# Unit -1

**Chapter 1. Vedic Mathematics with quick calculation methods for addition, multiplication, division, squares, and square roots**:

What is Vedic Mathematics?

- A system of mathematics based on ancient Indian techniques.
- Reconstructed by "Bharati Krishna Tirthaji".
- Uses **16 Sutras (formulas)** and **13 sub-sutras.
- Focus: speed, simplicity, mental calculation.

**# QUICK ADDITION METHODS**

1. Left-to-Right Addition
Instead of traditional right-to-left:
Example:

456 + 321
= (400+300) + (50+20) + (6+1)
= 700 + 70 + 7 = **777**

✓ Faster mental calculation

2. Compensation Method
Example: 498 + 276
→ Make 498 → 500
500 + 276 = 776
Now subtract extra 2 → 774

**# QUICK MULTIPLICATION METHODS**

**1. Nikhilam Sutra** (Near Base Method)
Best when numbers are near 10, 100, 1000...
Example: 98 × 97
Step:
* 98 → -2
* 97 → -3
Left: 98 - 3 = 95
Right: (-2 × -3) = 6
Answer = **9506**

**2. Vertical and Crosswise Method**
Example: 23 × 14
Step:
* 2×1 = 2
* Cross: (2×4 + 3×1) = 8 + 3 = 11
* Last: 3×4 = 12
Answer = **322**

**# ➗ QUICK DIVISION METHODS**

**1. Nikhilam Division (for numbers near base)**

Example: 123 ÷ 9

* 9 is near 10 → deficiency = 1
* Write 12 | 3

Bring 1 →

Add: 2+1 = 3 →

Add: 3+3 = 6

Answer ≈ **13 remainder 6**

**2. Paravartya Method (Transpose and Adjust**)

Used for harder divisions (like 12, 13, etc.)

* Change signs and simplify step-by-step.
* Faster than long division with practice.

**# SQUARE OF NUMBERS**

1. Square of Numbers Ending in 5

Formula:

$n5^2 = n \times (n+1)$ | 25

Example: $35^2$

= 3×4 = 12 → **1225**

2. Numbers Near Base (100, 50, etc.)

Example: $98^2$

* 98 → -2
* Left: 98 - 2 = 96
* Right: $2^2$ = 04

Answer = **9604**

**# √ SQUARE ROOT METHODS**

**1. Basic Vedic Method (Digit Pairing)**

Example :√2025

Step:

* Pair digits: 20 | 25
* Closest square to 20 → $4^2$ = 16

First digit = 4

Now:

* Subtract: 20 - 16 = 4
* Bring down 25 → 425

Double 4 → 8

Find digit x such that 8x × x ≤ 425

x = 5 → 85×5 = 425

Answer = **45**

**2. Approximation Method**For non-perfect squares:

‘ Use nearest square and Adjust mentally’

Example:

√50 ≈ √49 = 7 → slightly more → **~7.07**

# Unit 2

## RULES OF SIGNS IN ALGEBRA, BODMAS, Simultaneous Equations

## 1. RULES OF SIGNS IN ALGEBRA

### ➕ Addition & Subtraction

| Signs | Result |
| --- | --- |
| + + | Add and keep + |
| - - | Add and keep - |
| + - | Subtract, keep bigger number's sign |
| - + | Subtract, keep bigger number's sign |

**✅ Examples:**

- 7 + 5 = **12**
- (-7) + (-3) = **-10**
- 8 + (-3) = **5**
- (-9) + 4 = **-5**

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### ✖ Multiplication & Division

| Signs | Result |
| --- | --- |
| + × + | + |
| - × - | + |
| + × - | - |
| - × + | - |

**Examples:**

- 6 × 4 = **24**
- (-6) × (-2) = **12**
- (-8) × 3 = **-24**
- (-12) ÷ (-3) = **4**

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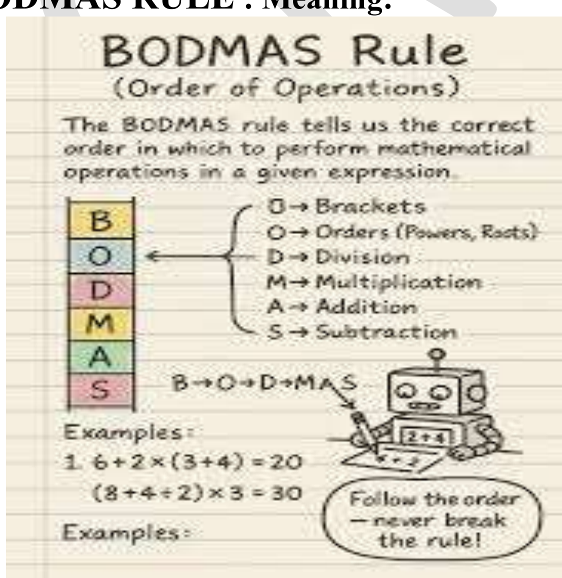
## BODMAS RULE : Meaning:




**Example 1:**

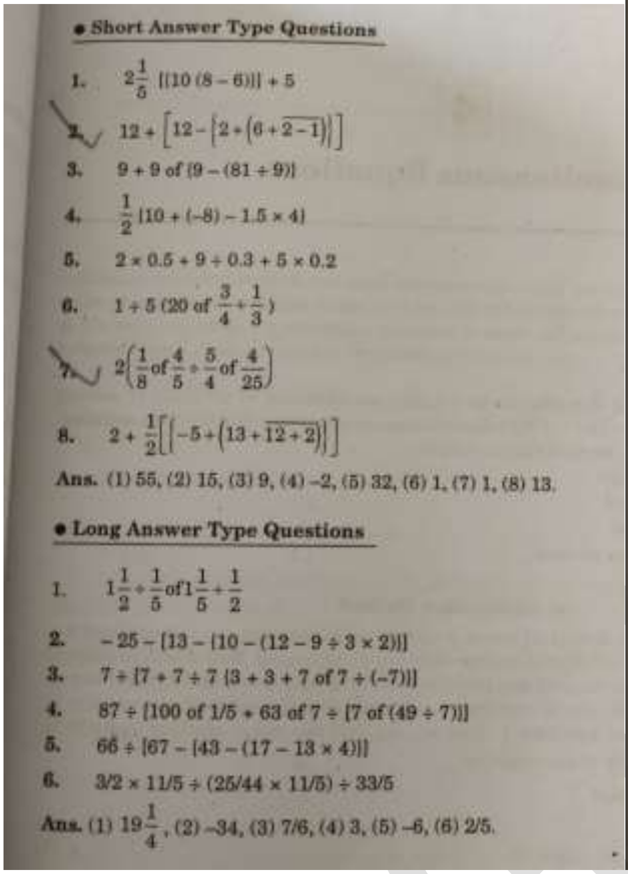
8 + 2 × 5= 8 + (2×5)
= 8 + 10
= **18**

**Example 2:**

(10 - 2) × 3 + 4= 8 × 3 + 4
= 24 + 4
= **28**

Q.1 Solve $36-2(20+12\div4\times3-2\times2)+10$.

Q.2 Solve $2\left(\frac{1}{8}\,of\,\frac{4}{5}\div\frac{5}{4}\,of\,\frac{4}{25}\right)$.



• **Short Answer Type Questions**

1. $2\frac{1}{5}\,[(10\,(8-6))]+5$
2. $12+\left[12-\left\{2+\left(6+\overline{2-1}\right)\right\}\right]$
3. $9+9$ of $\{9-(81\div9)\}$
4. $\frac{1}{2}\,[10+(-8)-1.5\times4]$
5. $2\times0.5+9\div0.3+5\times0.2$
6. $1\div5\,(20$ of $\frac{3}{4}\div\frac{1}{3})$
7. $2\left(\frac{1}{8}\text{of}\frac{4}{5}\div\frac{5}{4}\text{of}\frac{4}{25}\right)$
8. $2+\frac{1}{2}\left[\left\{-5+\left(13+\overline{12+2}\right)\right\}\right]$

**Ans.** (1) 55, (2) 15, (3) 9, (4) –2, (5) 32, (6) 1, (7) 1, (8) 13.

• **Long Answer Type Questions**

1. $1\frac{1}{2}\div\frac{1}{5}\text{of}1\frac{1}{5}+\frac{1}{2}$
2. $-25-[13-\{10-(12-9\div3\times2)\}]$
3. $7\div[7+7\div7\{3+3+7 \text{ of } 7\div(-7)\}]$
4. $87\div[100$ of $1/5+63$ of $7\div\{7$ of $(49\div7)\}]$
5. $66\div[67-\{43-(17-13\times4)\}]$
6. $3/2\times11/5\div(25/44\times11/5)\div33/5$

**Ans.** (1) $19\frac{1}{4}$, (2) –34, (3) 7/6, (4) 3, (5) –6, (6) 2/5.

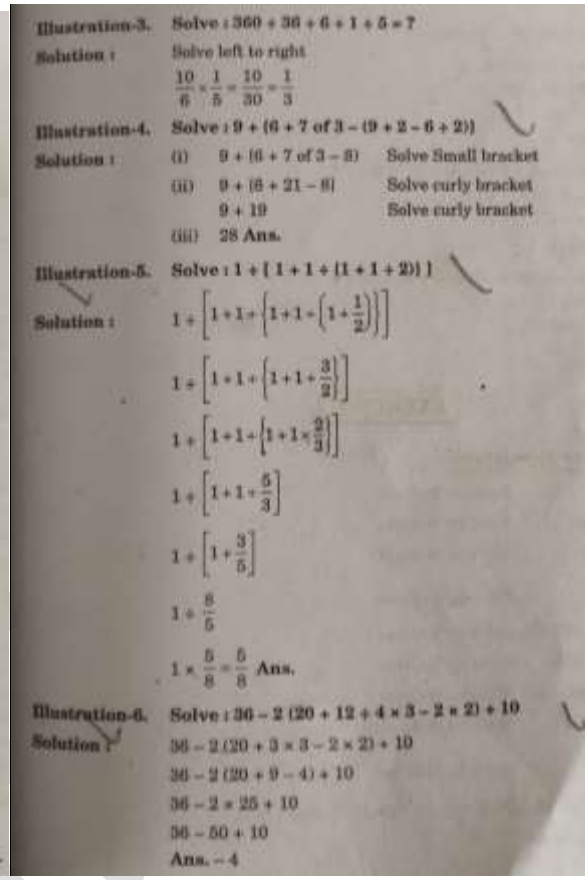


**Illustration-3.** **Solve :** $360\div36\div6\div1\div5=?$

**Solution :** Solve left to right

$\frac{10}{6}\times\frac{1}{5}=\frac{10}{30}=\frac{1}{3}$

**Illustration-4.** **Solve :** $9+\{6+7$ of $3-(9+2-6+2)\}$

**Solution :**

(i) $9+\{6+7$ of $3-8\}$ Solve Small bracket

(ii) $9+\{6+21-8\}$ Solve curly bracket

$9+19$ Solve curly bracket

(iii) 28 Ans.

**Illustration-5.** **Solve :** $1+[1+1+\{1+1+(1+2)\}]$

**Solution :**

$1+\left[1+1+\left\{1+1+\left(1+\frac{1}{2}\right)\right\}\right]$

$1+\left[1+1+\left\{1+1+\frac{3}{2}\right\}\right]$

$1+\left[1+1+\left\{1+1\times\frac{2}{3}\right\}\right]$

$1+\left[1+1+\frac{5}{3}\right]$

$1+\left[1+\frac{3}{5}\right]$

$1+\frac{8}{5}$

$1\times\frac{5}{8}=\frac{5}{8}$ Ans.

**Illustration-6.** **Solve :** $36-2\,(20+12\div4\times3-2\times2)+10$

**Solution :**

$36-2\,(20+3\times3-2\times2)+10$

$36-2\,(20+9-4)+10$

$36-2\times25+10$

$36-50+10$

**Ans.** – 4

# . SIMULTANEOUS EQUATIONS

Equations with **two variables** solved together.

# METHOD 1: SUBSTITUTION METHOD

## Steps:

1. Solve one equation for one variable
2. Substitute into other equation

**Example 1:** x + y = 10
x = y + 2

Substitute:

(y + 2) + y = 10

2y + 2 = 10

2y = 8 → y = 4

$x = y + 2 = 6$

✓ Answer: **$x = 6, y = 4$**

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**Example 2:** $x - y = 2$
$x = 3y$

Substitute:
$3y - y = 2$
$2y = 2 \rightarrow y = 1$

$x = 3$

✓ Answer: **$x = 3, y = 1$**

## METHOD 2: ELIMINATION METHOD

### Steps:

1. Make coefficients same
2. Add or subtract equations
3. Eliminate one variable

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### ✅ Example 1:

$x + y = 5$
$x - y = 1$

Add both:
$2x = 6 \rightarrow x = 3$

Put in first equation:
$3 + y = 5 \rightarrow y = 2$

✓ Answer: **$x = 3, y = 2$**

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### ✅ Example 2:

$2x + y = 7$
$2x - y = 3$

Add:
$4x = 10 \rightarrow x = 2.5$

Substitute:
2(2.5) + y = 7
5 + y = 7 → y = 2

✓ Answer: **x = 2.5, y = 2**

## 4. WORD PROBLEMS (SIMULTANEOUS EQUATIONS)

**Problem 1:** Sum of two numbers is 20 and their difference is 4.Find the numbers.

Let numbers be x and y

Then according to given condition x + y = 20 …..(1)

x - y = 4 …….(2)

Add:
2x = 24 → x = 12

y = 20 - 12 = 8

✓ Numbers: **12 and 8**.

**Problem 2:** Two numbers have sum 30. One number is twice the other.

Let:
x + y = 30
x = 2y

Substitute:
2y + y = 30
3y = 30 → y = 10

x = 20 Numbers: **20 and 10.**

# AGE PROBLEM

**Problem 1:**The sum of ages of a father and son is 50 years. After 10 years, the father will be twice the son's age. Find their present ages.

✏ **Solution:**Let:

- Father's age = x
- Son's age = y

Equations:

1. $x + y = 50$
2. After 10 years → $(x + 10) = 2(y + 10)$

Simplify:
$x + 10 = 2y + 20$
$x = 2y + 10$

Substitute into (1):
$2y + 10 + y = 50$
$3y = 40$ → $y =$ **13.33 (not realistic)**

☞ Let's correct (common exam version):

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### ✓ Correct Version:

Sum = 60

$x + y = 60$
$x + 10 = 2(y + 10)$

Solve:
$x = 2y + 10$

Substitute:
$2y + 10 + y = 60$
$3y = 50$ → $y =$ **16.67 (still odd)**

☞ So let's use a proper integer-based example:

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## ✓ Final Clean Example:

Sum = 70

$x + y = 70$
$x + 10 = 2(y + 10)$

Solve:
$x = 2y + 10$

Substitute:
$2y + 10 + y = 70$
$3y = 60$ → $y = 20$

$x = 50$

✓ Father = **50 years**, Son = **20 years**

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**Problem 2:** The sum of ages of two brothers is 40 years. The elder brother is 6 years older than the younger.

✏ **Solution:** Let:

- Younger = x
- Elder = x + 6

Equation:
x + (x + 6) = 40

2x + 6 = 40
2x = 34 → x = 17

Elder = 17 + 6 = 23

✓ Ages = **17 and 23 years**

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**Problem 3:** The sum of ages of two friends is 30 years. One friend is 4 years older than the other.

✏ **Solution:** Let:

- Younger = x
- Older = x + 4

x + (x + 4) = 30
2x + 4 = 30
2x = 26 → x = 13

Older = 17

✓ Ages = **13 and 17 years**

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Q.1 Ankita is 34 years older than Surbhi. Ten years ago the total of their ages was 48 years. Find their present ages.

Q.2 In an election 4% of the votes cast are void. A candidate gets 55% of the total valid votes and wins the election by 960 votes. Find the total number of votes cast.

Q.3 Sum of two digits of a number is 9. If 27 is added to the number, the digits are reversed. Find the number.

**Illustration 6. The sum of the numerator and the denominator of fraction is 16. If 2 is subtracted from both the numerator and denominator, the fraction will be equal to 5/7. Find the fraction.**

**Solution :** Let the numerator & denominator be x and y respectively

Sum of numerator and the denominator of the fraction is 16

$$\therefore \quad x + y = 16 \quad ....(1)$$

On substrating 2 from both numerator and denominator, the fraction will be equal to 5/7.

$$\therefore \quad \frac{x-2}{y-2} = \frac{5}{7} \quad \text{(on cross multiplication)}$$

$$7x - 14 = 5y - 10$$

$$7x - 5y = -10 + 14$$

$$7x - 5y = 4 \quad ....(2)$$

Value of x from equation (1) :

$$x = 16 - y$$

Substitute the value of x in equation (2)

$$7x - 5y = 4$$

$$7(16 - y) - 5y = 4$$

$$112 - 7y - 5y = 4$$

$$-12y = 4 - 112$$

$$-12y = -108$$

$$y = 9$$

$$\therefore \quad x = 16 - y$$

$$x = 16 - 9$$

$$x = 7 \quad$$ **(∴ Fraction is 7/9)**

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**($\therefore$ Fraction is 7/9)**

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$$\therefore \quad x = 16 - y$$

$$x = 16 - 9$$

$$x = 7$$

**($\therefore$ Fraction is 7/9)**

**UNIT-III**

## Logarithmic Function Definition

**1. THEORY OF INDICES**

**Definition: $a^n$ means a multiplied by itself n times.**

**Laws:**

$a^m \times a^n = a^{(m+n)}$

$a^m / a^n = a^{(m-n)}$

$(a^m)^n = a^{(mn)}$

$a^0 = 1$

$a^{-n} = 1/a^n$

$a^{(1/n)}$ = nth root of a

In mathematics, the **logarithm table** is used to find the value of the logarithmic function. The simplest way to find the value of the given logarithmic function is by using the **log table**. Here the definition of the logarithmic function and procedure to use the logarithm table is given in detail.

## Logarithmic Function Definition

The logarithmic function is defined as an inverse function to exponentiation. The logarithmic function is stated as follows

For x, a > 0, and a≠1,

**$y = \log_a x$, if $x = a_y$**

Then the logarithmic function is written as: **$f(x) = \log_a x$**

The most 2 common bases used in logarithmic functions are base e and base 10. The log function with base 10 is called the common logarithmic function and it is denoted by $\log_{10}$ or simply log. **$f(x) = \log_{10}$**

The log function to the base e is called the natural logarithmic function and it is denoted by $\log_e$.

**$f(x) = \log_e x$**

**2. LOGARITHMS & ANTILOGARITHMS**

**Definition: If $a^x = N$, then $\log_a(N) = x$**

**Rules: $\log(ab) = \log a + \log b$**

**log(a/b) = log a - log b**

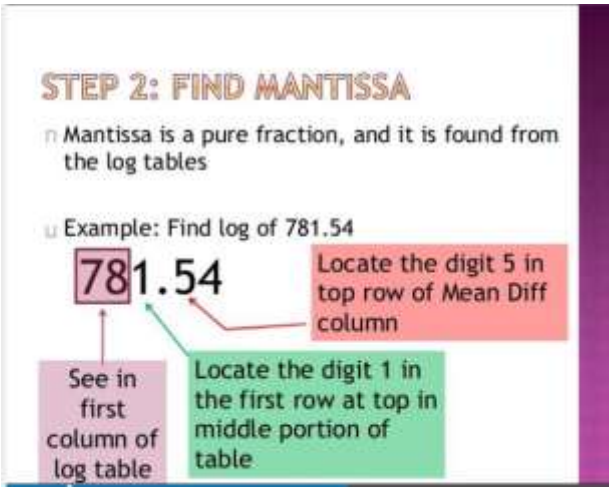
**log($a^n$) = n log a**

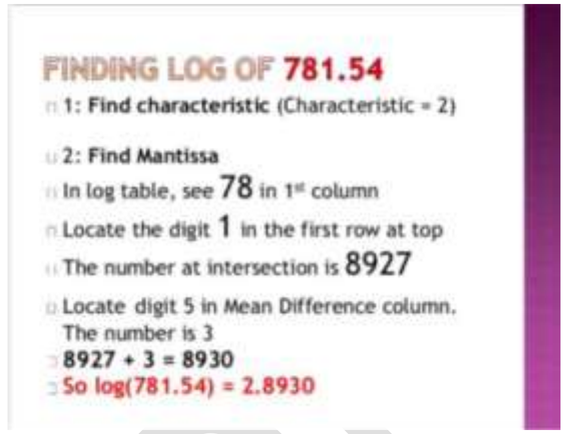
**Characteristic: integer part**
**Mantissa: decimal part**
**Antilog: reverse of log**

**To find the logarithm of a number**, we can use the logarithm table instead of using mere calculation. Before finding the logarithm of a number, we should know about the characteristics and mantissa part of a given number

•**Characteristic Part** – The whole part of a number is called the characteristic part. The characteristic of any number greater than one is positive, and if it is one less than the number of digits to the left of the decimal point in a given number. If the number is less than one, the characteristic is negative and is one more than the number of zeros to the right of the decimal point.

•**Mantissa Part** – The decimal part of the logarithm number is said to be the mantissa part and it should always be a positive value. If the mantissa part is in a negative value, then convert into the positive value.




# How to Use the Log Table?

The procedure is given below to find the log value of a number using the log table. First, you have to know how to use the log table. The log table is given for the reference to find the values.

•**Step 1**: Understand the concept of the logarithm. Each log table is only usable with a certain base. The most common type of logarithm table is used is log base 10.

•**Step 2:** Identify the characteristics and mantissa part of the given number. For example, if you want to find the value of $\log_{10}(15.27)$, first separate the characteristic part and the mantissa part.

•Characteristic Part = 15

•Mantissa part = 27

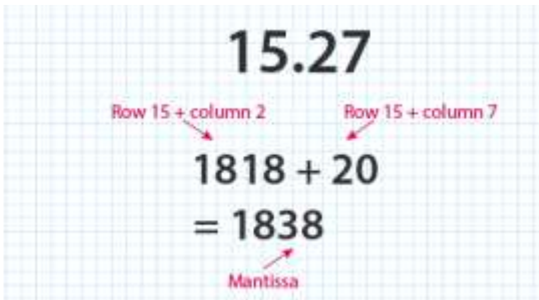
•**Step 3**: Use a common log table. Now, use row number 15 and check column number 2 and write the corresponding value. So the value obtained is 1818.

•**Step 4:** Use the logarithm table with a mean difference. Slide your finger in the mean difference column number 7 and row number 15, and write down the corresponding value as 20.

15.27

| N | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean Difference | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 13 | 1139 | 1173 | 1206 | 1239 | 1271 | 1303 | 1335 | 1367 | 1399 | 1430 | 3 | 6 | 10 | 13 | 16 | 19 | 23 | |
| 14 | 1431 | 1492 | 1523 | 1553 | 1584 | 1614 | 1644 | 1673 | 1703 | 1732 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | |
| 15 | 1761 | 1790 | 1818 | 1847 | 1875 | 1903 | 1931 | 1959 | 1987 | 2014 | 3 | 6 | 8 | 11 | 14 | 17 | 20 | |
| 16 | 2041 | 2068 | 2095 | 2122 | 2148 | 2175 | 2201 | 2227 | 2253 | 2279 | 3 | 5 | 8 | 11 | 13 | 16 | 7 | |
| 17 | 2304 | 2330 | 2355 | 2380 | 2405 | 2430 | 2455 | 2480 | 2504 | 2529 | 2 | 5 | 7 | 9 | 12 | 6 | 7 | |

•**Step 5**: Add both the values obtained in step 3 and step 4. That is 1818+20= 1838. Therefore, the value 1838 is the mantissa part.




•**Step 6**: Find the characteristic part. Since the number lies between 10 and 100, (101 and 102), the characteristic part should be 1.

•**Step 7**: Finally combine both the characteristic part and the mantissa part, it becomes 1.1838.


# Use of Antilog

What Is an Antilog?

•An **antilog** is the result of raising the base being used to the logarithm given or calculated. Put another way, it "undoes" what calculating the logarithm of a number does and simply returns that number. In an equation of the form $\log_b x = y$, it is the "x" term, called the argument of the log function.

•"Antilog" can also be written **$\log_{b-1}$** or just **$\log_{-1}$** where base 10 is implied by default.

•In summary, then:

•Antilog $x = \log_{b-1} x = y = b_x$

A log number can then be returned to its original number. This can be done using **antilogarithm** (antilog). Thus, the antilog is the **inverse function** of log. Likewise, antilog functions to **exponentiation** a simplified log value.
To compute the antilog of a number y, you must raise the logarithm base b (usually 10, sometimes the constant e) to the power that will generate the number y.

•Here is the equation for antilog using base 10: $\mathbf{10^{x} = y}$ Where x is the exponent and y is the antilog value.

•For instance, if we take this equation, log(5) = x, its antilog will be 10x = 5.

•Log: log(5) = 0.698970004336019

•Antilog: $10^{0.698970004336019} = 5$

•Now let's try it with a larger number.

•If we take log(150,000,000,000) = x, its antilog will be 10x = 150,000,000,000.

•Log: $\log_{10}$(150,000,000,000) = 11.1760912590557

•Antilog: $10^{11.1760912590557}$= 150,000,000,000

# Procedure to Find the Antilog of a Number

**Method 1 : Using an Antilog Table**

Consider a number, 2.6452

•Step 1: Separate the characteristic part and the mantissa part. From the given example the characteristic part is 2 and the mantissa part is 6452.

•Step 2: To find a corresponding value of the mantissa part uses the antilog table. Using the antilog table, find the corresponding value. Now, find the row number that starts with .64, then the column for 5. Now, you get the corresponding value as 4416.

•Step 3: From mean difference columns find the value. Again use the same row number .64 and find the value for column 2. Now, the value corresponding to this is 2.

•Step 4: Add the values obtained in step 2 and 3, we get 4416 + 2 = 4418.

•Step 5: Now insert the decimal point. The decimal point always goes the designated place. For this, you have to add 1 to the characteristic value. Now you get 3. Then add the decimal point after 3 digits, we get 441.8

•So the antilog value of 2.6452 is 441.8.

**Method 2 : Antilog calculation**

•Step 1 : Separate the characteristic part and the mantissa part. From the above example given, the characteristic part is 2 and the mantissa part is 6452.

•Step 2 : Know the base. For numerical computations, the base is always 10 . Therefore for computing the antilog use base 10.

•Step 3 : Calculate the 10x . x is the number which you are using. If the mantissa of the number is 0, then the computation is easy. Calculate the value 102.6452 . Use calculator to find the value. Finally it comes 441.7

**•Both the methods produces the same result.**

Q.1 If $\log 4 = 0.6021$ then find $\log 16$ and $\log 256$.

Q.2 If $\log 5 = 0.6990$ then find $\log 125$ and $\log 500$.

(g) $\sqrt{.0006868}$ AL $= [\frac{1}{2} \times \text{Log } .0006868]$

$= \text{AL } [\frac{1}{2} \times \bar{4}.8368]$

$= \text{AL } [\bar{2}.4184]$

$= .02620$

**Illustration 7.** $\frac{5.856 \times .007161}{.06253}$ **(Vikram 2002)**

**Solution :** $= \text{AL } [\text{Log } 5.856 + \text{Log } .007161] - [\text{Log } .06253]$

$= \text{AL } [0.7676 + \bar{3}.8550] - [\bar{2}.7963]$

$= \text{AL } [\bar{2}.6226 - \bar{2}.7963]$

$= \text{AL } \bar{1}.8263$

$= .6704$

**Illustration 8.** $\frac{2.389 \times .004679}{.00556 \times 52.14}$ **(Vikram 2003)**

**Solution :** $= \text{AL } [\text{Log } 2.389 + \text{Log } .004679] - [\text{Log } .00556 + \text{Log } 52.14]$

$= \text{AL } [0.3783 + \bar{3}.6710] - [\bar{3}.7451 + 1.7171]$

$= \text{AL } [\bar{2}.0493 - \bar{1}.4622]$

$= \text{AL } \bar{2}.5871$

$= .03865$

**Illustration 9.** $\frac{81.73 \times 24.68}{3155}$ **(Vikram 2004)**

**Solution :** $= \text{AL } [\text{Log } 81.73 + \text{Log } 24.68 - \text{Log } 3155]$

$= \text{AL } [1.9124 + 1.3923 - 3.4990]$

$= \text{AL } \bar{1}.8057$

$= .6393$

**Illustration 10.** $\frac{1.5 \times 1.2}{.036}$ **(Vikram 2005)**

**Solution :** $= \text{AL } [\text{Log } 1.5 + \text{Log } 1.2 - \text{Log } .036]$

$= \text{AL } [0.1761 + 0.0792 - \bar{2}.5563]$

$= \text{AL } [.2553 - \bar{2}.5563]$

$= \text{AL } [1.6990]$

$= 50.$

**Illustration 11.** $\frac{7.93 \times (2.65)^2}{\sqrt{31.89}}$

**Solution :** $= \text{AL } [(\text{Log } 7.93 + 2 \times \text{Log } 2.65) - (½ \times \text{Log } 31.89)]$

$= \text{AL } [(0.8993 + 2 \times 0.4232 - (½ \times 1.5036)]$

$= \text{AL } [(1.7457) - (.7518)]$

$= \text{AL } [0.9939] = 9.860$

# LOGARITHMS

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | Mean Difference | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 0000 | 0043 | 0086 | 0128 | 0170 | 0212 | 0253 | 0294 | 0334 | 0374 | 4 | 8 | 12 | 17 | 21 | 25 | 29 | 33 | 37 |
| 11 | 0414 | 0453 | 0492 | 0531 | 0569 | 0607 | 0645 | 0682 | 0719 | 0755 | 4 | 8 | 11 | 15 | 19 | 23 | 26 | 30 | 34 |
| 12 | 0792 | 0828 | 0864 | 0899 | 0934 | 0969 | 1004 | 1038 | 1072 | 1106 | 3 | 7 | 10 | 14 | 17 | 21 | 24 | 28 | 31 |
| 13 | 1139 | 1173 | 1206 | 1239 | 1271 | 1303 | 1335 | 1367 | 1399 | 1430 | 3 | 6 | 10 | 13 | 16 | 19 | 23 | 26 | 29 |
| 14 | 1461 | 1492 | 1523 | 1553 | 1584 | 1614 | 1644 | 1673 | 1703 | 1732 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 15 | 1761 | 1790 | 1818 | 1847 | 1875 | 1903 | 1931 | 1959 | 1987 | 2014 | 3 | 6 | 8 | 11 | 14 | 17 | 20 | 22 | 25 |
| 16 | 2041 | 2068 | 2095 | 2122 | 2148 | 2175 | 2201 | 2227 | 2253 | 2279 | 3 | 5 | 8 | 11 | 13 | 16 | 18 | 21 | 24 |
| 17 | 2304 | 2330 | 2355 | 2380 | 2405 | 2430 | 2455 | 2480 | 2504 | 2529 | 2 | 5 | 7 | 10 | 12 | 15 | 17 | 20 | 22 |
| 18 | 2553 | 2577 | 2601 | 2625 | 2648 | 2672 | 2695 | 2718 | 2742 | 2765 | 2 | 5 | 7 | 9 | 12 | 14 | 16 | 19 | 21 |
| 19 | 2788 | 2810 | 2833 | 2856 | 2878 | 2900 | 2923 | 2945 | 2967 | 2989 | 2 | 4 | 7 | 9 | 11 | 13 | 16 | 18 | 20 |
| 20 | 3010 | 3032 | 3054 | 3075 | 3096 | 3118 | 3139 | 3160 | 3181 | 3201 | 2 | 4 | 6 | 8 | 11 | 13 | 15 | 17 | 19 |
| 21 | 3222 | 3243 | 3263 | 3284 | 3304 | 3324 | 3345 | 3365 | 3385 | 3404 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 22 | 3424 | 3444 | 3464 | 3483 | 3502 | 3522 | 3541 | 3560 | 3579 | 3598 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 15 | 17 |
| 23 | 3617 | 3636 | 3655 | 3674 | 3692 | 3711 | 3729 | 3747 | 3766 | 3784 | 2 | 4 | 6 | 7 | 9 | 11 | 13 | 15 | 17 |
| 24 | 3802 | 3820 | 3838 | 3856 | 3874 | 3892 | 3909 | 3927 | 3945 | 3962 | 2 | 4 | 5 | 7 | 9 | 11 | 12 | 14 | 16 |
| 25 | 3979 | 3997 | 4014 | 4031 | 4048 | 4065 | 4082 | 4099 | 4116 | 4133 | 2 | 3 | 5 | 7 | 9 | 10 | 12 | 14 | 15 |
| 26 | 4150 | 4166 | 4183 | 4200 | 4216 | 4232 | 4249 | 4265 | 4281 | 4298 | 2 | 3 | 5 | 7 | 8 | 10 | 11 | 13 | 15 |
| 27 | 4314 | 4330 | 4346 | 4362 | 4378 | 4393 | 4409 | 4425 | 4440 | 4456 | 2 | 3 | 5 | 6 | 8 | 9 | 11 | 13 | 14 |
| 28 | 4472 | 4487 | 4502 | 4518 | 4533 | 4548 | 4564 | 4579 | 4594 | 4609 | 2 | 3 | 5 | 6 | 8 | 9 | 11 | 12 | 14 |
| 29 | 4624 | 4639 | 4654 | 4669 | 4683 | 4698 | 4713 | 4728 | 4742 | 4757 | 1 | 3 | 4 | 6 | 7 | 9 | 10 | 12 | 13 |
| 30 | 4771 | 4786 | 4800 | 4814 | 4829 | 4843 | 4857 | 4871 | 4886 | 4900 | 1 | 3 | 4 | 6 | 7 | 9 | 10 | 11 | 13 |
| 31 | 4914 | 4928 | 4942 | 4955 | 4969 | 4983 | 4997 | 5011 | 5024 | 5038 | 1 | 3 | 4 | 6 | 7 | 8 | 10 | 11 | 12 |
| 32 | 5051 | 5065 | 5079 | 5092 | 5105 | 5119 | 5132 | 5145 | 5159 | 5172 | 1 | 3 | 4 | 5 | 7 | 8 | 9 | 11 | 12 |
| 33 | 5185 | 5198 | 5211 | 5224 | 5237 | 5250 | 5263 | 5276 | 5289 | 5302 | 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 |
| 34 | 5315 | 5328 | 5340 | 5353 | 5366 | 5378 | 5391 | 5403 | 5416 | 5428 | 1 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 11 |
| 35 | 5441 | 5453 | 5465 | 5478 | 5490 | 5502 | 5514 | 5527 | 5539 | 5551 | 1 | 2 | 4 | 5 | 6 | 7 | 9 | 10 | 11 |
| 36 | 5563 | 5575 | 5587 | 5566 | 5611 | 5623 | 5635 | 5647 | 5658 | 5670 | 1 | 2 | 4 | 5 | 6 | 7 | 8 | 10 | 11 |
| 37 | 5682 | 5694 | 5705 | 5717 | 5729 | 5740 | 5752 | 5763 | 5775 | 5786 | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 |
| 38 | 5798 | 5809 | 5821 | 5832 | 5843 | 5855 | 5866 | 5877 | 5888 | 5899 | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 |
| 39 | 5911 | 5922 | 5933 | 5944 | 5955 | 5966 | 5977 | 5988 | 5999 | 6010 | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 9 | 10 |
| 40 | 6021 | 6031 | 6042 | 6053 | 6064 | 6075 | 6085 | 6096 | 6107 | 6117 | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 | 10 |
| 41 | 6128 | 6138 | 6149 | 6160 | 6170 | 6180 | 6191 | 6201 | 6212 | 6222 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 42 | 6232 | 6243 | 6253 | 6263 | 6274 | 6284 | 6294 | 6304 | 6314 | 6325 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 43 | 6335 | 6345 | 6355 | 6365 | 6375 | 6385 | 6395 | 6405 | 6415 | 6425 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 44 | 6435 | 6345 | 6454 | 6464 | 6474 | 6484 | 6493 | 6503 | 6513 | 6522 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 45 | 6532 | 6542 | 6551 | 6561 | 6571 | 6580 | 6590 | 6599 | 6609 | 6618 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 46 | 6628 | 6637 | 6646 | 6656 | 6665 | 6675 | 6684 | 6693 | 6702 | 6712 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 7 | 8 |
| 47 | 6721 | 6730 | 6739 | 6749 | 6758 | 6767 | 6776 | 6785 | 6794 | 6803 | 1 | 2 | 3 | 4 | 5 | 5 | 6 | 7 | 8 |
| 48 | 6812 | 6821 | 6830 | 6839 | 6848 | 6857 | 6866 | 6875 | 6884 | 6893 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 |
| 49 | 6902 | 6911 | 6920 | 6928 | 6937 | 6946 | 6955 | 6964 | 6972 | 6981 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 8 |
| 50 | 6990 | 6998 | 7007 | 7016 | 7024 | 7033 | 7042 | 7050 | 7059 | 7067 | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 |
| 51 | 7076 | 7084 | 7093 | 7101 | 7110 | 7118 | 7126 | 7135 | 7143 | 7152 | 1 | 2 | 3 | 3 | 4 | 5 | 6 | 7 | 8 |
| 52 | 7160 | 7168 | 7177 | 7185 | 7193 | 7202 | 7210 | 7218 | 7226 | 7235 | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 7 | 7 |
| 53 | 7243 | 7251 | 7259 | 7267 | 7275 | 7284 | 7292 | 7300 | 7308 | 7316 | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 7 |
| 54 | 7324 | 7332 | 7340 | 7348 | 7356 | 7364 | 7372 | 7380 | 7388 | 7396 | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 6 | 7 |
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

## 1.0 COMMISSION

A commission is the amount of money paid to an employee for selling something. It is usually a percentage. Payment for some jobs include an amount per hour as well as a commission on total sales. The commission is a motivation or reward for the employee to sell products. So, the company has more sales and can make more money.

The formula for calculating commission is:

Total Commission = Total Sales × Commission Percentage

Salespeople often receive a commission, or per cent of total sales, for their sales. Their income may be just the commission they earn, or it may be their commission added to their hourly wages or salary. The commission they earn is calculated as a certain percent of the price of each item they sell. That per cent is called the rate of commission.

To find the commission on a sale, multiply the rate of commission by the total sales. Just as we did for computing sales tax, remember to first convert the rate of commission from a per cent to a decimal.

The Gupta family's house was sold for ₹ 300,000. How much money will they have after they pay their real estate agent a 5% commission?

Commission is paid to an employee or company as an incentive to sell more. A commission is generally a percentage of sales. The real estate agent was hired by the Gupta family to sell their house for a 5% sales commission.

Example-1:

An agent got 2% commission for selling a plot for ₹ 1,000,000. Find his commission.

Solution:

Let Sale Price = ₹ 1,000,000 Commission Rate = 2%

Amount of Commission = 2% × 1,000,000

= 2/100 × 1,000,000

= ₹ 20,000

Example -2.:

An agent received ₹ 6,000 as commission for selling a house. If his commission rate is 2%, what is the selling price?

Solution:

Let Selling Price = x

Commission Rate = 2% Commission = (Selling Price) (Rate)

6000 = x× 2/100

x = ₹ 3,00,000

# UNIT-4 Ratio & Proportion Discount & Brokerage

## Chapters 8 and 9

## Ratio & Proportion

A ratio can exist only between two quantities of the same type. If x and y are any two numbers and $y \neq 0$ then the fraction $xy$ is called the ratio of x and y is written as x:y.

**Characteristics of Ratio –**

The following characteristics are attributed to ratio relationship:

i i) Ratio is a cross relation found between two or more quantities of same type.

ii ii) It must be expressed in the same units.

iii iii) By the fraction laws a ratio can be expressed as below:

$yx$=x:y 105=10:5 or 2:1

i iv) A ratio expresses the number of times that one quantity contains another.

ii v) Two or more ratios may be compared by reducing their equivalent fractions to a common denominator.

**Different types of Ratio –**

Ratio can be divided into following ways –

1) Unit Ratio – When homogeneous items are same on the basis of unit, it is called unit ratio.

For example – Ram and Shyam are getting Rs. 5 each. $xy$= 55 *or* 5:5 *or* 1:1

2) Duplicate Ratio – When the homogeneous items are shown in unit with square, it is called duplicate ratio.

For Example, 2:3 square means $2_2:3_2$ or 4:9

3) Triplicate ratio – When homogenous item is multiplied by 3, it is known as triplicate ratio.

For example, $2_3:3_3$ = x2x2x2:3x3x3 8:27

4) Sub triplicate ratio – When ratio is expressed in cube root it is known as sub triplicate ratio.

For example, $\sqrt{8}_3$: $\sqrt{27}$ $_2$= 2:3

5) Ratio of greater in equality – In this type of ratio the first item of given ratio is greater than other items.

For example, 8:3, 13:8.

6) Ratio of less in equality – When first item of given ratio is less than the other items of ratio, it is called ratio of less of equality.

For example, 2:7, 5:12, 1:3

7) Equality ratio – In this type of ratio first item is equal to other item of ratio.

For example, 5:5, 8:8, 12:12

**Proportion**

Relationship between the two ratio's is called proportion. Here, quantity ratio of first two items is equality to rest two terms.

For example, 2:5::6:15

Proportion is expressed by four parallel points (::).

In the simple proportion here its not necessary that two items of first ratio and the items of second ratio should be homogeneous. But the items of second set of ratio has the same relationship which is found between the items of first ratio. For example 2:5::6:15. Here 5 is 2.5 times of 2 in case of first ratio. In the same 15 is 2.5 times of 6 in the second set of ratio.

**Characteristics of Proportion –**

i i) Proportion is given in four parts. So first number is known as first item, second number is second item, third number is third item and fourth number is known as fourth item.

ii ii) First and fourth items are known as extremes items and second and third items are known as mean items.

iii iii) It is not necessary in proportion that all four items should be homogenous. But the ratios of first and second and third and fourth should be the same.

**Types of Proportion –**

1) Continued proportion –

If ratio of items is going on continuously, e.g., ratio of first and two is equal to two and three and ratio of two and three is equal to three and fourth item and so on, thus, ratio is known as continued ratio.

For example, $AB = BC = CD = DE = EF$….

Here A, B, C, D, E and F are in continued ratio.

2) Direct Proportion –

In this type of ratio, two different items has the such relation that if the one is increased or decreased, another will change accordingly in the same ratio.

| **Sr n.** | **Ratio** | | |
|---|---|---|---|
| 1 | There are two terms in a ratio. | There are four terms in a proportion. | |
| 2 | Comparison of two quantities of same type. | Comparison of two ratios. | |
| 3 | Two quantities must be of same type. | All four quantities are not of same type but the first two are of one type and the last two may be of another type. | |
| 4 | There is not a product rule | The product of extremes is equal to product of the means. | |
| | | | |

Solution :

1. Terms of same kind Rs. 320 and Rs. 480.
2. Direct proportion.
3. We can purchase more quantity of sugar for Rs. 480. Therefore in first ratio small term written first and then big term.
4. ∴ $320 : 480 :: 16 : x$

$$320 \times x = 480 \times 16$$

$$x = \frac{480 \times 16}{320}$$

$$= 24 \text{ kg.}$$

**Illustration 3. 6 carpenters make 24 chairs in a certain time. How many chairs will be made by 5 carpenters in the same time ?**

**Solution :**

1. Terms of same kind – 6 carpenters and 5 carpenters.
2. Direct proportion.
3. 5 carpenters can make less number of chairs. Therefore in first ratio big term is written first and then small term.
4. ∴ $6 : 5 :: 24 : x$

$$x \times 6 = 5 \times 24$$

$$x = \frac{5 \times 24}{6}$$

$$x = 20 \text{ chairs.}$$

**Illustration 4. If 6 labourers make 18 kilometers road in a certain time, how many kilometers road will be made by 15 labourers in the same time ?**

**Solution :**

1. Terms of same kind – 6 labourers and 15 labourers
2. Direct proportion.
3. 15 labourers can work more than 6 labourers. There for the term (x) is more than third term. So second term should be more than first term.
4. ∴ $6 : 15 :: 18 : x$

$$6 \times x = 15 \times 18$$

$$x = \frac{15 \times 18}{6}$$

$$x = 45 \text{ kms.}$$

**Illustration 5. A plain covers a distance of 1800 kilometer in 3 hours. How much distance will it cover is 5 hours ?**

**Solution :**

1. Terms of same kind – 3 hours and 5 hours
2. Direct proportion.

### Procedure to Solve the Problems of Compound Proportion

**Step 1 –** Ascertain the odd term in which answer is required and placed it on third te The unknown number or quantity placed on fourth term. This constitutes a ratio.

**Step 2 –** All same kind of term placed on first and second term (according to direc inverse proportion). It will be again considered that if fourth term x is more than third te then the second term will also more than first term and vice versa.

**Step 3 –** Now an equation is form. We will take product of second and third term on o side and product of first and unknown quantity on other side.

**Equation –** First term × Fourth term = Second term × Third term.

**Illustration 13. 12 Carpenters working 9 hours a day can complete 10 Beds 20 days. How many days will 18 carpenters working 6 hours a day take to comple 30 Beds ?**

**Solution :** 1. Ratio of third and fourth term = 20 days : x days

2. No. of carpentors and wrking days – (Inverse proportion)

3. Less no. of hours takes more working days because it is inverse proportion.

4. More bed will complete in more days because it is direct proportion.

First term : Second term

$$\begin{cases} 18 : 12 \\ 6 : 9 \\ 10 : 30 \end{cases}$$

5. Equation– First term × Forth term = Second term × Third term

$$18 \times 6 \times 10 \times x = 12 \times 9 \times 30 \times 20$$

$$x = \frac{12 \times 9 \times 30 \times 20}{18 \times 6 \times 10}$$

$$= 60 \text{ days}$$

**Illustration 14. 12 men plough a land in 18 days working 10 hours daily. How many days will be taken by 18 men to plough the same land, working 8 hours daily!**

**(Modified DAVV 2010)**

**Solution :**1. Ratio of third and forth term 18 days : x days

| | First term | : | Second term |
|---|---|---|---|
| 2. No. of men (Inverse ratio) | 18 | : | 12 |
| 3. No. of working hours (Inverse ratio) | 8 | : | 10 |

4. Equation – First term × Forth term = Second term × Third term

$$18 \times 8 \times x = 12 \times 10 \times 18$$

$$x = \frac{12 \times 10 \times 18}{18 \times 8}$$

$$x = 15 \text{ days}$$

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## Discount & Brokerage

Trade discount is a discount which is referred to as discount given by the seller to the buyer at the time of purchase of goods. It is given as a deduction in the list price or retail price of the quantity sold. This is usually allowed by the sellers to attract more customers and receive the order in bulk, i.e., to increase the number of sales. No record is to be maintained in the books of accounts of both the buyer and seller for this discount.

**Features of Trade Discount**

1. It is usually allowed with the aim of facilitating bulk sales.
2. It can be generally allowed to all customers who want to purchase in bulk.
3. No entry is made in the books of accounts of both the buyer and seller in case of trade discount.
4. It is always deducted before any type of an exchange takes place. So, it does not form part of the books of accounts of the business.
5. It is usually allowed at the time of purchase.
6. It usually differs from the number of goods purchased and the number of purchases.

**1. Discount**

Discount is reduction in marked price.

**Types:**

• Trade Discount – Given by wholesaler, not recorded in books
• Cash Discount – Given for early payment, recorded in books

**Formulas:**

Discount = MP × Rate / 100
SP = MP – Discount

**Successive Discount:**

Net Discount = A + B – (A × B / 100)

**2. Brokerage**

Brokerage is fee paid to broker for buying/selling.

**Formulas:**

Brokerage = Value × Rate / 100
Total Cost = Purchase Value + Brokerage
Net Sale = Sale Value – Brokerage

Note the following:

(i) Discount is always calculated on the amount.
(ii) Discount = Amount – Present worth.
(iii) Present worth = Amount – Discount.
(iv) Banker's discount is the simple interest on the face value or amount or sum due.
(v) Banker's Gain = $BD - TD$.
(vi) Interest on $TD = BD - TD$.

***Example 35:***

The list price of an article is ₹ 10,000. The producer offers 20% trade discount to the customer. A cash discount of 3% is offered for immediate payment. Assuming that the customer makes immediate payment for the purchase, compute the selling price.

Solution :

| | |
|---|---|
| List Price | 10,000 |
| *Less:* Trade Discount @ 20% (10,000 × 20%) | 2,000 |
| Invoice Price | 8,000 |
| *Less:* Cash Discount @ 3% (8000 × 3%) | 240 |
| **Selling Price** | **7,760** |



**Illustration 8. Find the single rate equivalent to the following series discount – 20% + 15% + 5%**

**Solution:** Listed price = 100

| | | | |
|---|---|---|---|
| Less : | First Discount (20%) [ 100 × 20% ] | = | 20 |
| | Remaining | = | 80 |
| Less : | Second Discount (15%) [ 80 × 15% ] | = | 12 |
| | Remaining | = | 68 |
| Less : | Third Discount (5%) [ 68 × 5% ] | = | 3.40 |
| | Invoice price | = | 64.60 |

Equivalent discount = Gross price – Net invoice price

= 100 – 64.60 = 35.40 Rs.

Equivalent discount rate = 35.4%

**Illustration 9. An importer buyes goods at 10% discount but pays an import duty at 5% on cost, the other expenses amount to 20% of landed cost. By how much percent should the goods be marked above the list price so as to gain 15% on the total cost.**

**Solution:** Listed price = 100

| | | | |
|---|---|---|---|
| Less : | Discount 10% | = | 10 |
| | Remaining | = | 90 |
| Add : | Import duty 5% | = | 4.50 |
| | | = | 94.50 |
| Add : | Other expenses 20% | = | 18.90 |
| | Total cost | | 113.40 |
| Add : | Desired profit 15% | = | 17.01 |
| | Selling price | = | 130.41 |

∴ Increase in cost price = 130.41 – 100 = 30.41 Rs.

Percentage increase = 30.41.%

**Nine values tables :** Nine values tables is used for quick calculation of discount. A business in which lot of transaction are done in a day and the rate of discount is same the discount on Re. 1 to 9 is calculated and set in a table. With the help of these table discount of any of the transaction value is calculated very easily. For example a seller allows $6\frac{1}{4}$% discount to his customer, the nine values table is calculated as under :

Discount on Rs. 100 = $\frac{25}{4}$

Discount on Re 1 = $\frac{25}{4} \times \frac{1}{100}$ = 0.0625

**Table of Nine multiples**

| Rs. | Discount |
|---|---|
| Re. 1 | 0.0625 × 1 = 0.0625 |
| Rs. 2 | 0.0625 × 2 = 0.1250 |
| Rs. 3 | 0.0625 × 3 = 0.1875 |
| Rs. 4 | 0.0625 × 4 = 0.2500 |
| Rs. 5 | 0.0625 × 5 = 0.3125 |
| Rs. 6 | 0.0625 × 6 = 0.3750 |
| Rs. 7 | 0.0625 × 7 = 0.4375 |
| Rs. 8 | 0.0625 × 8 = 0.5000 |
| Rs. 9 | 0.0625 × 9 = 0.5625 |

**Use of Table :** If we want to calculate discount on Rs. 4,568. It will be calculated as under.

Discount on Rs. 4,000 = .2500 × 1,000 = 250

Discount on Rs. 500 = .3125 × 100 = 31.25

Discount on Rs. 60 = .3725 × 10 = 3.75

Discount on Rs. 8 = .5000 × 1 = .50

Total discount 285.50

**Illustration 10. A wholesale dealer of motor car tyres offers a discount of 20%, 15% and 10%. Find the single equivalent rate with the help of nine value table. Calculate the discount on invoice of Rs. 1,845.75.**

| | | | |
|---|---|---|---|
| **Solution:** | Listed price | = | 100 |
| Less : | Discount 20% | = | 20 |
| | Remaining | | 80 |
| Less : | Discount 15% | = | 12 |
| | Remaining | | 68 |
| Less : | Discount 10% | = | 6.80 |
| | Net invoice price | = | 61.20 |

# Unit 5

## 1. Simple Interest (SI)

Simple interest is calculated only on the principal amount (the original money). It is linear and predictable.

**I = (P × R × T) / 100**

**A = P + I**

**P:** Principal (Initial Sum)

**R:** Rate of Interest (per annum)

**T:** Time (in years)

## 2. Compound Interest (CI)

Interest on interest. The interest earned is added back to the principal for the next period.

**$A = P [1 + (R / 100)]^n$**

**CI = A - P**

**Note for different frequencies:**

**Half-Yearly:** Rate = R/2, Time = n × 2

**Quarterly:** Rate = R/4, Time = n × 4

**Q1. At what rate of SI will ₹5,000 double itself in 8 years?**

**Solution:**

Given: P = 5000, A = 10000 (doubled), T = 8 years.

I = A - P = 5000.

R = (I × 100) / (P × T) = (5000 × 100) / (5000 × 8) = 12.5%.

**Ans: 12.5% p.a.**

**Q2. Calculate CI on ₹10,000 for 1 year at 12% p.a. compounded quarterly.**

**Solution:**

P = 10,000, R = 12% (Quarterly R = 12/4 = 3%), n = 1 year (4 quarters).

$A = 10000(1 + 0.03)^4$ = 10000 × 1.1255 = ₹11,255.

CI = 11,255 - 10,000 = ₹1,255.

**Ans: ₹1,255**

**Q3. Find the difference between SI and CI on ₹20,000 for 2 years at 10% p.a.**

**Solution:**

SI = (20000 × 10 × 2) / 100 = 4,000.

CI = $[20000(1.1)^2]$ - 20000 = 24200 - 20000 = 4,200.

Difference = 4200 - 4000 = ₹200.

**Ans: ₹200**