12/2/24

HCF & LCM of Numbers

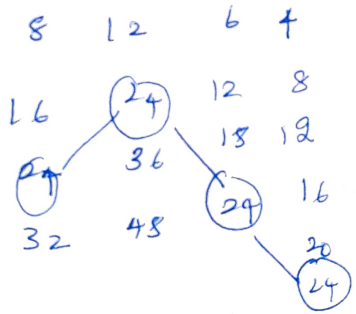
Lesson 1 Introduction:-

LCM - Least Common Multiple

* Traditional Method
* Factorization
* Shortcut Method
* Long Division

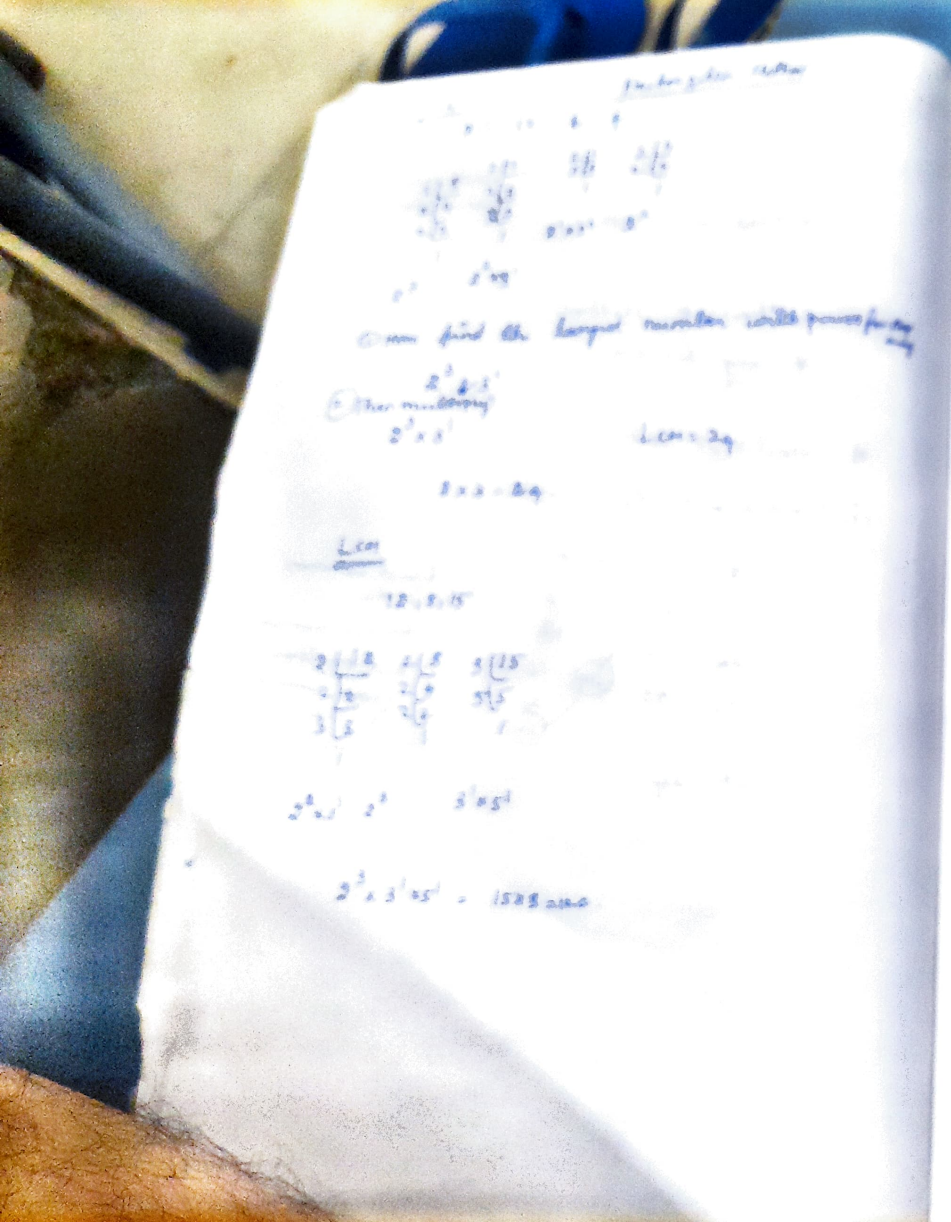
☆ Traditional Method

(i) Find LCM of 8, 12, 6, 4



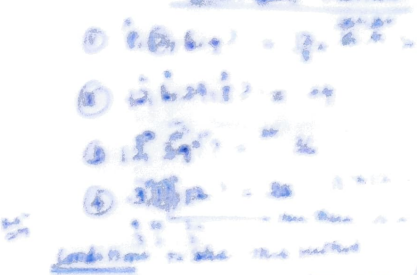
LCM: 24.

Least Common is the given numbers has multiple value common in all given values



Long division method

Short cut Method



Lesson 2

HCF (Highest common Factor)

→ Traditional Method
→ Factorization Method
→ Division Method
→ Short cut Method

Traditional Method

Find HCF

27, 18, 36

Here we the number divided by the prime factors

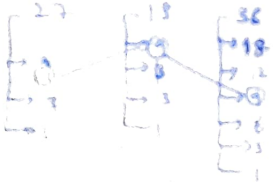
Ex:

27

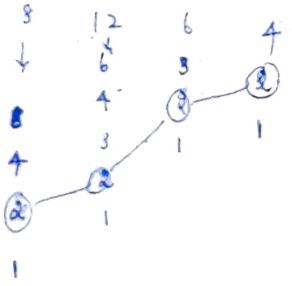
27 | 9
27 | 3
9 | 1

Write number from highest to lowest

and common in all numbers are multiplied



HCF = 9



HCF = 2

Factorisation Method –

27, 18, 36

3 | 27 → 3 | 9 → 3 | 3 → 1 = 3^3

3 | 18 → 3 | 6 → 2 | 3 → 1 = $3^2 \times 2^1$

3 | 36 → 3 | 12 → 2 | 6 → 2 | 3 → 1 = $3^2 \times 2^2$

check the common factor are in given numbers, select the lowest among them

$= 3^2 = 9$

12, 6, 8, 4

3 | 12 → 2 | 4 → 2 | 2 → 1 | 1

2 | 6 → 2 | 3 → 1

2 | 8 → 2 | 4 → 2 | 2 → 1

2 | 4 → 2 | 2 → 1

$3^1 2^1$ $3^1 2^1$ 2^3 2^2

$= 2^1 = 2$

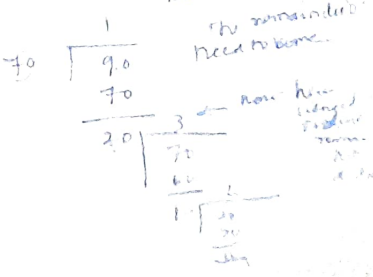
Division Method (i) with 2 numbers

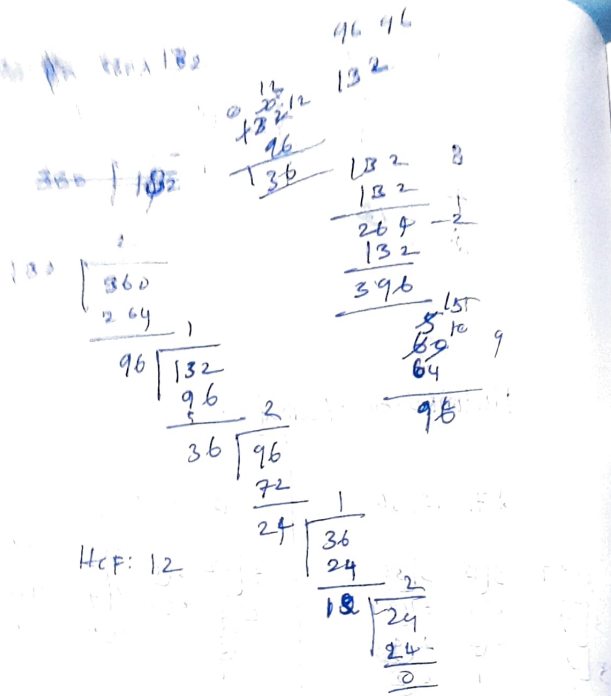
Find HCF of 70 & 90?

70 | 90 → 70 | 20 → 60 | 10

HCF = 10

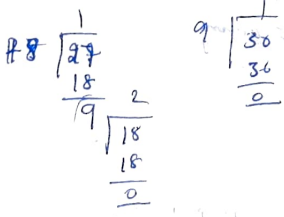
Here we need to divide two values which the remainder need to zero.





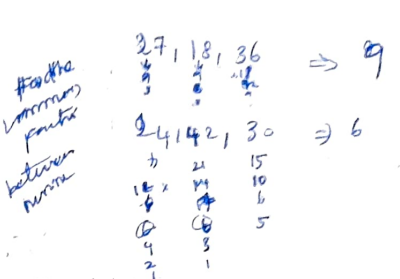
ii) With 3 numbers

i) find HCF for 27, 18, 36



HCF: 9

Short cut Method:



(95)

(1) if the given number is less than 100 we short cut Method

(2) if the given number is greater than 100 we use Division Method.

Lesson 3

Model 1

Fractions

Find LCM with given $\frac{2}{5}, \frac{3}{15}, \frac{6}{25}$

LCM ⇒ formula

for Numerator (find LCM)

for Denominator (find HCF)

HCF ⇒ formula

for Numerator (find HCF)

for Denominator (find LCM)

LCM

LCM:

Numerator

2, 3, (6)

2	2, 3, 6
3	1, 3, 3
	1 1 1

HCF:

Denominator

5	15	25
↓	↓	↓
5	5	5
1	3	1
	1	

A = 5

LCM: $\frac{6}{5}$

HCF

$\frac{2}{3}$ $\frac{3}{15}$ $\frac{6}{25}$

HCF:

2	3	6
4	3	3
2	1	1
1		

$= \frac{1}{75}$

$\frac{15 \times 5}{75}$

LCM:

3	3 15 25
5	1 5 25
5	1 1 5
	1 1 1

LCM:

$\frac{27}{50}, \frac{9}{20}, \frac{6}{25}$

LCM (Num):

3	27, 9, 6
3	9, 3, 2
3	3, 1, 2
2	1, 1, 2
	1 1 1

HCF (Denom)

	50	20	25
	↓	10	5
	10	5	1
	5	4	
	1	1	

5	50	20	25
5	10	4	5
2	2	4	1
2	1	2	
	1	1	

$\frac{54}{5}$

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

LCM (Num)

2	2 4 5 7
2	1 2, 5, 7
5	1 1 5 7
7	1 1 1 7
	1 1 1 1

HCF (Denom)

3	9	6	12
↓	↓	↓	↓
3	3	3	6
1	1	2	4
		1	3
			2
			1

$\frac{140}{1} = \frac{140}{3}$

Lesson 4 - Decimal

Find LCM for 1.2, 1.5, 2 & 5?

1.2 1.5 2.0 5.0

First multiply to the equal decimal values

12 15 20 50

So remove our one zeros to all

L.C.M = 300

$\Rightarrow \frac{300}{10}$

= 30.

	12	15	20	50
2	6	15	10	25
5	6	3	2	5
3	2	1	2	5
5	2	1	2	1
2	1	1	1	1

300

Find LCM of 1.20, 0.24 & 60?

	1.20	0.24	60
	x100	x100	x100
	120	24	6000

	120	24	6000
2	60	12	3000
2	30	6	1500
5	15	3	750
5	3	3	150
5	1	3	30
2	1	3	6
	1	3	3
	1	1	1

LCM = 2 x 2 x 5 x 5 x 2 x 3 = 600

$\frac{600}{100} = 6$

HCF of 6.16 & 13

x100

6.16 & 1300

	616	1300
2	308	650
2	154	325
2	77	325
11	7	25
7	1	25
	1	1

HCF = 4

$\frac{4}{100} = 0.04$

	616	1300
	1	2
68	616	1232
	9	
4	68	612
	17	
17	68	
	68	
	0	

Lesson 5:

Module 3:

Product of Numbers ⊗ V topic

Ex:-

12 9 = 108 12 x 9 = 108

Take LCM & HCF

LCM

	12	9
3	4	3
	1	3
	1	1

3 x 4 x 3 = 36

HCF

	12	9
	1	
9	12	
	9	
3	3	
	9	
	0	

HCF = 3

Here, Products of 2 no = HCF x LCM

36 x 3

108

* Example :-

1. LCM and HCF two no are 1260 & 63
If one of the number is 315.

product of two numbers = HCF × LCM

$x \times 315 = 1260 \times 63$

$x = \frac{1260 \times 63}{315}$

$x = 252$

The other no is 252

H/W

Product

The LCM of 2 numbers is 1820 · HCF is 26 one no is 130 other no is ?

LCM × HCF = product of 2 numbs

$1820 \times 26 = 130 \times N_2$

$N_2 = \frac{1820 \times 26}{130}$

$N_2 = 364$

The LCM of two numbers is 14560 and HCF is 13 and one no is 416. The other is

$14560 \times 13 = 416 \times N_2$

$N_2 = \frac{14560 \times 13}{416}$

$= 455$

Lesson - 6

Model 4

LCM - Same / different Remainder

Same Remainder :-

Ex

Diff Remainder :-

Ex

find the least number which when divided by 4, 9, & 12 will leave each case a remainder 3

4 | ? → 3

9 | ? → 3

12 | 3 → 3

Take LCM (4, 9, 12) = 36

4 | 4, 9, 12

3 | 1, 9, 3

3 | 1, 1, 3

1 1 1

4 | 39 → 36 → 3

9 | 39 → 36 → 3

12 | 39 → 36 → 3

Then add remainder with LCM = 36 + 3

= 39

find the least number when divided by 4, 6, 8, 12, 16 will leave case in remainder 2

4 | 2

6 | 2

8 | 2

12 | 2

16 | 2

4 | 4, 6, 8, 12, 16

2 | 1, 6, 2, 3, 4

2 | 1, 3, 1, 3, 2

3 | 1, 3, 1, 3

1 1 1 1

4 | 50 → 48 → 2

8 | 50 → 48 → 2

6 | 50 → 48 → 2

12 | 50 → 48 → 2

16 | 50 → 48 → 2

48 = 48 + 2

= 50.

Computer Monthly salary

Model-5 (5) for company, Railway owner

Lesson: 7

18/9/24

least 4 digit Number

99 - 2 digit no

100 - 3 digit no (least)

999 - Highest 3 digit no

1000 - 4 least digit no

9999 - 4 highest digit no

10000 least 5 digit no

99999 highest 5 digit no

Ex: find the least number of four digit which is divisible by 4, 16, 8 & 10. (1000)

1. Take LCM for divisible value 4, 16, 8, 10.
2. Then take LCM value multiple

use any one method (i) Shortcut (or) ii) Traditional

Shortcut Method

2	4, 16, 8, 10
3	3, 8, 4, 5
4	1, 8, 4, 5
5	1, 2, 1, 5
	1, 2, 1, 1

$120 \times 3 = 360$ (X not is divisible)

$120 \times 8 = 960$ (X not a four digit no)

$120 \times 9 = 1080$ is a least four digit no

Traditional Method

$120 \overline{)1000}\ (8$

960

40

$1000 + (120 - 40) = 80$

Practice:

1. find the least number of 4 digit divisible by 18, 24 & 32

2	18, 24, 32
3	9, 12, 16
4	3, 4, 16
4	3, 1, 4
3	3, 1, 1
	1, 1, 1

48×3

144×2

288×5

24×4

96×3

44×8

$288 \times 2 = 576$

$288 \times 3 = 864$

$288 \times 4 = 1152$

donot a least

$22 \times 3 = 66$

288×3

864

288×4

1152

33

288×4

1152 → least 4 digit no

10000

② find the least number of five digit which is divisible by 16, 18, 24 & 30.

2 | 16, 18, 24, 30
8, 9, 12, 15

720 × 3 = 2160

720 × 8 = 5760

720 × 9 = 6480

720 × 15 = 10,800 → five digit no

720 × 14 = 10,080 → least 5 digit no

③ Find the smallest 4-digit no such that when divided by 12, 18, 21 and 28 it leaves remainder 3 in each case

→ means add the remainder.

2 | 12, 18, 21, 28
2 | 6, 9, 21, 14
3 | 3, 9, 21, 7
3 | 1, 3, 7, 7
7 | 1, 1, 7, 7
1, 1, 1, 1

4 × 9 × 7 = 63 × 4 = 252

LCM 252

252 × 4 = 1008 - least 4 digit

& leaves remainder 3 means add that

1008 + 3 = 1011

12) 1011
3

Ans: 1011.

LCM and HCF

MODEL-6

Lesson-8

Greatest 4/5 digit numb

Greatest 4 digit number - 9999 (→)

" 5 " " - 99999 (→)

Answer should be (→) with digit number.

Q1. Find the greatest 4-digit number divisible by 12, 15, 20, 35 and leave no remainder.

2 | 12, 15, 20, 35

2 | 6, 15, 10, 35

3 | 3, 15, 5, 35

5 | 1, 5, 5, 7

1, 1, 1, 7

2 × 2 × 3 × 5 × 7

4 × 3

12 × 5

60 × 7

420

420 × 2

840

420 × 10

420 × 5

9660

9660 / 420 = 23

420 × 23

1260

8400 +

9660

420 × 21

420

8400 +

8820

420 × 20

8400

420

8820

8400 × 21

(2) find the greatest 4-digit no which when divided by 15, 10, 20. leaves no remainder.

2 | 10 15 20

2 | 5, 15, 10

3 | 5, 15, 5

5 | 1, 5, 5

1 1 1

60

60 × 99

540 5

5940 +

6530

60 | 9999

60 | 399

360

399

360

39

166 × 60

166 × 60

000

996

3 6

60 × 110

00

600 +

60 ++

6600

60 × 17

60 × 180

00

1020 +

10200

60 × 250

00

9000 +

90000

60 × 160

00

9600 +

96000

9999 - 39

9960

⑤ Find the greatest 5-digit no which divides 8, 4, 6 leaves 3 as remainder

99999 → 5 digit greatest no.

2 | 8, 9, 10
2 | 4, 9, 5
3 | 2, 9, 5
3 | 1, 3, 5
5 | 1, 5
1, 1

4 8 24 48 240
2 × 2 × 2 × 3 × 3 × 5

~~4 2 5~~
~~1 2 0~~
360

8 | 8, 9, 10
1, 9, 10
7 2, 1 0
210

15×3
5×2
3×2
90×2
180×2
360

4 7 6
360 | 99999
840
1599
1470
1299
1080
219
39

2 | 8, 9, 10
2 | 4, 9, 5
5 | 2, 9, 5
9 | 1, 9, 1
1, 1

2×2
4×2
8×3
24×3
72×5
360

99999 | 39
39
999 0 +3
9963

45×2
90×4
45×4
0

819, 10

360 | 2 7 7
99999
720 ↓
2799
2520 ↓
02799
2520
279

99999 − 279

360×7
4
360×8
2880
8×6
4
360×8
2880

99999
279
99720+3

99923

lesson-9

Model-7

(Applications Questions)

① A, B, C start jogging around a circular field and complete a single round in 18 sec, 22 sec, 30 sec respectively. In how much time will they all meet at start point?

A B C

A – 18 Sec
B – 22 Sec
C – 30 Sec

18 22 30
36 24 60
54 88 90
0 0 0

L.C.M

2 | 18, 22, 30
3 | 9, 11, 15
3 | 3, 11, 5
5 | 1, 11, 5
11 | 1, 11, 1
1, 1

2×3=6
6×3=18
18×5=90
90×11=990

= 990 Sec.

② Three friends A, B, C start running a circular ground in 24 seconds, 36 seconds, 30 seconds respectively, after how many minutes will they meet again at starting point?

3 | 24, 36, 30	2×2 = 4
3 | 8, 12, 10	4×2 = 8
2 | 8, 4, 10	8×5 = 40
2 | 4, 2, 5	40×9 = 360 sec
2 | 2, 1, 5	
5 | 1, 1, 5	
1, 1, 1	

$\frac{360}{60}$ = 6 minutes

1 min = 60 sec

6 min = 360 sec

③ The traffic lights at three different road crossings change after 24 sec, 36 sec, 54 sec respectively, if they all change simultaneously at 10:15:00 AM, then what time they will change simultaneously

2 | 24, 36, 54	2×2×2 = 8
3 | 12, 18, 27	3×3×3 = 27
2 | 4, 6, 9	8×27 = 216 sec
2 | 2, 3, 9	
3 | 1, 3, 9	
3 | 1, 1, 3	
1, 1, 1	

60 sec = 1 min

216 sec = 3 min 36 sec

Now the three signal at 10:05:00 AM

after 3 min 36 sec → 10:08:36 AM.

the next three signal.

④ There are 3 bell which start ringing 3, 6, 9, 12, 15 seconds respectively. In 36 minutes how many times will the bells ring simultaneously?

LCM of (3, 6, 9, 12, 15)

3 | 3, 6, 9, 12, 15	2×2 = 4
3 | 1, 2, 3, 4, 5	3×3 = 9
2 | 1, 2, 1, 4, 5	5×1 = 5
2 | 1, 1, 1, 2, 5	5×9×4
5 | 1, 1, 1, 1, 5	45×4
1, 1, 1, 1	180

180 sec = 3 min

36 × 3 min = 1 hr

$\frac{180}{60} = 3$

180 = 1 ring = 3 min

? rings = 36 min

$\frac{36 \times 3}{3} = 36$

1	2	3	4	5	6	7	8	9	10	11	12	
	3 min	3m	3m	3m	3m	3m	3m	3m	3m	3m	3m	
1	2											
times												

12 × 3

A: 13

⑤ Three pieces of timber 42 m, 49 m, 63 m long have to be divided into planks of same length, what is the greatest possible length of each plank?

(Greatest, largest, highest → HCF)

42	49	63
1	7	21
7	7	9
6	1	7
3		3
2		1

7 × 3 × 1

A: 7 m