Lesson

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K L E TECHNOLOGICAL UNIVERSITY
DEPARTMENT OF HUMANITIES

PROFESSIONAL APTITUDE AND LOGICAL REASONING

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Percentages

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Percentage and Its Applications

A fraction with denominator 100 is called a per cent. Per cent is an abbreviation for the Latin word "per centum" meaning per hundred or hundredths and is denoted by the symbol %. It is the same way as a fraction with denominator 10 is called decimal. Since percent is a form of fraction, we can express percent as fractions and vice-versa.

Conversion of a FRACTION INTO PERCENTAGE

To convert a fraction into a percentage, multiply the fraction by 100 and put % sign for example $\frac{1}{2}$ in percent is $(\frac{1}{2})$ X 100 = 50%

Conversion of a PERCENTAGE INTO FRACTION

To convert a percentage into a fraction, replace the % sign with 1/100 and reduce the fraction to simplest form for example 20%= 20/100 = 1/5

Percentage of a Quantity

Example: A student scored 80% marks. Total marks were 400. How much did he score?

Marks scored = 80% of 400 = (80/100)X400 = 320

Expressing One Quantity as a Percentage of Another

Example: What percentage is 4 of 50?

Out of 50, its 4

Out of 1, its 4/50 or out of 100, it will be (4/50)X100 = 8%

Concept of Percentage Change

If a value p is increased by x%, then we have to decrease the resultant value by $\left(\frac{x}{x+100} \times 100\right)\%$ to get back to the original value p.

In terms of fractions if the value is increased by n/d then go back the same number p from the resultant value, we have to decrease the increased value by $\left(\frac{n}{d+n}\right)$.

If a value p is decreased by x%, then we have to increase the resultant value by $\left(\frac{x}{x-100} \times 100\right)\%$ to get back to the original value p.

In terms of fractions if the value is decreased by n/d then go back the same number p from the resultant value, we have to increase the decreased value by $\left(\frac{n}{d-n}\right)$.

Concept of Product Constancy

This concept is similar to the inverse proportion concept of Ratio, Proportion and Variation.

When the rate of pen is Rs. 1.5 then we can purchase 20 pens for Rs. 30. If the rate of purchase is decreased by Rs. 0.5 then we can purchase 30 pens by paying Rs. 30.

Rate X No. of Pens = Price 1.5 X 20 = 1.0 X 30 = 30

The product remains constant in both the cases. Some more examples of product constancy

a) Speed X Time = Distance
b) Rate X Time = Cost
c) Efficiency X Time = Work
d) Length X Breadth = Area

e) Average X Number of elements = Total Value
f) Rate X Quantity = Expenditure

Product Constancy Conditions

- When one factor of a product is increased by p% then the other factor will be decreased by $\left(\frac{p}{p+100} \times 100\right)\%$. In fractions, when one factor of the product is increased by n/d then the other factor is decreased by $\left(\frac{n}{d+n}\right)$
- When one factor of a product is decreased by p% then the other factor will be increased by $\left(\frac{p}{p-100} \times 100\right)\%$. In fractions, when one factor of the product is decreased by n/d then the other factor is increased by $\left(\frac{n}{d-n}\right)$

First increase and then decrease

- **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 x% of x or $\frac{x^2}{100}$. If the order of increase and decrease is changed, the result remains unaffected.**
- **Instance:** If the population of a town is increased by 15% in the first year and is decreased by 15% in the next year, what effect can be seen in the population of that town?

  Explanation: There is a decrease of $\frac{(15)^2}{100}\%$ i.e., 2.25%.

When both values are different

- **If the value is first increased by x% and then decreased by y% then there is $\left(x - y - \frac{xy}{100}\right)\%$ increase or decrease, according to the +ve or –ve sign respectively.**
- **Instance:** A shopkeeper marks the prices of his goods at 20% higher than the original price. After that, he allows a discount of 10%. What profit or loss did he get?

  Explanation: By the Precept : $20 - 10 - \frac{20 \times 10}{100} = 8\%$

  ∴ He gets 8% profit as the sign obtained is +ve.

Exercise

01 If price of a commodity increases by 10% then by what % the consumption of that commodity should be reduced to keep the overall cost same?
(a) $9\ ^1/_{11}\%$ (b) $11\ ^1/_9\%$ (c) $16\ ^2/_3\%$ (d) None of these

02 If price of sugar decreases by 10% then by what % the consumption of sugar should be increased to keep the overall cost same?
(a) 12.5% (b) $9\ ^1/_{11}\%$ (c) $11\ ^1/_9\%$ (d) 10%

03 According to calculation measure of an angle = 37.5 degree but practical measurement shows it to be 35 degree. What % is the error?

(a) 6.66 % (b) 1.5 % (c) 4.16 % (d) 3%

04 By how much % four – fifth of 80 lesser than five – seventh of 112?
(a) 42 % (b) 24 % (c) 36 % (d) 20 %

05 If the length & breadth of a rectangle increased by 18% then what is the percentage change (increment) in area?
(a) 39.8 % (b) 18.9 % (c) 39.24 % (d) 63.89 %

06 A person spends 80 % of his income. If his income & expenditure are increased by 40 % and 20% respectively then what is the % increase in saving?
(a) 120 % (b) 125 % (c) 130 % (d) 110 %

07 Salary of a person first increases by 40% and then reduces by 10%. What is the overall change in the salary?
(a) 14% ↓ (b) 26% ↑ (c) 14% ↑ (d) 26% ↓

08 Two numbers are 10% and 25% more than the third number, respectively. What % is 1^{st} of 2^{nd}?
(a) 35 % (b) 88 % (c) 108.6 % (d) 92%

09 Current population (P) of a town is 1764000. What will the population of the town be after 2 years if population increases @ 5% / annum?
(a) 19,44,180 (b) 19,48,140 (c) 19,48,410 (d) 19,44,810

10 Current price (P) of a machine is 100000. What will the price of the machine be after 2 years if price increases @ 20% / annum & 10 % /annum in those 2 years?
(a) 110000 (b) 132000 (c) 120000 (d) None of these

11 Current population (P) of a town is 66000. What was the population of the town before 1 year if population increases @ 10% / annum?
(a) 60000 (b) 64000 (c) 65000 (d) 63000

12 Current population (P) of a village is 11,550. What was the population of the village before 2 years if population increased @ 5% / annum & 10% / annum?
(a) 10600 (b) 10500 (c) 10400 (d) 10000

13 Current Price (P) of a machine is 100000. What will the Price of the machine be after a year if price decreases during that 1 year @ 19% / annum?
(a) 80000 (b) 81000 (c) 79000 (d) None of

these

14 Current population (P) of a village is 2500. What will the population of the village be after 2 years if population decreases during those 2 years @ 14% / annum & 18% / annum?
(a) 1673 (b) 1637 (c) 1376 (d) 1763

15 Current population (P) of a town named Kurg is 164000. What was the population of the town a year ago if population has decreased during that year @ 18% / annum?
(a) 182000 (b) 200000 (c) 218000 (d) None of these

16 Current population (P) of a village named Bhilvada is 15300. What was the population of the village 2 years ago if population has decreased during those 2 years @ 10% / annum and 15 % / annum, respectively?
(a) 17,000 (b) 18,000 (c) 20,000 (d) None of these

17 If price of carrot increases by 20% then by what % the consumption of carrot should be reduced to keep the overall cost same?
(a) $9\ ^{1}/_{11}$ % (b) $16\ ^{2}/_{3}$ % (c) $11\ ^{1}/_{9}$ % (d) None of these

18 If price of wheat decreases by 16% then by what % the consumption of wheat should be increased to keep the overall cost same?
(a) 19.05% (b) 8.33% (c) 9.50% (d) None of these

19 A person gives a house for rent. He charges 0.4 % of the cost of the house as monthly rental. In how many months he would be able to fetch full cost of house?
(a)100 (b) 250 (c) 125 (d) 200

20 A person spends 70 % of his income. If his income & expenditure are increased by 40 % and 50% respectively then what is the % increase in saving?
(a) 35 % (b) 5 % (c) 16.66 % (d) None of these

21 Salary of a person first increases by 30% and then reduces by 30%. What is the overall change in the salary?
(a) 9% ↓ (b) 9% ↑ (c) 3% ↑ (d) 3% ↓

22 Two numbers are 66% and 100% more than the third number,

respectively. What % is 1st of 2nd?
(a) 34 % (b) 83 % (c) 38 % (d) 166%

23 If the side of a square increased by 35% then what is the percentage change in area?
(a) 35 % (b) 82.25 % (c) 55 % (d) 40.5 %

24 Current population (P) of a town is 1600. What will the population of the town be after 1 year if population increases @ 19% / annum?
(a) 1900 (b) 1940 (c)1904 (d) None of these

25 Current price (P) of a tool is 50000 US $. What will the price of the tool be after 2 years if price increases @ 4% / annum & 3 % / annum?
(a) 53560 $ (b) 55360 $ (c) 53650 $ (d) 55630 $

26 Current population (P) of a town is 133100. What was the population of the town before 3 years if population increases @ 10% / annum?
(a) 119790 (b) 100000 (c) 200000 (d) 107810

27 Current population (P) of a village is 26000. What will be the population of the village after 2 years if population has decreased during those 2 years @ 10% / annum and 21% / annum?
(a) 18486 (b) 18468 (c) 14886 (d) None of these

28 Current population (P) of a village is 30276. What was the population of the village 2 years ago if population has decreased during those 2 years @ 13% / annum?
(a)36,000 (b) 40,000 (c) 32,000 (d) None of these

29 X % of 600 is equal to 40 % of 300, then what is X?
(a) 25 (b) 50 (c) 30 (d) 20

30 If price of a commodity increases by 40% then by what % the consumption should be reduced to keep the overall cost same?
(a) 28.57% (b) 7.14 % (c) 14.28% (d) None of these

31 X% of Y equal to $^4/_5$ of 90, then what is the value of XY?
(a) 600 (b) 360 (c) 720 (d) 7200

32 Salary of a person first increases by 40% and then reduces by 15%. What is the overall change in the salary?

(a) 25% ↓ (b) 19% ↓ (c) 19% ↑ (d) 25% ↑

33 Two numbers are 6.2% and 80% more than the third number, respectively. What % is 1st number of 2nd number?
(a) 59 % (b) 16.9 % (c) 95 % (d) None of these

34 Current population (P) of a sub - urban zone is 14256. What was the population of the sub - urban zone before 3 years if population increased @ 8% / annum & 10% / annum & 20 % / annum during those 3 years?
(a) 13200 (b) 12960 (c) 10,000 (d) 11880

35 Current price (P) of a computer is 160000 Rs.. What will the price of the computer be after 2 years if price decreased @ 16% / annum flat rate?
(a) 118296 Rs. (b) 112896 Rs. (c) 112869 Rs. (d) None of these

36 Current price (P) of a machine is 22464 Rs. What was the price of the machine 2 years ago if price has decreased during those 2 years @ 22% /annum and 28 % / annum?
(a) 40000 Rs. (b) 39312 Rs. (c) 30000 Rs. (d) None of these