EXERCISE 8(C)

Question 1.

Using the common multiple method, find the L.C.M. of the following :

(i) 8, 12 and 24

(ii) 10, 15 and 20

(iii) 3, 6, 9 and 12

Solution:

(*i*) 8, 12 and 24

4	8, 12, 24
3	2, 3, 6
2	2, 1, 2
	1, 1, 1

$\therefore$ L.C.M. $= 4 \times 3 \times 2 =$ **24**

(*ii*) 10, 15 and 20

2	10,15,20
2	5,15,10
5	5,15,5
	1,3,1

$\therefore$ L.C.M. $= 2 \times 2 \times 5 \times 3 =$ **60**

(*iii*) 3, 6, 9 and 12

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

$\therefore$ L.C.M. $= 3 \times 2 \times 3 \times 2 =$ **36**

Question 2.
Find the L.C.M. of each the following groups of numbers, using
(i) the prime factor method and
(ii) the common division method :
(i) 18, 24 and 96
(ii) 100, 150 and 200
(iii) 14, 21 and 98
(iv) 22, 121 and 33
(v) 34, 85 and 51

Solution:
(i) L.C.M. of 18, 24 and 96
(i) By prime factors
Prime factors of 18 = 2 x 3 x 3
Prime factors of 24 = 2 x 2 x 2 x 3
Prime factors of 96 = 2 x 2 x 2 x 2 x 2 x 3
L.C.M. = 2 x 2 x 2 x 2 x 2 x 3 x 3 = 288
By common division method
L.C.M. of 18, 24 and 96 = 2 x 2 x 2 x 3 x 3 x 4 = 288

2	18, 24, 96
2	9, 12, 48
2	9, 6, 24
3	9, 3, 12
	3, 1, 4

(*ii*) 100, 150 and 200

Factor of $100 = 2 \times 2 \times 5 \times 5 = 2^2 \times 5^2$

Factor of $150 = 2 \times 3 \times 5 \times 5$

$= 2^1 \times 3^1 \times 5^2$

Factor of $200 = 2 \times 2 \times 2 \times 5 \times 5 = 2^3 \times 5^2$

$\therefore$ L.C.M. of 100, 150 and 200

$= 2^3 \times 3^1 \times 5^2 =$ **600**

Common Division Method :

2	100,	150,	200
2	50,	75,	100
5	25,	75,	50
5	5,	15,	10
	1,	3,	2

$\therefore$ L.C.M. of 100, 150 and 200

$= 2 \times 2 \times 5 \times 5 \times 3 \times 2 =$ **600**

(*iii*) 14, 21, 98

Factor of $14 = 2 \times 7 = 2^1 \times 7^1$

Factor of $21 = 3 \times 7 = 3^1 \times 7^1$

Factor of $98 = 2 \times 7 \times 7 = 2^1 \times 7^2$

$\therefore$ L.C.M. of 14, 21 and 98

$= 2^1 \times 3^1 \times 7^2 = \mathbf{294}$

Common Division Method :

2	14, 21, 98
7	7, 21, 49
	1, 3, 7

$\therefore$ L.C.M. of 14, 21, 98 $= 2 \times 7 \times 3 \times 7 = \mathbf{294}$

(*iv*) 22, 121 and 33

Factor of $22 = 2 \times 11 = 2^1 \times 11^1$

Factor of $121 = 11 \times 11 = 11^2$

Factor of $33 = 3 \times 11 = 3^1 \times 11^1$

$\therefore$ L.C.M. of 22, 121 and 33

$= 2^1 \times 3^1 \times 11^2 = \mathbf{726}$

Common Division Method :

2	22, 121, 33
11	11, 121, 33
	1, 11, 3

∴ L.C.M. of 22, 12 and 33

$= 2 \times 11 \times 11 \times 3 = \mathbf{726}$

(v) 34, 85 and 51

Factor of $34 = 2 \times 17 = 2^1 \times 17^1$

Factor of $85 = 5 \times 17 = 5^1 \times 17^1$

Factor of $51 = 3 \times 17 = 3^1 \times 17^1$

∴ L.C.M. of 34, 85 and 51

$= 2^1 \times 5^1 \times 3^1 \times 17 = \mathbf{510}$

Common Division Method :

2	34, 85, 51
17	17, 85, 51
	1, 5, 3

∴ L.C.M. of 34, 85 and 51

$= 2 \times 17 \times 5 \times 3 = \mathbf{510}$

Question 3.

The H.C.F. and the L.C.M. of two numbers are 50 and 300 respectively. If one of the numbers is 150, find the other one.

Solution:

H.C.F. = 50

L.C.M. = 300

Product of L.C.M. and H.C.F. = 300 x 50 = 15000

One number = 150

The other number

$$= \frac{\text{Product of L.C.M. and H.C.F.}}{\text{One number}} = \frac{15000}{150} = \mathbf{100}$$

Question 4.

The product of two numbers is 432 and their L.C.M. is 72. Find their H.C.F.

Solution:

Product of two numbers = Product of their L.C.M. and H.C.F.

Here, product of two number = 432

L.C.M. = 72

H.C.F. = $\frac{432}{72}$ = 6

Question 5.
The product of two numbers is 19,200 and their H.C.F. is 40. Find their L.C.M.
Solution:

$$\text{L.C.M.} = \frac{\text{Product of number}}{\text{H.C.F.}}$$

Product of number = 19,200

H.C.F. = 40

$$\therefore \text{L.C.M.} = \frac{19,200}{40} = \mathbf{480}$$

Question 6.
Find the smallest number which, when divided by 12, 15, 18, 24 and 36 leaves no remainder
Solution:
The least number which is exactly divisible by each given number is their L.C.M.
Required number L.C.M. of 12, 15, 18, 24 and 36.

2	12,	15,	18,	24,	36
2	6,	15,	9,	12,	18
3	3,	15,	9,	6,	9
3	1,	5,	3,	2,	3
	1,	5,	1,	2,	1

$\therefore$ L.C.M. = least required number

$= 2 \times 2 \times 3 \times 3 \times 5 \times 2 = \mathbf{360}$

Hence, the least required number = **360**

Question 7.
Find the smallest number which, when increased by one is exactly divisible by 12, 18, 24, 32 and 40

Solution:

L.C.M. of given numbers

2	12,	18,	24,	32,	40
2	6,	9,	12,	16,	20
2	3,	9,	6,	8,	10
3	3,	9,	3,	4,	5
	1,	3,	1,	4,	5

$\therefore$ L.C.M. $= 2 \times 2 \times 2 \times 3 \times 3 \times 4 \times 5$

$= 1440 =$ One increasing

$\therefore$ The required number $= 1440 - 1 =$ **1439**

Question 8.

Find the smallest number which, on being decreased by 3, is completely divisible by 18, 36, 32 and 27.

Solution:

LCM of 18, 36, 32 and 27

2	18, 36, 32, 27
2	9, 18, 16, 27
3	9, 9, 8, 27
3	3, 3, 8, 9
	1, 1, 8, 3

$= 2 \times 2 \times 3 \times 3 \times 3 \times 8 = 864$

$\therefore$ Required number $= 864 + 3 = 867$

REVISION EXERCISE

Question 1.

Find the H.C.F. of :

(i) 108, 288 and 420

(ii) 36, 54 and 138

Solution:

(i) H.C.F. of 108, 288, 420 = 12

```
108)288(2          36)420(11
  216                396
 72)108(1           24)36(1
    72                 24
  36)72(2           12)24(2
    72                 24
    ×                  ×
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(*ii*) H.C.F. of 36, 54 and 138 = 6

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36)54(1          18)138(7
  36               126
 18)36(2          12)18(1
    36               12
    ×              6)12(2
                     12
                     ×
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Question 2.
Find the L.C.M. of:
(i) 72, 80 and 252
(ii) 48, 66 and 120
Solution:
L.C.M. 72, 80, 252

2	72, 80, 252
2	36, 40, 126
2	18, 20, 63
3	9, 10, 63
3	3, 10, 21
	1, 10, 7

= 2× 2 × 2 × 3 × 3 × 10 × 7 = 5040

(*ii*) L.C.M. of 48, 66 and 120

2	48, 66, 120
2	24, 33, 60
2	12, 33, 30
3	6, 33, 15
	2, 11, 5

= 2 × 2 × 2 × 2 × 3 × 5 × 11 = 2640

Question 3.
State true or false : Give an example.
(i) H.C.F. of two prime numbers is 1.
(ii) H.C.F. of two co-prime numbers is 1.
(iii) L.C.M. of two prime numbers is equal to their product.
(iv) L.C.M. of two co-prime numbers is equal to their product.
Solution:
(i) True : Because the prime numbers have no common factor except 1.
(ii) True : Because co-prime numbers have no common factor except 1.
(iii) True : Because the prime number have no common factor except 1.
(iv) True : Because co-prime numbers have no common factor except 1.

Question 4.
The product of two numbers is 12096 and their H.C.F. is 36. Find their L.C.M.
Solution:
We know that
Product of two numbers = Product of their H.C.F. and L.C.M.
=> 12096 = 36 x L.C.M.
=> L.C.M. = $\frac{12096}{36}$ = 336

Question 5.
The product of the H.C.F. and the L.C.M. of two numbers is 1152. If one number is 48, find the other one.
Solution:
We know that:
Product of two numbers = Product of their H.C.F. and L.C.M.
=> 1st number x 2nd number = Product of their H.C.F. and L.C.M.
=> 48 x 2nd number = 1152
=> 2nd number = $\frac{1152}{48}$ = 24

Question 6.
(i) Find the smallest number that is completely divisible by 28 and 42.
(ii) Find the largest number that can divide 28 and 42 completely.
Solution:
(i) We know that the least number which is divisible by 28 and 42 is their L.C.M.

2	28, 42
7	14, 21
	2, 3

L.C.M. of 28 and 42 = 2 x 2 x 3 x 7 = 84
(ii) We know that the largest number which can divide 28 and 42 completely will be their H.C.F.

$$
\begin{array}{l}
28\overline{)42}(1 \\
\quad 28 \\
\quad\overline{\quad} \\
14\overline{)28}(2 \\
\quad 28 \\
\quad\overline{\times}
\end{array}
$$

H.C.F. of 28 and 42 = 14

Question 7.
Find the L.C.M. of 140 and 168. Use the L.C.M. obtained to find the H.C.F. of the given numbers.
Solution:
Numbers are 140 and 168
L.C.M. of 140 and 168

2	140, 168
2	70, 84
7	35, 42
	5, 6

$= 2 \times 2 \times 7 \times 5 \times 6 = 840$

$$\text{H.C.F.} = \frac{\text{1st number} \times \text{2nd number}}{\text{L.C.M.}}$$

$$= \frac{140 \times 168}{840} = 28$$

Question 8.
Find the H.C.F. of 108 and 450 and use the H.C.F. obtained to find the L.C.M. of the given numbers.
Solution:
Numbers are given : 108 and 450

H.C.F. of 108 and 450= 18

$$108\overline{)450}(4$$
$$\underline{432}$$
$$18\overline{)108}(6$$
$$\underline{108}$$
$$\times$$

$$\therefore \text{ L.C.M.} = \frac{\text{1st number} \times \text{2nd number}}{\text{H.C.F.}}$$

$$= \frac{108 \times 450}{18} = 2700$$