Percentage

Class Assignment

Answers and explanations

Level-I

1. c; Let 2 be x% of 50

$\Rightarrow x\%$ of 50 = 2

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

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

$\therefore x = 4$

2. d; x % of $\frac{1}{3} = \frac{2}{3}$

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

3. d; **Quicker Method :**

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

4. b; 30% of x = 72

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

5. a; Let the number be x.
Now, according to the question,

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

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

6. b; $\frac{20(P+Q)}{100} = \frac{50}{100}(P-Q)$

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

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

[By componendo & dividendo]

$\Rightarrow \frac{P}{Q} = \frac{7}{3}$

7. a; $(A + B) \times \frac{40}{100} = (A - B) \times \frac{60}{100}$

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

$\Rightarrow 2A + 2B = 3A - 3B \quad \Leftrightarrow A = 5B$

Now, according to the question,

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

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

8. b; Percentage of boys = 60%

$\therefore$ Percentage of girls = 40%

Boys : Girls = 60 : 40 = 3 : 2

Number of girls = 812

$\therefore$ Number of boys $= \frac{3}{2} \times 812 = 1218$

9. c; Let, C = 100

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

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

$\therefore x$ % of C = 5

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

$\Rightarrow x = 5$

10. b; Required percentage increase $= \frac{x}{100-x} \times 100$

$= \left(\frac{20}{100-20}\right)\times 100 = \frac{20}{80}\times 100 = 25\%$

11. a; **Quicker Method :**

If A is r% more than B, then B is $\left(\frac{r}{100+r}\times 100\right)\%$ less than A.

$x = \left(\frac{10}{100+10}\times 100\right)\% = \left(\frac{1000}{110}\right)\% = \left(\frac{100}{11}\right)\%$

$= 9\frac{1}{11}\%$

12. a; Reqd. reduction in percentage

$= \left(\frac{100\times 20}{100+20}\right)\% = \left(\frac{200}{12}\right)\% = \frac{50}{3}\% = 16\frac{2}{3}\%$

13. b; Required fractional decrease

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

14. c; Let the number be x.
Now, according to the question,
80% of x + 80 = x

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

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

$\Rightarrow x = 80 \times 5 = 400$

15. d; Let the total number of votes be 100.
Number of uncast votes = 8
$\therefore$ Number of votes polled = 92

Number of votes obtained by the winner
= 48

$\therefore$ Number of votes obtained by the loser
= 48 – 44 = 4

If the difference of win be 4 votes, total voters =100

$\therefore$ When the difference be 1100 votes, total voters = $\frac{100}{4}$ × 1100 = 27500

16. c; Let the number of students in the class be 100.

$\therefore$ Number of students in Biology = 72 and the number of students in Maths = 44.

$\therefore$ Number of students opting for both subjects = 72 + 44 – 100 = 16

$\because$ When 16 students opt for both subjects, total number of students = 100

$\therefore$ When 40 students opt for both subjects, total number of students = $\frac{100}{16}$ × 40 = 250

17. d; Percentage of failures either in 1 subject or both subjects = (35 + 45 – 20)% = 60%

Percentage of the successful = (100 – 60)% = 40%

18. a; Percentage of the candidates passing in English or Mathematics or both = n(E) + n(M) – n (E $\cap$ M)

= 80 + 85 – 73 = 92

$\Rightarrow$ Percentage of candidates who failed in both the subjects = 100 – 92 = 8

Type-II

1. b; Let the CP of each article be `100 and consumption be 100 units.

Initial expenditure = `(100 × 100) = `10000

New price of article = `80

Consumption 120 units

Expenditure = `(120 × 80) = `9600

Decrease = `(10000 – 9600) = `400

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

2. a; **Quicker Method :**

If A is first increased by x% and then decreased by y% the net % change = $\left(x - y - \frac{xy}{100}\right)\%$

If the result is positive, the change indicates increase and if the result is negative, the change indicates decrease.

Change in his salary

$= \left(20 - 20 - \frac{20 \times 20}{100}\right)\% = \left(-\frac{400}{100}\right)\% = -4\%$

3. b; **Quicker Method :**

A single equivalent reduction to reduction series of x%, y% = $\left(x + y - \frac{xy}{100}\right)\%$

$= \left(10 + 10 - \frac{10 \times 10}{100}\right)\%$ = (20 – 1)% = 19%

4. a; Let the number be 100. After 20% increase, number = 120

After 20% increase of 120, number

= 120 × $\frac{120}{100}$ = 144

$\therefore$ Per cent decrease = $\frac{44}{144}$ × 100

= $\frac{275}{9}$ = 30$\frac{5}{9}$%

5. a; **Quicker Method:**

Let the required percentage be x.

Now, according to the question,

$30 - x - \frac{30x}{100} = 0$

$\Leftrightarrow 300 - 10x - 3x = 0$

$\left(\textit{Percentage Effect} = \left(x + y + \frac{xy}{100}\right)\%\right)$

$\Rightarrow 13x = 300 \quad \Leftrightarrow x = \frac{300}{13} = 23\frac{1}{13}\%$

6. d; Income = Rs 100

Expenditure = Rs 60

Saving = Rs 40

New Income = Rs 120

New Expenditure = Rs 66

New Saving = Rs 54

% Increase in saving = $\frac{14}{40} \times 100$ = 35%

7. b; Let the boys and girls in the village be 3x and 2x respectively.

Villagers who appeared in the examination

$= \frac{3x \times 30}{100} + \frac{2x \times 70}{100} = \frac{9x}{10} + \frac{14x}{10} = \frac{23x}{10}$

Villagers who did not appear in the examination

$= \frac{3x \times 70}{100} + \frac{2x \times 30}{100} = \frac{21x}{10} + \frac{6x}{10} = \frac{27x}{10}$

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

8. c; Let the income be `x and the rate of income tax be y %.

Now, according to the question,

$\frac{xy \times 1.19}{100} - \frac{xy}{100} = \left(x - \frac{xy}{100}\right) \times \frac{1}{100}$

$\Rightarrow 1.19\,xy - xy = x - \dfrac{xy}{100}$

$\Rightarrow 0.19y = 1 - \dfrac{y}{100}$

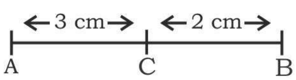
$\Rightarrow \dfrac{y}{100} + 0.19y = 1 \;\Rightarrow y\left(\dfrac{1+19}{100}\right) = 1$

$\Rightarrow y = \dfrac{100}{20} = 5$

9. b; In 100 kg fresh fruit, water = 68 kg and pulb = 3 kg
In dry fruit the quantity of pulp will remain the same as 32 kg which in 80% of dry fruit.

So lot of dry fruit = $\dfrac{32}{80} \times 100 = 40$ kg

10. d;



Increase in AC = 6%

$\Rightarrow$ Increased AC = $\dfrac{106}{100} \times 3 = 3.18$ cm

$\Rightarrow$ Decreased CB = 5 – 3.18 = 1.82 cm.
$\Rightarrow$ Decrease = 2 – 1.82 = 0.18 cm

$\therefore$ Percentage decrease = $\dfrac{0.18}{2} \times 100 = 9\%$

11. b; Sales tax on the article sold at `400

$= \dfrac{400 \times 7}{100}$ = `28

Sales tax on the article sold at `6400

$= \dfrac{6400 \times 9}{100}$ = `576

Total tax = 28 + 576 = `604

Percentage sales tax = $\dfrac{604}{6800} \times 100$

$= \dfrac{151}{17} = 8\dfrac{15}{17}\%$

12. d; Total expenditure except clothing is `3600.
$\Rightarrow$ 75% of expenditure = `3600

$\therefore$ Total expenditure = $3600\left(\dfrac{100}{75}\right)$ = `4800

As Ramesh saves 20%
$\Rightarrow$ His expenditure is 80% of salary
$\therefore$ If 80% $\equiv$ `4800
$\therefore$ Savings = 20% $\equiv$ `1200
Alternative Method:
Suppose salary = `100
Savings = `20
Expenditure = `80
Expenditure on clothing = `20
Other expenditure = `60
Now, 60 $\equiv$ `3600
$\therefore$ 20 $\equiv$ `1200

Type-III

1. c; Let the number of matches played between India and Pakistan in the first case be x.

$\therefore$ Number of wins by Pakistan $= \dfrac{60x}{100} = \dfrac{3x}{5}$

Now, according to the question,

$$\dfrac{\frac{3x}{5}}{x+30} = \dfrac{30}{100}$$

$\Rightarrow \dfrac{3x}{5(x+30)} = \dfrac{3}{10} \Leftrightarrow \dfrac{x}{x+30} = \dfrac{1}{2}$

$\Rightarrow 2x = x + 30 \Leftrightarrow x = 30$
$\therefore$ Total number of matches = 30 + 30 = 60

2. b; Let 100 pairs of shoes be bought for `100.
New budget = `160
New price = `1.20 pair of shoes

$\therefore$ Number of shoes bought $= \dfrac{160}{1.2} = \dfrac{1600}{12}$

$= \dfrac{400}{3} = 133\dfrac{1}{3}$

$\therefore$ Percentage increase $= 33\dfrac{1}{3}\%$

3. d; Let the present population of the town be P.

$\Rightarrow$ P = $x\left(1+\dfrac{R}{100}\right)$ and y = P$\left(1+\dfrac{R}{100}\right)$ = P$\dfrac{P}{x}$

$\Rightarrow$ P^2 = xy $\Leftrightarrow$ P = $\sqrt{xy}$

4. c; Number of blood cells in first 6 hours

$= 40000\left(1+\dfrac{10}{100}\right)^2\left(1-\dfrac{10}{100}\right)\left(1+\dfrac{5}{100}\right)^2$

$= 40000 \times \dfrac{11}{10} \times \dfrac{11}{10} \times \dfrac{9}{10} \times \dfrac{21}{20} \times \dfrac{21}{20}$

$= 480249 = 48250$

5. d; According to the question,

$x + y = (x^2 + y^2) \times \dfrac{1}{5}$

Again, $x + y = (x^2 - y^2) \times \dfrac{1}{4}$

$\therefore \dfrac{x^2+y^2}{5} = \dfrac{x^2-y^2}{4}$

$\Rightarrow 5x^2 - 5y^2 = 4x^2 + 4y^2$
$\Rightarrow 5x^2 - 4x^2 = 5y^2 + 4y^2$
$\Rightarrow x^2 = 9y^2 \Leftrightarrow x = 3y$

$$\therefore\ \frac{x+y}{x^2}=\frac{x^2+y^2}{5x^2}=\frac{9y^2+y^2}{5\times 9y^2}=\frac{10y^2}{45y^2}=\frac{2}{9}$$

6.c; Let the population of the town be 100
Population increase = 2.5%
$\therefore$ New population = 102.5
Now, according to the question,
Population decreases by 0.5%

$$=\frac{102.5\times 0.5}{100}=0.5125$$

After one year, population = 102.5 – 0.5125
= 101.9875
$\therefore$ Total increase% = (101.9875 – 100) = 1.98%
Reqd. percentage of increase in two years

$$=\left(101.98+\frac{101.98\times 1.98}{100}\right)-100$$

= (101.98 + 2.019)
= 103.999 – 100 = 3.999% $\approx$ 4%

7. c; Let the business man's present earning be `x.
Now, according to the question,

$$x\times\frac{125}{100}\times\frac{96}{100}\times\frac{125}{100}\times\frac{96}{100}\times\frac{125}{100}=72000$$

$$\Rightarrow x\times\frac{5}{4}\times\frac{24}{25}\times\frac{5}{4}\times\frac{24}{25}\times\frac{5}{4}=72000$$

$$\Rightarrow x\times\frac{9}{5}=72000$$

$$\Rightarrow x\times\frac{72000\times 5}{9}=\text{\`{}}40000$$

8. c; Let the total number of voters enrolled be x.
Number of votes polled = 75% of x

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

Number of valid votes

$$=\frac{3x}{4}-\frac{2}{100}\times\frac{3x}{4}=\frac{3x}{4}-\frac{3x}{200}=\frac{147x}{200}$$

Now, according to the question,

$$75\%\text{ of }\frac{147x}{200}=9261$$

$$\text{or, }\frac{3}{4}\text{ of }\frac{147x}{200}=9261$$

$$\text{or, }x=\frac{9261\times 4\times 200}{3\times 147}=16800$$

9. b; Let the total voters in the list be x.

Votes got by the winner $=\dfrac{47x}{100}$

Votes got by the loser $= x-\dfrac{x}{10}-60-\dfrac{47x}{100}$

$$=\frac{9x}{10}-\frac{47x}{100}-60=\frac{90x-47x}{100}-60$$

$$=\frac{43x}{100}-60$$

Now, according to the question,

$$=\frac{47x}{100}-\frac{43x}{100}+60=308$$

$$\Rightarrow\frac{4x}{100}=308-60=248$$

$$\Rightarrow x=\frac{248\times 100}{4}=6200$$