

21/9/23

# Least Common Multiple (LCM)

Quantitative Aptitude

## Introduction

Traditional Method

Fraction Factorisation

Short cut Method

Long division

### Traditional Method:

1) Find LCM for 8, 12, 6, 4?

8	12	6	4
16	24	12	8
24	36	18	12
32	48	24	16
		30	24
			28

Least common Multiple = 24

### Factorisation Method:

① Find LCM 8, 12, 6, 4

$$\begin{array}{l}
 2 \overline{) 8} \\
 2 \overline{) 4} \\
 2 \overline{) 2} \\
 \underline{\quad} \\
 1 \\
 2^3
 \end{array}
 \left|
 \begin{array}{l}
 2 \overline{) 12} \\
 2 \overline{) 6} \\
 3 \overline{) 3} \\
 \underline{\quad} \\
 1 \\
 2^2 \times 3 \\
 2^3 \times 3 \\
 = 24
 \end{array}
 \right.
 \left.
 \begin{array}{l}
 2 \overline{) 6} \\
 3 \overline{) 3} \\
 \underline{\quad} \\
 1 \\
 2 \times 3
 \end{array}
 \right)
 \begin{array}{l}
 2 \overline{) 4} \\
 2 \overline{) 2} \\
 \underline{\quad} \\
 1 \\
 2^2
 \end{array}$$

(Highest power take)

2) find LCM 12, 8, 15 ?

$2 \times 3 \times 5$

$$\begin{array}{r} 2 \overline{) 12} \\ \underline{2} \phantom{0} \\ 2 \phantom{0} \\ \underline{2} \phantom{0} \\ 3 \phantom{0} \\ \underline{3} \\ 1 \end{array}$$

$$2^2 \times 3$$

$$\begin{array}{r} 2 \overline{) 8} \\ \underline{2} \phantom{0} \\ 2 \phantom{0} \\ \underline{2} \phantom{0} \\ 2 \\ \underline{2} \\ 1 \end{array}$$

$$2^3$$

$$\begin{array}{r} 3 \overline{) 15} \\ \underline{3} \phantom{0} \\ 5 \phantom{0} \\ \underline{5} \\ 1 \end{array}$$

$$3^1 \times 5^1$$

$$2^3 \times 3 \times 5 = 120$$

Long Division Method:

①

$$\begin{array}{r} 2 \overline{) 8, 12, 6, 4} \\ \underline{2} \phantom{0}, \underline{2} \phantom{0}, \underline{2} \phantom{0}, \underline{2} \phantom{0} \\ 2 \overline{) 4, 6, 3, 2} \\ \underline{2} \phantom{0}, \underline{2} \phantom{0}, \underline{2} \phantom{0}, \underline{2} \phantom{0} \\ 2 \overline{) 2, 3, 3, 1} \\ \underline{2} \phantom{0}, \underline{2} \phantom{0}, \underline{2} \phantom{0}, \underline{2} \phantom{0} \\ 3 \overline{) 1, 3, 3, 1} \\ \underline{3} \phantom{0}, \underline{3} \phantom{0}, \underline{3} \phantom{0}, \underline{3} \phantom{0} \\ 1, 1, 1, 1 \end{array}$$

$$2^3 \times 3 = 24$$

$24/3$

② 12, 8, 15

Short cut Method  $\Rightarrow$  Choose Largest number

①  $8, 12, 6, 4 = 24$

②  $12, 6, 24, 8 = 24$

③  $12, 3, 9 = 36$

④  $3, 11, 2 = 11 \times 12 = 132$

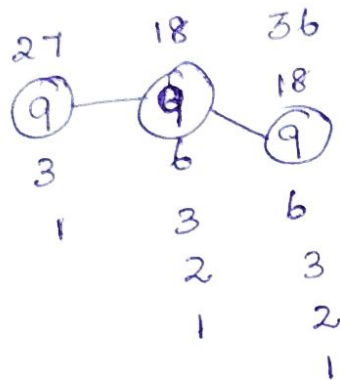
$11, 2$   
 $12 \times 3 = 36$   
 $12 \times 7 = 84$   
 $24 \times 9 = 216$

$12 \times 2 = 24$   
 $\frac{24}{6} = 3$   
 $\frac{12}{4} = 3$   
 $\frac{24}{4} = 6$   
 $\frac{24}{6} = 4$

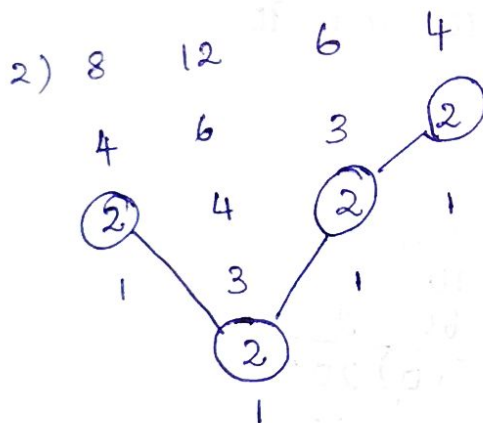
# Highest Common Factor

## Traditional Method

1) Find HCF 27, 18, 36



$$\text{HCF} = 9$$



## Factorization Method

1) 27 18 36

$$\begin{array}{r} 3 \overline{) 27} \\ 3 \overline{) 9} \\ 3 \overline{) 3} \\ 1 \end{array}$$

$$3^3$$

$$\begin{array}{r} 2 \overline{) 18} \\ 3 \overline{) 9} \\ 3 \overline{) 3} \\ 1 \end{array}$$

$$2 \times 3^2$$

$$\begin{array}{r} 2 \overline{) 36} \\ 2 \overline{) 18} \\ 3 \overline{) 9} \\ 3 \overline{) 3} \\ 1 \end{array}$$

$$2^2 \times 3^2$$

$$3^2 = 9$$

2) 12, 6, 8, 4

$$\begin{array}{r} 2 \overline{) 12} \\ 2 \overline{) 6} \\ 3 \overline{) 3} \\ \hline 1 \end{array} \quad \begin{array}{r} 2 \overline{) 6} \\ 3 \overline{) 3} \\ \hline 1 \end{array} \quad \begin{array}{r} 2 \overline{) 8} \\ 2 \overline{) 4} \\ 2 \overline{) 2} \\ \hline 1 \end{array} \quad \begin{array}{r} 2 \overline{) 4} \\ 2 \overline{) 2} \\ \hline 1 \end{array}$$

$2^2 \times 3 \quad 2 \times 3 \quad 2^3 \quad 2^2$

$$\boxed{2' = 2}$$

Division Method:

1) Find the HCF for 70 and 90?

HCF = 10

$$\begin{array}{r} 1 \\ 70 \overline{) 90} \\ \underline{70} \phantom{0} \\ 20 \phantom{0} \\ 20 \overline{) 20} \\ \underline{20} \\ 0 \end{array}$$

2) Find HCF for 360 and 132?

$$\begin{array}{r} 2 \\ 132 \overline{) 360} \\ \underline{264} \phantom{0} \\ 96 \phantom{0} \\ 96 \overline{) 96} \\ \underline{96} \\ 0 \end{array}$$

HCF = 12

$$\begin{array}{r} 1 \\ 24 \overline{) 36} \\ \underline{24} \phantom{0} \\ 12 \phantom{0} \\ 12 \overline{) 12} \\ \underline{12} \\ 0 \end{array}$$

3) Find HCF for 27, 18 and 36?

$$\begin{array}{r}
 18 \overline{) 27} \\
 \underline{18} \phantom{0} \\
 9 \phantom{0} \\
 9 \overline{) 36} \\
 \underline{36} \\
 0
 \end{array}$$

$$\begin{array}{r}
 27 + 18 \\
 \hline
 \boxed{\text{HCF} = 9}
 \end{array}$$

$$\begin{array}{r}
 4 \\
 9 \overline{) 36} \\
 \underline{36} \\
 0
 \end{array}$$

Short cut Method:

(Given numb. below 100)

1) 27  $\boxed{18}$  36  
           9  
 HCF = 9

⇒ Factor of small number  
 ⇒ { All number divided by that  
       small number

⇒ Then it is HCF

2)  $\boxed{24}$ , 42, 30  
 '12 → X  
 8 X  
 6 ✓

$$\boxed{\frac{42}{6}, \frac{30}{6}}$$

# LCM and HCF

## Model 1

### Fractions

$$\text{LCM} \Rightarrow \frac{2}{5}, \frac{3}{15}, \frac{6}{25}$$

$$\text{LCM} = \frac{\text{L.C.M } N \uparrow}{\text{H.C.F } D \downarrow}$$

$$\text{H.C.F} = \frac{\text{HCF } \uparrow N}{\text{LCM } \downarrow D}$$

$$\text{Numerator} = 2, 3, 6 = 6 \text{ (short cut)} \rightarrow \text{LCM}$$

$$\text{D} = 5, 15, 25 = 5 \text{ (short cut)} \rightarrow \text{HCF}$$

$$\text{LCM} = \frac{6}{5}$$

$$\textcircled{1} \text{ LCM } \frac{27}{50}, \frac{9}{20}, \frac{6}{25}$$

$$\frac{\text{LCM of } N}{\text{HCF of } D} = \frac{27, 9, 6}{50, 20, 25} = \frac{54}{5}$$

$$\begin{array}{r} 27 \times \\ \underline{2} \phantom{\times} \\ 54 \\ \hline 54 \\ \underline{6} \phantom{\times} \\ 20 \\ \hline 50 \\ \hline 5 \\ \hline 4 \\ \hline 2 \end{array}$$

$$\textcircled{2} \text{ LCM } \frac{2}{3}, \frac{4}{9}, \frac{5}{6}, \frac{7}{12}$$

$$\frac{\text{LCM of N} = 2, 4, 5, 7}{\text{HCF of D} = 3, 9, 6, 12} = \frac{4 \times 5}{20 \times 7 = 140}$$

$$\text{LCM} = \frac{140}{3}$$

② Find HCF  $\Rightarrow \frac{4}{9}, \frac{10}{21}$  and  $\frac{20}{63}$

$$\frac{\text{N HCF} = 4 \quad 10 \quad 20}{\text{D LCM} = 9 \quad 21 \quad 63} = \frac{2}{63}$$

$$\begin{array}{r} 63 \quad \frac{21 \times 3}{63} \\ \frac{21 \times 3}{63} \\ \frac{2}{63} \\ 42 \end{array}$$

$\text{HCF} = \frac{2}{63}$

MODEL 2

Decimal

9.36    6.04    7.94

1) Find LCM for 1.2, 1.5, 2 and 5?

1.2	1.5	2.0	5.0
x10	x12	x15	x20
$2 \mid 12 \quad 15 \quad 20 \quad 50$			
$2 \mid 6, 15, 10, 25$			
$3 \mid 3, 15, 5, 25$			
$5 \mid 1, 5, 5, 25$			
$5 \mid 1, 1, 1, 5$			
$5 \mid 1, 1, 1, 1$			

$$2^2 \times 3 \times 5^2 = 300$$

$$\div \text{by } 10 = 30$$

- $\Rightarrow$  change all number to equal decimal value
- $\Rightarrow$  then multiply with digit after points (ie) x10
- $\Rightarrow$  LCM (long division method)
- $\Rightarrow$   $\div$  the answer again by 10.

$$2^2 \times 3 \times 5^2 = 300$$

$$\frac{300}{10} = 30$$

2) Find LCM for 1.20, 0.24 & 6?

1.20      0.24      6.00  
 $\times 100$     120      24      600

2	120	24	600
2	60	12	300
2	30	6	150
2	15	3	75
3	5	3	25
5	1	1	5
5	1	1	1

$2^4 \times 3 \times 5^2 = 600$

$\div$  by 100

LCM = 6

$$\begin{array}{r} 24 \times 2 \\ \underline{5} \quad 2 \\ 120 \times 5 \\ \underline{600} \quad 6 \times 3 \\ \underline{480} \quad 4 \\ \underline{240} \quad 2 \\ \underline{120} \end{array}$$

3) Find LCM for 0.12, 0.96 and 0.6?

0.12      0.96      0.60  
 $\times 100$       12      96      60

2	12	96	60
2	6	48	30
2	3	24	15
2	3	12	15
3	3	6	15
2	1	2	5

$5 \mid 1, 1, 5$   
 $1, 1, 1$

$2^5 \times 5 \times 3 = 480$

LCM = 4.8



④ Find HCF for 6.16 and 13?

6.16

13.00

$\times 100$

616

1300

$$\begin{array}{r} 2 \\ \hline 616 \overline{) 1300} \\ \underline{1232} \phantom{00} \\ 68 \phantom{00} \\ \phantom{00} 616 \\ \phantom{00} \underline{612} \phantom{00} \\ \phantom{00} \phantom{00} 4 \phantom{00} \\ \phantom{00} \phantom{00} \phantom{00} 17 \\ \phantom{00} \phantom{00} \phantom{00} \underline{68} \\ \phantom{00} \phantom{00} \phantom{00} \phantom{00} 68 \\ \phantom{00} \phantom{00} \phantom{00} \phantom{00} \underline{68} \\ \phantom{00} \phantom{00} \phantom{00} \phantom{00} \phantom{00} 0 \end{array}$$

HCF = 4

$\div$  by 100  $0.004$

### Model - 3

- Railway
- Staff Selection
- Tamilnadu
- Placement

### Product of Numbers

Eg: 12, 9 [product of 12, 9 = 108]  
 $12 \times 9 = 108$

L.C.M = 36

H.C.F = 3

$36 \times 3 = 108$

$$\begin{array}{r} 12 \\ \times 9 \\ \hline 108 \end{array}$$

Product of two numbers = LCM  $\times$  HCF

$N_1 \times N_2 = \text{LCM} \times \text{HCF}$

$108 = 108$

① LCM and HCF of two numbers are 1260 and 63 respectively. If one of the number is 315 Find the another number.

LCM = 1260

HCF = 63

$$\begin{array}{r} 1260 \times \\ 63 \overline{) 79380} \\ \underline{3780} \\ 7560 \\ \underline{79380} \end{array}$$

$315 \times ? = 1260 \times 63$

$N_1 \times N_2 = \text{LCM} \times \text{HCF}$

$315 \times N_2 = 1260 \times 63$

$N_2 = \frac{1260 \times 63}{315} = 252$

$N_2 = 252$

## Home Work

1) The L.C.M of two numbers is 1820 and their H.C.F is 26. If one number is 130 then the other number is : (Ans: 364)

2) The L.C.M of two numbers is 14560 and their H.C.F is 13. If one number is 416 then the other number is : (Ans: 455)