RKDF University, Bhopal

Open Distance Learning (ODL) Material

Faculty of Commerce

Semester –II

Subject- BUSINESS MATHEMATICS

Syllabus

Units	**Topic**	**Duration (In Hours)**	**Marks**
I	Brief History of Vedic Mathematics in Indian Knowledge tradition, methods and practice of quick calculation of addition, multiplication, division, square and square root of numbers, method of quick verification of answers from Digit Sum.	18	20
II	Rules for sign in algebra and practice, Rules for Calculation(BODMAS) and practice, simultaneous Equations- Meaning, Characteristics, types, Calculations(with word problems).	18	20
III	Theory of Indices(preliminary Knowledge only formulae).	18	20
IV	Ratio, Proportion, Percentage, Discount, Brokerage.	18	20
V	Commission, Average, Profit and Loss, Simple Interest and Compound Interest	18	20

UNIT – I

BRIEF HISTORY OF VEDIC MATHEMATICS IN INDIAN KNOWLEDGE TRADITION

The Vedic Mathematics is an ancient Indian system of mathematics that was rediscovered in the early 20th century by Sri Bharati Krishna Tirthaji Maharaj. It is based on a set of 16 sutras (Sanskrit words or aphorisms) and 13 sub-sutras that can be used to solve complex mathematical problems quickly and easily.

Here's a brief history of Vedic Mathematics in the Indian knowledge tradition:

1. The origins of Vedic Mathematics can be traced back to the ancient Vedas, the oldest sacred texts of Hinduism. The Vedas contain various mathematical concepts and principles that were used in religious rituals, astronomical calculations, and other applications.

2. Over the centuries, Indian mathematicians and scholars developed and refined these mathematical ideas, often incorporating them into the broader Hindu knowledge tradition. Prominent figures such as Aryabhata, Brahmagupta, and Bhaskara made significant contributions to the development of Vedic Mathematics.

3. In the early 20th century, Sri Bharati Krishna Tirthaji Maharaj, a Hindu monk and mathematician, rediscovered and systematized the ancient Vedic mathematical techniques. He published a book titled "Vedic Mathematics" in 1965, which outlined the 16 sutras and their applications in various mathematical operations.

4. The rediscovery of Vedic Mathematics sparked renewed interest in this ancient system and its potential applications in modern education and problem-solving. It has since been taught in various schools and universities, both in India and internationally, as an alternative approach to traditional mathematics.

Methods and Practice of quick calculation of addition, multiplication, division, square and square root of numbers

There are various methods and practices that can help you perform quick calculations for addition, multiplication, division, squaring, and square root. Here's a brief overview of some of these techniques:

1. Addition and Subtraction:

    - Rounding and Compensation: Round the numbers to the nearest convenient value, perform the calculation, and then adjust the result.

- Mental Math Techniques: Leverage place value, decomposition, and other strategies to break down the numbers and perform the calculation mentally.

2. Multiplication:
    - Doubling and Halving: Use the properties of powers of 2 to quickly multiply by doubling and halving the numbers.
    - Squaring and Halving: For multiplying numbers that are close to a power of 10, use the formula: (x + y)^2 = x^2 + 2xy + y^2.
    - Russian Peasant Method: A method that uses binary expansion and repeated doubling and halving to perform multiplication.
3. Division:
    - Reciprocal Method: Divide by the reciprocal of the divisor, which is the same as multiplying by the reciprocal.
    - Estimation and Compensation: Estimate the quotient and then adjust the result based on the error.
4. Squaring:
    - Squaring a Two-Digit Number: Use the formula: (10x + y)^2 = 100x^2 + 20xy + y^2.
    - Russian Peasant Method for Squaring: Similar to the Russian Peasant Method for multiplication, but simpler since only one number is involved.
5. Square Root:
    - Estimating Square Root: Use the fact that the square root of a number is approximately the average of the number and its reciprocal.
    - Babylonian Method: An iterative method for approximating the square root of a number.

Method of quick verification of answers from Digit Sum.

The method of quick verification of answers using the Digit Sum is a technique that can be used to quickly check the correctness of mathematical calculations, especially when dealing with large numbers.

The Digit Sum is the sum of the digits in a number. For example, the Digit Sum of 456 is 4 + 5 + 6 = 15. This property can be used to quickly verify the correctness of calculations.

Here's how the method works:

1. Perform the calculation you want to verify.
2. Calculate the Digit Sum of the original number and the Digit Sum of the result.
3. Compare the Digit Sums of the original number and the result. If they are the same, then the calculation is likely correct.

This method works because the Digit Sum of a number is preserved through most basic arithmetic operations, such as addition, subtraction, multiplication, and division (with some exceptions).

Here's a simple Python code example that demonstrates the Digit Sum verification method:

```
def digit_sum(num):
    """
    Calculates the Digit Sum of a number.
    """
    return sum(int(digit) for digit in str(num))

def verify_answer(original_num, result):
    """
    Verifies the correctness of a calculation using the Digit Sum method.
    """
    original_digit_sum = digit_sum(original_num)
    result_digit_sum = digit_sum(result)

    if original_digit_sum == result_digit_sum:
        print("The calculation is likely correct.")
    else:
        print("The calculation may be incorrect.")

# Example usage
original_num = 456
result = 912
verify_answer(original_num, result)  # Output: The calculation is likely correct.
```

In this example, the digit_sum() function calculates the Digit Sum of a given number, and the verify_answer() function compares the Digit Sums of the original number and the result to determine the correctness of the calculation.

While this method can be a quick and handy tool, it's important to note that it's not a definitive way to verify the correctness of complex calculations.

UNIT-2

Rules for sign in algebra and practice

The rules for signs in algebra are fundamental concepts that guide the operations and manipulations of algebraic expressions. These rules help us understand how to handle positive and negative signs when performing various algebraic operations.

Here are the basic rules for signs in algebra:

1. Multiplying or dividing with the same signs:
    - Positive × Positive = Positive
    - Negative × Negative = Positive
    - Positive ÷ Positive = Positive
    - Negative ÷ Negative = Positive
2. Multiplying or dividing with different signs:
    - Positive × Negative = Negative
    - Negative × Positive = Negative
    - Positive ÷ Negative = Negative
    - Negative ÷ Positive = Negative
3. Adding or subtracting with the same signs:
    - Positive + Positive = Positive
    - Negative + Negative = Negative
    - Positive - Positive = Positive
    - Negative - Negative = Negative
4. Adding or subtracting with different signs:
    - Positive + Negative = Positive - Negative
    - Negative + Positive = Negative - Positive
    - Positive - Negative = Positive + Negative

- Negative - Positive = Negative + Positive

These rules are essential for simplifying and manipulating algebraic expressions, solving equations, and understanding the behavior of signs in various algebraic operations.

Simultaneous Equations- Meaning, Characteristics, types, Calculations

Simultaneous equations are a set of two or more linear equations that have multiple variables and need to be solved together to find the values of those variables.

Meaning: Simultaneous equations are a system of two or more linear equations that have the same set of variables. The goal is to find the values of those variables that satisfy all the equations in the system.

Characteristics:

1. The equations must have the same set of variables.
2. The number of variables must be equal to the number of equations.
3. The equations must be linearly independent, meaning they cannot be expressed as a multiple of each other.

Types of Simultaneous Equations:

1. Linear Simultaneous Equations: These are equations where the variables appear in the first degree.
2. Quadratic Simultaneous Equations: These are equations where at least one variable appears in the second degree.
3. Mixed Simultaneous Equations: These are equations with a combination of linear and quadratic terms.

Calculations: There are several methods to solve simultaneous equations, including:

1. **Substitution Method:** Solve one equation for one variable in terms of the other variables, and then substitute this expression into the other equations.
2. **Elimination Method:** Multiply one or both equations by a constant to eliminate one of the variables, and then solve for the remaining variable.
3. **Graphical Method:** Plot the equations on a coordinate plane and find the point of intersection, which represents the solution.

UNIT-3

THEORY OF INDICES

Theory of Indices(preliminary Knowledge only formulae)

The Theory of Indices, also known as the Laws of Exponents, is a fundamental concept in mathematics that deals with operations involving powers or exponents. It provides a set of rules or formulas that help simplify and manipulate expressions involving exponents.

Here are some of the basic formulas and rules in the Theory of Indices:

1. Product rule: a^m × a^n = a^(m+n)
2. Quotient rule: a^m ÷ a^n = a^(m-n)
3. Power rule: (a^m)^n = a^(m×n)
4. Zero exponent: a^0 = 1 (for a ≠ 0)
5. Negative exponent: a^(-n) = 1 / a^n
6. Fractional exponent: a^(1/n) = $\sqrt[n]{a}$

These formulas and rules can be used to simplify and manipulate expressions involving exponents, such as:

- (x^3 × x^5) = x^8
- (x^4 ÷ x^2) = x^2
- (x^3)^2 = x^6
- x^0 = 1
- x^(-2) = 1/x^2
- $\sqrt[4]{x^{16}} = x^4$

UNIT-IV

RATIO, PROPORTION, PERCENTAGE, DISCOUNT, BROKERAGE.

Ratio

Ratio is a mathematical concept that represents the relationship between two quantities. It is often expressed as a fraction or a decimal. Ratios can be used to compare two or more quantities and are commonly used in various fields, such as science, engineering, and finance.

here's a simple Python code snippet that calculates the ratio between two numbers:

```
a = 10
b = 5

ratio = a / b
print(f"The ratio of {a} to {b} is {ratio:.2f}")
```

This code will output:

```
The ratio of 10 to 5 is 2.00
```

In this example, the ratio of ato bis calculated by dividing aby b. The :.2fformat specifier is used to round the result to two decimal places.

Proportion

Proportion is a fundamental concept in mathematics that refers to the relationship between two or more quantities. It is often expressed as a ratio or a fraction, where the two quantities are compared to each other. Proportion is used in various fields, including art, design, engineering, and finance.

There are several types of proportions, including:

1. Direct proportion: When two quantities are directly proportional, an increase in one quantity leads to a proportional increase in the other quantity.
2. Inverse proportion: When two quantities are inversely proportional, an increase in one quantity leads to a proportional decrease in the other quantity.
3. Golden ratio: The golden ratio is a specific proportion that is often found in nature and has been used in art and design throughout history.

According to the definition of proportion, when two ratios are equivalent, they are in proportion. The proportion formula is used to depict if two ratios or fractions are equal. The proportion formula can be given as, a : b :: c : d = a/b = c/d.

A proportion is an equation in which two ratios are set equal to each other. For example, if there is 1 boy and 3 girls you could write the ratio as: 1 : 3 (for every one boy there are 3 girls) 1 / 4 are boys and 3 / 4 are girls.

Direct Proportion Example

- Marks scored is directly proportional to the performance in the test.
- Temperature is directly proportional to heat.
- Energy is directly proportional to work.
- Speed is directly proportional to distance.
- Earning is directly proportional to the amount of work done.

Discount

Discount is a term that refers to a reduction in the original price of a product or service. It is a common marketing strategy used by businesses to attract customers and increase sales.

There are several types of discounts, including:

1. Percentage Discount: A reduction in the original price by a certain percentage, such as 20% off.
2. Fixed Discount: A fixed amount deducted from the original price, such as $10 off.
3. Quantity Discount: A discount offered when a customer buys a certain quantity of a product, such as "Buy 2, get 1 free."
4. Promotional Discount: A temporary discount offered for a limited time, often to promote a new product or service.
5. Loyalty Discount: A discount offered to customers who are part of a loyalty program or have been loyal to the business for a certain period.

Discounts can be applied in various ways, such as through coupons, promo codes, or directly on the product's price tag. They can also be used to clear out excess inventory, attract new customers, or reward loyal customers.

Brokerage

Brokerage refers to the services provided by a financial intermediary, known as a broker, who facilitates the buying and selling of securities, such as stocks, bonds, or commodities, on behalf of their clients. Brokers typically charge a fee, called a brokerage commission, for their services.

Brokerages play a crucial role in the financial markets, as they provide access to investment opportunities and execute transactions on behalf of investors. They also offer a range of additional services, such as investment research, portfolio management, and financial planning

UNIT-V

COMMISSION, AVERAGE, PROFIT AND LOSS, SIMPLE INTEREST AND COMPOUND INTEREST COMMISSION

A commission is paid to the salesperson for his/her services by the seller with respect to the M.P. For example, if Radhika is a salesperson and works in a garment shop and takes 2% commission. It means from shop owner Radhika take 2Rs for selling of 100Rs (M.P.). In this case, the shop owner is sharing his revenue, thus his profit is reduced. Types of commission:

1. Standard commission
2. Base wage plus commission
3. Graduate or tiered commission

Example 1

Norman earns 6% commission on each baseball uniform he sells. If each uniform cost RS 90 and he sells 21 uniforms to the baseball team. How much commission will Norman earn?

Solution: Given:

Commission rate=6
. Thus,
revenue=21×90Rs.revenue=1890Rs.
and Commission earned by Narman:
Commission=Commissionrate×revenue100Commission=6×1890100Rs.Commission=113.40 Rs

Examples

Q1. After allowing a discount of 12% on the marked price of an article, it is sold for Rs 880. Find the market price.

Answer: We have,

S.P.=Rs880Discount_rate=12%

. Therefore,

M.P.=S.P.×100100−discountin%M.P.=880×100100−12Rs.M.P.=880×10088Rs.M.P.=1000Rs.

Q2. A shopkeeper offers his customers 10% discount and still makes a profit of 26%. What is the actual cost to him of an article marked Rs 280.

Answer: Shopkeeper makes proa fit of 26% on selling price item. First, we will determine the selling price of the item.

Calculation of selling price

We know:

M.P.=Rs280Discount_Rate=10

. Therefore,

S.P.=M.P.(100−discountin100)S.P.=280(100−10100)Rs.S.P.=280(90100)Rs.S.P.=252Rs.

Calculation of cost price

Now we that

S.P.=252Rs.Gain=26%

, Therefore,

C.P.=S.P.(100100+Gain%)C.P.=252(100100+26)Rs.C.P.=252(100126)Rs.C.P.=200Rs.

Hence, the actual cost of the article is Rs 200

Question. What is the way of calculating a discount?

Answer. In order to calculate a discount, one must multiply the original price by the decimal form of the percentage. In order to calculate the item's sale price, subtract the discount from the original price. One can do this by using a calculator or manual estimation.

Question. How can one take 20% off a price?

Answer. First of all, one must convert the percentage discount to a decimal. So, a 20 per cent discount happens to be 0.20 in decimal format. Secondly, one must multiply the decimal discount by the item's price to determine the savings in dollars.

Question. Explain what is a discount with example?

Answer. Discount refers to reduced prices or something sold at a price that is lower than the normal price. For example, a purse sold for 50 per cent off its normal price or a store that sells designer items at prices that are below market price.

Question. Explain how one can calculate a 10% discount?

Answer. The simple way of calculating 10% discount is to first divide the total sale price by 10. This should be followed by subtraction from the price.

Average

Average is a mathematical concept that represents the central tendency of a set of data. It is a measure of the central value or the typical value in a dataset. There are different types of averages, such as:

1. **Arithmetic Mean**: The most commonly used average, calculated by summing up all the values in the dataset and dividing by the total number of values.
2. **Median**: The middle value in a dataset when the values are arranged in order from smallest to largest. If there are an even number of values, the median is the average of the two middle values.
3. **Mode**: The value that appears most frequently in the dataset.

In Maths, an **average** of a list of data is the expression of the central value of a set of data. Mathematically, it is defined as the ratio of summation of all the data to the number of units present in the list. In terms of statistics, the average of a given set of numerical data is also called mean. For example, the average of 2, 3 and 4 is (2+3+4)/3 = 9/3 =3. So here 3 is the

central value of 2,3 and 4. Thus, the meaning of average is to find the mean value of a group of numbers.

Average Definition

The average is defined as the mean value which is equal to the ratio of the sum of the number of a given set of values to the total number of values present in the set.

he average formula has many applications in real life. Suppose if we have to find the average age of men or women in a group or average male height in India, then we calculate it by adding all the values and dividing it by the number of values.

Symbol

The average is basically the mean of the values which are represented by $\bar{x}$. It is also denoted by the symbol 'μ'.

Average Formula in Maths

The formula to find the average of given numbers or values is very easy. We just have to add all the numbers and then divide the result by the number of values given. Hence, the average formula in Maths is given as follows:

Average = Sum of Values/ Number of values

Suppose, we have given with n number of values such as x_1, x_2, x_3 ,….., x_n. The average or the mean of the given data will be equal to:

Average = $(x_1+x_2+x_3+\ldots+x_n)/n$

How to Calculate Average?

We can easily calculate the average for a given set of values. We just have to add all the values and divide the outcome by the number of given values.

Average can be calculated using three simple steps. They are:

Step 1: Sum of Numbers:

The first step in finding the average of numbers is to find the sum of all the given numbers.

Step 2: Number of Observations:

Next, we have to count how many numbers are in the given dataset.

Step 3: Average Calculation:

The final step in calculating the average is to divide the sum by the number of observations.

Now, let us consider an example to calculate the average.

If there are a group of numbers say, 20, 21, 23, 22, 21, 20, 23. Then find the average of these values.

By average formula, we know,

Average = (Sum of values)/No.of values

= (20+21+23+22+21+20+23)/7

= 150/7

=21.42

Arithmetic Mean

The Arithmetic mean is the most common type of Average. If n numbers are given, each number denoted by ai(where i = 1,2, …, n), the arithmetic mean is the sum of the as divided by n, then:

- n is the number of observation
- i represent the index of summation
- and a_i = data value for the given index

Geometric Mean

The geometric mean is a method to find the central tendency of a set of numbers by finding the nth root of the product of n numbers. It is completely different from the arithmetic mean, where we add the observations and then divide the sum by the number of observations. But in geometric mean, we find the product of all the observations and then find the nth root of the product, provided that n is number of observations.

The formula is given by:

Geometric Mean,

x_1, x_2, x_3,…, x_n are the individual items up to n terms

Harmonic Mean

The harmonic mean is defined as the reciprocal of the average of the reciprocals of the given data values.

The formula to find the harmonic mean is given by:

Harmonic Mean, HM = $n / [(1/x_1)+(1/x_2)+(1/x_3)+\ldots+(1/x_n)]$

Where x_1, x_2, x_3,…, x_n are the individual items up to n terms.

Average of Negative Numbers

If there are negative numbers present in the list, then also the process or formula to find out the average is the same. Let's understand this with an example.

Example:

Find the average of 3, −7, 6, 12, −2.

Solution:- The sum of these numbers

= 3 + (-7) + 6 + 12 + (-2)

= 3 – 7 + 6 + 12 – 2

= 12

Total Units = 5

Hence, average = 12/5 = 2.4

How does this whole idea of average or mean works? Average helps you to calculate how to make all the units present in a list equal.

Solved Examples on Averages

Example 1:

Find the average of 2, 4, 6, 8.

Solution:

Add the numbers = 2 + 4 + 6 + 8 = 20

Total Units = 4

Hence, average = 20/4 =5

Example 2:

Find the average of 6, 13, 17, 21, 23.

Solution:

Add the numbers

= 6 + 13 + 17 + 21 + 23 = 80

Total units = 5

Hence, average = 80/5 = 16

Example 3:

If the age of 9 students in a team is 12, 13, 11, 12, 13, 12, 11, 12, 12. Then find the average age of students in the team.

Solution:

Given, the age of students are 12, 13, 11, 12, 13, 12, 11, 12, 12.

Average = Sum of ages of all the students/Total number of students

A = (12+13+11+12+13+12+11+12+12)/9

A = 108/9

A = 12

Hence, the average age of students in a team is 12 years.

Example 4:

If the heights of males in a group are 5.5, 5.3, 5.7, 5.9, 6, 5.10, 5.8, 5.6, 5.4, 6. Then find the average height.

Solution:

Given the height of males: 5.5, 5.3, 5.7, 5.9, 6, 5.10, 5.8, 5.6, 5.4 and 6

Average = Sum of heights of males/total number of males

A = (5.5+5.3+5.7+5.9+6+5.10+5.8+5.6+5.4+6)/10

A = 56.3/10

A = 5.63

By closely analyzing these examples, one can observe that the average of a certain list of numbers is the central value of the set. Thus, the average or mean is a quantity intermediate of a set of quantities. In Mathematics, this is also called average mean.

Profit and Loss:

Profit and Loss formula is used in mathematics to determine the price of a commodity in the market and understand how profitable a business is. Every product has a cost price and a selling price. Based on the values of these prices, we can calculate the profit gained or the loss incurred for a particular product. The important terms covered here are cost price, fixed, variable and semi-variable cost, selling price, marked price, list price, margin, etc. Also, we will learn the profit and loss percentage formula here.

For example, for a shopkeeper, if the value of the selling price is more than the cost price of a commodity, then it is a profit and if the cost price is more than the selling price, it becomes a loss. Here, in this article, we will discuss profit as well as loss concepts along with tricks to solve problems based on it.

Profit and Loss Basic Concepts

Let us learn profit and loss concepts in maths. It is well explained in terms of cost price and selling price.

Profit(P)

The amount gained by selling a product for more than its cost price.

Loss(L)

The amount the seller incurs after selling the product less than its cost price is mentioned as a loss.

Cost Price (CP)

The amount paid for a product or commodity to purchase is called a cost price. Also, denoted as CP. This cost price is further classified into two different categories:

- **Fixed Cost:** The fixed cost is constant, it doesn't vary under any circumstances
- **Variable Cost:** It could vary depending on the number of units and other factors

Selling Price (SP)

The amount for which the product is sold is called the Selling Price. It is usually denoted as SP. Also, sometimes called a sale price.

Marked Price Formula (MP)

This is basically labelled by shopkeepers to offer a discount to the customers in such a way that,

- **Discount = Marked Price – Selling Price**
- **And Discount Percentage = (Discount/Marked price) x 100**

Profit and Loss Formulas

Now let us find the profit formula and loss formula.

- The profit or gain is equal to the selling price minus the cost price.

- Loss is equal to the cost price minus the selling price.

Profit or Gain = Selling price – Cost Price

Loss = Cost Price – Selling Price

The formula for the profit and loss percentage is:

Profit percentage (P%) = (Profit /Cost Price) x 100

Loss percentage (L%) = (Loss / Cost price) x 100

Profit and Loss Examples

- If a shopkeeper brings a cloth for Rs.100 and sells it for Rs.120, he has made a profit of Rs.20/-.
- If a salesperson has bought a textile material for Rs.300 and has to sell it for Rs.250/-, he has gone through a loss of Rs.50/-.
- Suppose Ram brings a football for Rs. 500/- and sells it to his friend for Rs. 600/-, then Ram has made a profit of Rs.100 with a gain percentage of 20%.

These are some common examples of the profit and loss concept in real life, which we observeregularly.

Profit and Loss Tricks

You have learned until now how to calculate profit, loss, and percentage of them. Now let us learn some tricks or formulas to solve maths problems based on gain and loss.

1. Profit, P = SP – CP; SP>CP
2. Loss, L = CP – SP; CP>SP
3. P% = (P/CP) x 100
4. L% = (L/CP) x 100
5. SP = {(100 + P%)/100} x CP
6. SP = {(100 – L%)/100} x CP
7. CP = {100/(100 + P%)} x SP

8. CP = {100/(100 – L%)} x SP
9. Discount = MP – SP
10. SP = MP -Discount
11. For false weight, profit percentage will be P% = [(True weight – false weight)/ false weight] x 100.
12. When there are two successful profits, say m% and n%, then the net percentage profit equals to [m+n+(mn/100)]
13. When the profit is m%, and loss is n%, then the net % profit or loss will be: [m-n-(mn/100)]
14. If a product is sold at m% profit and then again sold at n% profit then the actual cost price of the product will be: CP = [100 x 100 x P/(100+m)(100+n)]. In case of loss, CP = [100 x 100 x L/(100-m)(100-n)]
15. If P% and L% are equal then, P = L and %loss = $P^2/100$

Points to remember:

- For profit, the selling price should be more than the cost price
- For loss, the cost price should be more than the selling price
- The percentage value for profit and loss is calculated in terms of cost price

Let us explain the above-given formulas with examples.

Solved Problems

Q. 1: Suppose a shopkeeper has bought 1 kg of apples for 100 rs. And sold it for Rs. 120 per kg. How much is the profit gained by him?

Solution:

Cost Price for apples is 100 rs.

Selling Price for apples is 120 rs.

Then profit gained by shopkeeper is ; P = SP – CP

P = 120 – 100 = Rs. 20/-

Q.2: For the above example calculate the percentage of the profit gained by the shopkeeper.

Solution:

We know, Profit percentage = (Profit /Cost Price) x 100

Therefore, Profit percentage = (20/100) x 100 = 20%.

Q.3: A man buys a fan for Rs. 1000 and sells it at a loss of 15%. What is the selling price of the fan?

Solution: Cost Price of the fan is Rs.1000

Loss percentage is 15%

As we know, Loss percentage = (Loss/Cost Price) x 100

15 = (Loss/1000) x 100

Therefore, Loss = 150 Rs.

As we know,

Loss = Cost Price – Selling Price

So, Selling Price = Cost Price – Loss

= 1000 – 150

Selling Price = R.850/-

Q.4: If a pen cost Rs.50 after 10% discount, then what is the actual price or marked price (MP) of the pen?

Solution:

Since, we know;

MP – D = SP

where MP is marked price, D is discount, SP is selling price.

Percentage discount, D% = D/MP x 100

⇒ D = (D% x MP)/100

Substitute value of D in above formula.

MP – (D% x MP)/100 = SP

MP x (100-D%)/100 = SP

Putting the given values in formula

MP x (100 – 10) /100 = 50

MP x (90/100) = 50

MP = (50 x 100)/90

MP = Rs. 55.55/-

Q1

What is meant by profit and loss?

The profit is the amount gained by selling an article at a price greater than its cost price. In contrast, the loss is the amount lost by selling an article for less than its cost price.

Q2

What is the profit and loss formula?

The formula for profit = Selling price – Cost price

The formula for loss = Cost price – Selling price

Q3

What is CP and SP in maths?

In maths, CP represents the cost price, and SP denotes the selling price.

Q4

How is CP calculated?

CP can be calculated with the help of the formulas given below.

CP (selling price) when profit% and selling price are given:
CP = {100/(100 + P%)} x SP
CP (selling price) when loss% and selling price are given:
CP = {100/(100 – L%)} x SP
Q5

How is SP calculated?

We can calculate the SP (selling price) using the formulas given below.
SP (selling price) when profit and cost price are given:
SP = {(100 + P%)/100} x CP
SP (selling price) when loss and cost price are given:
SP = {(100 – L%)/100} x CP

Simple Interest and Compound Interest

Simple interest and compound interest are fundamental concepts in finance and economics.

Simple Interest: Simple interest is the interest earned on the principal amount (the initial investment) over a specific period of time. The formula for calculating simple interest is:

```
Simple Interest = (Principal × Rate × Time) / 100
```

Where:

- Principal is the initial investment
- Rate is the annual interest rate (expressed as a percentage)
- Time is the duration of the investment (in years)

Compound Interest: Compound interest is the interest earned on the principal amount and the accumulated interest from previous periods. The formula for calculating compound interest is:

```
Compound Interest = Principal × (1 + Rate/100)^Time - Principal
```

Where:

- Principal is the initial investment
- Rate is the annual interest rate (expressed as a percentage)

- Time is the duration of the investment (in years)

What is Simple Interest?

Simple Interest (S.I) is the method of calculating the interest amount for some principal amount of money. Have you ever borrowed money from your siblings when your pocket money is exhausted? Or lent him maybe? What happens when you borrow money? You use that money for the purpose you had borrowed it in the first place. After that, you return the money whenever you get the next month's pocket money from your parents. This is how borrowing and lending work at home.

But in the real world, money is not free to borrow. You often have to borrow money from banks in the form of a loan. During payback, apart from the loan amount, you pay some more money that depends on the loan amount as well as the time for which you borrow. This is called simple interest. This term finds extensive usage in banking.

Simple Interest Formula

The formula for simple interest helps you find the interest amount if the principal amount, rate of interest and time periods are given.

Simple interest formula is given as:

SI=PTR100
Where SI = simple interest

P = principal

R = interest rate (in percentage)

T = time duration (in years)

In order to calculate the total amount, the following formula is used:

Amount (A) = Principal (P) + Interest (I)

Where,

Amount (A) is the total money paid back at the end of the time period for which it was borrowed.

The total amount formula in case of simple interest can also be written as:

A = P(1 + RT)

Here,

A = Total amount after the given time period

P = Principal amount or the initial loan amount

R = Rate of interest (per annum)

T = Time (in years)

Click here to get the simple interest calculator for quick computations.

Simple Interest Formula For Months

The formula to calculate the simple interest on a yearly basis has been given above. Now, let us see the formula to calculate the interest for months. Suppose P be the principal amount, R be the rate of interest per annum and n be the time (in months), then the formula can be written as:

Simple Interest for n months = (P × n × R)/ (12 ×100)

Example 1:

Rishav takes a loan of Rs 10000 from a bank for a period of 1 year. The rate of interest is 10% per annum. Find the interest and the amount he has to pay at the end of a year.

Solution:

Here, the loan sum = P = Rs 10000

Rate of interest per year = R = 10%

Time for which it is borrowed = T = 1 year

Thus, simple interest for a year, SI = (P × R ×T) / 100 = (10000 × 10 ×1) / 100 = Rs 1000

Amount that Rishav has to pay to the bank at the end of the year = Principal + Interest = 10000 + 1000 = Rs 11,000

Example 2:

Namita borrowed Rs 50,000 for 3 years at the rate of 3.5% per annum. Find the interest accumulated at the end of 3 years.

Solution:

P = Rs 50,000

R = 3.5%

T = 3 years

SI = (P × R ×T) / 100 = (50,000× 3.5 ×3) / 100 = Rs 5250

Example 3:

Mohit pays Rs 9000 as an amount on the sum of Rs 7000 that he had borrowed for 2 years. Find the rate of interest.

Solution:

A = Rs 9000

P = Rs 7000

SI = A – P = 9000 – 7000 = Rs 2000

T = 2 years

R = ?

SI = (P × R ×T) / 100

R = (SI × 100) /(P× T)

R = (2000 × 100 /7000 × 2) =14.29 %

Thus, R = 14.29%

Practice Questions

1. A sum fetched a total simple interest of Rs. 4016.25 at the rate of 9% per annum in 5 years. What is the sum?
2. A sum of Rs. 725 is lent at the beginning of a year at a specific rate of interest. After eight months, a sum of Rs. 362.50 more is lent but at the rate twice the former. At the end of the year, Rs. 33.50 is earned as interest from both loans. What was the actual rate of interest?
3. Simple interest on a certain sum is 16/25 of the sum. Find the rate of interest and time if both are numerically equal.

Compound Interest Definition

Compound interest is the interest calculated on the principal and the interest accumulated over the previous period. It is different from simple interest, where interest is not added to the principal while calculating the interest during the next period. In Mathematics, compound interest is usually denoted by C.I.

Compound Interest in Maths

In Maths, Compound interest can be calculated in different ways for different situations. We can use the interest formula of compound interest to ease the calculations. To calculate compound interest, we need to know the amount and principal. It is the difference between amount and principal.

Compound Interest Formula

As we have already discussed, the compound interest is the interest-based on the initial principal amount and the interest collected over the period of time. The compound interest formula is given below:

Compound Interest = Amount – Principal

we can write the formula as given below:

CI = A – P

This formula is also called periodic compounding formula.

Here,

- **A** represents the new principal sum or the total amount of money after compounding period
- **P** represents the original amount or initial amount
- **r** is the annual interest rate
- **n** represents the compounding frequency or the number of times interest is compounded in a year
- **t** represents the number of years

It is to be noted that the above formula is the general formula for the number of times the principal is compounded in a year. If the interest is compounded annually, the amount is given as:

Thus, the **compound interest rate formula** can be expressed for different scenarios such as the interest rate is compounded yearly, half-yearly, quarterly, monthly, daily, etc.