HCF (Highest Common Factor) : The HCF of two or more numbers is the greatest number which divides each of them exactly.

To find HCF : Write the numbers as product of prime factors.

Eg. : HCF of 108, 288, 360

$108 = 2^2 \times 3^3$

$288 = 2^5 \times 3^2$

$360 = 2^3 \times 3^2 \times 5$

HCF = Product of Common factors in all the numbers.

$HCF = 2^2 \times 3^2 = 36$

LCM (Lowest Common Multiple) : The least number which is exactly divisible by each one of the given numbers is called their LCM.

To find LCM of 21, 72 and 108

$21 = 3 \times 7$

$72 = 2^3 \times 3^2$

$108 = 2^2 \times 3^3$

LCM = Product of highest power of all the factors $= 2^3 \times 3^3 \times 7$

= 1512 ***or***

2	21*, 72, 108
3	21, 36, 54
2	7*, 12, 18
3	7*, 6, 9
	7, 2, 3

L.C.M. $= 2^3 \times 3^2 \times 7 = 1512$

Note: (The '*' shows that if a number is not divisible by the divisor, it is brought down as it is.)

Properties :-

1. Product of 2 numbers = Product of their HCF and LCM.
2. LCM is always divisible by HCF.
3. HCF of Fractions =

$$\frac{\text{HCF of numerators}}{\text{LCM of denominators}}$$

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

5. HCF of two numbers = HCF of [sum the numbers & their LCM]

E.g.1. Two jars of capacity $50l$ and $80l$ are filled with oil. What must be the capacity of a mug that can completely measure the oil of the two jars?

Sol. Factors of $50 = 5^2 \times 2$

Factors of $80 = 5^1 \times 2^4$

H.C.F. of 50 & 80 $= 5^1 \times 2^1 = 10l$

The capacity of the mug must be $10l$

E.g.2. The HCF of two numbers is 11 and their LCM is 693. If one of the numbers is 77, then find the other number.

Sol. Product of two number = LCM × HCF

$$77 \times x = 11 \times 693$$

$$x = \frac{11 \times 693}{77}$$

$$x = 99$$

E.g.3. Find the largest number which divides 34, 90, 104 leaving the same remainder in each case.

Sol. Difference between numbers = 90 – 34 = 56 and 104 – 90 = 14

HCF of 56 and 14 = 14

So 14 is the largest number which divides the above given numbers leaving the same remainder in each case.

E.g.4. The smallest multiple of 7 which when divided by 6, 9, 15 and 18 respectively, leaves 4 as the remainder in each case?

Sol. Smallest number which is divisible by 6, 9, 15 & 18 = LCM of 6, 9, 15 & 18 = 90

Smallest number which when divided by 6, 9, 15 & 18 gives remainder 4 in each case

= LCM of 6, 9, 15 & 18 + 4

= 90 + 4

= 94

According to question, we can write the required number in the form
= 90 k + 4 which is also divisible by 7
$90k + 4 = 12 \times 7k + (6k + 4)$
By Hit & Trial method, we get the value of k = 4,
So, required number = $90 \times 4 + 4$
$= 360 + 4 = 364.$

Short-cut:

6, 9, 15, 18

LCM $\Rightarrow 90 \times k + 4$

$$\Rightarrow \frac{90k+4}{7} \Rightarrow \frac{90k}{7} + \frac{4}{7}$$

4

$$\Rightarrow \frac{7 \times 12k}{7} + \frac{6k+4}{7}$$

$\Rightarrow 90 \times 4 + 4 = 360 + 4 = 364$

E.g.5. The length of a circular path is 20kms. Three runners start running from a point in same direction with speed of 4km/hr. 5km/hr. and 8km/hr respectively. After how many hours will they be together at the starting point again?

Sol. Time taken by each runner $= \frac{D}{S}$

$$\Rightarrow \frac{20km}{4km/hr.} ; \frac{20km}{5km/hr.} ; \frac{20km}{8km/hr.}$$

= 5 ; 4 ; 2.5
L.C.M. of 5, 4 & 2.5 = 20
Therefore, they will meet again after 20 hours

E.g.6. Four traffic light blink at the interval of 4sec, 6sec, 8sec and 16sec respectively. If they blink together now, after what time will they blink together again? Determine how many times, they blink in one hour.

Sol. LCM of all the given time:

4 6 8 16

2×2 2×3 $2 \times 2 \times 2$ $2 \times 2 \times 2 \times 2$

$\Rightarrow 2^4 \times 3 = 16 \times 3 = 48$ sec

1 hr = 3600 sec

Interval = 48 secs.

Number of times they blink together

$$= \frac{3600}{48} = 75 \text{ times.}$$

Number of times they blink together in one hour = 75 + 1 = 76 times

[Here 1 is when they blink together for the first time]

EXERCISE

1. Find the HCF of 35 and 30.
(A) 5 (B) 6
(C) 7 (D) 8

2. The HCF and the product of two numbers are 15 and 6300 respectively. The number of possible pairs of the number is
(A) 4 (B) 3
(C) 2 (D) 1

3. What least number must be subtracted from 1936 so that the resulting number when divided by 9, 10 and 15 will leave in each case the same remainder 7?
(A) 37 (B) 36
(C) 39 (D) 30

4. Two numbers are in the ratio 15 : 11. If their HCF is 13, find the numbers.
(A) 195, 143 (B) 143, 145
(C) 175, 190 (D) 170, 190

5. Two numbers, both greater than 29, have HCF 29 and LCM 4147. Find the sum of the numbers?
(A) 696 (B) 144
(C) 169 (D) 225

6. The LCM of two numbers is 12 times their HCF. The sum of the HCF and the LCM is 403. If one of the numbers is 93, then other number is
(A) 124 (B) 128
(C) 134 (D) 138

7. The LCM of two numbers is 495 and their HCF is 5. If the sum of the numbers is 100, then find the difference between both the numbers.
(A) 5 (B) 10
(C) 15 (D) 20

8. The LCM of two numbers is 45 times their HCF. If one of the numbers is 125 and sum of HCF and LCM is 1150. The other number is —
(A) 225 (B) 235
(C) 240 (D) 250

9. Find the least number exactly divisible by 12, 15, 20, 27.
(A) 450 (B) 540
(C) 230 (D) 640

10. Find the least number which when divided by 6, 7, 8, 9 and 12 leaves the remainder 1 in each case.
(A) 404 (B) 303
(C) 505 (D) 202

11. Find the least number which when divided by 5, 6, 7, 8 leaves remainder 3 but when divided by 9, leaves no remainder.
(A) 843 (B) 2523
(C) 1683 (D) 3363

12. Find the least number which when divided by 20, 25, 35, 40 leaves remainders 14, 19, 29, 34 respectively.
(A) 1220 (B) 1394
(C) 1365 (D) 1470

13. The largest number which divides 25, 73 and 97 to leave the same remainder in each case, is:
(A) 24 (B) 23
(C) 21 (D) 6

14. The LCM of two prime number x and y is 161(where $x > y$). Find out the value of $3y - x$.
(A) –2 (B) 2
(C) –4 (D) 4

15. If 5231 is added in a greatest 4 digit number then it will be divisible by 12, 15, 27, 32 and 40. Find out the number.
(A) 7929 (B) 7829
(C) 9729 (D) 7729

16. Find the largest 5 digits number which is exactly divisible by 12, 15, 18, 27.
(A) 90000 (B) 99999
(C) 99010 (D) 99900

17. 3 different containers contain 496l, 403l and 713l mixture of milk and water. What biggest measure of a container can measure all the 3 quantities exactly?
(A) 31 (B) 41
(C) 51 (D) 52

18. Two tanks have the capacity of 120 l and 56 l. What must be the capacity of the container which can completely measure the liquid contained in both the tanks?
(A) 8 (B) 5
(C) 2 (D) 4

19. 6 bells ring after 2, 4, 6, 8, 10 and 12 seconds respectively. How many times will they ring simultaneously in 30 minutes?
(A) 16 (B) 18
(C) 20 (D) 22

20. The ratio of two numbers is 4 : 3 and their HCF is 7. Find the difference between the two numbers.
(A) 7 (B) 8
(C) 14 (D) 16

21. Three numbers are in ratio 2 : 3 : 4 and their HCF is 12. The LCM of the number is
(A) 144 (B) 192
(C) 96 (D) 72

22. The sum of the HCF and LCM of two numbers is 680 and their LCM is 84 times their HCF. If one of the numbers is 56, then the other number is:
(A) 64 (B) 72
(C) 96 (D) 80

23. The greatest number that divides 122 and 243 leaving 2 and 3 respectively as remainders is:
(A) 12 (B) 24
(C) 30 (D) 120

24. The number nearest to 10000 which is exactly divisible by each of 3, 4, 5, 6, 7 and 8, is:
(A) 9240 (B) 10080
(C) 9996 (D) 100000

25. The HCF of two numbers is 23 and the other two factors of their LCM are 13 and 14. The larger of the two numbers is:

(A) 276 (B) 299
(C) 345 (D) 322

26. If the students of a class can be grouped exactly into 6 or 8 or 10, then the minimum number of students in the class must be
(A) 60 (B) 120
(C) 180 (D) 240

27. The HCF and LCM of two numbers are 12 and 72 respectively. If the sum of two numbers is 60, then one of the number is:
(A) 24 (B) 36
(C) either (A) or (B) (D) Can't be determined

28. LCM of two numbers is 225 and their HCF is 5. If one number is 25, the other number will be:
(A) 5 (B) 25
(C) 45 (D) 225

29. The least number, which when divided by 12, 15, 20 or 54 leaves a remainder 4 in each case is:
(A) 450 (B) 454
(C) 540 (D) 544

30. The LCM of two numbers is 2079 and their HCF is 27. If one of the number is 189, find the other number.
(A) 295 (B) 296
(C) 297 (D) 298

31. Which is the smallest number from which when 7 is subtracted leaves a remainder which is completely divisible by 12, 18, 24 and 36?
(A) 79 (B) 151
(C) 251 (D) 295

32. Find the least number which, when divided by 18, 24, 30 and 42, will leave in each case the same remainder 1.
(A) 2420 (B) 2521
(C) 2620 (D) 2621

33. What is the smallest number to which when 8 is added, the number becomes completely divisible by 9, 12, 24 and 30?
(A) 352 (B) 712
(C) 1072 (D) 1432

34. What is the least number which, when divided by 52, leaves 33 as the remainder, when divided by 78 leaves 59, and when divided by 117 leaves 98 as the respective remainders?
(A) 449 (B) 549
(C) 649 (D) 749

35. Find the greatest number of six digits which, on being divided by 6, 7, 8, 9 and 10 leaves 4, 5, 6, 7 and 8 as remainders respectively.
(A) 997868 (B) 996878
(C) 996786 (D) 997918

36. Find the greatest number by which 78, 153 and 228 will be divided so that it leaves the same remainder in every case?
(A) 25 (B) 75
(C) 77 (D) 76

37. Find the greatest number less than 900, which is divisible by 8, 12 and 28.
(A) 840 (B) 842
(C) 846 (D) 848

38. What least number must be subtracted from 1936 so that the remainder when divided by 9, 10, 15 will be same as 7?
(A) 35 (B) 36
(C) 38 (D) 39

39. The greatest number that can be subtracted from 10000 so that the remainder may be divisible by 32, 36, 48 and 54 is-
(A) 9136 (B) 9216
(C) 9316 (D) 9236

40. What is the least multiple of 7, which when divided by 2, 3, 4, 5 and 6 leaves the remainders 1, 2, 3, 4 and 5 respectively?
(A) 117 (B) 119
(C) 121 (D) 123

41. The largest four digit number exactly divisible by each of 12, 15, 18 and 27 is:
(A) 9690 (B) 9720
(C) 9930 (D) 9960

42. The greatest number, by which 1657 and 2037 are divided to get remainders 6 and 5 respectively, is:
(A) 127 (B) 133
(C) 235 (D) 305

43. Find two three digit numbers, whose HCF is 80 and LCM 5760.
(A) 640, 720 (B) 620, 740
(C) 680, 740 (D) 650, 720

44. The LCM of two numbers is 2310 and their HCF is 30. If one of the numbers is 7 × 30, Find the other number.
(A) 320 (B) 330
(C) 340 (D) 350

45. Three bells commence tolling together and they toll after 0.25, 0.1 and 0.125 seconds respectively. After what interval will they toll together again?
(A) 0.5 sec (B) 0.6 sec
(C) 0.51 sec (D) 0.61 sec

46. What is the smallest sum of money which contains ₹ 2.50, ₹ 20, ₹ 1.20 and ₹ 7.50?
(A) ₹ 40 (B) ₹ 50
(C) ₹ 60 (D) ₹ 70

47. What is the greatest number which will divide 410, 751 and 1030 so as to leave the remainder 7 in each case?
(A) 31 (B) 33
(C) 35 (D) 37

48. Three men start together on a circular track of 11 km. Their speeds are 4, 5.5 and 8 km per hour respectively. When will they meet at the starting point?
(A) 18 hrs (B) 20 hrs
(C) 22 hrs (D) 16 hrs

49. Find the least number which, when divided by 8, 12 and 16, leaves 3 as the remainder in each case; but when divided by 7 leaves no remainder.
(A) 143 (B) 145
(C) 146 (D) 147

50. Find the greatest number that will divide 55, 127 and 175 so as to leave the same remainder in each case.
(A) 24 (B) 25
(C) 26 (D) 27

51. What least number should be added to 3500 to make it exactly divisible by 42, 49, 56 and 63?
(A) 28 (B) 30
(C) 32 (D) 34

52. Find the least number which, when divided by 72, 80 and 88 leaves the remainders 52, 60 and 68 respectively.
(A) 7700 (B) 7900
(C) 7920 (D) 7940

53. Find the greatest number of 4 digits which, when divided by 2, 3, 4, 5, 6 and 7 leaves remainder 1 in each case.
(A) 9961 (B) 9962
(C) 9661 (D) 9861

54. Find the greatest possible length which can be used to measure the lengths 7 m, 3.85 m and 12.95 m exactly.
(A) 31 cm (B) 32 cm
(C) 34 cm (D) 35 cm

55. Find the least number of square tiles required to pave the ceiling of a hall 15 m 17 cm long and 9 m 2 cm broad.
(A) 814 (B) 816
(C) 818 (D) 820

56. What is the largest number which divides 77, 147 and 252 to leave the same remainder in each case?
(A) 32 (B) 33
(C) 34 (D) 35

57. The traffic lights at three different road crossings change after every 48 sec, 72 sec, and 108 sec respectively. If they all change simultaneously at 8:20 hours, then at what time will they again change simultaneously?
(A) 8:27:12 hours (B) 8 : 25 : 14 hours
(C) 8:24:12 hours (D) 8 : 29 : 12 hours

58. The HCF and LCM of two numbers are 44 and 264 respectively. If the first number is divided by 2, the quotient is 44. What is the other number?
(A) 130 (B) 132
(C) 134 (D) 136

59. Find the least number which can be divided by 12, 18, 32 or 40 exactly.
(A) 1420 (B) 1440
(C) 1460 (D) 1480

60. Find the least number which, when increased by 8, is divisible by 32, 36 and 40.
(A) 1432 (B) 1434
(C) 1436 (D) 1438

61. In a school, 391 boys and 323 girls have been divided into the largest possible equal classes, so that in each class of boys, the number of boys is

the same as that in each class of girls. What is the number of students in the classes?

(A) 13 (B) 15
(C) 17 (D) 19

62. What least number must be subtracted from 1294 so that the remainder, when divided by 9, 11, 13 will leave the same remainder 6 in each case ?

(A) 1 (B) 2
(C) 3 (D) 4

Solution

1.(A)
30 —— 5 × 3
35 —— 5 × 2 × 2

H.C.F. = 5

2.(C) Let two numbers be $15x$ and $15y$.
Where x and y are co-prime to each other.

$\therefore 15x \times 15y = 6300$

$$x \times y = \frac{6300}{15 \times 15}$$

$x \times y = 28$

Factor of 28 are 1, 2, 4, 7, 28

$\therefore$ 28 = 1 × 28 or 4 × 7

$\therefore$ There are only a two possible pairs

3.(C) LCM of 9, 10 and 15 = 90
When 1936 is divided by 90, we get 46 as remainder but we need only 7 as remainder.
So we need to subtract 7 from 46.
Required numbers = 46 –7 = 39.

4.(A) Required numbers
= $13x : 11x$ = 15 × 13 : 11 × 13
= 195 : 143

5.(A)
$$\frac{\text{LCM}}{\text{HCF}} = \frac{4147}{29} = 143 = 11 \times 13$$

$\therefore$ Ratio of numbers = 11 : 13
Numbers are = 11 × 29, 13 × 29
Sum = (11 × 29) + (13 × 29)
= (11 + 13) × 29
= 24 × 29 = 696

6.(C) HCF + LCM = 403
HCF + 12 HCF = 403
(It is given that LCM = 12 × HCF)
13 × HCF = 403
HCF = 31

$\because$ Product of two number is equal to product of their LCM and their HCF.
93 × other number = 31 × 12 × 31

$$\text{Other number} = \frac{31 \times 12 \times 31}{93} = 124$$

Short cut:
H.C.F. + L.C.M. = 403 or 13 × H.C.F.
13 × H.C.F = 403
$\therefore$ H.C.F.= 31

$$\frac{\text{L.C.M.}}{\text{H.C.F.}} = \text{Other factors excluding H.C.F.}$$

$$\frac{12\ \text{H.C.F.}}{\text{H.C.F.}} = \frac{12 \times 31}{31} = 12 = 3 \times 4$$

$\therefore$ The numbers = 3 × 31, 4 × 31 = 93, 124

7.(B) Divide LCM by HCF

$$\frac{495}{5} = 99$$

↓ (Break into the product of two co-primes)
9 × 11
This gives the ratio of numbers = 9 : 11
Multiply with HCF to get the numbers
= 9 × 5 and 11 × 5 = 45 and 55
Difference between both the numbers
= 55 – 45 = 10

8.(A)
$$\frac{\text{LCM}}{\text{HCF}} = 45 = 9 \times 5$$

Ratio of numbers = 9 : 5
Numbers = 9 × HCF, 5 × HCF
It is given that one number is 125
Possibly 5 × HCF = 125
HCF = 25
Required number = 9 × 25 = 225

9.(B) We need to find the LCM of 12, 15, 20, 27.
12 = $2^2 \times 3$
15 = 3×5
20 = $2^2 \times 5$
27 = 3^3
LCM = Product of highest powers of factors
= $2^2 \times 3^3 \times 5$ = 540

10.(C) L.C.M. of 6,7,8,9,12

$$\begin{array}{r|l} 2 & 6, 7, 8, 9, 12 \\ \hline 3 & 3, 7, 4, 9, 6 \\ \hline 2 & 1, 7, 4, 3, 2 \\ \hline & 1, 7, 2, 3, 1 \end{array}$$

LCM = $7 \times 2^3 \times 3^2 = 504$

Required number = (LCM) + 1 = 504 + 1

= 505

11.(C) LCM of 5, 6, 7, 8 = 840

ATQ,

Given number will be of the form 840K + 3

(As remainder = 3) (K = 0, 1, 2, 3 ......)

Since the number is completely divisible by 9, We put different values of K to find out the number.

For divisibility by 9, sum of digit should be divisible by 9.

(i) $840 \times 0 + 3 = 3$ (Not divisible by 9)

(ii) $840 \times 1 + 3 = 843$ (Not divisible by 9)

(iii) $840 \times 2 + 3 = 1683$ (Divisible by 9)

Required number = 1683

12.(B) $20 - 14 = 25 - 19 = 35 - 29 = 40 - 34 = 6$

Required number = (LCM of 20, 25, 35, 40) – 6

= 1400 – 6 = 1394

13.(A) Let x be the remainder then $(25 - x)$, $(73 - x)$ and $(97 - x)$ will be exactly divisible by the required number.

Required number = HCF of $(73 - x) - (25 - x)$, $(97 - x) - (73 - x)$ and $(97 - x) - (25 - x)$

= HCF of (73 – 25), (97 – 73) and (97 –25)

= HCF of 48, 24 and 72 = 24

14.(A) Remark : HCF of 2 prime numbers = 1

$\therefore \dfrac{\text{LCM}}{\text{HCF}} = \dfrac{161}{1} = 161 = 7 \times 23$

$\therefore$ Ratio of numbers = 7 : 23

Since HCF = 1 ⇒ Number are 7, 23

$3y - x = 3 \times 7 - 23 = -2$

15.(D) [Divisible by 12, 15, 27, 32, 40 ⇒ must be divisible by 3, 4, 5]

First we add 5231

⇒ From options :

(A) 7929 + 5231 = 13160

(B) 7829 + 5231 = 13060

(C) 9729 + 5231 = 14960

(D) 7729 + 5231 = 12960

Now all are divisible by 4, 5.

$\therefore$ We check divisibility by 3.

(for that, sum of digits should be divisible by 3) only option (D) is divisible 7729. Ans our answer is D.

16.(D) LCM of 12, 15, 18, 27 = 540

Largest number of 5 digits = 99999

On dividing $\dfrac{99999}{540}$ ⇒ remainder = 99

$\therefore$ Required number = 99999 – 99 = 99900

Through option :

(A) 99912 (B) 99937

(C) 99010 (D) 99900

Now, $12 = 3 \times 4$, $15 = 3 \times 5$, $27 = 3^3$ and $18 = 2 \times 3^2$

The answer must be divisible by 3, 4 and 5

(A) Not divisible by 5 → Not possible

(B) Not divisible by 5 → Not possible

(C) Not divisible by 4 → Not possible

(D) Divisible by 3,4,5 → Possible

17.(A) To find the biggest measure, we have to find the HCF of 496, 403 and 713.

HCF of 496, 403 and 713 = 31

18.(A) Required capacity of container

= HCF 120 l and 56 l

= 8 l

19.(A) Here we have to find LCM of 2, 4, 6, 8, 10 and 12

$$\begin{array}{r|l} 2 & 2, 4, 6, 8, 10, 12 \\ \hline 2 & 1, 2, 3, 4, 5, 6 \\ \hline 3 & 1, 1, 3, 2, 5, 3 \\ \hline & 1, 1, 1, 2, 5, 1 \end{array}$$

L.C.M. = $2^3 \times 3 \times 5 = 120$ sec. = 2 min.

They ring simultaneously after every 2 mins.

In 30 min they will ring = $\dfrac{30}{2} + 1 = 16$ times simultaneously

20.(A) Let number are $4x$ and $3x$
So, HCF of $4x$ and $3x = x$
$x = 7$ (given)
So, difference of numbers $= 4x - 3x = 1x = 7$

21.(A) Let the numbers be $2x$, $3x$ and $4x$ respectively.
$\therefore$ HCF $= x = 12$
$\therefore$ Numbers are
$2x = 2 \times 12 = 24$, $3x = 3 \times 12 = 36$ and $4x = 4 \times 12 = 48$
LCM $= 2 \times 2 \times 2 \times 3 \times 3 \times 2 = 144$

22.(C) H.C.F. + L.C.M. = 680
L.C.M. = 84 H.C.F.
H.C.F. + 84 H.C.F. = 680
85 H.C.F = 680

$$\therefore \text{H.C.F.} = \frac{680}{85} = 8$$

L.C.M. = 84 × H.C.F.
= 84 × 8 = 672
We know that
Product of two number = H.C.F. × L.C.M.
$56 \times x = 8 \times 672$

$$x = \frac{8 \times 672}{56} = 96$$

23.(D) The required number will be the HCF of (122 – 2) and (243 – 3), i.e. of 120 and 240, which is 120.

24.(B) LCM of 3, 4, 5, 6, 7 and 8 = 840
Dividing 10000 by 840, we get 760 as remainder.
To make the number divisible by 840, 760 must be made 840 i.e. 80 must be added.
Hence, the required number
= 10000 + (840 – 760) = 10080

25.(D) The larger number
= HCF × largest Factor of the number
= 23 × 14 = 322

26.(B) The required number of students will be the LCM of 6, 8, and 10, ie. 120

27.(C) Let the number are $12x$ and $12y$, where x and y are co-prime to each other.
$12 \times x \times y = 72$
$xy = 6 \Rightarrow 2 \times 3$
$x = 12 \times 2 = 24$
$y = 12 \times 3 = 36$
The number is either 36 or 24.

28.(C) Let the other number is x.
Product of two number = H.C.F. × L.C.M.
$x \times 25 = 5 \times 225$

$$x = \frac{5 \times 225}{25} = 45$$

29.(D) Required number
= (LCM of 12, 15, 20 & 54) + 4
= 540 + 4 = 544

30.(C) Product of two number = H.C.F.× L.C.M.
$x \times 189 = 27 \times 2079$

$$x = \frac{27 \times 2079}{189} = 297$$

31.(A) Required number
= (LCM of 12, 18, 24 & 36) + 7
= 72 + 7 = 79

32.(B) The required number must be greater than the LCM of 18, 24, 30 and 42 by 1.
Now,

$$\begin{array}{r|l} 2 & 18,\ 24,\ 30,\ 42 \\ \hline 3 & 9,\ 12,\ 15,\ 21 \\ \hline 3 & 3,\ \ 4,\ 5,\ 7 \\ \hline & 3,\ \ 2,\ 5,\ 7 \end{array}$$

$\therefore$ LCM $= 2^2 \times 3^2 \times 5 \times 7 = 2520$
$\therefore$ The required number = 2520 + 1 = 2521

33.(A) Required number
= (LCM of 9, 12, 24 & 30) – 8
= 360 – 8 = 352

34.(A) Since 52 - 33 = 19, 78 - 59 = 19 and 117 - 98 = 19
We see that the remainder in each case is less than the divisor by 19. Hence, if 19 is added to the required number, it becomes exactly divisible by 52,78 and 117. Therefore, the required number is 19 less than the LCM of 52, 78 and 117.
The LCM of 52, 78 and 117 = 468
$\therefore$ The required number = 468 – 19 = 449

35.(D) The LCM of 6, 7, 8, 9 and 10 = 2520
The greatest number of 6 digits = 999999
Dividing 999999 by 2520, we get 2079 as remainder.
Hence, the 6-digit number divisible by

2520 is = 999999 – 2079 = 997920
Since 6 – 4 = 2, 7 – 5 = 2, 8 – 6 = 2, 9 – 7 = 2, 10 – 8 = 2, then remainder in each case is less than the divisor by 2.

∴ The required number = 997920 – 2 = 997918

36.(B) Required number = HCF of {(153 – 78), (228 – 153) and (228 – 78)}
= H.C.F of (75, 75, 150) = 75

37.(A) The least number divisible by 8, 12 and 28 is L.C.M. of the three number = 168. Clearly, any multiple of 168 will be exactly divisible by each of the numbers 8, 12 and 28. But since the required greatest number does not exceed 900.
Required number = 168 × 5 = 840.

38.(D) The LCM of 9, 10 and 15 = 90
On dividing 1936 by 90, the remainder = 46
But 7 is the remainder so the required number = 46 – 7 = 39

39.(A) LCM of 32, 36, 48, 54 = 864
The required greatest number = 10000 - 864
= 9136

40.(B) LCM of 2, 3, 4, 5 and 6 = 60
Other numbers divisible by 2, 3, 4, 5, 6 are 60k, where k is a positive integer. Since 2 – 1 = 1, 3 – 2 = 1, 4 – 3 = 1, 5 – 4 = 1 and 6 - 5 = 1, the remainder in each case is less than the divisor by 1. Now, the required number is to be divisible by 7. Whatever may be the value of k the portion 7 × 8k is always divisible by 7. Hence, we must choose the least value of k which will make (4k - 1) divisible by 7. Putting k equal to 1, 2, 3, etc. in succession, we find that k should be 2

∴ The required number = 60k – 1
= 60 × 2 – 1 = 119

41.(B) LCM of 12, 15, 18 and 27 = 540
The least 5 digit number is 10000, which when divided by 540 leaves 280 as the remainder.
Hence, 10000 – 280 = 9720 which will be the highest possible 4 digit number which will be completely divisible by 540.

42.(A) 1657 – 6 = 1651 and 2037 – 5 = 2032
∴ Required number = HCF of 1651 and 2032
= 127

43.(A) Let the two numbers of 3-digits be $80x$ and $80y$
∴ Their L.C.M. = $80 \times x \times y = 5760$

$$\Rightarrow x \times y = \frac{5760}{80} = 72 = 8 \times 9$$

∴ $x = 8$ and $y = 9$
Hence the required numbers are
= 8 × 80 = 640 and 9 × 80 = 720

44.(B) Product of two numbers = H.C.F. × L.C.M.
First number × Second number = H.C.F × L.C.M.
7 × 30 × Second number = 30 × 2310

$$\text{Second number} = \frac{30 \times 2310}{7 \times 30} = 330$$

45.(A) They will toll together after an interval of time equal to the LCM of 0.25 sec, 0.1 sec and 0.125 sec.
LCM of 0.25, 0.1 and 0.125
= (LCM of 250, 100 and 125) × 0.001
= 500 × 0.001 = 0.5 sec.

46.(C) LCM of 2.50, 20, 1.20 and 7.50
= (LCM of 25, 200, 12 and 75) × 0.1
= 600 × 0.1 = ₹60

47.(A) The required number will be
= HCF of (410 – 7), (751 – 7), (1030 – 7)
= HCF of 403, 744, 1023
= 31

48.(C) Time taken by them to complete one

$$\text{revolution} = \frac{D}{S} = \frac{11}{4}, \frac{11}{5.5} \text{ and } \frac{11}{8}$$

$$\text{hrs respectively} = \frac{11}{4}, \frac{2}{1} \text{ and } \frac{11}{8}$$

$$\text{LCM of } \frac{11}{4}, \frac{2}{1} \text{ and } \frac{11}{8}$$

$$= \frac{\text{LCM of } 11, 2, 11}{\text{HCF of } 4, 1, 8} = \frac{22}{1} = 22 \text{ hrs}$$

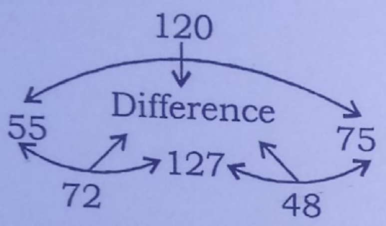
∴ They will meet after 22 hrs.

49.(D) The least number which, when divided by 8, 12 and 16, leaves 3 as remainder
= (LCM of 8, 12 and 16) + 3
= 48 + 3 = 51
Other such numbers are 48 × 2 + 3 = 99, 48 × 3 + 3 = 147,....
∴ The required number which is divisible by 7 is 147.

50.(A) Let x be the remainder, then the numbers $(55 - x)$, $(127 - x)$ and $(175 - x)$ are exactly divisible by the required number.

Note:- If two numbers are divisible by a certain number, then their difference is also divisible by the same number. Hence the numbers $(127 - x) - (55 - x)$, $(175 - x) - (127 - x)$ and $(175 - x) - (55 - x)$
= HCF of 48, 72 and 120 = 24
Therefore the required number = 24

Short cut:



HCF of 48, 72 and 120 = 24

51.(A) LCM of 42, 49, 56, 63 = 3528
Therefore, the required least number
= 3528 – 3500
= 28

52.(B) 72 – 52 = 20, 80 – 60 = 20, 88 – 68 = 20. We see that in each case, the remainder is less than the divisor by 20.
The LCM of 72, 80 and 88 = 7920
Therefore, the required number = 7920 - 20
= 7900

53.(A) The greatest number of 4 digits = 9999
LCM of 2, 3,4, 5, 6 and 7 = 420
On dividing 9999 by 420, we get 339 as remainder.
∴ The greatest number of 4 digits which is divisible by 2, 3,4, 5, 6 and 7 = 9999 – 339 = 9660
∴ Required number = 9660 + 1
= 9661

54.(D) Required length = HCF of 7, 3.85 and 12.95
= (HCF of 700, 385, 1295) × .01 m
= 35 × .01 m = 0.35 m
= 35 cm

55.(A) Side of tile = HCF of 1517 cms and 902 cms
= 41 cms.
Area of each tile = 41 × 41 cm²

∴ The number of tiles = $\frac{\textit{Area of celing}}{\textit{Area of 1 tile}}$

$= \frac{1517 \times 902}{41 \times 41} = 814$

56.(D) The required number = HCF of (147 – 77), (252 – 147) and (252 – 77)
= HCF of 70, 105 and 175 = 35

57.(A) LCM of 48, 72 and 108 = 432
The traffic lights will change simultaneously after 432 seconds or 7 m 12 secs.
∴ They will change simultaneously at
= 8 : 20 hours + 7 m + 12 sec.
= 8 : 27 : 12 hrs.

58.(B) The first number = 2 × 44 = 88

∴ The second number $= \frac{\text{HCF} \times \text{LCM}}{\text{1st number}}$

$= \frac{44 \times 264}{88} = 132$

59.(B) Required number = LCM of 12, 18, 32 and 40 = 1440

60.(A) LCM of 32, 36 and 40 = 1440
Therefore, the required number
= 1440 – 8
= 1432

61.(C) Number of students in the classes
= HCF of 391 and 323 = 17

62.(A) LCM of 9, 11 and 13 = 1287
Therefore, the number which, after being divided by 9, 11 and 13, leaves in each case the same remainder i.e. 6
= 1287 + 6 = 1293
Required least number = 1294 – 1293
= 1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