

## Chapter - 3

### Playing with Numbers

1. **Factors**  $\Rightarrow$  A number which divides a given number completely and leaves no remainder is called the factor of given number.
- $\Rightarrow$  1 is a factor of every number.
- $\Rightarrow$  Every no except 1 is a factor of itself.

2. **Multiples**  $\Rightarrow$  Multiples of a number are what we get after multiplying the number with a natural number.

3. **Whole Number** :- Any of the numbers  $\{0, 1, 2, 3, \dots\}$  etc. There are no fractional or decimal parts and no negatives.

#### Whole Numbers by different Names

- (i) **Prime Numbers** :- All the numbers which have only two factors, 1 and the number itself are called the prime numbers.  
ex. 2, 3, 5, 7.
- (ii) **Composite Numbers** :- All the numbers which have more than two factors are called composite numbers.  
ex. 4, 6, 8, 10.

(iii) **Even Numbers** :- All the numbers that are multiples of 2 are called even number.  
Ex: 2, 4, 6, ... etc.

(iv) **Odd Numbers** :- All the numbers that are not multiples of 2 or a number that does not have 2 as its factor is called an even no. Ex: 1, 3, 5, 7, ... etc.

(v) **Co-prime Numbers** :- A pair of 2 no. which have no common factor other than 1 are called co-prime.  
Ex: (2, 3), (3, 4)

(vi) **Twin-Primes** :- A set of 3 prime numbers differing by 2 are called twin primes.  
Ex: (3, 5), (5, 7)

(vii) **Prime Triplet** :- A set of 3 prime numbers differing by 2 form a prime triplet.  
Ex: (3, 5, 7)

(viii) **Perfect Numbers** :- If sum of all the factors of a number is double that number, then that number is called a perfect number.

Exercise 3.1

Q1. Write all the factors of the following numbers

(a) 24

$$1 \times 24 = 24$$

$$2 \times 12 = 24$$

$$3 \times 8 = 24$$

$$4 \times 6 = 24$$

$$6 \times 4 = 24$$

$$8 \times 3 = 24$$

$$12 \times 2 = 24$$

$$24 \times 1 = 24$$

(b) 15

$$1 \times 15 = 15$$

$$3 \times 5 = 15$$

$$5 \times 3 = 15$$

$$15 \times 1 = 15$$

Factor of 15  $\Rightarrow$  1, 3, 5, 15

Factor of 24  $\Rightarrow$  1, 2, 3, 4, 6, 8, 12, 24

(c) 21

$$1 \times 21 = 21$$

$$3 \times 7 = 21$$

$$7 \times 3 = 21$$

$$21 \times 1 = 21$$

(d) 27

$$1 \times 27 = 27$$

$$3 \times 9 = 27$$

$$9 \times 3 = 27$$

$$27 \times 1 = 27$$

Factor of 21 = 1, 3, 7 and 21      Factor of 27 = 1, 3, 9 and 27

(e) 12

$$1 \times 12 = 12$$

$$2 \times 6 = 12$$

$$3 \times 4 = 12$$

$$4 \times 3 = 12$$

$$6 \times 2 = 12$$

Factor of 12 = 1, 2, 3, 4, 6 and 12

(8) 20

$1 \times 20 = 20$

$2 \times 10 = 20$

$4 \times 5 = 20$

$5 \times 4 = 20$

$10 \times 2 = 20$

$20 \times 1 = 20$

Factor of 20 = 1, 2, 4, 5, 10 and 20

(9) 18

$1 \times 18 = 18$

$2 \times 9 = 18$

$3 \times 6 = 18$

$6 \times 3 = 18$

$9 \times 2 = 18$

$18 \times 1 = 18$

Factor of 18 = 1, 2, 3, 6, 9 and 18.

(10) 23

$1 \times 23 = 23$

$23 \times 1 = 23$

Factor = 1 and 23.

Q2. Write first five multiples of

(a) 5

$5 \times 1 = 5$

$5 \times 2 = 10$

$5 \times 3 = 15$

$5 \times 4 = 20$

$5 \times 5 = 25$

(b)

8

$8 \times 1 = 8$

$8 \times 2 = 16$

$8 \times 3 = 24$

$8 \times 4 = 32$

$8 \times 5 = 40$

(c) 9

$9 \times 1 = 9$

$9 \times 2 = 18$

$9 \times 3 = 27$

$9 \times 4 = 36$

$9 \times 5 = 45$

### Exercise 3.1

Match the items in Column 1 with the items in Column 2.

Column 1	Column 2
35 (b)	(a) Multiple of 8
15 (d)	(b) Multiple of 7
16 (a)	(c) Multiple of 70
20 (f)	(d) Factor of 30
25 (e)	(e) Factor of 50
	(f) Factor of 20

Q4. Find all the Multiples of 9 up to 100.

- $9 \times 1 = 9$
- $9 \times 2 = 18$
- $9 \times 3 = 27$
- $9 \times 4 = 36$
- $9 \times 5 = 45$
- $9 \times 6 = 54$
- $9 \times 7 = 63$
- $9 \times 8 = 72$
- $9 \times 9 = 81$
- $9 \times 10 = 90$
- $9 \times 11 = 99$

Multiples of 9  $\Rightarrow$  9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99.

Exercise 3.2

Q1. What is the sum of any two!

(a) odd numbers? (b) even number?

(a) odd numbers  $\Rightarrow 3 + 5 \Rightarrow 8$   
 $\Rightarrow 15 + 13 \Rightarrow 28$

The sum of any two odd numbers is even number.

(b) even numbers  $\Rightarrow 2 + 4 \Rightarrow 6$

$$\Rightarrow 8 + 6 \Rightarrow 14$$

The sum of any two even numbers is even number.

Q2. State whether the following statements are True or False:-

(a) The sum of three odd numbers is even. (False)

Ex:  $7 + 9 + 3 \Rightarrow 19$

(b) The sum of two odd numbers and one even number is even. (True)

Ex  $\Rightarrow 3 + 5 + 2 \Rightarrow 10$

(c) The product of three odd numbers is odd. (True)

Ex  $\Rightarrow 3 \times 7 \times 9 \Rightarrow 189$

(d) If an even number is divided by 2, the quotient is always odd. (false)

Ans  $\Rightarrow 8 \div 2 = 4$

(e) All prime numbers are not odd. (false)

Ans  $\rightarrow 2$  is prime number but it is also an even number.

(f) Prime numbers do not have any factors. (false)

Ans  $\rightarrow 1$  and the number itself are factors of the number.

(g) Sum of two prime numbers is always even. (false)

Ans  $\rightarrow 2 + 5 \Rightarrow 7$  odd no.

(h) 2 is the only even prime number. (True)

Ans 2 is the only even prime number.

(i) All even numbers are composite numbers. (false)

Ans Since, 2 is a prime number.

(j) The product of two even numbers is always even. (True)

Ans  $2 \times 4 = 8$  even number.

Q3. The numbers 13 and 31 are prime numbers. Both these numbers have same digits 1 and 3. Find such pairs of prime numbers up to 100.

Ans. The prime numbers with same digits upto 100 are as follows:-

17 and 71

37 and 73

79 and 97

Q4. Write down separately the prime and composite numbers less than 20.

Ans. 2, 3, 5, 7, 11, 13, 17 and 19 are the prime numbers less than 20.

4, 6, 8, 9, 10, 12, 14, 15, 16 and 18 are the composite numbers less than 20.

Q5. What is the greatest prime number between 1 to 10?

Ans. 2, 3, 5 and 7 are the prime numbers between 1 to 10, 7 is the greatest prime number among them.



### Exercise 3.2

Q6. Express the following as the sum of two odd numbers/prime:-

(a)  $44 \Rightarrow 3 + 41$

(b)  $36 \Rightarrow \boxed{3 + 33} \quad 5 + 31$

(c)  $24 \Rightarrow \boxed{3 + 21} \quad 5 + 19$

(d)  $18 \Rightarrow 5 + 13$

Q7. Give three pairs of the prime numbers whose difference is 2.

(i) 5 and 3:  $5 - 3 = 2$

(ii) 7 and 5:  $7 - 5 = 2$

(iii) 13 and 11:  $13 - 11 = 2$

Q8. Which of the following numbers are prime?

(a) 23

$1 \times 23 = 23$

$23 \times 1 = 23$

23 has only two factors 1 and 23. Hence it is a prime number.

(b) 51

$1 \times 51 = 51$

$17 \times 3 = 51$

$51 \times 1 = 51$

51 is not a prime number.

(c) 37

$$1 \times 37 = 37$$

$$37 \times 1 = 37$$

37 has only two factors 1 and 37. So it is a prime number.

(d) 26

$$1 \times 26 = 26$$

$$13 \times 2 = 26$$

$$26 \times 1 = 26$$

26 is not a prime number.

Q9. Write seven consecutive composite numbers less than 100 so that there is no prime number between them.

Ans

90, 91, 92, 93, 94, 95 and 96 are seven consecutive composite numbers.

Prime Numbers

- 2
- 3
- 5
- 7
- 11
- 13
- 17
- 19
- 23
- 29
- 31
- 37
- 41
- 43
- 47
- 53
- 59
- 61
- 67
- 71
- 73
- 79
- 83
- 89
- 97

Q10. Express each of the following numbers as the sum of 3 odd primes:-

(a) 21  $\Rightarrow$  3 + 5 + 13

(b) 31  $\Rightarrow$  3 + 5 + 23

(c) 53  $\Rightarrow$  13 + 17 + 23

(d) 61  $\Rightarrow$  7 + 13 + 41

Q11. Write 5 pairs of prime numbers less than 20 whose sum is divisible by 5.

Ans (i) 2 + 3 = 5

(ii) 2 + 13 = 15

(iii) 3 + 17 = 20

(iv) 7 + 13 = 20

(v) 19 + 11 = 30

Q12. Fill in the blanks:-

(a) A number which has only two factors is called a prime number.

(b) A number which has more than two factors is called a Composite number.

(c) 1 is neither prime nor Composite number.

(d) The smallest prime number is 2.

(e) The smallest Composite number is 4.

(f) The smallest even number is 2.

### Exercise 3.3

Q2. Using divisibility test, determine which of the following numbers are divisible by 4 and 8

(a) 572

The last two digits of given no. is 72, which is divisible by 4.

$$\begin{array}{r} 18 \\ 4 \overline{) 72} \\ \underline{- 4} \phantom{2} \\ 32 \\ \underline{- 32} \\ 0 \end{array}$$

So 572 is divisible by 4.

The last 3 digits are 572.  
Let us divide by 8.

$$\begin{array}{r} 71 \\ 8 \overline{) 572} \\ \underline{- 56} \phantom{2} \\ 12 \\ \underline{- 8} \\ 4R \end{array}$$

So 572 is not divisible by 8.

(b) 726352

Ans. The last two digits of given no. is 52.  
Let us divide by 4.

$$\begin{array}{r} 13 \\ 4 \overline{) 52} \\ \underline{-4} \downarrow \\ 12 \\ \underline{-12} \\ 0 \end{array}$$

So 726352 is divisible by 4.

The last 3 digits are 352.  
Let us divide by 8.

$$\begin{array}{r} 44 \\ 8 \overline{) 352} \\ \underline{-32} \downarrow \\ 32 \\ \underline{-32} \\ 0 \end{array}$$

So 726352 is divisible by 8.

(c) 5500

Ans 5500 is divisible by 4.

The last three digits of given no  $\Rightarrow$  500

Let us divide by 8.

$$\begin{array}{r} 62 \\ 8 \overline{) 500} \\ \underline{- 48} \phantom{0} \\ 20 \\ \underline{- 16} \\ 4R \end{array}$$

So 5500 is not divisible by 8.

(d) 6000

Ans 6000 is divisible by 4. because last 2 digits are 00.  
6000 is divisible by 8. because last three digits are 000.

(e) 12159

The last 2 digits are 59.

So let us divide by 4.

So 12159 is not divisible by 4.

$$\begin{array}{r} 14 \\ 4 \overline{) 59} \\ \underline{- 4} \phantom{0} \\ 19 \\ \underline{- 16} \\ 3R \end{array}$$

The last 3 digits of given no  $\Rightarrow$  159  
Let us divide by 8.

$$\begin{array}{r}
 19 \\
 \hline
 8 \overline{) 159} \\
 \underline{- 8 \downarrow} \\
 79 \\
 \underline{- 72} \\
 \hline
 6R
 \end{array}$$

So 12159 is not divisible by 8.

(f) 14560

As The last two digits of given no = 60  
Let us divide by 4.

$$\begin{array}{r}
 15 \\
 4 \overline{) 60} \\
 \underline{- 4 \downarrow} \\
 20 \\
 \underline{- 20} \\
 \hline
 0
 \end{array}$$

So 14560 is divisible by 4.

The last three digits of given no = 560  
Let us divide by 8.

$$\begin{array}{r}
 70 \\
 8 \overline{) 560} \\
 \underline{- 56 \downarrow} \\
 \hline
 00
 \end{array}$$

So 14560 is divisible by 8.



(f) 14  
(g) 21084

The last 2 digits of given no = 84  
Let us divide by 4.

$$\begin{array}{r} 4 \overline{) 84} \\ - 8 \downarrow \\ \hline 04 \\ - 4 \\ \hline 0 \end{array}$$

So 21084 is divisible by 4.

The last 3 digits of given no = 084  
Let us divide by 8.

So 21084 is not divisible by 8.

$$\begin{array}{r} 01 \\ 8 \overline{) 084} \\ - 8 \downarrow \\ \hline 04 \end{array}$$

(h) 31795072

The last 2 digits of given no = 72  
Let us divide by 4.

$$\begin{array}{r} 18 \\ 4 \overline{) 72} \\ - 4 \downarrow \\ \hline 32 \\ - 32 \\ \hline 0 \end{array}$$

So 31795072 is divisible by 4.

The last 3 digits of given no = 072  
Let us divide by 8.  $72 \div 8 = 9$

So 31795072 is divisible by 8.

(ii) 1700

As 1700 is divisible by 4, because last two digits is 00.

The 3 digits of given no = 700

Let us divide by 8

$$\begin{array}{r} 87 \\ 8 \overline{) 700} \\ \underline{- 64} \downarrow \\ 60 \\ \underline{- 56} \\ \underline{4R} \end{array}$$

So 1700 is not divisible by 8.

(j) 2150

The last two digits of given no  $\Rightarrow$  50

Let us divide by 4.

$$\begin{array}{r} 12 \\ 4 \overline{) 50} \\ \underline{- 4} \downarrow \\ 10 \\ \underline{- 8} \\ \underline{2R} \end{array}$$

So, 2150 is not divisible by 4.

The last 3 digits of given no  $\Rightarrow$  150

Let us divide by 8.

$$\begin{array}{r} 18 \\ 8 \overline{) 150} \\ \underline{- 8} \downarrow \\ 70 \\ \underline{- 64} \\ \underline{6R} \end{array}$$

So 2150 is not divisible by 8.

Q3. Using divisibility test, determine which of the following numbers are divisible by 6:-

$$\text{Factor of } 6 = 2 \times 3$$

(a) 297144

As last digit of the number is 4. Hence, the no is divisible by 2.

By adding all the digits of the no.  $2 + 9 + 7 + 1 + 4 + 4 \Rightarrow 27$ . We get 27 which is divisible by 3.

3. So the no is divisible by 3.

The number is divisible by both 2 and 3 so the number is divisible by 6.

(b) 1258

last digit of the no is 8. Hence, the no. is divisible by 2.

By adding all the digit of the no  $\Rightarrow 1 + 2 + 5 + 8 = 16$  we get 16 which is not divisible by 3. So the no is not divisible by 3.

The no is divisible by 2 but not by 3. So the no. is not divisible by 6.

(c) 4335

last digit of the no is 5. Hence, the no is not divisible by 2.

By adding all the digit of the no  $= 4 + 3 + 3 + 5 = 15$  we get 15 which is divisible by 3. So the no is divisible by 3.

The no is not divisible by 2 but by 3. So the no is not divisible by 6.

61233

last digit of the number is 3, so the no is not divisible by 2.

By adding all the digit of the no  $6+1+2+3+3=15$  we get 15, which is divisible by 3.

The no. is divisible by 3 but not by 2. So the no. is not divisible by 6.

901352

last digit of the no. is 2, so the no is divisible by 2.

By adding all the digit of the no  $9+0+1+3+5+2=20$  we get 20 which is not divisible by 3.

The no. is divisible by 2 but not by 3. So the number is not divisible by 6.

438750

last digit of the no is 0, so the no. is divisible by 2.

By adding all the digit of the no  $4+3+8+7+5+0=27$  we get 27 which is divisible by 3.

The no. is divisible by 2 and 3. So the number is divisible by 6.

1790184

last digit of the no. is 4, so the no. is divisible by 2.

By adding all the digit of the no  $1+7+9+0+1+8+4=30$ . we get 30 which is divisible by 3.

The no. is divisible by 2 and 3. so the number is divisible by 6.

(h) 12583

Ans last digit of the number is 3. Hence it is not divisible by 2.

By adding all the digit  $1+2+5+8+3=19$ . we get 19 which is not divisible by 3.

The no. is not divisible by 2 & 3. So the number is not divisible by ~~2~~ 6.

(i) 639210

Ans last digit of the no is 0. Hence it is not divisible by 2.

By adding all the digit  $6+3+9+2+1+0=21$ . we get 21. which is divisible by 3.

The number is divisible by both 2 & 3. So the number is divisible by 6.

(j) 17852

Ans last digit of the no. is 2. Hence it is divisible by 2.

By adding all the digit  $1+7+8+5+2=23$ . we get 23 which is not divisible by 3.

The no. is divisible by 2 but not by 3, so the number is not divisible by 6.

## Exercise 3.3

Q4. Using divisibility test, determine which of the following numbers are divisible by 11.

(a) 5445  
①②③④

Sum of digit at odd places  $\Rightarrow 5 + 4 = 9$

Sum of digit at even places  $\Rightarrow 4 + 5 = 9$

diff  $\Rightarrow 9 - 9 = 0$

which is divisible by 11,

So, 5445 is divisible by 11.

(b) 10824  
①②③④⑤

Sum of digit at odd places  $\Rightarrow 1 + 8 + 4 = 13$

Sum of digit at even places  $\Rightarrow 0 + 2 = 2$

diff  $\Rightarrow 13 - 2 = 11$

which is divisible by 11.

So 10,824 is divisible by 11.

(c) 7138965  
①②③④⑤⑥⑦

Sum of digit at odd places  $\Rightarrow 7 + 3 + 9 + 5 = 24$

Sum of digit at even places  $\Rightarrow 1 + 8 + 6 = 15$

diff  $\Rightarrow 24 - 15 = 9$

which is not divisible by 11.

So 7138965 is not divisible by 11.

(d) 70169308  
①②③④⑤⑥⑦⑧

Sum of digit at odd places  $\Rightarrow 7+1+9+0 \Rightarrow 17$

Sum of digit at even places  $\Rightarrow 0+6+3+8 \Rightarrow 17$

$$\text{diff} = 0$$

which is not divisible by 11.

So, 70169308 is not divisible by 11.

(e) 10000001  
①②③④⑤⑥⑦⑧

Sum of digit at odd places  $\Rightarrow 1+0+0+0 \Rightarrow 1$

Sum of digit at even places  $\Rightarrow 0+0+0+0 \Rightarrow 0$

$$\text{diff} = 1 - 0 = 1$$

which is not divisible by 11.

So, 10000001 is not divisible by 11.

(f) 901153  
①②③④⑤⑥

Sum of digit at odd places  $\Rightarrow 9+1+5 \Rightarrow 15$

Sum of digit at even places  $\Rightarrow 0+1+3 \Rightarrow 4$

$$\text{diff} = 15 - 4 = 11$$

which is divisible by 11.

So 901153 is also divisible by 11.

Q 5. Write the smallest digit and the greatest digit in the blank space of each of the following numbers so that the number formed is divisible by 3:-

(a)          6924

Sum of digit  $\Rightarrow 6 + 7 + 2 + 4 \Rightarrow 19$

Smallest digit 2  $\Rightarrow$  26724

$\Rightarrow 2 + 6 + 7 + 2 + 4 = 21$

Greatest digit 8  $\Rightarrow$  86724

$\Rightarrow 8 + 6 + 7 + 2 + 4 \Rightarrow 27$

<del>20</del>
21 + (2)
24 + (5)
27 + (8)
30 + (11)
33 + (14)

(b) 4765         2

Sum of digit  $\Rightarrow 4 + 7 + 6 + 5 + 2 = 24$

Smallest digit 0  $\Rightarrow$  476502

$\Rightarrow 4 + 7 + 6 + 5 + 0 + 2 = 24$

Greatest digit 9  $\Rightarrow$  476592

$\Rightarrow 4 + 7 + 6 + 5 + 9 + 2 \Rightarrow 33$

24 + (0)
27 + (3)
30 + (6)
33 + (9)
36 + (12)
39 + (15)



Q6. Write a digit in the blank space of each of the following numbers so that the number formed is divisible by 11.

(a)  $\overset{\textcircled{1}}{9} \overset{\textcircled{2}}{2} \overset{\textcircled{3}}{x} \overset{\textcircled{4}}{3} \overset{\textcircled{5}}{8} \overset{\textcircled{6}}{9}$

We know that a number is divisible by 11 if the diff. of the sum of the digit at odd places and that of even places should be either 0 or 11.

$$\text{Sum of digit at odd places} \Rightarrow 9 + x + 8 \Rightarrow 17 + x$$

$$\text{Sum of digit at even places} \Rightarrow 2 + 3 + 9 \Rightarrow 14$$

$$\text{diff} \Rightarrow 17 + x - 14 = 11$$

$$\Rightarrow x + 3 = 11$$

$$x = 11 - 3$$

$$x = 8$$

Therefore = 928389 Ans.

(b)  $\overset{\textcircled{1}}{8} \overset{\textcircled{2}}{x} \overset{\textcircled{3}}{9} \overset{\textcircled{4}}{4} \overset{\textcircled{5}}{8} \overset{\textcircled{6}}{4}$

(b)  $8 \overset{\textcircled{2}}{x} 9484$

$$\text{Sum of digit at odd places} \Rightarrow 8 + 9 + 8 \Rightarrow 25$$

$$\text{Sum of digit at even places} \Rightarrow x + 4 + 4 \Rightarrow 8 + x$$

$$\text{diff} = 25 - 8 + x \Rightarrow 11$$

$$\Rightarrow 17 + x = 11$$

$$\Rightarrow x = 11 - 17$$

$$\Rightarrow x \Rightarrow 6$$

869484 Ans.

### Exercise 3.4

Q1. Find the Common factors of

(a) 20 and 28

20  $\Rightarrow$  (1), (2), (4), 5, 10 and 20

28  $\Rightarrow$  (1), (2), (4), 7, 14 and 28.

Common factors = 1, 2, and 4.

(b) 15 and 25

15  $\Rightarrow$  (1), 3, (5), and 15

25  $\Rightarrow$  (1), (5) and 25

Common factors = 1 and 5

(c) 35 and 50

35  $\Rightarrow$  (1), (5), 7 and 35

50  $\Rightarrow$  (1), 2, (5), 10, 25, and 50

Common factors = 1 and 5

(d) 56 and 120

56  $\Rightarrow$  (1), (2), (4), 7, (8), 14, 28 and 56

120  $\Rightarrow$  (1), (2), 3, (4), 5, 6, (8), 10, 12, 15, 20, 24,  
30, 40, 60 and 120

Common factors = 1, 2, 4 and 8

Q2. Find the common factors of

(a) 4, 8 and 12

Ans 4  $\Rightarrow$  (1), (2), (4)  
 8  $\Rightarrow$  (1), (2), (4) and 8.  
 12  $\Rightarrow$  (1), (2), 3, (4), 6 and 12

Common factors  $\Rightarrow$  1, 2 and 4

(b) 5, 15 and 25

Ans 5  $\Rightarrow$  (1) and (5)  
 15  $\Rightarrow$  (1), 3, (5) and 15  
 25  $\Rightarrow$  (1), (5) 25

Common factors  $\Rightarrow$  1 and 5

Q3. Find first three common multiples of

(a) 6 and 8

Ans Multiples of 6  $\Rightarrow$  6, 12, 18, (24), 30, 36, 42, (48), 54, 60, 66, (72)  
 Multiples of 8  $\Rightarrow$  8, 16, (24), 32, 40, (48), 56, 64, (72), 80

Common multiples  $\Rightarrow$  24, 48 and 72.

(b) 12 and 18.

Ans Multiples of 12  $\Rightarrow$  12, 24, (36), 48, 60, (72), 84, 96, (108), 120  
 Multiples of 18  $\Rightarrow$  18, (36), 54, (72), 90, (108), 126, 144, 162, 180  
 Common multiples = 36, 72 and 108

Q4. Write all the numbers less than 100 which are common multiples of 3 and 4.

Ans Multiples of 3 are  $\Rightarrow$  3, 6, 9, (12), 15, 18, 21, (24), 27, 30, 33, (36), 39, 42, 45, (48), 51, 54, 57, (60), 63, 66, 69, (72), 75, 78, (84), 87, 90, 93, (96), 99,

Multiples of 4 are  $\Rightarrow$  ~~4, 8, 12, 16, 20, 24~~, 4, 8, (12), 16, 20, (24), 28, 32, (36), 40, 44, (48), 52, 56, (60), 64, 68, (72), 76, 80, (84), 88, 92, (96), 100.

Common multiples of 3 & 4 are  $\Rightarrow$  12, 24, 36, 48, 60, 72, 84 and 96.

Exercise 3.4

Q5: Which of the following numbers are co-prime:-

(a) 18 and 35

Ans Factors of 18 are  $\Rightarrow$  1, 2, 3, 6, 9 and 18  
 Factors of 35 are  $\Rightarrow$  1, 5, 7 and 35  
 Common factor = 1

Since, their common factor is 1, so the given two numbers are co-prime numbers.

(b) 15 and 37

Ans Factors of 15 are  $\Rightarrow$  1, 3, 5 and 15  
 Factors of 37 are  $\Rightarrow$  1 and 37  
 Common factor = 1

Since, their common factor is 1, so the given two numbers are co-prime numbers.

(c) 30 and 45

Ans Factors of 30 are  $\Rightarrow$  1, 2, 3, 5, 6, 10, 15 and 30  
 Factors of 45 are  $\Rightarrow$  1, 5, 9, 15 and 45  
 Common factor = 1, 5

Since, their common factor is other than 1, so the given two numbers are not co-prime numbers.

(d) 17 and 68

Ans Factors of 17 are  $\Rightarrow$  1, and 17  
 Factors of 68 are  $\Rightarrow$  1, 2, 4, 17, 34 and 68  
 Common factor  $\Rightarrow$  1, 17

Since, their common factor is other than 1, so the given two numbers are not co-prime numbers.

(e) 216 and 215

As Factors of 216 are  $\Rightarrow 1, 2, 3, 4, 6, 8, 9, 12, 18, 27, 36, \text{ and } 54, 216$

Factors of 215 are  $\Rightarrow 1, 5, 43, 215$   
Common factor = 1,

Since, their common factor is 1, so the given numbers are two numbers are co-prime no.

(f) 81 and 16

Ans Factors of 81 are  $\Rightarrow 1, 3, 9, 27 \text{ and } 81$   
Factors of 16 are  $\Rightarrow 1, 2, 4, 8 \text{ and } 16$

Common factor = 1

Since, their common factor is 1, so the given two numbers are co-prime no.

Q6 A number is divisible by both 5 and 12. By which other number will be that number be always divisible?

As Factor of 5 are  $\Rightarrow 1, 5$

Factor of 12 are  $\Rightarrow 1, 2, 3, 4, 6 \text{ and } 12$

Common factor = 1

Since, their common factor is 1. The given two numbers are co-prime and is also divisible by their product 60.

Factor of 60  $\Rightarrow 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30$   
and 60.

PAGE NO. 1  
Q. A number is divisible by 12. By what other numbers will that number be divisible?

Ans. Factors of 12 are = 1, 2, 3, 4, 6 and 12.  
Therefore 1, 2, 3, 4 and 6 are the numbers other than 12 by which this number is also divisible.

Ex - 3.5

Q. Which of the following statements are true:-

(i) If a number is divisible by 3, it must be divisible by 9.

Ans. False, 6 is divisible by 3, but is not divisible by 9.

(ii) If a number is divisible by 9, it must be divisible by 3.

Ans. True, as  $9 = 3 \times 3$ , Hence, if a number is divisible by 9, it will be divisible by 3.

(iii) A number is divisible by 18, if it is divisible by both 3 and 6.

Ans. False, since 30 is divisible by 3 and 6 but is not divisible by 18.

(d) If a number is divisible by 9 and 10 both, then it must be divisible by 90.

Ans True, as  $9 \times 10 = 90$ . Hence, if a number is divisible by both 9 and 10 then it is divisible by 90.

(e) If two numbers are co-prime, at least one of them must be prime.

Ans False. Since 15 and 32 are co-prime and also composite numbers.

(f) All numbers which are divisible by 4 must also be divisible by 8.

Ans False. as 12 is divisible by 4 but is not divisible by 8.

(g) All numbers which are divisible by 8 must also be divisible by 4.

Ans True. as  $2 \times 4 = 8$ . Hence, if a number is divisible by 8, it will be divisible by 2 & 4.

(h) If a number exactly divides two numbers separately, it must exactly divide their sum.

Ans True, as 2 divides 4 and 8 and it also divides 12.

(i) If a number exactly divides the sum of 2 numbers, it must exactly divide the two numbers separately.

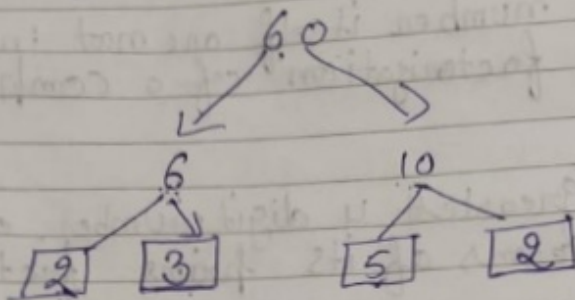
Ans False. Since, 2 divides 12 but it does not divide 7 & 5.



### Exercise 3.5

Q2. Here are two different factor trees for 60. Write the missing numbers.

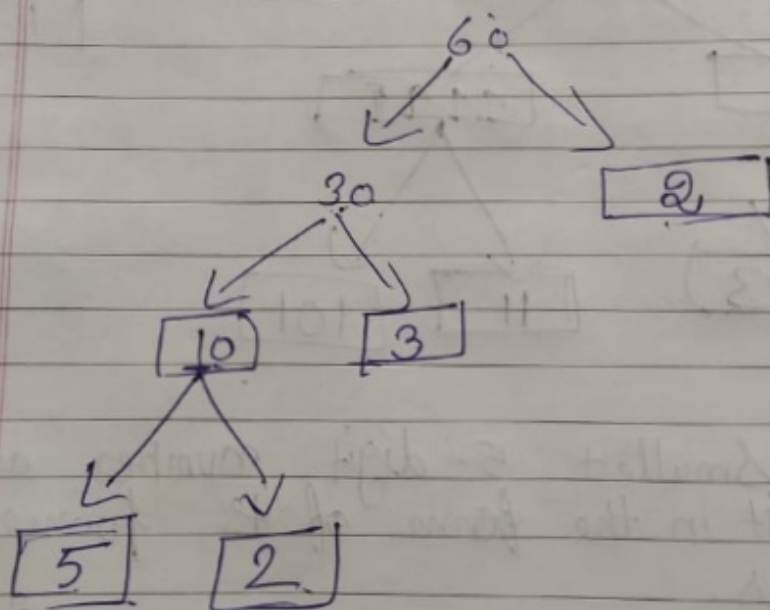
(a)



Ans

$$60 = 6 \times 10$$
$$6 = 2 \times 3$$
$$10 = 5 \times 2$$

(b)



A

$$60 = 30 \times 2$$
$$30 = 10 \times 3$$
$$10 = 5 \times 2$$

Q3. Which factors are not included in the prime factorization of a composite number?

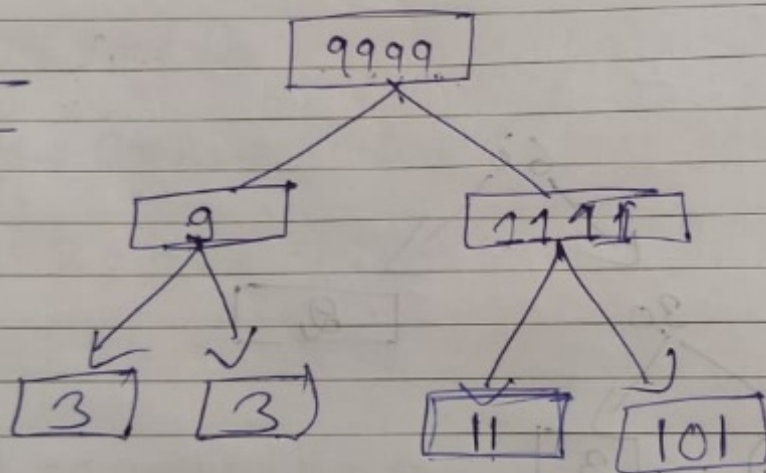
As 1 and the number itself are not included in the prime factorization of a composite number.

Q4 Write the greatest 4 digit number, and express it in terms of its prime factors.

As The greatest four digit number is 9999.

Therefore  $9999 \Rightarrow$

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



$$\begin{array}{r} 11 \overline{) 1111} \\ \underline{101} \\ 101 \\ \underline{101} \\ 11 \end{array}$$

Q5. Write the smallest 5-digit number, and express it in the form of its prime factors.

As The smallest 5 digit no  $\Rightarrow$  10000

Ans By Divide Method.

2	10000
2	5000
2	2500
2	1250
5	625
5	125
5	25
5	5
	1

$$10,000 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$$

Q6. Find all the prime factors of 1729 and arrange them in ascending order. Now, state the relation, if any, between two consecutive prime factors.

Ans

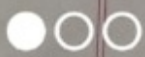
7	1729
13	247
19	19
	1

$$1729 \Rightarrow 7 \times 13 \times 19$$

$$13 - 7 \Rightarrow 6$$

$$19 - 13 = 6$$

The difference between 2 consecutive prime factors is 6.



SHOT ON MI XIAO MI TRIPLE CAMERA

2020/7/23 10:12

Q7. The product of 3 consecutive numbers is always divisible by 6. Verify this statement with the help of some examples.

- Ans
- (i)  $2 \times 3 \times 4 = 24$ , which is divisible by 6.
  - (ii)  $5 \times 6 \times 7 = 210$ , which is divisible by 6.

Q8. The sum of two consecutive odd numbers is divisible by 4. Verify this statement with the help of some examples.

- Ans
- (i)  $5 + 3 = 8$ , which is divisible by 4.
  - (ii)  $7 + 9 = 16$ , which is divisible by 4.

Friday - 24 July 2020

Exercise 3.5

Q9. In which of the following expressions, prime factorization has been done?

(a)  $24 = 2 \times 3 \times 4$

As Since, 4 is a composite no. so prime factorization has not been done.

(b)  $56 = 7 \times 2 \times 2 \times 2$

As Since, all the factors are prime, so prime factorization has been done.

(c)  $70 = 2 \times 5 \times 7$

As Since, all the factors are prime, so prime factorization has been done.

(d)  $54 = 2 \times 3 \times 9$

As Since, 9 is a composite no. so prime factorization has not been done.

Q10. Determine if 25110 is divisible by 45.

[Hint: 5 and 9 are co-prime numbers. Test the divisibility of the numbers by 5 and 9.]

As  $45 = 5 \times 9$

factors of 5 = 1, 5

factors of 9 = 1, 3, 9

Hence, 5 and 9 are co-prime numbers.

The last digit of 25110 is 0. Hence it is divisible by 5.

Sum of digits 25110  
 $2 + 5 + 1 + 1 + 0 \Rightarrow 9$

Since, the sum of the digit of 25110 is ~~divis~~ divisible by 9, so 25110 is also divisible by 9.

Therefore 25110 is divisible by 45.

Q11. 18 is divisible by both 2 and 3. It is also divisible by  $2 \times 3 = 6$ . Similarly, a number is divisible by both 4 and 6, can we say that the number must also be divisible by  $4 \times 6 = 24$ ? If not, give an example to justify your answer.

Ans 12 and 36 are both divisible by 4 and 6 But 12 and 36 are not divisible by 24. (NO.)

Q12. I am the smallest numbers having 4 different prime factors, can you find me?

Ans It is the smallest number therefore it will be the product of 4 smallest prime numbers.  
 $2 \times 3 \times 5 \times 7 = 210$

### Exercise 3.6

Q1. Find the HCF of the following numbers:

(a) 18, 48

$$\begin{array}{r|l} 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 48 \\ \hline 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$18 \Rightarrow 2 \times 3 \times 3$$

$$48 \Rightarrow 2 \times 2 \times 2 \times 2 \times 3$$

$$\text{HCF} \Rightarrow 2 \times 3 = 6$$

(b) 30, 42

$$\begin{array}{r|l} 2 & 30 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 42 \\ \hline 3 & 21 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$30 = 2 \times 3 \times 5$$

$$42 = 2 \times 3 \times 7$$

$$\text{HCF} \Rightarrow 2 \times 3 = 6$$

(c) 18, 60

$$\begin{array}{r|l} 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array} \quad \begin{array}{r|l} 2 & 60 \\ \hline 2 & 30 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$18 = 2 \times 3 \times 3$$
$$60 = 2 \times 2 \times 3 \times 5$$

$$\text{HCF} = 2 \times 3 = 6$$

(d) 27, 63

$$\begin{array}{r|l} 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array} \quad \begin{array}{r|l} 3 & 63 \\ \hline 3 & 21 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$27 = 3 \times 3 \times 3$$
$$63 = 3 \times 3 \times 7$$

$$\text{HCF} = 3 \times 3 = 9$$

(e) 36, 84

$$\begin{array}{r|l} 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array} \quad \begin{array}{r|l} 2 & 84 \\ \hline 2 & 42 \\ \hline 3 & 21 \\ \hline 7 & 7 \\ \hline & 1 \end{array} \quad \begin{array}{l} 36 = 2 \times 2 \times 3 \times 3 \\ 84 = 2 \times 2 \times 3 \times 7 \\ \text{HCF} = 2 \times 2 \times 3 \\ 12 \end{array}$$



6) 34, 102

$$\begin{array}{r|l} 2 & 34 \\ \hline 17 & 17 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 102 \\ \hline 3 & 51 \\ \hline 17 & 17 \\ \hline & 1 \end{array}$$

$$34 = 2 \times 17$$

$$102 = 2 \times 3 \times 17$$

$$\text{HCF} = 2 \times 17 = 34$$

g) 70, 105, 175

$$\begin{array}{r|l} 2 & 70 \\ \hline 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 105 \\ \hline 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 5 & 175 \\ \hline 5 & 35 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{l} 70 = 2 \times 5 \times 7 \\ 105 = 3 \times 5 \times 7 \\ 175 = 5 \times 5 \times 7 \end{array}$$

$$\text{HCF} = 5 \times 7 = 35$$

h) 91, 112, 49

$$\begin{array}{r|l} 7 & 91 \\ \hline 13 & 13 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 112 \\ \hline 2 & 56 \\ \hline 2 & 28 \\ \hline 2 & 14 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

91 = 7 × 13

112 = 2 × 2 × 2 × 2 × 7

49 = 7 × 7

HCF = 7

(ii) 18, 54, 81

As

2	18
3	9
3	3
	1

2	54
3	27
3	9
3	3
	1

3	81
3	27
3	9
3	3
	1

18 = 2 × 3 × 3

54 = 2 × 3 × 3 × 3

81 = 3 × 3 × 3 × 3

HCF = 3 × 3 = 9

(f) 12, 45, 75

As

2	12
2	6
3	3
	1

3	45
3	15
5	5
	1

3	75
5	25
5	5
	1

12 = 2 × 2 × 3

45 = 3 × 3 × 5

75 = 3 × 5 × 5

HCF = 3

### Exercise 3.6

Q2. What is the HCF of two consecutive:-  
(a) numbers?

Ans. The HCF of two consecutive numbers is 1.

Ex: The HCF of 2 and 3 is 1

(b) even numbers?

Ans. The HCF of two consecutive numbers is 2.

Ex: The HCF of 2 and 4 is 2.

(c) odd numbers?

Ans. The HCF of two consecutive odd number is 1.

Ex: The HCF of 3 and 5 is 1.

Q3. HCF of co-prime numbers 4 and 15 was found as follow by factorisation.

$4 = 2 \times 2$  and  $15 = 3 \times 5$  since there is no common prime factor, so HCF of 4 and 15 is 0. Is the answer correct? If not, what is the correct HCF?

Ans. No, The answer is not correct. The correct answer is 1.

Date / /

### Exercise 3.7

Q1. Renu Purchases two bags of fertilizer of weights 75 Kg and 69 Kg. Find the maximum value of weight which can measure the weight of the fertilizer exact number of times.

Ans Given, weight of two bags of fertilizer = 75 Kg and 69 Kg.  
maximum weight  $\Rightarrow$  HCF of two bags weight.

3	75	3	69
5	25	23	23
5	5		1
	1		

$$75 = 3 \times 5 \times 5$$

$$69 = 3 \times 23$$

$$\text{HCF} = 3.$$

3 Kg is the maximum value of weight which can measure the weight of the fertilizer exact number of times.

Q2. Three boys step off together from the same spot. Their steps measure 63 cm, 70 cm, and 77 cm respectively. What is the minimum distance each should cover so that all can cover the distance in complete steps?

Ans I<sup>st</sup> boy's steps measure  $\Rightarrow$  63 cm.

II<sup>nd</sup> boy's steps measure = 70 cm

III<sup>rd</sup> boy's steps measure = 77 cm

$$\text{LCM} \Rightarrow 63, 70, 77$$

2	63, 70, 77
3	63, 35, 77
3	21, 35, 77
5	7, 35, 77
7	7, 7, 77
11	1, 1, 11
	1, 1, 1

$$\text{LCM} = 2 \times 3 \times 3 \times 5 \times 7 \times 11 = 6930 \text{ cm.}$$

Hence, 6930 cm is the distance each should cover so that all can cover the distance in complete steps.

Q3. The length, breadth and height of a room are 825 cm, 675 cm and 450 cm respectively. Find the longest tape which can measure the three dimensions of the room exactly.

As  
 length = 825 cm  
 breadth = 675 cm  
 height = 450 cm.  
 HCF = 825, 675, 450.

3	825
5	275
5	55
11	11
	1

3	675
3	225
3	75
5	25
5	5
	1

2	450
3	225
3	75
5	25
5	5
	1

$$825 = 3 \times 5 \times 5 \times 11$$

$$675 = 3 \times 3 \times 3 \times 5 \times 5$$

$$450 = 2 \times 3 \times 3 \times 5 \times 5$$

HCF =  $3 \times 5 \times 5 = 75 \text{ cm}$ ,  
 longest tape is 75 cm.

Q4. Determine the Smallest 3-digit number which is exactly divisible by 6, 8 and 12.

Ans. LCM of 6, 8 and 12

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

$$\text{LCM} \Rightarrow 2 \times 2 \times 2 \times 3 = 24.$$

We need to find the Smallest 3 digit multiple of 24.

$$24 \times 4 \Rightarrow 96, \quad 24 \times 5 = 120, \quad 24 \times 6 \Rightarrow 144.$$

120 is the Smallest 3 digit number.

Ex. 3.7

Q5. Determine the greatest 3-digit number exactly divisible by 8, 10 and 12.

As LCM of 8, 10, 12

2	8, 10, 12
2	4, 5, 6
2	2, 5, 3
3	1, 5, 3
5	1, 5, 1
	1, 1, 1

$$\text{LCM} = 2 \times 2 \times 2 \times 3 \times 5 = 120$$

Now we need to find the greatest 3 digit multiple of 120

120, 240, 360, 480, 600, 720, 840, 960, 1080, 1200

So, 960 is the greatest 3 digit no. exactly divisible by 8, 10 and 12.

Q6. The traffic lights at three different road crossing change after every 48 second, 72 second and 108 second respectively. If they change simultaneously at 7 a.m. at what time will they change simultaneously again?

→ LCM of 48, 72, 108

2	72, 72, 108
2	24, 36, 54
2	12, 18, 27
2	6, 9, 27
3	3, 3, 27
3	1, 3, 9
3	1, 1, 3
	1, 1, 1

$LCM = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = 432$  Seconds

lights will change together after every 432 Second.

$432 \div 60 \Rightarrow 7$  min and 12 Second.

Q7. Three tanks contain 403 L, 434 L, and 465 L of diesel respectively. Find the maximum capacity of a container that can measure the diesel of the three containers exact number of times.

HCF of 403, 434, 465

13	403	2	434	3	465
31	31	7	217	5	155
	1	31	31	31	31
			1		1

$403 = 13 \times 31$   
 $434 = 2 \times 7 \times 31$   
 $465 = 3 \times 5 \times 31$   
 HCF = 31

A container of 31 L can measure the diesel of the three containers exact number of times.



Friday 31 - July 2020

Ex-3.7

Q. Find the least number which when divided by 6, 15 and 18 leave remainders 5 in each case.

Sol. LCM of 6, 15 and 18

2	6, 15, 18
3	3, 15, 9
3	1, 5, 3
5	1, 5, 1
	1, 1, 1

$$\text{LCM} = 2 \times 3 \times 3 \times 5 \Rightarrow 90$$

$$\text{Required number} \Rightarrow 90 + 5 \Rightarrow 95$$

So, 95 is the required number.

Q. Find the smallest 4-digit number which is divisible by 18, 24 and 32.

Sol. LCM of 18, 24 and 32.

2	18, 24, 32
2	9, 12, 16
2	9, 6, 8
2	9, 3, 4
2	9, 3, 2
3	9, 3, 1
3	3, 1, 1
	1, 1, 1

$$\text{LCM} \Rightarrow 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \Rightarrow 288$$

Here, we need to find the smallest 4 digit multiple of 288.

We find =  $288 \times 2 \Rightarrow 576$ ,  $288 \times 3 = 864$ ,  $288 \times 4 = 1152$   
 $288 \times 5 = 1440$

So, 1152 is the smallest 4-digit number which is divisible by 18, 24 and 32.

Find the LCM of the following numbers :-

- (a) 9 and 4 (b) 12 and 5 (c) 6 and 5 (d) 15 and 4

Observe a common property in the obtained LCMs.  
 Is LCM the product of two numbers in each case?

Sol. LCM of 9 and 4

2	9, 4
2	9, 2
3	9, 1
3	3, 1
	1, 1

$LCM = 2 \times 2 \times 3 \times 3$   
 $\Rightarrow 36$

(b) LCM of 12 and 5

2	12, 5
2	6, 5
3	3, 5
5	1, 5
	1, 1

$LCM = 2 \times 2 \times 3 \times 5$   
 $\Rightarrow 60$

6 and 5

2	6, 5
3	3, 5
5	1, 5
	1, 1

$$\text{LCM} = 2 \times 3 \times 5 = 30$$

15 and 4

2	15, 4
2	15, 2
3	5, 1
5	1, 1
	1, 1

$$\text{LCM} = 2 \times 2 \times 3 \times 5 = 60$$

Yes in each case the LCM of given numbers is the product of these numbers.

Q. Find the LCM of the following numbers in which one number is the factor of other:-

- (a) 5, 20      (b) 6, 18      (c) 12, 48      (d) 9, 45

What do you observe in the result obtained?

(a) 5, 20

$$\begin{array}{r|l} 2 & 5, 20 \\ \hline 2 & 5, 10 \\ \hline 5 & 5, 5 \\ \hline & 1, 1 \end{array}$$

$$\text{LCM} = 2 \times 2 \times 5 \Rightarrow 20$$

(b) 6, 18

$$\begin{array}{r|l} 2 & 6, 18 \\ \hline 3 & 3, 9 \\ \hline 3 & 1, 3 \\ \hline & 1, 1 \end{array}$$

$$\text{LCM} = 2 \times 3 \times 3 \Rightarrow 18$$

(c) 12, 48

$$\begin{array}{r|l} 2 & 12, 48 \\ \hline 2 & 6, 24 \\ \hline 2 & 3, 12 \\ \hline 2 & 3, 6 \\ \hline 3 & 3, 3 \\ \hline & 1, 1 \end{array}$$

$$\text{LCM} = 2 \times 2 \times 2 \times 2 \times 3 \Rightarrow 48$$

(d) 9, 45

$$\begin{array}{r|l} 3 & 9, 45 \\ \hline 3 & 3, 15 \\ \hline 5 & 1, 5 \\ \hline & 1, 1 \end{array}$$

$$\text{LCM} = 3 \times 3 \times 5 \Rightarrow 45$$

Hence, in each case the LCM of given numbers is the larger number. When a number is a factor of other number then their LCM will be the larger number.