

Some Innovative Formulae for Percentage Unipar Formulae

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Abstract: UNIPAR FORMULAE: UNIPAR (UNI+P+AR) means **UNI**versal formula for **P**ercentage by **AR**un. These are new innovative formulae of percentage which are applicable to all of its concepts e.g. Profit/ loss, Discount, Compound Interest, Sales Tax, Depreciation, to finding increase/decrease in population and other concepts also. It helps the students in dealing their daily monetary transactions in practical life.

Keywords: Compound Interest, Depreciation, Discount, Profit, Sales Tax etc.

I. Introduction

UNIPAR FORMULAE: UNIPAR (UNI+P+AR) means **UNI**versal formula for **P**ercentage by **AR**un. These formulas are applicable to all applications of percentage e.g. Profit/ loss, Discount, Compound Interest, Sales Tax, Depreciation etc. Some Formulae which are already existed and related to some of these applications are mentioned below [1,2 &3]:

- Selling Price = $\left(\frac{100 + \text{Profit \%}}{100} \right) \times \text{Cost price}$
- Selling Price = $\left(\frac{100 - \text{loss \%}}{100} \right) \times \text{Cost price}$
- Selling Price = $\left(\frac{100 - \text{discount \%}}{100} \right) \times \text{Marked price}$
- Amount = Principal $\times \left(1 + \frac{\text{Rate \%}}{100} \right)^{\text{Time}}$

II. UNIPAR Formulae:

2.1 UNIPAR 1st Formula

$$\text{New Price} = \left(\frac{100 + \text{Increase \%}}{100} \right) \times \text{Old price}$$

$$\text{New Price} = \left(\frac{100 - \text{Decrease \%}}{100} \right) \times \text{Old price}$$

2.2 UNIPAR 2nd Formula (If time is given)

$$\text{New Price} = \left(\frac{100 + \text{Increase \%}}{100} \right)^{\text{Time}} \times \text{Old price}$$

$$\text{New Price} = \left(\frac{100 - \text{Decrease \%}}{100} \right)^{\text{Time}} \times \text{Old price}$$

- **Old Price:** In practical life, the first price or original price of a particular activity likes transaction of money, goods, sale and purchase of goods etc.
- **New Price:** In practical life, the last price or increased/decreased value of a particular activity likes transaction of money, goods, sale and purchase of goods etc.
- **Increase:** In practical life, which term makes increase in old price e.g. profit, sales tax, rate of interest etc.
- **Decrease:** In practical life, which term makes decrease in old price e.g. loss, discount, depreciation etc.

III. Applications related to UNIPAR:

3.1 UNIPAR 1st :

3.1.1 Profit/loss:

In daily transaction related to profit/loss, old price is Cost Price and new price is selling price and profit makes increase & loss makes decrease in cost price.

Exp.1 Kasvi bought a particle of Rs. 1200 and sold at profit of 10% then what will be the Selling price of that particle?

Sol.1 Cost Price (Old Price) = 1200 Rs

Profit % (Increase %) = 10%

Selling Price (New Price) = ?

$$\text{Selling Price (New Price)} = \left[\frac{100 + \text{Profit (Increase) \%}}{100} \right] \times \text{Cost Price (Old Price)}$$

$$= \left[\frac{100 + 10}{100} \right] \times 1200 = \frac{110}{100} \times 1200 = 1320 \text{ Rs}$$

Exp.2 A particle is sold at Rs 1800 and got loss of 10% then what was the cost price?

Sol.2 Selling Price (New Price) = 1800 Rs

Loss% (Decrease %) = 10%

Cost Price (Old Price) = ?

$$\text{Selling Price (New Price)} = \left[\frac{100 - \text{loss (decrease) \%}}{100} \right] \times \text{Cost Price (Old Price)}$$

$$1800 = \left[\frac{100 - 10}{100} \right] \times \text{Cost Price (Old Price)}$$

$$1800 \times \frac{100}{90} = \text{Cost Price (Old Price)}$$

Cost Price (Old Price) = 2000 Rs.

3.1.2 Marked Price/Discount:

In daily transaction of discount for a shopkeeper, Old price is Marked Price and new price is selling price and discount makes decrease in marked price

Exp.1 The price marked on a book is Rs 2400 and the shopkeeper gives 15% discount. What is the selling price?

Sol.1 Marked Price (Old Price) = 2400 Rs

Discount% (Decrease %) = 15 %

Selling Price (New Price) = ?

$$\text{Selling Price (New Price)} = \left[\frac{100 - \text{Discount (Decrease) \%}}{100} \right] \times \text{Marked Price (Old Price)}$$

$$= \left[\frac{100 - 15}{100} \right] \times 2400 = \frac{85}{100} \times 2400 = 2040 \text{ Rs}$$

Exp.2 A table was sold for Rs 2210 after giving discount of 15%. What was the marked price?

Sol.2 Selling Price (New Price) = 2210 Rs

Discount% (Decrease %) = 15%

Marked Price (Old Price) = ?

$$\text{Selling Price (New Price)} = \left[\frac{100 - \text{Discount (decrease) \%}}{100} \right] \times \text{Marked Price (Old Price)}$$

$$2210 = \frac{100 - 15}{100} \times \text{Marked Price (Old Price)}$$

$$\text{Marked Price (Old Price)} = 2210 \times \frac{100}{85} = 2600 \text{ Rs}$$

3.1.3 Sales Tax & Value Added Tax (VAT):

Exp.1 Jayant bought a music system for Rs. 9600 and payed a sales tax of 8% for the same. What is the actual price payed by him?

Sol.1 Value of the system (old Price) = Rs. 9600

Sales tax rate % (Increase %) = 5 %

Actual Price (New Price) =

$$\text{New Price} = \left(\frac{100 + \text{rate (Increase) \%}}{100} \right) \times \text{Old Price}$$

$$= \frac{100}{100} \left(\frac{100 + 5\%}{100} \right) \times 9600 = \frac{105}{100} \times 9600 = 10080$$

Exp.2 Anannya bought a suitcase for Rs. 2520. The VAT for this item is 5%. What was the Price of the suitcase before VAT was added?

Sol.2 Cost paid by Anannya (New Price) = Rs. 2520

VAT rate (Increase) = 5%

$$\text{New Price} = \left(\frac{100 + \text{rate (Increase) \%}}{100} \right) \times \text{Old Price}$$

$$2520 = \left(\frac{100 + 5\%}{100} \right) \times \text{old price}$$

$$2520 \times \frac{100}{105} = \text{old price}$$

Old price = Rs. 2400

3.2 UNIPAR-2nd

3.2.1 Compound Interest:

In daily transaction related to Compound Interest, Old price (that amount which is deposited, borrowed etc) is Principal and New price is Amount and rate of interest makes increase in price.

Exp.1 Find the amount paid on Rs 12000 at rate 10% after 2 years if it is compounded annually.

Sol.1 Principal (Old Price) = Rs 12000

Rate (increase) = 10%

Time = 2 years

Amount (New Price) = ?

$$\begin{aligned} \text{Amount (New Price)} &= \left(\frac{100 + \text{Rate (Increase) \%}}{100} \right)^{\text{time}} \times \text{Principal (Old price)} \\ &= \left(\frac{100 + 10}{100} \right)^2 \times 12000 = \left(\frac{110}{100} \right)^2 \times 12000 = 14520 \text{ Rs} \end{aligned}$$

3.2.1 Growth and Depreciation:

Exp.1 The cost of a car is Rs 200000. Its value is depreciated every year at rate of 10%. What is its depreciated price after two years?

Sol.1 Cost of car (Old Price) = Rs 200000

Rate of depreciation (decrease) = 10%

Time = 2 years

Price after two years (new price) = ?

$$\begin{aligned} \text{Amount (New Price)} &= \left(\frac{100 - \text{Rate (decrease) \%}}{100} \right)^{\text{time}} \times \text{Principal (Old price)} \\ &= \left(\frac{100 - 10}{100} \right)^2 \times 200000 = \left(\frac{90}{100} \right)^2 \times 200000 = 162000 \end{aligned}$$

IV. Conclusion:

UNIPAR Formulae are also applicable to finding increase/decrease in population and other concepts also, students don't have need to learn different formulas for all these applications, with these they can do these applications very easily and it will help them to relate with practical life.

References

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