H.C.F. AND L.C.M. DAY-5

Concept of Factor and Multiple

When two or more numbers are multiplied together to give a product, each is called a factor of the product.
The product of two or more numbers is said to be a multiple of each of those numbers.
For example, 4 x 5 = 20. Here, 4 and 5 are factors of 20 and 20 is a multiple of both 4 and 5.
HCF (Highest Common Factor) Also known as GCD and GCM' (Greatest Common divisor and Greatest Common Measure).
LCM (Least Common Multiple) Also known as least common dividend.

Important Result

1. HCF × LCM = One number × Another number

2. LCM of fractions = $\frac{\text{LCM of numerators}}{\text{HCF of denominators}}$

3. HCF of fractions = $\frac{\text{HCF of numerators}}{\text{LCM of denominators}}$

Example : Find the *LCM* and *HCF* of $\frac{25}{6}$ and $\frac{15}{4}$.

Solution : LCM of $\frac{25}{6}$ and $\frac{15}{4}$

$$= \frac{\text{LCM of } (25, 15)}{\text{HCF of } (6, 4)} = \frac{75}{2}$$

$$\text{HCF of } \frac{25}{6} \text{ and } \frac{15}{4} = \frac{\text{HCF of } (25, 15)}{\text{LCM of } (6, 4)} = \frac{5}{12}$$

Multiple Choice Questions

1. Find the greatest no., which can divide 72 and 90.
(a) 16 (b) 17
(c) 18 (d) 19

2. Find the greatest no., which can divide 342, 396 and 432?
(a) 18 (b) 19
(c) 20 (d) 21

3. Find the greatest no., which when divide 139, 163 and 187 leaves remainder 7 in each case.
(a) 12 (b) 6
(c) 24 (d) 13

4. Find the greatest no., which when divide 243, 307 and 385 leaves remainder 3, 7, 10?
(a) 16 (b) 17
(c) 15 (d) 18

5. Find the largest number which divides 62, 132 and 237 to leave the same remainder in each case
(a) 21 (b) 30
(c) 35 (d) 40

6. Find the greatest no., which when divide 159, 295, 346 leaves the same remainder, find the common remainder.
(a) 17.5 (b) 17.6
(c) 18.5 (d) 18.6

LOWEST COMMON MULTIPLIES (LCM)

7. Find the smallest number which is divisible by 24, 28 and 32.
(a) 672 (b) 636
(c) 336 (d) 762

8. Find the smallest no., which when divided by 24, 30 and 40 leaves remainder 11 in each case?
(a) 240 (b) 131
(c) 120 (d) 251

9. Find the smallest no., which when divided by 18, 24, 36 leaves remain 8 in each case.
(a) 80 (b) 72
(c) 152 (d) 44

10. Find the smallest no., which when divided by 15, 18, 25 leaves remainder 9, 12, 19 respectively.
(a) 450 (b) 456
(c) 454 (d) 444

11. Find the greatest no., of 4 digits, which is divisible by 15, 18 and 24.
(a) 9720 (b) 9700
(c) 9999 (d) 9970

12. Find the greatest no. of 5 digits, which when divided by 12, 15, 20 leaves remainder 5 in each case.
(a) 99960 (b) 99965
(c) 99939 (d) 9979

13. The least number of five digits, which is exactly divisible by 12, 15 and 18 is :
(a) 10010 (b) 10015
(c) 10020 (d) 10080

14. Find the greatest no. of 5 digits, which when divided by 11, 12 and 16 it leaves remainder 6,7,11 respectively.
(a) 99792 (b) 99765
(c) 99797 (d) 99787

15. Find the smallest no. of 5 digits, which when divided by 40, 45, and 60 leaves remainder 25 in each case.
(a) 10120 (b) 10280
(c) 10360 (d) 10000

FORMULA If N_1, N_2 are two numbers.
H be their H.C.F
L be their L.C.M then $N_1 \times N_2 = H \times L$

16. The LCM of two no. is 11781 and their HCF 119. If one of the no. is 1071 find the other.
(a) 1311 (b) 1309
(c) 1039 (d) 1903

17. The HCF and LCM of two numbers are 14 and 3528. If one of the no is 504. Find the other.
(a) 98 (b) 196
(c) 72 (d) 49

18. L.C.M of two no. is 14 times their HCF. If sum of HCF and LCM is 600 and one of the no. is 80. Find the other no.?

(a) 40 (b) 280
(c) 560 (d) 160

If H is the H.C.F of two No.s N_1 and N_2 then
$N_1 = H_x$, $N_2 = H_y$
Where {x, y should be co-prime}

19. The sum of two numbers is 1215 and their HCF is 81. How many pairs of such numbers can be formed? Find them?
(a) 1 (b) 2
(c) 3 (d) 4

20. The sum of two numbers is 216 and their HCF is 27. The numbers are
(a) 27, 189 (b) 154, 162
(c) 108, 108 (d) 81, 189

21. The sum of two numbers is 528 and their HCF is 33. The number of pairs of such numbers satisfying the above condition is
(a) 6 (b) 12
(c) 8 (d) 4

22. The HCF and LCM of two numbers are 9 and 1188 respectively. The number of pairs of such numbers satisfying the above condition is
(a) 3 (b) 2
(c) 4 (d) 5

23. The HCF and LCM of two numbers are 21 and 4641 respectively. If one of the numbers lies between 200 and 300, the two numbers are
(a) 273,357 (b) 210,340
(c) 215,314 (d) 210,252

24. In a school there are 391 boys and 323 girls, if these students are to be distributed into largest possible equal classes so that equal no. of boys & girls in each class should be there. Find the no. of classes.
(a) 23-B, 19-G (b) 19-B, 23-G
(c) 21-B, 21-G (d) 17-B, 17-G

25. A merchant has three kinds of wine of the first kind 403 gallons of the second kind 527 gallons and of the third kind 589 gallon's. What is the least no. of full drums that are required to store these wines with out mixing?
(a) 31 (b) 36
(c) 49 (d) 51

26. Find the least no. of square tiles that are required for a terrace 15.7 long and 9.02 broad.
(a) 814 (b) 614
(c) 714 (d) 914

27. 5 balls begin to toll together and toll respectively at intervals of 6, 7, 8, 9, 12 seconds. How many times they will toll together in 1 hour excluding the in the start?
(a) 8 (b) 7
(c) 6 (d) 5

28. Five bells first begin to toll together and then at intervals of 3, 5, 7, 8 and 10 s. Find after what interval they will again toll together. How many times do they toll together in one hour?
(a) 14min, 3 times (b) 12 min, 4 times
(c) 14 min, 4 times (d) 12 min, 3 timesV

29. 4 traffic lights blink after an interval of 6, 8, 12 and 18 seconds respectively find after what time they all will blink together and how many times will they blink together in 6 m.
(a) 5 (b) 6
(c) 7 (d) 8

30. Three persons A, B, C run along a circular path 12 km long. They start their race from the same place pt in some line with a speed of 3 km 1hr, 7 km/hr, and 13km/hr respectively. After what time will they meet again.
(a) 12 (b) 13
(c) 14 (d) 15

ANSWERS

1. (c)	2. (a)	3. (a)	4. (c)	5. (c)
6. (b)	7. (a)	8. (b)	9. (a)	10. (d)
11. (a)	12. (b)	13. (d)	14. (d)	15. (a)
16. (b)	17. (a)	18. (b)	19. (d)	20. (a)
21. (d)	22. (a)	23. (a)	24. (c)	25. (c)
26. (a)	27. (b)	28. (c)	29. (b)	30. (a)

Hints and Explanations :

1. (c)

```
      1
72 ) 90
     72
     18 ) 72
          72
           x
```

18 x 4, 18 x 5
H.C.F. = 18.

2. (a)

```
      1
342 ) 396
     342
      54 ) 342
          324
           18 ) 54
                54
                 x
```

```
      24
18 ) 432
      36
      72
      72
       x
```

or

342	396	432
18x19	18x22	18x24

∴ H.C.F. = 18

3. (a)

139	163	187
-7	-7	-7
132	156	180
12x11	12x13	12x15

∴ H.C.F. = 12

```
      2
276 ) 690
     552
     138 ) 276
           276
            x
```

```
      11
138 ) 1610
      138
      230
      138
       92 ) 138
           92
            46 ) 138
                 92
                  x
```

4. (c)

243	307	385
-3	-7	-10
240	300	375
15x19	15x20	15x21

∴ H.C.F. = 15

5. (c) Required number
= HCF of (132-62), (237-132) and (237 - 62) = HCF of 70, 105 and 175 = 35

70	105	175
35x2	35x3	35x5

Reqd. No. = 35.

6.(b)

295	346	346
-159	-295	-159
136	51	187
17x8	17x3	17x11

H.C.F = 17
∴ Answer = 17,6.

```
      17
17 ) 295
     17
     125
     119
       6
```

7. (a)

2	24, 28, 32
2	12, 14, 16
2	6, 7, 8
	3, 7, 4

∴ L.C.M. = 2 x 2 x 2 x 3 x 4 x 7 = 672

8. (b)

2	24, 30, 40
2	12, 15, 20
5	6, 15, 10
3	6, 3, 2
2	2, 1, 2
	1, 1, 1

= 2 x 2 x 5 x 3 x 2
= 120
∴ we will get remainder 11, when we add 11 to it.
∴ = 120 + 11 = 131

9. (a)

2	18, 24, 36
3	9, 12, 18
3	3, 4, 6
2	1, 4, 2
	1, 2, 1

= 2 x 3 x 3 x 2 x 2 = 72
∴ Reqd. No. is 72 + 8 = 80.

10.(d)

5	15, 18, 25
3	3, 18, 5
	1, 6, 5

= 3 x 5 x 5 x 6 = 450

Since, the nos. derived by

	15	18	25
Remainder	9	12	19
Diff.	6	6	6

we subtract the common difference from L.C.M.

∴ Regd. No. is 450 - 6= 444.

11.(a)

3	15, 18, 24
2	5, 6, 8
	5, 3, 4

= 3 x 2 x 5 x 3 x 4 = 360

12.(b) For 12, 15, 20

L.C.M = 60

Greatest 5 digit no. divisible by 360 is 99960.

It will given remainder, when we add it

∴ 99960 + 5 = 9,9965

13.(d) Least number of 5 digits is 10000.

L.C.M. of 12, 15, 18 is 180. On dividing 10000 by 180. the remainder is 100.

∴ Required number = 10000 + (180-100)

= 10080.

14.(d)

2	11, 12, 16
2	11, 6, 8
	11, 3, 4

= 2 x 2 x 11 x 3 x 4

= 528 G. 5 digit no. 9999/528

Now greates 5 digit No. is 99999

```
        189
528)99999
    528
    4719
    4224
     4959
     4752
      207
```

Now the No. divisible by 528 is

(99999-207 = 99792

Now, if it is divided by

	11	12	16
Remainder	6	7	11
Diff.	5	5	5

∴ Regd no. = 99792 - 5 = 99787.

15.(a)

5	40, 45, 60
2	8, 9, 12
3	4, 9, 6
2	4, 3, 2
	2, 3, 1

= 5 x 2 x 3 x 2 x 2 x 3 = 360

```
        27
360)10000
    720
    2800
    2520
     280
```

∴ Required no. = 10000 + (360 - 280)

= 10000 + (80)

= 10080 + 25 =10105

16.(b) $N_2 = \frac{11781 \times 119}{504} = 1309$

17.(a) $N_2 = \frac{14 \times 3528}{504}$

$N_2 = 98$

18.(b) H = x

L = 14x

14x + x = 600

15x = 60

H = x = 40

L = 14x = 14 x 40

∴ 80 x N_1 = 40x 14 x 40

N_2 = 2280

19.(d) H.C.F = 81

N_1 = 81x, N_2 = 81y

81x + 81y = 1215

81(x+y) = 1215

$x + y = \frac{1215}{81}$

x + y = 15

1 + 14 = 15

2 + 13 = 15

3 + 12 = 15

4 + 11 = 15

5 + 10 = 15

6 + 9 = 15

7 + 8 = 15

Possible no's = 81 x 1, 81 x 14

81 x 2, 81 x 13

81 x 4, 81 x 11

81 x 7, 81 x 8.

20.(a) Since, the HCF of numbers is 27, then the numbers be 27a and 27b.

Now, 27a + 27b = 216

$\Rightarrow$ a + b = 8

Since, a and b are co-prime with sum 8. Then, pairs of numbers are (1, 7), (3, 5). Thus, the numbers are

(27 x 1, 27 x 7) or (27 x 3, 27 x 5)

= (27,189) or (81,135)

21.(d) Let, the required numbers be 33a and 336. Then, 33a + 33b = 528 $\Rightarrow$ a + b = 16

Now, co-primes with sum 16 are (1, 15), (3, 13), (5, 11) and (7, 9)

Hence, four such pairs can be formed.

22.(a) 9x x 9y = 9 x 1188

x + y = 132

132 x 1

66 x 2

33 x 4

22 x 6

11 x 12

no. of pairs is 3.

23.(a) Since, the HCF of two numbers is 21, hence, let, the numbers be 21x and 21y respectively.

We know that product of two numbers

HCF x LCM

21x x 21y = 21 x 4641

$\therefore$ xy = 221 = (13 x 17), because x and y are co-prime.

Therefore, the numbers are (21 x 13, 21 x 17)

(273,357)

24.(c) No. of boys = 390

No. of girls = 323

$\therefore$ H.C.F = 17

No. of Girls in classes = $\frac{323}{17}$ = 19

No. of Boys in classes = $\frac{391}{17}$ = 23

25.(c)

403	527	589
31x13	31x13	31x13

H.C.F = 31

No. of Drums = 13 + 17 + 19 = 49

26.(a) H.C.F = 902

$\therefore$ H.C.F = 41

1517 x 902

$\therefore$ No. of tiles = $\frac{1517 \times 902}{141 \times 41}$ = 814.

27. (b)

3	6, 7, 8, 9, 12
2	2, 7, 8, 3, 4
2	1, 7, 4, 3, 2
	1, 7, 3, 2

= 3 x 2 x 2 x 7 x 2 x 3 = 504

In 60 min = 60 x 60 = 3600 sec.

No. of times = $\frac{3600}{504}$ = 7

28.(c) Required time interval = LCM of 3, 5, 7, 8 and 10 = 840s =14 min

Number of times, they will toll together in one hour

$\frac{60}{14}$ = 4 times, (ignoring the fraction part)

29.(b)

2	6, 18, 12, 8
3	3, 9, 6, 4
2	1, 3, 2, 4
	1, 3, 1, 2

= 2 x 3 x 2 x 3 x 2 = 72

L.C.M = 72

6 min = $\frac{60 \times 6}{72}$ = 5 times.

$\therefore$ No. of times = 6 - 5 + 1.

30.(a) Here distancde = 12

$S_A = 3$, $T_A = \frac{12}{3}$

$S_B = 7$, $T_B = \frac{12}{7}$

$S_C = 13$, $T_C = \frac{12}{13}$

Now, to find the time when the three A, B, C will be again at starting point is L.C.M. of all three time.

$= \frac{\text{L.C.M. of } 12, 12, 12}{\text{H.C.F. of } 3, 7, 13}$

Now, L.C.M. of 12, 12, 12, = 12

H.C.F. of 3, 7, 13 = 1

$\therefore$ Reqd. time is 12 hrs.