$.

Number of readers in P, reading only one magazine a week $= (24000 - 6000) = 18000$.

Similarly, we can find these values in other cases. Thus, we have the following table :

City	No. of magazine-readers	No. of readers reading only one magazine a week
P	24000	18000
Q	17500	14000
R	7500	4500
S	6000	3300
T	5600	1400

102. The lowest number of magazine-readers is 5600 and this is in the case of city T.

103. The highest number of magazine-readers who read only one magazine a week is 18000 and this is in the case of city P.

104. The highest number of magazine-readers is 24000.

105. Number of magazine-readers in city Q reading only one magazine a week $= 14000$.

106. Total number of magazine-readers reading only one magazine, a week
$= (18000 + 14000 + 4500 + 3300 + 1400) = 41200$.

107. Saving $= [100 - (40 + 20 + 10 + 10)]\% = 20\%$. Let the monthly salary be Rs. x.

Then, 20% of $x = 1500 \Leftrightarrow \dfrac{20}{100}x = 1500 \Leftrightarrow x = 1500 \times 5 = 7500$.

108. Let the total amount be Rs. x. Then, $(100 - 20)\%$ of $x = 35000 + 40000$

$\Leftrightarrow 80\%$ of $x = 75000 \Leftrightarrow \dfrac{80}{100}x = 75000 \Leftrightarrow x = \left(\dfrac{75000 \times 5}{4}\right) = 93750$.

109. Saving $= 50\%$ of $(100 - 40)\%$ of $(100 - 30)\%$ of Rs. 18,400

$= \text{Rs.} \left(\dfrac{50}{100} \times \dfrac{60}{100} \times \dfrac{70}{100} \times 18400\right) = \text{Rs. } 3864$.

110. Height climbed in second hour $= 12\dfrac{1}{2}\%$ of $\left(100 - 62\dfrac{1}{2}\right)\%$ of 192 m

$= \left(\dfrac{25}{2} \times \dfrac{1}{100} \times \dfrac{75}{2} \times \dfrac{1}{100} \times 192\right) \text{m} = 9 \text{ m}$.

111. Let the total income be x.

Then, income left $= (100 - 80)\%$ of $[100 - (35 + 25)]\%$ of $x = 20\%$ of 40% of x

$= \left(\dfrac{20}{100} \times \dfrac{40}{100} \times 100\right)\%$ of $x = 8\%$ of x.

112. Let the total salary be Rs. x.

Then, $(100 - 10)\%$ of $(100 - 20)\%$ of $(100 - 20)\%$ of $(100 - 10)\%$ of $x = 15552$

$\Leftrightarrow \left(\dfrac{90}{100} \times \dfrac{80}{100} \times \dfrac{80}{100} \times \dfrac{90}{100} \times x\right) = 15552 \Leftrightarrow x = \left(\dfrac{15552 \times 10000}{64 \times 81}\right) = 30000$.

113. Let the amount with Aman be Rs. x.

Then, amount received by Sahil $= \dfrac{1}{4}$ of 40% of Rs. $x = 10\%$ of Rs. x.

$\therefore$ 10% of $x = 600 + 200$ $\Leftrightarrow$ $\frac{10}{100}x = 800$ $\Leftrightarrow$ $x = 800 \times 10 = 8000$.

114. Let the monthly salary of Sameer be Rs. x.

Then, $[100 - (25 + 20)]\%$ of $[100 - (24 + 15)]\%$ of $x = 10736$ $\Leftrightarrow$ 55% of 61% of $x = 10736$

$\Leftrightarrow$ $\frac{55}{100} \times \frac{61}{100} \times x = 10736$ $\Leftrightarrow$ $x = \left(\frac{10736 \times 100 \times 100}{55 \times 61}\right) = 32000$.

115. Let the total number of children be x.

Then, $x \times (20\%$ of $x) = 405$ $\Leftrightarrow$ $\frac{1}{5}x^2 = 405$ $\Leftrightarrow$ $x^2 = 2025$ $\Leftrightarrow$ $x = 45$.

$\therefore$ Number of sweets received by each child = 20% of 45 = 9.

116. We have : $x + x\%$ of $150 = 150$

$\Leftrightarrow$ $x + \frac{x}{100} \times 150 = 150$ $\Leftrightarrow$ $\frac{5}{2}x = 150$ $\Leftrightarrow$ $x = \left(\frac{150 \times 2}{5}\right) = 60$.

117. $15 + \frac{1}{3}(n - 20) = 50\%$ of $n = \frac{50}{100}n = \frac{n}{2}$ $\Leftrightarrow$ $90 + 2n - 40 = 3n$ $\Leftrightarrow$ $n = 50$.

118. Let A's salary = Rs. x. Then, B's salary = Rs. $(2000 - x)$.

$(100 - 95)\%$ of A = $(100 - 85)\%$ of B $\Leftrightarrow$ $\frac{5}{100}x = \frac{15}{100}(2000 - x)$ $\Leftrightarrow$ $x = 1500$.

119. Let $B + M + D = x$. Then, $B = 25\%$ of $x - 20 = \left(\frac{25}{100}x - 20\right) = \left(\frac{x}{4} - 20\right)$ and $D = 50$.

$\therefore$ $\frac{x}{4} - 20 + M + 50 = x$ or $M = \left(\frac{3x}{4} - 30\right)$.

So, marks in Maths cannot be determined.

120. Let the total sales be Rs. x. Then, $5\frac{1}{2}\%$ of $x + \frac{1}{2}\%$ of $(x - 10000) = 1990$

$\Leftrightarrow$ $\frac{11}{2} \times \frac{1}{100} \times x + \frac{1}{2} \times \frac{1}{100} \times (x - 10000) = 1990$

$\Leftrightarrow$ $12x - 10000 = 398000$ $\Leftrightarrow$ $12x = 408000$ $\Leftrightarrow$ $x = 34000$.

121. Let the marks required be x. Then, $(62 + 35 + x) = 35\%$ of $(150 + 150 + 180)$

$\Leftrightarrow$ $97 + x = \frac{35}{100} \times 480$ $\Leftrightarrow$ $x = 168 - 97 = 71$.

122. Let the number of students in the class be 100 and let the required average be x.

Then, $(10 \times 95) + (20 \times 90) + (70 \times x) = (100 \times 80)$

$\Leftrightarrow$ $70x = 8000 - (950 + 1800) = 5250$ $\Leftrightarrow$ $x = 75$.

123. Let total marks = x. Then, $(30\%$ of $x) + 15 = (40\%$ of $x) - 35$

$\Leftrightarrow$ $\frac{30}{100}x + 15 = \frac{40}{100}x - 35$ $\Leftrightarrow$ $\frac{1}{10}x = 50$ $\Leftrightarrow$ $x = 500$.

So, passing marks = $(30\%$ of $500) + 15 = \left(\frac{30}{100} \times 500 + 15\right) = 165$.

$\therefore$ Pass percentage = $\left(\frac{165}{500} \times 100\right)\% = 33\%$.

124. Let the price of a chair be Rs. x. Then, price of a table = Rs. $(x + 400)$.

So, $6(x + 400) + 6x = 4800$ $\Leftrightarrow$ $12x = 2400$ $\Leftrightarrow$ $x = 200$.

$\therefore$ Price of a table = Rs. 600; Price of a chair = Rs. 200.

Required percentage = $\left(\frac{400}{600} \times 100\right)\% = 66\frac{2}{3}\%$.

125. Let the total number of houses be x. Then,

$\therefore$ Number of houses having one female only = $(100 - 25)\%$ of $(100 - 40)\%$ of x

$$= \left(\frac{75}{100} \times \frac{60}{100} \times x\right) = \frac{9}{20}\,x.$$

$\therefore$ Required percentage = $\left(\frac{9x}{20} \times \frac{1}{x} \times 100\right)\% = 45\%.$

126. Let the total population be x. Then,

Poor population = $\frac{60}{100}\,x = \frac{3}{5}\,x.$ Illiterate population = $\frac{40}{100}\,x = \frac{2}{5}\,x.$

Illiterate rich = 10% of $(100 - 60)\%$ of $x = \left(\frac{10}{100} \times \frac{40}{100} \times x\right) = \frac{x}{25}.$

Illiterate poor = $\left(\frac{2}{5}\,x - \frac{x}{25}\right) = \frac{9x}{25}.$

$\therefore$ Required percentage = $\left(\frac{9x}{25} \times \frac{5}{3x} \times 100\right)\% = 60\%.$

127. Number of males = 60% of 1000 = 600. Number of females = $(1000 - 600) = 400.$
Number of literates = 25% of 1000 = 250.
Number of literate males = 20% of 600 = 120.
Number of literate females = $(250 - 120) = 130.$

$\therefore$ Required percentage = $\left(\frac{130}{400} \times 100\right)\% = 32.5\%.$

128. Let the total number of candidates be x. Then, $\left(100 - 62\frac{1}{2}\right)\%$ of $37\frac{1}{2}\%$ of $x = 342$

$\Leftrightarrow \frac{75}{2} \times \frac{1}{100} \times \frac{75}{2} \times \frac{1}{100} \times x = 342 \Leftrightarrow \frac{9x}{64} = 342 \Leftrightarrow x = \left(\frac{342 \times 64}{9}\right) = 2432.$

Number of boys failed = $(100 - 75)\%$ of $\left(100 - 37\frac{1}{2}\right)\%$ of 2432

$$= \left(\frac{25}{100} \times \frac{125}{2} \times \frac{1}{100} \times 2432\right) = 380.$$

129. Let total population = x. Then, number of males = $\frac{5}{9}\,x.$

Married males = 30% of $\frac{5}{9}\,x = \left(\frac{30}{100} \times \frac{5}{9}\,x\right) = \frac{x}{6}.$

Married females = $\frac{x}{6}$; Number of females = $\left(x - \frac{5}{9}\,x\right) = \frac{4x}{9}.$

Unmarried females = $\left(\frac{4x}{9} - \frac{x}{6}\right) = \frac{5x}{18}.$

$\therefore$ Required percentage = $\left(\frac{5x}{18} \times \frac{1}{x} \times 100\right)\% = 27\frac{7}{9}\%.$

130. Migrants = 35% of 728400 = $\left(\frac{35x}{100} \times 728400\right) = 254940.$

Local population = $(728400 - 254940) = 473460.$

Rural population = 20% of 473460 = 94692.

Urban population = (254940 − 94692) = 160248.

$\therefore$ Female population = 48% of 473460 + 30% of 94692 + 40% of 160248

$$= \left(\frac{48}{100} \times 473460 + \frac{30}{100} \times 94692 + \frac{40}{100} \times 160248\right)$$

$$= 227260.8 + 28407.6 + 64099.2 = 896660.$$

131. Let the number of boys and girls be $3x$ and $2x$ respectively. Then,

No. of students who are not adults $= \left(\frac{80}{100} \times 3x\right) + \left(\frac{75}{100} \times 2x\right) = \left(\frac{12x}{5} + \frac{3x}{2}\right) = \frac{39x}{10}$.

$\therefore$ Required percentage $= \left(\frac{39x}{10} \times \frac{1}{5x} \times 100\right)\% = 78\%$.

132. Suppose monthly rent = Rs. x. Then, $12x - \frac{25}{2}\%$ of $12x - 1660 = 10\%$ of 500000

$\Leftrightarrow$ $12x - \frac{25}{200} \times 12x - 1660 = 50000 \Leftrightarrow \frac{21x}{2} = 51660 \Leftrightarrow x = \left(51660 \times \frac{2}{21}\right) = 4920$.

133. Let total debt = x. Asset $= \frac{87}{100}x$.

After paying 20% of the debt, he is left with 80% of the debt plus Rs. 42.

$\therefore$ 80% of $x + 42 = \frac{87}{100}x \Leftrightarrow \frac{87}{100}x - \frac{80}{100}x = 42 \Leftrightarrow x = 600$.

So, debt = Rs. 600 and assets = Rs. $\left(\frac{87}{100} \times 600\right)$ = Rs. 522.

134. Let the original price be Rs. 100.

New final price = 120% of (75% of Rs. 100) = Rs. $\left(\frac{120}{100} \times \frac{75}{100} \times 100\right)$ = Rs. 90.

$\therefore$ Decrease = 10%.

135. Let the original price be Rs. 100.

New final price = 85% of (115% of Rs. 100) = Rs. $\left(\frac{85}{100} \times \frac{115}{100} \times 100\right)$ = Rs. 97.75.

$\therefore$ Decrease = $(100 - 97.75)\% = 2.25\%$.

136. Let the original number be x.

Final number obtained = 110% of (90% of x) = $\left(\frac{110}{100} \times \frac{90}{100} \times x\right) = \frac{99}{100}x$.

$\therefore$ $x - \frac{99}{100}x = 10 \Leftrightarrow \frac{1}{100}x = 10 \Leftrightarrow x = 10 \times 100 = 1000$.

137. Let the original price be Rs. x.

$\therefore$ $(100 - r)\%$ of $(100 + r)\%$ of $x = 1$

$\Rightarrow$ $\frac{(100 - r)}{100} \times \frac{(100 + r)}{100} \times x = 1 \Rightarrow x = \frac{100 \times 100}{(100 - r)(100 + r)} = \frac{10000}{(10000 - r^2)}$.

138. Let original income = Rs. 100. Then, saving = Rs. 10 and expenditure = Rs. 90.

New income = Rs. 120, New saving = Rs. 10.

New expenditure = Rs. $(120 - 10)$ = Rs. 110.

Increase in expenditure = Rs. $(110 - 90)$ = Rs. 20.

$\therefore$ Increase% = $\left(\frac{20}{90} \times 100\right)\% = 22\frac{2}{9}\%$.

139. Let Madan's income be Rs. x.

Then, Net income = $(100 - 10)\%$ of Rs. x = 90% of Rs. x = Rs. $\dfrac{9x}{10}$.

New net income = 85% of 110% of Rs. x = Rs. $\left(\dfrac{85}{100} \times \dfrac{110}{100} \times x\right)$ = Rs. $\dfrac{187}{200}x$.

$\therefore \dfrac{187x}{200} - \dfrac{9x}{10} = 350 \Leftrightarrow \dfrac{7x}{200} = 350 \Leftrightarrow x = \left(\dfrac{350 \times 200}{7}\right) = 10000.$

140. Let his investment in the year 2000 be Rs. x.

Then, income in 2000 = Rs. $[x + 20\%$ of $x]$ = Rs. $\dfrac{120}{100}x$.

Income in 2001 = Rs. $\left[\dfrac{126}{100}(x - 5000)\right]$.

$\therefore \dfrac{120}{100}x = \dfrac{126}{100}(x - 5000) \Leftrightarrow 120x = 126(x - 5000) \Leftrightarrow 6x = 630000 \Leftrightarrow x = 105000.$

141. Let original salary = Rs. 100. New salary = Rs. 120.

Decrease on 120 = 20. Decrease on 100 = $\left(\dfrac{20}{120} \times 100\right)\% = 16\dfrac{2}{3}\%.$

142. Let original number = 100.

New number = 120% of 120% of 100 = $\left(\dfrac{120}{100} \times \dfrac{120}{100} \times 100\right) = 144.$

Decrease on 144 = 44. Decrease on 100 = $\left(\dfrac{44}{144} \times 100\right)\% = 30\dfrac{5}{9}\%.$

143. Let original price per T.V. = Rs. 100 and original sale = 100 T.V.s.
Then, total revenue = Rs. (100×100) = Rs. 10,000.
New revenue = Rs. (75×120) = Rs. 9000.

$\therefore$ Decrease in revenue = $\left(\dfrac{1000}{10000} \times 100\right)\% = 10\%.$

144. Let original consumption = 100 units and original price = Rs. 100 per unit.
Original expenditure = Rs. (100×100) = Rs. 10000.
New expenditure = Rs. (120×80) = Rs. 9600.

$\therefore$ Decrease in expenditure = $\left(\dfrac{400}{10000} \times 100\right)\% = 4\%.$

145. Let the total original sale be Rs. 100. Then, original number of visitors = 100.

New number of visitors = $\dfrac{120}{0.75} = 160.$

$\therefore$ Increase% = 60%.

146. Suppose the business value changes from x to y.

4% of $x = 5\%$ of $y \Rightarrow \dfrac{4}{100}x = \dfrac{5}{100}y \Rightarrow y = \dfrac{4}{5}x.$

$\therefore$ Change in business = $\left(x - \dfrac{4}{5}x\right) = \dfrac{x}{5}.$

Percentage slump = $\left(\dfrac{x}{5} \times \dfrac{1}{x} \times \dfrac{1}{100}\right)\% = 20\%.$

147. Let the original fraction be $\frac{x}{y}$. Then, new fraction $= \frac{140\% \text{ of } x}{180\% \text{ of } y} = \frac{140x}{180y} = \frac{7x}{9y}$.

$\therefore \quad \frac{\text{New fraction}}{\text{Original fraction}} = \left(\frac{7x}{9y} \times \frac{y}{x}\right) = \frac{7}{9}$.

148. Decrease in consumption $= \left[\frac{R}{(100+R)} \times 100\right]\% = \left(\frac{30}{130} \times 100\right)\% = 23\frac{1}{13}\%$.

149. Increase in consumption $= \left[\frac{R}{(100-R)} \times 100\right]\% = \left(\frac{16}{84} \times 100\right)\% = \frac{400}{21}\% = 19.04\% \sim 19\%$.

150. Let original consumption be 1 unit costing Rs. 100.

New cost = Rs. 125. New consumption $= \left(\frac{1}{125} \times 100\right) = \frac{4}{5}$ unit.

$\therefore \quad \frac{\text{Reduction in consumption}}{\text{Original consumption}} = \frac{\left(1 - \frac{4}{5}\right)}{1} = \frac{1}{5}$, i.e., 1 : 5.

151. Let original consumption = 100 kg and new consumption = x kg.

So, $100 \times 6 = x \times 7.50 \iff x = 80$ kg.

$\therefore$ Reduction in consumption = 20%.

152. Let expenditures on food and other items be Rs. $2x$ and Rs. $5x$.

Then, $2x + 5x = 2590$ or $x = 370$.

So, expenditure on food = Rs. (2×370) = Rs. 740.

Expenditure on other items = Rs. (5×370) = Rs. 1850.

New expenditure = 110% of Rs. 740 + 115% of Rs. 1850

$= \text{Rs. } \left(\frac{110}{100} \times 740 + \frac{115}{100} \times 1850\right) = \text{Rs. } (814 + 2127.50) = \text{Rs. } 2941.50$.

$\therefore$ Desired increase = Rs. $(2941.50 - 2590)$ = Rs. 351.50.

153. Population after 3 years $= 64000 \times \left(1 + \frac{5}{2 \times 100}\right)^3 = \left(64000 \times \frac{41}{40} \times \frac{41}{40} \times \frac{41}{40}\right) = 68921$.

154. Cost after 2 years $= \text{Rs. } \left[20 \times \left(1 + \frac{8}{100}\right)^2\right] = \text{Rs. } \left(20 \times \frac{27}{25} \times \frac{27}{25}\right) = \text{Rs. } 23.33$.

155. Present population $= 160000 \times \left(1 + \frac{3}{100}\right)\left(1 + \frac{5}{2 \times 100}\right)\left(1 + \frac{5}{100}\right)$

$= \left(160000 \times \frac{103}{100} \times \frac{41}{40} \times \frac{21}{20}\right) = 177366$.

156. Present population $= 62500 \times \left(1 - \frac{4}{100}\right)^2 = \left(62500 \times \frac{24}{25} \times \frac{24}{25}\right) = 57600$.

157. Let the present value be Rs. 100.

Value after 3 years $= \text{Rs. } \left[100 \times \left(1 - \frac{20}{100}\right)^3\right] = \text{Rs. } \left(100 \times \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5}\right) = \text{Rs. } 51.20$.

$\therefore$ Reduction in value = $(100 - 51.20)\%$ = 48.8%.

158. Population in 1998 $= \dfrac{138915}{\left(1 + \dfrac{5}{100}\right)^3} = \left(138915 \times \dfrac{20}{21} \times \dfrac{20}{21} \times \dfrac{20}{21}\right) = 120000.$

159. Purchase price $=$ Rs. $\left[\dfrac{8748}{\left(1 - \dfrac{10}{100}\right)^3}\right] =$ Rs. $\left(8748 \times \dfrac{10}{9} \times \dfrac{10}{9} \times \dfrac{10}{9}\right) =$ Rs. 12000.

160. Number of ticketless travellers in April

$= 4000 \times \left(1 + \dfrac{5}{100}\right)\left(1 - \dfrac{5}{100}\right)\left(1 - \dfrac{10}{100}\right) = \left(4000 \times \dfrac{21}{20} \times \dfrac{19}{20} \times \dfrac{9}{10}\right) = 3591.$

161. Number of bushes in the beginning

$= \dfrac{26730}{\left(1 + \dfrac{10}{100}\right)\left(1 + \dfrac{8}{100}\right)\left(1 - \dfrac{10}{100}\right)} = \left(26730 \times \dfrac{10}{11} \times \dfrac{25}{27} \times \dfrac{10}{9}\right) = 25000.$

162. Let the production in 1998 be 100 units. Then,

Production in 2002 $= 100 \times \left(1 + \dfrac{15}{100}\right)^2\left(1 - \dfrac{10}{100}\right)\left(1 + \dfrac{15}{100}\right)$

$= \left(100 \times \dfrac{23}{20} \times \dfrac{23}{20} \times \dfrac{9}{10} \times \dfrac{23}{20}\right) = 136.88.$

∴ Increase in production $= (136.88 - 100)\% = 36.88\% \approx 37\%.$

163. 10 crores $\times \left(1 + \dfrac{R}{100}\right)^3 = 13.31$ crores.

∴ $\left(1 + \dfrac{R}{100}\right)^3 = \dfrac{13.31 \text{ crores}}{10 \text{ crores}} = \dfrac{13.31}{10} = \dfrac{1331}{1000} = \left(\dfrac{11}{10}\right)^3.$

So, $\left(1 + \dfrac{R}{100}\right) = \dfrac{11}{10} \Leftrightarrow \left(1 + \dfrac{R}{100}\right) = \left(1 + \dfrac{1}{10}\right) \Leftrightarrow \dfrac{R}{100} = \dfrac{1}{10} \Leftrightarrow R = 10.$

164. Let the required time be n years. Then, $72900 \times \left(1 + \dfrac{10}{100}\right)^n = 133100 \times \left(1 - \dfrac{10}{100}\right)^n$

$\Leftrightarrow \left(\dfrac{11}{10}\right)^n \times \left(\dfrac{10}{9}\right)^n = \dfrac{133100}{72900} \Leftrightarrow \left(\dfrac{11}{9}\right)^n = \dfrac{1331}{729} = \left(\dfrac{11}{9}\right)^3 \Leftrightarrow n = 3.$

165. Let original population $= 100.$

Population after 3 years $= 100 \times \left(1 + \dfrac{3\frac{1}{2}}{100}\right)^3 = 100 \times \dfrac{207}{200} \times \dfrac{207}{200} \times \dfrac{207}{200} = 110.87.$

∴ Increase $= (110.87 - 100)\% = 10.87\% \approx 10.8\%.$

166. Net growth on 1000 $= (32 - 11) = 21.$ Net growth on 100 $= \left(\dfrac{21}{1000} \times 100\right)\% = 2.1\%.$

167. Let the number of males be $x.$ Then, number of females $= (5000 - x).$

∴ 10% of $x +$ 15% of $(5000 - x) = (5600 - 5000)$

$\Leftrightarrow \dfrac{10}{100}x + \dfrac{15}{100}(5000 - x) = 600 \Leftrightarrow 10x + 75000 - 15x = 60000$

$\Leftrightarrow 5x = 15000 \Leftrightarrow x = 3000.$

168. $A = 125\%$ of $B \Rightarrow A = \frac{125}{100}B \Rightarrow B = \frac{100}{125}A = \left(\frac{4}{5} \times 100\right)\%$ of $A = 80\%$ of A.

169. B's salary is less than A's by $\left[\frac{50}{(100+50)} \times 100\right]\%$ i.e., $\frac{100}{3}\% = 33\frac{1}{3}\%$.

170. Excess of B's height over A's $= \left[\frac{40}{(100-40)} \times 100\right]\% = \frac{200}{3}\% = 66\frac{2}{3}\%$.

171. $p = 6q$. So, q is less than p by $5q$.

    $\therefore$ Required percentage $= \left(\frac{5q}{p} \times 100\right)\% = \left(\frac{5q}{6q} \times 100\right)\% = 83\frac{1}{3}\%$.

172. Let third number be x.

    Then, first number $= 70\%$ of $x = \frac{7x}{10}$; second number $= 63\%$ of $x = \frac{63x}{100}$.

    Difference $= \left(\frac{7x}{10} - \frac{63x}{100}\right) = \frac{7x}{100}$.

    $\therefore$ Required percentage $= \left(\frac{7x}{100} \times \frac{10}{7x} \times 100\right)\% = 10\%$.

173. Let third number be x.

    Then, first number $= 112\frac{1}{2}\%$ of $x = \frac{9x}{8}$; second number $= 125\%$ of $x = \frac{5}{4}x$.

    $\therefore$ Required percentage $= \left(\frac{9x}{8} \times \frac{4}{5x} \times 100\right)\% = 90\%$.

174. $A = 40\%$ of $B = 40\%$ of $(25\%$ of $C) = \left(\frac{40}{100} \times \frac{25}{100} \times 100\right)\%$ of $C = 10\%$ of C.

175. $\frac{5}{100}A = \frac{15}{100}B$ and $\frac{10}{100}B = \frac{20}{100}C \Rightarrow A = 3B$ and $B = 2C = 2 \times 2000 = 4000$.

    $\therefore A = 3 \times 4000 = 12000$.

    Hence, $A + B + C = (12000 + 4000 + 2000) = 18000$.

176. $P = \frac{140}{100}A = \frac{140}{100}\left(\frac{80}{100}M\right) = \left(\frac{140}{100} \times \frac{80}{100} \times 100\right)\%$ of $M = 112\%$ of M.

177. Let Deepak's monthly income $=$ Rs. 100. Then, Raunaq's monthly income $=$ Rs. 80.

    Amit's monthly income $=$ Rs. $\left(\frac{130}{100} \times 80\right) =$ Rs. 104.

    If difference between Amit's and Deepak's income is Rs. 4, then Raunaq's income
    $=$ Rs. 80.

    If difference is Rs. 800, Raunaq's income $=$ Rs. $\left(\frac{80}{4} \times 800\right) =$ Rs. 16000.

178. $A = \frac{120}{100}B$, $B = \frac{120}{100}C$ and $C = \frac{85}{100}D$.

    $\therefore B = \frac{5}{6}A$, $C = \frac{5}{6}B$ and $D = \frac{20}{17}C$.

    $B = \frac{5}{6} \times 576 = 480$; $C = \frac{5}{6} \times 480 = 400$; $D = \frac{20}{17} \times 400 = \frac{8000}{17}$.

    So, required percentage $= \left(\frac{8000}{17} \times \frac{1}{800} \times 100\right)\% = 58.82\%$.

179. Let number of students appeared from school A = 100.

Then, number of students qualified from school A = 70.

Number of students appeared from school B = 120.

Number of students qualified from school B = $\left(\frac{150}{100} \times 70\right)$ = 105.

∴   Required percentage = $\left(\frac{105}{120} \times 100\right)$% = 87.5%.

180. Quantity of pulp in 100 kg of fresh fruits = (100 – 68)% of 100 kg = 32 kg.

Let the quantity of dry fruit obtained be x kg.

Then, (100 – 20)% of x = 32 ⟺ $\frac{80}{100}x$ = 32 ⟺ $x = \left(\frac{32 \times 100}{80}\right)$ = 40.

181. Let the reduced weight be x kg.

Clearly, the quantity of pulp remains the same in both the cases.

So, (100 – 96)% of 20 kg = (100 – 95)% of x kg

⟺   4% of 20 kg = 5% of x kg ⟺ $x = \left(\frac{4}{5} \times 20\right)$ kg = 16 kg.

182. Quantity of alcohol in 400 ml solution = $\left(\frac{15}{100} \times 400\right)$ ml = 60 ml.

Quantity of water = (400 – 60) ml = 340 ml.

Let x ml of alcohol be added.

Then, $\frac{60 + x}{400 + x} = \frac{32}{100}$ ⟺ 6000 + 100x = 12800 + 32x ⟺ 68x = 6800 ⟺ x = 100.

183. Quantity of water in 10 litres = 5% of 10 litres = 0.5 litres.

Let x litres of pure milk be added. Then, $\frac{0.5}{10 + x} = \frac{2}{100}$ ⟺ 2x = 30 ⟺ x = 15.

184. Quantity of alcohol in 9 ml lotion = $\left(\frac{50}{100} \times 9\right)$ ml = 4.5 ml.

Let the water to be added be x ml.

Then, $\frac{4.5}{9 + x} = \frac{30}{100}$ ⟺ 270 + 30x = 450 ⟺ x = 6 ml.

185. Quantity of sugar = $\left(\frac{40}{100} \times 3\right)$ kg = 1.2 kg.

∴   New percentage = $\left(\frac{1.2}{4} \times 100\right)$% = 30%.

186. Required percentage = $\left(\frac{20\% \text{ of } 10 + 35\% \text{ of } 4}{10 + 4} \times 100\right)$% = $\left(\frac{3.4}{14} \times 100\right)$% = $24\frac{2}{7}$%.

187. Let the original quantity be x kg. Vanaspati ghee in x kg = $\left(\frac{40}{100}x\right)$ kg = $\left(\frac{2x}{5}\right)$ kg.

Now, $\frac{\frac{2x}{5}}{x + 10} = \frac{20}{100}$ ⟺ $\frac{2x}{5x + 50} = \frac{1}{5}$ ⟺ 5x = 50 ⟺ x = 10.

188. Let the original total weight be x. Weight of container $= \frac{25}{100}x = \frac{x}{4}$.

Original weight of fluid $= \left(x - \frac{x}{4}\right) = \frac{3x}{4}$.

New weight of (container + fluid) $= \frac{50}{100}x = \frac{x}{2}$. New weight of fluid $= \left(\frac{x}{2} - \frac{x}{4}\right) = \frac{x}{4}$.

$\therefore$ Required fraction $= \dfrac{\left(\frac{3x}{4} - \frac{x}{4}\right)}{\frac{3x}{4}} = \frac{x}{2} \times \frac{4}{3x} = \frac{2}{3}$.

189. Let total quantity of original milk = 1000 gm.
Milk after first operation = 80% of 1000 = 800 gm.
Milk after second operation = 80% of 800 = 640 gm.
Milk after third operation = 80% of 640 = 512 gm.
$\therefore$ Strength of final mixture = 51.2%.

190. Let the capacity of the tank be 100 litres. Then,
Initially : A type petrol = 100 litres.
After first operation :

A type petrol $= \left(\frac{100}{2}\right)$ = 50 litres; B type petrol = 50 litres.

After second operation :

A type petrol $= \left(\frac{50}{2} + 50\right)$ = 75 litres; B type petrol $= \left(\frac{50}{2}\right)$ = 25 litres.

After third operation :

A type petrol $= \left(\frac{75}{2}\right)$ = 37.5 litres; B type petrol $= \left(\frac{25}{2} + 50\right)$ = 62.5 litres.

$\therefore$ Required percentage = 37.5%.

191. Total money = Rs. $\left(600 \times \frac{25}{100} + 1200 \times \frac{50}{100}\right)$ = Rs. 750.

25 paise coins removed $= \left(\frac{12}{100} \times 600\right)$ = 72.

50 paise coins removed $= \left(\frac{24}{100} \times 1200\right)$ = 288.

Money removed = Rs. $\left(72 \times \frac{25}{100} + 288 \times \frac{50}{100}\right)$ = Rs. 162.

$\therefore$ Required percentage $= \left(\frac{162}{750} \times 100\right)\%$ = 21.6%.

192. Let the original price be Rs. 100 per kg.
Money required to buy 49 kg of rice = Rs. (100 × 49) = Rs. 4900.
New price = Rs. 98 per kg.

$\therefore$ Quantity of rice bought $= \left(\frac{4900}{98}\right)$ kg = 50 kg.

193. Let original price = Rs. x per kg. Reduced price = Rs. $\left(\dfrac{79x}{100}\right)$ per kg.

$\therefore \quad \dfrac{100}{\frac{79x}{100}} - \dfrac{100}{x} = 10.5 \Leftrightarrow \dfrac{10000}{79x} - \dfrac{100}{x} = 10.5$

$\Leftrightarrow 10000 - 7900 = 10.5 \times 79x \Leftrightarrow x = \dfrac{2100}{10.5 \times 79}$.

$\therefore$ Reduced price = Rs. $\left(\dfrac{79}{100} \times \dfrac{2100}{10.5 \times 79}\right)$ per kg = Rs. 2 per kg.

194. Let the original price per egg be Rs. x. Then, increased price = Rs. $\left(\dfrac{130}{100} x\right)$.

$\therefore \quad \dfrac{7.80}{x} - \dfrac{7.80}{\frac{130}{100} x} = 3 \Leftrightarrow \dfrac{7.80}{x} - \dfrac{780}{130x} = 3$

$\Leftrightarrow 1014 - 780 = 3 \times 130x \Leftrightarrow 390x = 234 \Leftrightarrow x = 0.6$.

So, present price per dozen = Rs. $\left(12 \times \dfrac{130}{100} \times 0.6\right)$ = Rs. 9.36.

195. Let original price = Rs. x per kg. Reduced price = Rs. $\left(\dfrac{90x}{100}\right)$ per kg.

$\therefore \quad \dfrac{279}{\left(\frac{90x}{100}\right)} - \dfrac{279}{x} = 6.2 \Leftrightarrow \dfrac{27900}{90x} - \dfrac{279}{x} = 6.2$

$\Leftrightarrow 27900 - 25110 = 6.2 \times 90x$

$\Leftrightarrow 558x = 2790 \Leftrightarrow x = 5$.

$\therefore$ Required difference = 10% of Rs. 5 = Re. 0.50.

196. $n(A) = 34$, $n(B) = 42$, $n(A \cap B) = 20$.

So, $n(A \cup B) = n(A) + n(B) - n(A \cap B) = 34 + 42 - 20 = 56$.

$\therefore$ Percentage failed in either or both the subjects = 56.

Hence, percentage passed = $(100 - 56)\% = 44\%$.

197. $n(A) = 40$, $n(B) = 50$, $n(A \cap B) = 10$.

$n(A \cup B) = n(A) + n(B) - n(A \cap B) = 40 + 50 - 10 = 80$.

$\therefore$ Percentage reading either or both newspapers = 80%.

Hence, percentage reading neither newspaper = $(100 - 80)\% = 20\%$.

198. $n(A) = 325$, $n(B) = 175$, $n(A \cup B) = 450 - 50 = 400$.

Required number = $n(A \cap B) = n(A) + n(B) - n(A \cup B) = 325 + 175 - 400 = 100$.

199. $n(A) = \left(\dfrac{60}{100} \times 96\right) = \dfrac{288}{5}$, $n(B) = \left(\dfrac{30}{100} \times 96\right) = \dfrac{144}{5}$, $n(A \cap B) = \left(\dfrac{15}{100} \times 96\right) = \dfrac{72}{5}$.

$\therefore \quad n(A \cup B) = n(A) + n(B) - n(A \cap B) = \dfrac{288}{5} + \dfrac{144}{5} - \dfrac{72}{5} = \dfrac{360}{5} = 72$.

So, people who had either or both types of lunch = 72.

Hence, people who had neither type of lunch = $(96 - 72) = 24$.

200. $n(A) = \left(\frac{75}{100} \times 600\right) = 450$, $n(B) = \left(\frac{45}{100} \times 600\right) = 270$, $n(A \cup B) = 600$.

$\therefore$ $n(A \cap B) = n(A) + n(B) - n(A \cup B) = (450 + 270 - 600) = 120$.

201. Let total number be x. Then,

$n(A) = \frac{72}{100} x = \frac{18x}{25}$, $n(B) = \frac{44}{100} x = \frac{11x}{25}$ and $n(A \cap B) = 40$.

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

$\Rightarrow$ $x = \frac{18x}{25} + \frac{11x}{25} - 40$ $\Rightarrow$ $\frac{29x}{25} - x = 40$ $\Rightarrow$ $\frac{4x}{25} = 40$ $\Rightarrow$ $x = 250$.

202. Let the total number of students be x.

Number passed in one or both is given by :

$n(A \cup B) = n(A) + n(B) - n(A \cap B) = 65\%$ of $x + 60\%$ of $x - 40\%$ of x

$= \left(\frac{65}{100} x + \frac{60}{100} x - \frac{40}{100} x\right) = \frac{85}{100} x = \frac{17}{20} x$.

Failed in both $= \left(x - \frac{17}{20} x\right) = \frac{3x}{20}$.

$\therefore$ $\frac{3x}{20} = 90$ $\Leftrightarrow$ $x = \left(\frac{90 \times 20}{3}\right) = 600$.

203. Failed in 1st subject $= \left(\frac{35}{100} \times 2500\right) = 875$.

Failed in 2nd subject $= \left(\frac{42}{100} \times 2500\right) = 1050$.

Failed in both $= \left(\frac{15}{100} \times 2500\right) = 375$.

Failed in 1st subject only $= (875 - 375) = 500$.

Failed in 2nd subject only $= (1050 - 375) = 675$.

$\therefore$ Passed in 2nd only + Passed in 1st only $= (675 + 500) = 1175$.