CHAPTER 1

Percentage

1.1 Percentage

(i) If an object's price is increased or decreased by x% and the other factor is increased or decreased by y% then, the net effect is given by

$$\text{Net effect} = \left[x + y + \frac{xy}{100}\right]\%$$

Remember that the percentages are taken with positive or negative sign according as there is increase or decrease in the factor.

(ii) If the net effect is nil, i.e., there is no loss or no gain, then the above formula become $y = \frac{100x}{100 + x}$

NUMERICAL CHALLENGE 1.1

1. If salary of a person is increased by 10% and 20% successively then, what is the change in his salary ?

Solution

Here x=10, y=20

$\therefore$ The net % change in the salary

$$= \left(10+20+\frac{10x20}{100}\right)\% = 32\%$$

2. The Price of a commodity first increased by 20% then decreased by 10% then what is the net change price of commodity.

Solution

Here x=20, y=-10 then net percent change in price is

$$= \left(20-10+\frac{20x(-10)}{100}\right)\% = 8\%$$

Here sign is (+ve) hence the net is (+ve) increase in price.

3. If price of commodity decreased by 20% and then by 30% then find the net change in price ?

Solution

Here x=20, y= 30

$\therefore$ net % change is

$$= \left(-20-30+\frac{-20x-30}{100}\right)\% = -44\%$$

1.2

(i) If A's income is x% more than that of B, B's Income is less than that of A by $\left[\frac{100.x}{100+x}\right]\%$

(ii) If A's income is x% less than that of B, B's income is more than that of A by $\left[\frac{100.x}{100-x}\right]\%$

NUMERICAL CHALLENGE 1.2

1. If Shailendra's Salary is 20% more than that of Surendra, then how much percent is salary of Surendra less than that of Shailendra.

Solution

Here x=20

$\therefore$ Required Answer= $\left(\frac{x}{100+x}x100\right)\%$

$= \frac{20}{120}x100\% = 16.66\%$

2. If A's income is 30% less than that of B's income, then how much percent is B's income more than A's income.

Solution

Here x = 30

$\therefore$ Required Answer= $\left(\frac{x}{100-x}\times100\right)\%$

$= \left(\frac{30}{70}\times100\right)\% = 42.8\%$

1.3

(i) If A is x% of C and B is y% of C then

$A = \frac{x}{y}\times100\%$ of B

NUMERICAL CHALLENGE 1.3

If A is 20% of C and B is 25% of C then what percentage is A of B

Solution

A= $\frac{x}{y}x100 = \frac{20}{25}$ x100=80%of B

1.4

(i) If the price of a commodity increase by P%, then the reduction in consumption so as not ot increase the expenditure is $\left(\frac{p}{100+p}\times100\right)\%$

(ii) If the price of a commodity decrease by P%, then the increase in consumption so as not to decrease the expenditure is $\left(\frac{p}{100-p}\times100\right)\%$

NUMERICAL CHALLENGE 1.4

1. If the price of sugar increase by 25%. Find how much percent its consumption be reduced so as not to increase the expenditure.

Solution

$$=\left(\frac{p}{100+p}x100\right)\%$$

$$=\frac{25}{125}x100\% = 20\%$$

2. If price of commodity decrease by 25%. Find how much percent its consumption be increase so as not decrease expenditure.

Solution

$$=\left(\frac{p}{100-p}x100\right)\%$$

$$=\frac{25}{100-25}x100\%$$

1.5

(i) If two numbers are, respectively, x% and y% more than a third number, then the first number. is $\left(\frac{100+x}{100+y}\times 100\right)\%$ of the second and the second is $\left(\frac{100+y}{100+x}\times 100\right)\%$ of the first

(ii) If two numbers are, respectively, x% and y% less than a third number, then the first number is $\left(\frac{100-x}{100-y}\times 100\right)$ of the second and the second is $\left(\frac{100-y}{100-x}\times 100\right)$ of the first

NUMERICAL CHALLENGE 1.5

1. Two numbers are respectively 20% and 50% more than a third number. What percent is the first of the second ?

Solution

Here x=20 and y= 50

$\therefore$ First number = $\left(\frac{100+x}{100+x}\right)\times 100\%$ of the second

$=\left(\frac{100+20}{100+50}\right)\times 100\%$ of the second i.e., 80% of the second

2. Two numbers are, respectively, 32% and 20% less than a third number. What percent is the first of the second?

Solution

Here x= 32 and y = 20

$\therefore$ First number = $\left(\frac{100+x}{100+x}\right)\times 100\%$ of the second

$=\left(\frac{100+20}{100+50}\right)\times 100\%$ of the second i.e., 85% of the second

1.6 Population formulae

(i) If the original (present) population of a town is P, then the population (P_0) after n years at an annual increase of r% is given by $P_0 = P\left(1+\frac{r}{100}\right)^n$

(ii) If the present population is P, then the population n years ago is given by $P_0 = \frac{P}{\left(1+\frac{r}{100}\right)^n}$

(iii) If the population increases by x% during the first year, by y% during the second year, by z% during third year, the population after three years will be $P\left(1+\frac{x}{100}\right)\left(1+\frac{y}{100}\right)\left(1+\frac{z}{100}\right)$

NUMERICAL CHALLENGE 1.6

1. The populatin of a town increase 10% annually. If its present population is 120000, what will it be in 2 years time.

Solution

Here P= 120000, r=10, n=2.

∴ Population after 2 years

$$= P\left(1+\frac{r}{100}\right)^n = 120000\left[1+\frac{10}{100}\right]^2$$

$$=120000x\frac{110}{100}x\frac{110}{100}=145200$$

2. The population of a town increase at the rate of 20% annually due to excessive migration. If present population is 144000, find population two year ago.

Solution

$$=\frac{P}{\left(1+\frac{r}{100}\right)^n} = \frac{144000}{\left(1+\frac{20}{100}\right)^2} = \frac{144000}{\frac{120}{100}x\frac{120}{100}} = 100000$$

3. The income of Ramesh increase by 10%, 20% and 30% successively in three years. Find change in his income, if present income is 150000 Rs. per annum.

Solution

Here x=10, y=20, z= 30.

A = 150000

So, percent change in income

$$A\left(1+\frac{x}{100}\right)\left(1+\frac{y}{100}\right)\left(1+\frac{z}{100}\right)$$

$$= 1500000x\left[\left(1+\frac{10}{100}\right)\left(1+\frac{20}{100}\right)\left(1+\frac{30}{100}\right)\right]$$

$$= 1500000x\ \frac{110}{100}\times\frac{120}{100}\times\frac{130}{100} = \text{Rs. } 257400$$

4. The population of a village is 5500. If the number of males increases by 11% and the number of females increases by 20%, then the population becomes 6330. Find the population of females in the town.

Solution

Let x is population of male

$\therefore$ (5500 – x) is female population

$$\frac{x \times 111}{100} + \frac{(550 - x) \times 120}{100} = 6330$$

On calculating we get x = 3000

So female population = 2500

1.7 Depreciation formulae

(i) If the present price an article is P, then price P_0 after n years at an anuual decrease of r% is given by

$$\mathbf{P_0 = P\left(1 - \frac{r}{100}\right)^n}$$

(ii) If the present price is P, then the price n years ago is given by

$$\mathbf{P_0 = \frac{P}{\left(1 - \frac{r}{100}\right)^n}}$$

NUMERICAL CHALLENGE 1.7

1. The population of a city increases at the rate of 10% annually. Its present population is 90.51 lacs. The population 3 years ago was nearly.

Solution

We have, P=90.51, r= 10 and n=3

$\therefore$ The population 3 years ago

$$= \frac{P}{\left(1 + \frac{r}{100}\right)^n} = \frac{90.51}{\left(1 + \frac{10}{100}\right)^3}$$

$$= \frac{9051}{100} \times \frac{100}{110} \times \frac{100}{110} \times \frac{100}{110} = 68 \text{ lacs}$$

2. A building worth Rs. 133, 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.?

Solution

$$72900\left(1 + \frac{10}{100}\right)^n = 133100x\left(1 - \frac{10}{100}\right)^n$$

$$\therefore \left(\frac{11}{10}\right)^n x\left(\frac{10}{9}\right)^n = \frac{133100}{72900} = \frac{1331}{729}$$

$$\therefore \left(\frac{11}{9}\right)^n = \left(\frac{11}{9}\right)^3 \qquad \Rightarrow n \Rightarrow 3$$

1.8

If after spending p_1% first, then p_2% from the remaining, and so on, B is the balance amount, then the total (original) amount is given by

$$\textbf{Total amount} = \frac{\mathbf{Bx100x100}}{(\mathbf{100 - p_1})(\mathbf{100 - p_2})\ldots}$$

NUMERICAL CHALLENGE 1.8

1. Ram Spends 30% of his salary on house rent, 30% of the rest he spends on his children's education and 24% of the rest salary he spends on cloths. After his expenditure, he is left with Rs. 2500. What is Ram's Salary ?

Solution

Let Total Salary is x Rs.

30% on house rent= x

30% of remaining on childrens education=y

24% of remaining on clothes= z

$$P\left[1+\frac{x}{100}\right]\left[1+\frac{y}{100}\right]\left[1+\frac{z}{100}\right] = 2500$$

$$P\left[1+\frac{30}{100}\right]\left[1+\frac{30}{100}\right]\left[1+\frac{24}{100}\right] = 2500$$

[(–) ve sign because of spending]

$$P\left[\frac{70}{100}\right]\left[\frac{70}{100}\right]\left[\frac{76}{100}\right] = 2500$$

P = Rs. 6713.21

2. An Army lost 10% its men in war, 10% of the remaining due to diseases and 10% of the rest were disabled. Thus, the strength was reduced to 729000 active men. Find the original strength.

Solution

Let A be the original strength

Then, $A\left(1+\frac{x}{100}\right)\left(1+\frac{y}{100}\right)\left(1+\frac{z}{100}\right)$

= 729000 (Given)

Here, x = 10, y = 100 and z = –10

$\therefore A\left(1-\frac{10}{100}\right)\left(1-\frac{10}{100}\right)\left(1-\frac{10}{100}\right)$

= 729000

$\Rightarrow A = \frac{729000\times100\times100\times100}{90\times90\times90}$

= 1000000 men

1.9

If the value of a number is first increased by x% and later decreased by x%, the net change is always a decrease which is equal to $\frac{x^2}{100}\%$

NUMERICAL CHALLENGE 1.9

Michael sold two T.V. sets for Rs. 3600 each gaining 20% on one and loosing 20% on the other. Find the total gain or loss percent.

Solution

Here x = 20

So, overall loss $\left(\frac{x}{10}\right)^2\% = \left(\frac{20}{10}\right)^2\% = 4\%$

1.10

A candidate scoring x% in an examination fails by 'a' marks, while another candidate who scores y% marks gets'b' marks more than the minimum required pass marks. Then the maximum marks for that examination are $M=\frac{100(a+b)}{y-x}$

NUMERICAL CHALLENGE 1.10

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 ?

Solution

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.

Failes in 2nd subject only= (1050 – 375)= 675

Passed in 2nd only+Passed in 1st only

= (675+500)= 1175

1.11

If in an examination x% of the students failed in one subject, y% failed in another subject and z% in both the subjects, the percentage of student who :

(a) Failed in either of the subjects = x+y-z

(b) Passed in both the subjects= 100-(x+y-z)

NUMERICAL CHALLENGE 1.11

1. In an examination, 30% and 35% students respectively failed in History and Geography while 27% studnets failed in both the subjects. If the number of students passing the examination in 248, find the total number of studnets who appeared in the examination.

Solution

Percentage of students passing the examination

$= (100 - (30 + 35 - 27))\%$

[here, x=30, y=35 and z=27]

= 62 (100-38)%= 62%

Let the total number of students appearing in the examination x.

Given: 62% of x= 248

or, $\frac{62}{100} \times x = 248$ or x=$\frac{248x100}{62} = 400$

Therefore, 400 students appeared in the examination.

2. In an examination, there were 2000 candidates, out of which 900 candidates were boys and rest were girls. If 32% of the boys 38% of the girls passed, then the total percentage of failed candidates is

Solution

Boys= 900, Girls= 1100

Passed = (32% of 900) + (38% of 1100) = 288 + 418 = 706

Failed = 2000 – 706 = 1294

Failed % = $\left(\frac{1294}{2000} \times 100\right)$ % = 64.7 %

1. If 40% of the numbers exceeds the 25% of it by 54. Find the number.

Sol. $\frac{\text{any value}}{\text{its rate \% of number}}$ = number (i.e, base number)

Here, 54 stands for the difference of (40% and 25% of number)

$\Rightarrow \frac{54}{(40-25)\%}$ = number

$\Rightarrow \frac{54}{40-25} \times 100 = 300$

2. $P_1\%$ number N_1 is equal to $P_2\%$ of number N_2. Find what per cent of N_1 is N_2 ?

Sol. $\therefore$ required percentage = $\frac{N_2}{N_1} \times 100\%$

It is given that $\frac{P_1}{100} \times N_1 = \frac{P_2}{100} \times N_2 \ \therefore \ \frac{N_2}{N_1} = \frac{P_1}{P_2}$

Putting the value of $\frac{N_2}{N_1}$, we find the required

percentage = $\left(\frac{P_1}{P_2} \times 100\right)\%$

$\therefore$ N_2 is equal to $\left(\frac{P_1}{P_2} \times 100\right)$ % of N_1

3. The ratio of salary of a worker in July to that in June was $2\frac{1}{2} : 2\frac{1}{4}$. By what % was the salary of July more than Salary of June ? Also find by what %, Salary of June was less than of July.

Sol. Let Salary of July $= \frac{5}{2} \times$

and Salary of June $= \frac{9}{4} \times$

Here the basis of comparison is either the salary of June or the Salary of July.

Salary of July more than that of June by percent.

$= \frac{\text{Difference}}{\text{Salary of June}} x100$

$= \frac{\left(\frac{5}{2} - \frac{9}{4}\right)x}{\frac{9}{4}x} \times 100 = 11\frac{1}{9}\%$

Salary of June Less than that of July by percent

$= \frac{\text{Difference}}{\text{Salary of July}} x100$

$= \frac{\left(\frac{5}{2} - \frac{9}{4}\right)x}{\frac{5}{2}x} x100 = 10\%$

4. The side of a square increases by p%, then find by what% does its area increase ?

Sol. Suppose, side of a square= b

Original area of the square= b^2, i.e., result = A x B

Here, both sides are increased by p%

Net % change in area = x + y + $\frac{xy}{100}$, where,

x = y = + p

$\Rightarrow$ Net % change in area =

$p + p + \frac{p^2}{100} = 2p + \frac{p^2}{100}$

Hence area increase by $\left(2p + \frac{p^2}{100}\right)\%$

Note: This formula is also applicable when the radius of circle is increased by p% Then its area increased by $\left(2p + \left(\frac{p}{100}\right)^2\right)\%$

5. The daily wage is increased by 15%, and a person now gets Rs. 23 per day. What was his daily wage before the increase ?

Sol. Original Daily wage = $\frac{\text{Increased daily wage}}{100 + \%\text{ increase}} \times 100$

$= \frac{23}{115} \times 100 = 20$

Note : In case of decrease use (-) ve sign, before % value.

6. A student X passes his examination with 515 marks, having scored 3% above the minimum. If Y had obtained 710 marks, what % would he have been above the minimum ?

Sol. $\frac{\text{Marks of Y}}{\text{Marks of X}} = \frac{100 + \%\text{ above minimum of Y}}{100 + \%\text{ above minimum of X}}$

$$\frac{710}{515} = \frac{100+Y}{100+3} \Rightarrow Y = +42\ \%$$

Hence Y gets 42% above minimum

Note:- Similarly, if the % marks is below minimum, formula would have been.

$$\frac{\text{Marks of Y}}{\text{Marks of X}} = \frac{100 - \%\text{ below minimum of Y}}{100 - \%\text{ above minimum of X}}$$

Remember,

$$\frac{\text{Marks of Y}}{\text{Marks of X}} = \frac{100 \pm \%\text{ above/below minimum of Y}}{100 \pm \%\text{ above/above minimum of X}}$$

7. The ratio of number of boys and girls in a school is 3 : 2, if 20% of boys and 25% of the girls are holding scholarship, find the % of school students who

(a) hold scholarship

(b) do not hold scholarship

Sol. Percentage of scholarship holders

= (Boys × % boys who are scholarship holders) + (Girls × % Girls who are scholarship holders)

$$\left(\frac{3}{2+3}\times 20\right) + \left(\frac{3}{3+2}\times 25\right) = 22$$

Similarly, percentage of non scholarship holders

$$= \left(\frac{3}{2+3}\times 80\right) + \left(\frac{3}{2+3}\times 75\right) = 78$$

(Since 100 – 20 = 80, 100 – 25 = 75)

8. A reduction of Rs 2 per kg enables a man to purchase 4 kg more sugar for Rs. 16, Find the original price of Sugar.

Sol. Here expenditure if fixed (=Rs.16), but as rate reduces (by Rs. 2/kg), so, the quantity of sugar available increases (by 4 kg.) Let original price be

Rs x/kg. $\frac{\text{Expenditure}}{x}$ + change in quantity available = $\frac{\text{Expenditure}}{\text{New rate}}$

$$\Rightarrow \frac{16}{x} + 4 = \frac{16}{x-2} \Rightarrow x^2 - 2x - 8 = 0$$

$\Rightarrow (x - 4)(x - 2) = 0 \Rightarrow x = 4$ or -2

Considering the +ve value original price = Rs 4 per kg.

9. If 10% of an electricity bill is deducted. Rs 45 is still to be paid. How much was the bill ?

Sol. Here Rs 45 refers to (100-10) % of the bill Since 90% of bill = 45

$$\Rightarrow 100\%\text{ of bill} = \frac{45}{90}x100 = 50$$

Hence the bill was 50.

10. The weight of a sand bag is 40 kg. In a hurry, it was weighed as 40.8 kg. Find the error percentage.

Sol. % Error = $\frac{\text{False weight} - \text{Actual weight}}{\text{Actual weight}} \times 100$

$$= \frac{40.8 - 40}{40} \times 100 = 2\%$$

$\therefore$ The error is 2%

1. The number of enrollments in a school has increased from 1800 to 2016. The percentage increase in the enrollments is _____.

(1) 10% (2) 11%
(3) 12% (4) 13%

2. The price of a commodity is increased by 40%. By what percent should a consumer reduce his consumption so that his expenditure on the commodity remains constant ?

(1) $25\frac{4}{7}\%$ (2) $26\frac{4}{7}\%$

(3) $27\frac{4}{7}\%$ (4) $28\frac{4}{7}\%$

3. If Ram's salary went up by 25%, then by what percent should it be brought down to bring it to its initial value ?

(1) 25% (2) 20%
(3) 33.33% (4) 37.5%

4. A number, when decreased by 20% becomes 136. What is the number ?

(1) 160 (2) 150
(3) 170 (4) 140

5. If 60% of K is 30 less than 75% of K, then what is the value of K ?

(1) 500 (2) 300
(3) 400 (4) 200

6. The length of a rectangle is increased by 10% while its breadth is decreased by 10%. what is the consequent percentage change in the area of the rectangle ?

(1) 1% increase (2) 10% increase
(3) 10% decrease (4) 1% decrease

7. In an examination, Ramu and Raju secured 783 marks and 684 marks respectively. If Ramu secured 87% marks, then the percentage of marks secured by Raju is _____.

(1) 75% (2) 76%
(3) 77% (4) 78%

8. In an examination, Ramesh secured 574 marks and Rekha secured 76% of the total marks. If Ramesh secured 82% of total marks, the difference in their marks, is _____.

(1) 40 (2) 41
(3) 42 (4) 43

9. By what percent will the area of a square change if its side is increased by 10% ?

(1) 10% increase (2) 20% increase
(3) 10% decrease (4) 21% increase

10. The population of a city increases by 30% every year. if the present population is 338000, then what was the population of the city two years ago ?

(1) 300000 (2) 250000
(3) 200000 (4) 240000

11. 860% of 50 + 50% of 860 = ?

(1) 430 (2) 516
(3) 860 (4) 960

12. 60% of 264 is the same as :

(1) 10% of 44 (2) 15% of 1056
(3) 30% of 132 (4) None of these

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

(1) 1.4 (2) 1.5
(3) 1.6 (4) 2.4

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

(1) 0.00625 (2) 0.0625
(3) 0.625 (4) 6.25

15. ?% of 932 + 30 = 309.6

(1) 25 (2) 30
(3) 35 (4) 40

16. $\sqrt{784}$ +? = 78% of 500

(1) 342 (2) 352
(3) 362 (4) 372

17. Two-fifth of one-third of three-seventh of a number is 15. What is 40 percent of that number?

(1) 72 (2) 84
(3) 136 (4) None of these

18. The difference between a number and its two-fifth is 510. What is 10% of that number?

(1) 12.75 (2) 85
(3) 204 (4) None of these

19. A number, when 35 is subtracted from it, reduces to its 80 percent. What is four-fifth of that number?

(1) 70 (2) 90
(3) 120 (4) 140

20. The sum of two numbers is $\frac{28}{25}$ of the first number.

The second number is what percent of the first?

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

21. If one number is 80% of the other and 4 times the sum of their squares is 656, then the numbers are:

(1) 4, 5 (2) 8, 10
(3) 16, 20 (4) None of these

22. A student multiplied a number by $\frac{3}{5}$ instead of $\frac{5}{3}$. What is the percentage error in the calculation?

(1) 34% (2) 44%
(3) 54% (4) 64%

23. 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?

(1) 72 (2) 80
(3) 120 (4) None of these

24. If x is 80% of y, then what percent of 2x is y?

(1) 40% (2) $62\frac{1}{2}\%$
(3) $66\frac{2}{3}\%$ (4) 80%

25. 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?

(1) 8% (2) 10%
(3) 12% (4) 14%

26. 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 :

(1) 30,000 (2) 32,000
(3) 34,000 (4) 35,000

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

(1) $16\frac{2}{3}$ (2) 18
(3) 20 (4) $33\frac{1}{3}$

28. If inflation increases at a rate of 8% p.a., what will a Rs. 20 article cost at the end of two years?

(1) Between Rs. 20 and Rs. 21
(2) Between Rs. 21 and Rs. 22
(3) Between Rs. 22 and Rs. 23
(4) Between Rs. 23 and Rs. 24

29. 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

(1) Rs. 10,000 (2) Rs. 11,372
(3) Rs. 12,000 (4) Rs. 12,500

30. 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 :

(1) 8% (2) 10%
(3) 12.7% (4) 15%

31. Two numbers are less than a third number by 30% and 37% respectively. How much percent is the second number less than the first?

(1) 3% (2) 4%
(3) 7% (4) 10%

32. Two candidates contested for a post of an election. 70 votes were declared as invalid. The victorious candidate secured 55% votes and won the election by 90 votes. Total numbers of votes polled is :

(1) 475 (2) 565
(3) 970 (4) 1070

33. In an examination, 450 candidates were boys and 550 were girls. If 32% of the boys and 38% of the girls passed the examination, the percentage of failed candidates is :

(1) 35.3% (2) 62%
(3) 64.7% (4) 68%

34. If 18% of x is the same as 90% of y, then 60% of x is same as

(1) 120% of y (2) 20% of y
(3) 30% of y (4) none of the above

35. In an examination, a candidate must secure 45% marks to pass. Ashok secures 325 marks but he fails by 35 marks. What were the maximum marks for the examination?

(1) 1800 (2) 900
(3) 800 (4) 750

36. Two numbers are 40% and 20% less than a third number. What percentage the first number forms of the second?

(1) 60% (2) 150%
(3) 75% (4) 200%

37. If x increases to y, the percentage increase is:

(1) $\frac{(x-y)}{100}$ (2) $\frac{(y-x)}{100}$
(3) $\left(\frac{y-x}{y}\right)\times 100$ (4) $\left(\frac{y-x}{x}\right)\times 100$

38. To reduce a given number by $12\frac{1}{2}$ percent, we should multiply it by :
(1) 1/8 (2) 12.5
(3) 7/8 (4) 2/25

39. The price of a machine bought for Rs. 32000 falls by 5% percent every year. At the end of 2 years, It is worth :
(1) Rs. 28800 (2) Rs.29200
(3) Rs. 28880 (4) Rs. 28240

40. The population of a village at the beginning of a year was 10000. During that, it increased by 5 percent and during next year decreased by 5 percent. At the end of the second year, the population of the village was :
(1) 9975 (2) 10500
(3) 10525 (4) 10075

41. If x% of 910 = 81.9, value of x is :
(1) 0.9 (2) 9
(3) 90 (4) None of these

42. 37.5% of 648 is the same as :
(1) 3.75% of 64.8 (2) 75% of 1296
(3) 3.75% of 6480 (4) $\frac{3}{32}$ of 162

43. The value of a machine depreciates from Rs. 32768 to Rs. 21952 in three years. What is the rate percentage of depreciation?
(1) 11% (2) 12.5%
(3) 33% (4) 12.25%

44. As a percentage $\left(3\frac{13}{14}\right)\times\frac{7}{11}$ can be written as : .
(1) 2.5% (2) 0.025%
(3) 250% (4) 0.25%

45. The population of a city increases at the rate of 10% annually. Its present population is 90.51 lacs. The population 3 years ago was nearly.
(1) 60 lacs (2) 68 lacs
(3) 71 lacs (4) 72.8 lacs

46. A man loses $12\frac{1}{2}$% of his money and after spending 70% of remainder, is left with Rs. 210 He initially had:
(1) Rs. 800 (2) Rs. 600
(3) Rs. 840 (4) Rs. 900

47. If the area of rectangle is increased by 13% and its breadth is increased by 5%, then what is the percentage increase in its length ? (approximately)
(1) 10% (2) 8%
(3) 18% (4) 12%

48. A man donated 6% of his income to a charity and deposited 20% of the rest in a bank. If he is left with Rs 14,100, then his income is _____.
(1) Rs 18000 (2) Rs 18250
(3) Rs 18500 (4) Rs 18750

49. The quantities consumed and the cost per kg of the commodities for the years 1986 and 1995 are given in the table below:

Item	Quantity consumed (kg)	Cost per kg(in Rs)	
		In 1986	In 1995
Wheat	34	5	8
Butter	16	30	50
Sugar	4	10	16
Tea	8	80	100
Rice	15	18	20

The cost of living index for the year 1995 taking 1986 as base year is equal to _____.
(1) 139.00 (2) 139.75
(3) 139.50 (4) 139.25

50. The price of an article increase by 10%, 15% and 20% in 3 consecutive weeks. What is the approximate overall percentage increase for the 3 weeks.
(1) 45% (2) 62%
(3) 35% (4) 52%

51. A reduction of 10% in the price of an article enables a dealer to purchase 25 articles more for Rs 45000. What is the original price of the article ?
(1) Rs 100 (2) Rs 150
(3) Rs 200 (4) Rs 250

52. The percentage increase in the total number of students of a school over that in the prevoius year.

Year	Percentage increase
1999-2000	20%
2000-2001	30%
2001-2002	10%

Find the effective percentage increase in the number of students from 1998–1990 to 2000–2001.
(1) 31.6% (2) 71.6%
(3) 62.6% (4) 81.6%

53. A solution of 165 litres contains 80% of acid and the rest water. How much water must be added to the above solution such that the resulting mixture contains 25% water ?
(1) 11 litres (2) 8 litres
(3) 9 litres (4) 10 litres

54. Laxman saves 10% more than his expenditure and Bhuwan spends 10% more than his savings. If Laxman's savings is 10% more than Bhuwan's expenditure, What is the ratio of incomes of Laxman and Bhuwan ?

(1) 9 : 10 (2) 100 : 99
(3) 10 : 11 (4) 11 : 10

55. Madan spends 50% of his income on household expenditure and 60% of the remaining on personal expenditure. Of the remaining, he pays 50% towards income tax and saves the remaining Rs 1200. What is the personal expenditure of Madan ?

(1) Rs 1800 (2) Rs 2400
(3) Rs 3600 (4) Rs 4800

56. In the year 2001, the price of article A is 20% more than the price of article B. In the year 2002, the price of article A is 50% more than the prices of article B. From 2001 to 2002, if the price of A has increased by 50%, by what percent has the price of B increased ?

(1) 0 (2) 10
(3) 20 (4) 25

57. When the price of an article is increased by 15%, the number of articles sold decreases by 20%. What is the percentage change in the sales revenue ? (Sales revenue = price of each article ×number of articles sold).

(1) 5% increase (2) 3% decrease
(3) 8% increase (4) 8% decrease

58. The population of a town increases by 25% annually. If the present population is one crore, then what was the difference between the population 3 years ago and that 2 years ago?

(1) 2500000 (2) 1280000
(3) 1560000 (4) 2000000

59. Ravi has some money with him. He gave 50% of it to Rupa and 30% to Raju and 60% of the remaining was donated to a charity. If he is still left with Rs 8040, then the money he initially had was _____.

(1) Rs 100000 (2) Rs 100500
(3) Rs 101000 (4) Rs 101500

60. The ratio of boys and girls in a class is 5 : 3. 20% of the boys and 60% of the girls have passed in first class. What percentage of the class has passed in first class ?

(1) 35% (2) 32%
(3) 34% (4) 33%

61. There are three quantities A, B and C. B is $16\frac{2}{3}\%$ less than A and C is $14\frac{2}{7}\%$ more than B. By what percent is A more than C ?

(1) 5 (2) 6
(3) 7 (4) 8

62. A's savings is 30% less than B's savings, B's savings is 20% less than C's savings. By what percentage is C's savings more than A's savings ?

(1) $63\frac{2}{7}\%$ (2) $52\frac{1}{3}\%$

(3) $64\frac{3}{5}\%$ (4) $78\frac{4}{7}\%$

63. A solution of 150 litres contains 60% of milk and the rest water. How much water must be added to the above solutions such that the resulting mixture contains 50% of water (in lts)?

(1) 60 (2) 80
(3) 20 (4) 30

64. In an election there are three contestants A, B and C. A secured 30% of the votes and B secured 60% of the remaining votes. If C secured 14000 votes, then by how many votes did the winner win the election?

(1) 5000 (2) 6000
(3) 7000 (4) 8000

65. If 55% of the teachers in a school are gents and the number of lady teachers in the school is 90, then the total number of teachers in the school is

(1) 100 (2) 150
(3) 200 (4) 250

66. The population of a city increased at the rate of 20% every year for the last three years. If present population is 203904, then what was the population of the city 3 years ago ?

(1) 119000 (2) 118000
(3) 117000 (4) 116000

67. The total expenditure of a family in 1920 is Rs 8,000. The cost of living index for the year 1920 taking 1910 as the base year is 160. Then, the expenditure of the family in the year 1910 was _____.

(1) Rs 3000 (2) Rs 4000
(3) Rs 5000 (4) Rs 6000

68. Kiran's salary was first increased by 30% and then decreased by 30%. If the latest salary is Rs 2275, then what was the original salary of Kiran ?

(1) Rs 2275 (2) Rs 2425
(3) Rs 2600 (4) Rs 2500

69. When the price of an article is increased by p%, the quantity of sales decrease by 10% but sales revenue increases by 10%. find p

(1) 20 (2) $22\frac{2}{9}$

(3) $18\frac{2}{11}$ (4) 30

70. The total expenditure of a school on certain consumable items was found to be Rs 50650 in the year 1972. If the cost of living index for the years 1975, taking 1972 as the base year, is 162.8, then the expenditure of the school in 1975 is

(1) Rs 82458 (2) Rs 82458.20
(3) Rs 82458.40 (4) None of these

71. In March Rohan's mothly expenditure was 90% of his monthly income. His monthly income increased by 30% and his monthly expenditure increased by 20% when compared to the previous month. Find the percentage increase in his monthly savings.

(1) 130% (2) 120%
(3) 110% (4) 125%

72. In the year 2000, rice formed 20% of total foodgrain production in a country. In the next year, total foodgrain production increased by 20% and rice production was 25% of total foodgrain production. What is the increase in the production of rice from 2000 to 2011 ?

(1) 25% (2) 50%
(3) 40% (4) 30%

73. In school X, the number of boys is more than that of the girls by 40%. In school Y, the number of girls is more than that of boys by 50%. If 50% boys in school X is equal to 70% of girls in school Y, what is the ratio between number of students of school X and school Y?

(1) 24 : 25 (2) 16 : 17
(3) 3 : 4 (4) 36 : 25

74.

Commodity	Quantity (in kg)	Rate per kg (in Rs)	
		Base year 2005	Current year 2007
X	50	17	20
Y	10	50	60
Z	5	30	P

The cost of living index for the year 2007 considering the base year as 2005 is Rs 120. Find P.

(1) 36 (2) 40
(3) 45 (4) 50

75. A manufacturer purchase a second hand machine for Rs 60000 and spends some amount towards repairs then its value goes upto Rs 90000. If depreciation is 10% p.a, what will be the value of the machine after two years ?

(1) Rs 48600 (2) Rs 81000
(3) Rs 67200 (4) Rs 72900

76. A's expenditure is 20% more than B's expenditure. B's expenditure is 30% less than C's expenditure. By what percentage is A's expenditure less than C's expenditure ?

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

77. Two numbers x and y, are in the ratio $\frac{5}{6} : \frac{3}{4}$. By what percent is x more than y?

(1) 10% (2) $9.\overline{09}\%$

(3) 12.5% (4) $11.\overline{11}\%$

78. Ramu saves 14% of his salary while Ramesh saves 24%. If both get equal salaries and Ramesh saves Rs 1440, then Ramu's expenditure is _____.

(1) Rs 5000 (2) Rs 5160
(3) Rs 6000 (4) Rs 7440

79. The side of square ABCD is 20% longer than the side of square PQRS. By what percentage is the area of ABCD more than the area of PQRS ?

(1) 20% (2) 24%
(4) 40% (4) 44%

80. Only two candidates, A and B, contested in an election. In the total of 20000 votes 10% were invalid. A won the election by 3600 votes. What percentage of valid votes are secured by B ?

(1) 45% (2) 40%
(3) 30% (4) 35%

81. Raju's salary was first increased by 10%, then decreased by 20%. If the latest salary is Rs 17600, then find his original salary.

(1) Rs 15000 (2) Rs 10000
(3) Rs 20000 (4) Rs 18000

82. If A is 50% more than B, then B is less than A by _____.

(1) $33\frac{1}{3}\%$ (2) 25%

(3) 50% (4) $66\frac{2}{3}\%$

83. Jacob and Mohan save 20% and 40% of their respective incomes. If their expenditures are equal, then what is the ratio of the incomes of Mohan and Jacob ?

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

84. There are 3 numbers. The first and second numbers are 20% and 40% more than the third number. What percentage is the first number of the sum of the second and the third numbers ?

(1) 25% (2) 50%
(3) 30% (4) 40%

85. Three commodities, their consumption and their prices in the years 1985 and 1990 are listed below:

Commodity	Consumption	Price in 1985 (in Rs/kg)	Price in 1990 (in Rs/kg)
Rice	90 kg	14.00	18.00
Wheat	150 kg	9.00	9.48
Tea	9 kg	75.00	100.00

The cost of living index for the year 1990 taking 1985 as base years is equal to _____.

(1) 100 (2) 10
(3) 120 (4) 130

ANSWER KEY

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