CLASS 6TH

MATHS

CHAPTER- 3rd

PLAYING WITH NUMBERS

EXERCISE- 3.1

NCERT SOLUTION

Question 1. Write all the factors of the following numbers:

(a) 24

Ans:

24 = 1 x 24;   24 = 2 x 12;   24 = 3 x 8;   24 = 4 x 6

Hence, Factors of 24 are: 1, 2, 3, 4, 6, 8, 12 and 24.

(b) 15

Ans:

15 = 1 x 15;   15 = 3 x 5

Hence, Factors of 15 are: 1, 3, 5 and 15.

(c) 21

Ans:

21 = 1 x 21;   21 = 3 x 7

Hence, Factors of 21 are: 1, 3, 7 and 21.

(d) 27

Ans:

$$27 = 1 \times 27; \qquad 27 = 3 \times 9.$$

Hence, Factors of 27 are: 1, 3, 9 and 27.

(e) 12

Ans:

$$12 = 1 \times 12; \qquad 12 = 2 \times 6; \qquad 12 = 3 \times 4$$

Hence, Factors of 12 are: 1, 2, 3, 4, 6 and 12.

(f) 20

Ans:

$$20 = 1 \times 20; \qquad 20 = 2 \times 10; \qquad 20 = 4 \times 5$$

Hence, Factors of 20 are: 1, 2, 4, 5, 10 and 20.

(g) 18

Ans:

$$18 = 1 \times 18; \qquad 18 = 2 \times 9; \qquad 18 = 3 \times 6$$

Hence, Factors of 18 are: 1, 2, 3, 6, 9 and 18.

(h) 23

Ans:

$$23 = 1 \text{ x } 23$$

Hence, Factors of prime number 23 are: 1 and 23.

(i) 36

Ans:

$$36 = 1 \text{ x } 36; \quad 36 = 2 \text{ x } 18; \quad 36 = 3 \text{ x } 12; \quad 36 = 4 \text{ x } 9;$$
$$36 = 6 \text{ x } 6$$

Hence, Factors of 36 are: 1, 2, 3, 4, 6, 9, 12, 18 and 36.

Question2. Write first five multiples of:

(a) 5

Ans:

First five multiples of 5 are:

$$5 \text{ x } 1 = 5; \quad 5 \text{ x } 2 = 10; \quad 5 \text{ x } 3 = 15; \quad 5 \text{ x } 4 = 20; \quad 5 \text{ x } 5 = 25$$

Hence, first five multiples of 5 are: 5, 10, 15, 20 and 25.

(b) 8

Ans:

First five multiples of 8 are:

8 x 1 = 8;   8 x 2 = 16;   8 x 3 = 24;   8×4 = 32;   8 x 5 = 40

Hence, first five multiples of 8 are: 8, 16, 24, 32 and 40.

(c) 9

Ans:

First five multiples of 9 are:

9 x 1 = 9;   9 x 2 = 18;   9 x 3 = 27;   9 x 4 = 36;   9 x 5 = 45

Hence, first multiples of 9 are: 9, 18, 27, 36 and 45.

Question3. Match the items in column I with the items in column II.

Ans

Column I	Column II (Ans)
(i) 35	(b) Multiple of 7
(ii) 15	(d) Factor of 30
(iii) 16	(a) Multiple of 8
(iv) 20	(f) Factor of 20

| (v) 25 | (e) Factor of 50 |

Question 4. Find all the multiples of 9 up to 100.
Ans:

9 x 1 = 9;   9 x 2 = 18;   9 x 3 = 27;   9 x 4 = 36;   9 x 5 = 45; 9 x 6 = 54;   9 x 7 = 63;   9 x 8 = 72;   9 x 9 = 81;   9 x 10 = 90; 9 x 11 = 99

Hence, Multiples of 9 up to 100 are: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90 and 99.

EXERCISE- 3.2
NCERT SOLUTION

Question 1. What is the sum of any two:

(a) Odd numbers?

Ans:

The sum of any two odd numbers is even.

(b) Even numbers?

Ans:

The sum of any two even numbers is even.

Question 2. State whether the following statements are True or False.

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

Ans:

False [1+ 3 + 5 = 9 (odd)]

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

Ans:

True [1 + 3+ 2= 6 (even)]

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

Ans:

True [1 x 3 x 5 = 15 (odd)]

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

Ans:

False [4 ÷ 2 = 2 (even)]

(e) All prime numbers are odd.

Ans:

False [2 is a prime number but it is also an even number.]

(f) Prime numbers do not have any factors.

Ans:

False [3 is a prime number having 1 and 3 as its factors]

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

Ans:

False [$5 + 2 = 7(odd)$]

(h) 2 is only the even prime number.
Ans:

True [2 is the only even prime number]

(i) All even numbers are composite numbers.
Ans:

False [2 is even number but not composite number]

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

Ans:

True [$\because 2 \times 4 = 8$ (even)]

Question 3. 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 pair of prime numbers having same digits are: (17 & 71), (37 & 73), (79 & 97).

Question 4. Write down separately the prime and composite numbers less than 20.

Ans:

Prime numbers less than 20 are:
2, 3, 5, 7, 11, 13 and 17

Composite numbers less than 20 are:
4, 6, 8, 9, 10, 12, 14, 15, 16 and 18

Question 5. What is the greatest prime number between 1 and 10?

Ans:

The greatest prime number between 1 and 10 is 7.

Question 6. Express the following as the sum of two odd primes.

(a) 44

Ans:

$44 = 7 + 37$

(b) 36

Ans:

$36 = 5 + 31$

(c) 24

Ans:

$24 = 11 + 13$

(d) 18

Ans:

$18 = 7 + 11$

Question 7. Give three pairs of prime numbers whose difference is 2.
[Remark: Two prime numbers whose difference is 2 are called twin primes]
Ans:

Required pairs are: (3 and 5), (5 and 7) and (11 and 13)

Question 8. Which of the following numbers are prime?
(a) 23

Ans:

23 is a prime number because factor of 23 is 1 and 23

(b) 51

Ans:

51 is not a prime number because factor of 51 is 1, 3, 17 and 51

(c) 37

Ans:

37 is a prime number because factor of 37 is 1 and 37

(d) 26

Ans:

26 is not a prime number because factor of 26 is 1,2,13 and 26

Question 9. Write seven consecutive composite numbers less than 100 so that there is no prime number between them.

Ans:

Seven consecutive composite numbers less than 100 are: 0, 91, 92, 93, 94, 95 and 96

Question 10. Express each of the following numbers as the sum of three odd primes.

(a) 21

Ans:

$21 = 3 + 5 + 13$

(b) 31

Ans:

$31 = 7 + 11 + 13$

(c) 53

Ans:

$53 = 13 + 17 + 23$

(d) 61

Ans:

$61 = 11 + 13 + 37$

Question 11. Write five pairs of prime numbers less than 20 whose sum is divisible by 5.
(Hint: 3 + 7 = 10)
Ans:

Required pairs of prime numbers less than 20 are:
(i) $2 + 3 = 5$ (ii) $3 + 7 = 10$ (iii) $13 + 2 = 15$

(iv) $17 + 3 = 20$ (v) $7 + 13 = 20$

Question 12. 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

(d) The smallest prime number is 2

(e) The smallest composite number is 4

(f) The smallest even number is 2

EXERCISE- 3.3

NCERT SOLUTION

Question 1. Using divisibility tests, determine which of the following numbers are divisible by 2, by 3, by 4, by 5, by 6, by 8, by 9, by 10, by 11 (Say, Yes or No)

	Divisible by								
Number	2	3	4	5	6	8	9	10	11
128	Yes	No	Yes	No	No	Yes	No	No	No
990	-	-	-	-	-	-	-	-	-
1586	-	-	-	-	-	-	-	-	-
275	-	-	-	-	-	-	-	-	-
6686	-	-	-	-	-	-	-	-	-
639210	-	-	-	-	-	-	-	-	-
429714	-	-	-	-	-	-	-	-	-
2856	-	-	-	-	-	-	-	-	-
3060	-	-	-	-	-	-	-	-	-
406839	-	-	-	-	-	-	-	-	-

Ans:

Divisible by									
	2	3	4	5	6	8	9	10	11
128	Yes	No	Yes	No	No	Yes	No	No	No
990	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes
1586	Yes	No	No	No	No	No	No	No	No
275	No	No	No	Yes	No	No	No	No	Yes
6686	Yes	No	No	No	No	No	No	No	No
639210	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes
429714	Yes	Yes	No	No	Yes	No	Yes	No	No
2856	Yes	Yes	Yes	No	Yes	Yes	No	No	No
3060	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No
406839	No	Yes	No	No	No	No	No	No	No

Question 2.

Using divisibility tests, determine which of following numbers are divisible by 4; by 8.

(a) 572

Ans:

Divisibility rule for 4
The number formed by the last two digits of the given number should be divisible by 4.

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

Hence 572 is divisible by 4

Divisibility rule for 8
The number formed by the last three digits of the given number should be divisible by 8.

$$
\begin{array}{r}
71 \\
8\,\overline{)572} \\
56 \\
\hline
12 \\
8 \\
\hline
4
\end{array}
$$

Hence, 572 is not divisible by 8

(b) 726352
Ans:

Divisibility rule for 4
The number formed by the last two digits of the should be divisible by 4.

$$
\begin{array}{r}
13 \\
4\,\overline{)52} \\
4 \\
\hline
12 \\
12 \\
\hline
4
\end{array}
$$

Hence, 726352 is not divisible by 4.

Divisibility rule for 8
The number formed by the last three digits of the given number should be divisible by 8.

```
        44
  8 ⟌ 352
       32
       32
       32
        0
```

Hence, 726352 is divisible by 8.

(c) 5500
Ans:

Divisibility rule of 4
The number formed by the last two digits of the given number should be divisible by 4. Here, the last two digits of the given number are 0.

Hence, 5500 is divisible by 4.

Divisibility rule of 8
The number formed by the last three digits of the given number should be divisible by 8.

```
         62
    8⟌500
        48
        20
        16
         4
```

Hence, 5500 is not divisible by 8.

(d) 6000

Divisibility rule for 4

The number formed by the last two digits of the given number should be divisible by 4. Here, the last two digits of the given number are 0.

Hence, 6000 is divisible by 4.

Divisibility rule for 8

The number formed by the last three digits of the given number should be divisible by 8. Here, the last three digits of the given number are 0.

Hence, 6000 is divisible by 8.

(e) 12159

Ans:

Divisibility rule for 4

The number formed by the last two digits of the given number should be divisible by 4.

```
        14
    4)59
      4
    ─────
     19
     16
    ─────
      3
```

Hence, 12159 is not divisible by 4.

Divisibility rule for 8

The number formed by the last three digits of the given number should be divisible by 8.

```
        19
    8)159
      8
    ─────
     79
     72
    ─────
      7
```

Hence, 12159 is not divisible by 8.

(f) 14560
Ans:

Divisibility rule for 4

The number formed by the last two digits of the given number should be divisible by 4.

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

Hence, 14560 is divisible by 4.

Divisibility rule for 8

The number formed by the last three digits of the given number should be divisible by 8.

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

Hence, 14560 is divisible by 8.

(g) 21084

Ans:

Divisibility rule for 4

The number formed by the last two digits of the given number should be divisible by 4.

$$
\begin{array}{r}
21 \\
4\overline{)84} \\
8 \\
\hline
4 \\
4 \\
\hline
0
\end{array}
$$

Hence, 21084 is divisible by 4.

Divisibility rule for 8

The number formed by the last three digits of the given number should be divisible by 8.

$$
\begin{array}{r}
10 \\
8\overline{)084} \\
8 \\
\hline
4
\end{array}
$$

21084 is not divisible by 8.

(h) 31795072

Ans:

Divisibility rule for 4
The number formed by the last two digits of the given number should be divisible by 4.

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

Hence, 31795072 is divisible by 4.

Divisibility rule for 8

The number formed by the last three digits of the given number should be divisible by 8. Here, the number formed by the last three digits of the given number = 072.

$$\begin{array}{r} 9 \\ 8\overline{)072} \\ 72 \\ \hline 0 \end{array}$$

Hence, 31795072 is divisible by 8.

(i) 1700

Ans:

Divisibility rule for 4

The number formed by the last two digits of the given number should be divisible by 4. Here, the last two digits of the given number is 0. Hence, 1700 is divisible by 4.

Divisibility rule for 8

The number formed by the last three digits of the given number should be divisible by 8.

$$
\begin{array}{r}
87 \\
8\overline{)700} \\
64 \\
\hline
60 \\
56 \\
\hline
4
\end{array}
$$

Hence, 1700 is not divisible by 8.

(j) 2150

Ans:

Divisibility rule for 4

The number formed by the last two digits of the given number should be divisible by 4.

$$
\begin{array}{r}
12 \\
4\overline{)50} \\
4 \\
\hline
10 \\
8 \\
\hline
2
\end{array}
$$

Hence, 2150 is not divisible by 4.

Divisibility rule for 8
The number formed by the last three digits of the given number should be divisible by 8.

$$
\begin{array}{r}
18 \\
4\overline{)150} \\
8 \\
\hline
70 \\
64 \\
\hline
6
\end{array}
$$

Hence, 2150 is not divisible by 8.

Question 3. Using divisibility tests, determine which of the following numbers are divisible by 6:
(a) 297144
Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.
The given number has even digit at its one's place. So, it is divisible by 2. Here, 4 is at one's place.

Hence, 297144 is divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of $297144 = 2 + 9 + 7 + 1 + 4 + 4 = 27$

which is divisible by 3.

Hence, the given number 297144 is divisible by 6.

(b) 1258

Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.
The given number has even digit at its one's place. So, it is divisible by 2. Here, 8 is at one's place.

Hence, 1258 is divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of $1258 = 1 + 2 + 5 + 8 = 16$ which is not divisible by 3.

Hence, the given number 1258 is not divisible by 6.

(c) 4335

Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.
The given number has even digit at its one's place. So, it is divisible by 2. Here, 5 is at one's place.

Hence, 4335 is not divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of $4335 = 4 + 3 + 3 + 5 = 15$ which is divisible by 3.

Hence, the given number 4335 is not divisible by 6.

(d) 61233

Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.
The given number has even digit at its one's place. So, it is divisible by 2. Here, 3 is at one's place.

Hence, 61233 is not divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of $61233 = 6 + 1 + 2 + 3 + 3 = 15$ which is divisible by 3.

Hence, the given number 61233 is not divisible by 6.

(e) 901352

Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.

The given number has even digit at its one's place. So, it is divisible by 2. Here, 2 is at one's place.

Hence, 901352 is divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of 901352 = 9 + 0 + 1 + 3 + 5 + 2 = 20. which is not divisible by 3.

Hence, the given number 901352 is not divisible by 6.

(f) 438750
Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.
The given number has even digit at its one's place. So, it is divisible by 2. Here, 0 is at one's place.

Hence, 438750 is divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of 438750 = 4 + 3 + 8 + 7 + 5 + 0 = 27 which is divisible by 3.

Hence, the given number 901352 is divisible by 6.

(g) 1790184

Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.
The given number has even digit at its one's place. So, it is divisible by 2. Here, 4 is at one's place.

Hence, 1790184 is divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of $1790184 = 1 + 7 + 9 + 0 + 1 + 8 + 4 = 30$ which is divisible by 3.

Hence, the given number 1790184 is divisible by 6.

(h) 12583

Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.
The given number has even digit at its one's place. So, it is divisible by 2. Here, 3 is at one's place.

Hence, 12583 is not divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of $12583 = 1 + 2 + 5 + 8 + 3 = 19$

which is not divisible by 3.

Hence, the given number 12589 is not divisible by 6.

(i) 639210

Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.
The given number has even digit at its one's place. So, it is divisible by 2. Here, 0 is at one's place.

Hence, 639210 is divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of $639210 = 6 + 3 + 9 + 2 + 1 + 0 = 21$ which is divisible by 3.

Hence, the given number 639210 is divisible by 6.

(j) 17852

Ans:

Divisibility rule for 6

We know that a number is divisible by 6 if it is also divisible by both 2 and 3.

The given number has even digit at its one's place. So, it is divisible by 2. Here, 2 is at one's place.

Hence, 17852 is divisible by 2

Divisibility rule for 3 is sum of all the digit is divisible by 3.
Here, the sum of all the digits of $17852 = 1 + 7 + 8 + 5 + 2 = 23$ which is not divisible by 3.

Hence, the given number 17852 is not divisible by 6.

Question 4. Using divisibility tests, determine which of the following numbers are divisible by 11:
(a) 5445
Ans:

Divisibility rule for 11

If the difference between the sum of the digits at odd places and the sum of the digits at even places (from the right) of the number is either divisible by 0 or 11.

Sum of the digits at odd places $= 5 + 4 = 9$
Sum of the digits at even places $= 4 + 5 = 9$
Difference $= 9 - 9 = 0$

Hence, the given number 5445 is divisible by 11.

(b) 10824

Ans:

Divisibility Rule for 11

If the difference between the sum of the digits at odd places and the sum of the digits at even places (from the right) of the number is either divisible by 0 or 11.

Sum of the digits at odd places = 4 + 8 + 1 = 13
Sum of the digits at even places = 2 + 0 = 2
Difference = 13 – 2 = 11

Hence, the given number 10824 is divisible by 11.

(c) 7138965

Ans:

Divisibility Rule for 11

If the difference between the sum of the digits at odd places and the sum of the digits at even places (from the right) of the number is either divisible by 0 or 11.

Sum of the digits at odd places = 5 + 9 + 3 + 7 = 24
Sum of the digits at even places = 6 + 8 + 1 = 15
Difference = 24 – 15 = 9

Hence, the given number 7138965 is not divisible by 11.

(d) 70169308

Ans:

Divisibility Rule for 11

If the difference between the sum of the digits at odd places and the sum of the digits at even places (from the right) of the number is either divisible by 0 or 11.

Sum of all the digits at odd places = 8 + 3 + 6 + 0 = 17
Sum of all the digits at even places = 0 + 9 + 1 + 7 = 17

Difference = 17-17 = 0

Hence, the given number 70169308 is divisible by 11.

(e) 10000001.

Ans:

Divisibility Rule for 11

If the difference between the sum of the digits at odd places and the sum of the digits at even places (from the right) of the number is either divisible by 0 or 11.

Sum of all the digits at odd places = 1 + 0 + 0 + 0 = 1
Sum of all the digits at even places = 0 + 0 + 0 + 1 = 1
Difference = 1 − 1 = 0

Hence, the given number 10000001 is divisible by 11.

(F) 901153

Ans.

Divisibility Rule for 11

If the difference between the sum of the digits at odd places and the sum of the digits at even places (from the right) of the number is either divisible by 0 or 11.

Sum of all the digits at odd places $= 3 + 1 + 0 = 4$
Sum of all the digits at even places $= 5 + 1 + 9 = 15$
Difference $= 15 - 4 = 11$

Hence, the given number 901153 is divisible by 11.

Question 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) ____ 6724

Ans:

Divisibility rule for 3 is sum of all the digit is divisible by 3.

Sum of the given digits $= 6+7+2+4= 19$

Smallest No. $= 2$, if we put 2 in the given blank. The sum of digit will be 21 which is divisibly by 3.

Largest No. $= 8$ if we put 8 in the given blank. The sum of digit will be 21 which is divisibly by 3.

(b) 4765 ____ 2

Ans:

Divisibility rule for 3 is sum of all the digit is divisible by 3.

Sum of the given digits = 4+7+6+5+2 = 24

Smallest No. = 0, if we put 0 in the given blank. The sum of digit will be same 24 which is divisibly by 3.

Largest No. = 9 if we put 9 in the given blank. The sum of digit will be 33 which is divisibly by 3.

Question 6. Write a digit in the blank space of each of the following numbers so that the numbers formed is divisible by 11.

(a) 92 ___ 389

Ans:

Sum of the digits at odd places = $9 + 3 + 2 = 14$

Sum of the digits at even places = $8 + \_ + 9 = 17 + \_$

Difference = $17 + \_ - 14 = \_ + 3$

For the given number to be divisible by 11

$\_ + 3 = 11$

$\therefore \_ = 11 - 3 = 8$

So, the missing digit = 8

(b) 8 ___ 9484

Ans:

Sum of the digits at odd places = 4 + 4 + _ = 8 + _
Sum of the digits at even places = 8 + 9 + 8 = 25
∴ Difference = 25 – [8 + _] = 25 – 8 – _ = 17 – _

For the given number to be divisible by 11
17 – _ = 11
∴ 17 – 11 = 6

So, the missing digit = 6

EXERCISE- 3.4

NCERT SOLUTION

Question 1. Find the common factors of:

(a) 20 and 28

Ans:

Factors of 20 are 1, 2, 4, 5, 10, and 20
Factors of 28 are 1, 2, 4, 7, and 28

Hence, common factors are 1, 2 and 4.

(b) 15 and 25

Ans:

Factors of 15 are 1, 3, 5, and 15
Factors of 25 are 1, 5, and 25

Hence, common factors are 1 and 5.

(c) 35 and 50

Ans:

Factors of 35 are: 1, 5, 7, and 35
Factors of 50 are: 1, 2, 5, 10, and 50

Hence, common factors are 1 and 5.

(d) 56 and 120

Ans:

Factors of 56 are 1, 2, 4, 7, 8, 14, 28, and 56
Factors of 120 are 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 30, 40, 60, and 120

Hence, common factors are 1, 2, 4, and 8.

Question 2. Find the common factors of:

(a) 4, 8 and 12

Ans:

Factors of 4 are 1, 2, and 4
Factors of 8 are 1, 2, 4, and 8
Factors of 12 are 1, 2, 3, 4, 6, and 12

Hence, the common factors are 1, 2 and 4.

(b) 5, 15 and 25
Ans:

Factors of 5 are 1, 5
Factors of 15 are 1, 3, 5, and 15
Factors of 25 are 1, 5, and 25

Hence, the common factors are 1 and 5.

Question 3. Find first three multiples of:
(a) 6 and 8
Ans:

First three multiples of 6 are 6, 12 and 18
6 x 1= 6; 6 x 2 = 12; 6 x 3 = 18.

First three multiples of 8 are 8, 16 and 24
8 x 1 = 8; 8 x 2 = 16; 8 x 3 = 24.

(b) 12 and 18

Ans:

First three multiples of 12 are 12, 24 and 36

12 x 1 = 12; 12 x 2 = 24; 12 x 1 = 36;

First three multiples of 18 are 18, 36 and 54
18 x 1 = 18; 18 x 2 = 36; 18 x 3 = 54.

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

Ans:

Multiples of 3 less than 100 are:

Multiples of 3 up to 100

3 x 1 = 3 ; 3 x 2 = 6 ; 3 x 3 = 9 ; 3 x 4 = 12 ; 3 x 5 = 15 ; 3 x 6 = 18 ; 3 x 7 = 21 ; 3 x 8 = 24 ; 3 x 9 = 27 ; 3 x 10 = 30 ;

3 x 11 = 33 ; 3 x 12 = 36 ; 3 x 13 = 39 ; 3 x 14 = 42 ; 3 x 15 = 45 ; 3 x 16 = 48 ; 3 x 17 = 51 ; 3 x 18 = 54 ; 3 x 19 = 57 ; 3 x 20 = 60 ;

3 x 21 = 63 ; 3 x 22 = 66 ; 3 x 23 = 69 ; 3 x 24 = 72 ; 3 x 25 = 75 ; 3 x 26 = 78 ; 3 x 27 = 81 ; 3 x 28 = 84 ; 3 x 29 = 87 ; 3 x 30 = 90 ;

3 x 31 = 93 ; 3 x 32 = 96 ; 3 x 33 = 99

Multiples of 4 up to 100

4 x 1 = 4 ; 4 x 2 = 8 ; 4 x 3 = 12 ; 4 x 4 = 16 ; 4 x 5 = 20 ; 4 x 6 = 24 ; 4 x 7 = 28 ; 4 x 8 = 32 ; 4 x 9 = 36 ;

4 x 10 = 40 ; 4 x 11 = 44 ; 4 x 12 = 48 ; 4 x 13 = 52 ; 4 x 14 = 56 ; 4 x 15 = 60 ; 4 x 16 = 64 ; 4 x 17 = 68 ;

4 x 18 = 72 ; 4 x 19 = 76 ; 4 x 20 = 80 ; 4 x 21 = 84 ; 4 x 22 = 88 ; 4 x 23 = 92 ; 4 x 24 = 96

Hence, the common multiples of 3 and 4 less than 100 are: 12, 24, 36, 48, 60, 72, 84 and 96.

Question 5. Which of the following numbers are co-prime?

(a) 18 and 35

Ans:

Factors of 18 are 1, 2, 3, 6, 9, and 18
Factors of 35 are 1, 5, 7, and 35

Common factors of 18 and 35 is only 1. Hence, 18 and 35 are co-prime.

(b) 15 and 37

Ans:

Factors of 15 are 1, 3, 5, and 15
Factors of 37 are 1, 37

Common factor of 15 and 37 is only 1. Hence, they are co-prime.

(c) 30 and 415

Ans:

Factors of 30 are 1, 2, 3, 5, 6, 15, and 30
Factors of 415 are 1, 5, and 83

Common factors of 30 and 415 is 1 and 5. Hence, they are not co-prime.

(d) 17 and 68
Ans:

Factors of 17 are 1, 17
Factors of 68 are 1, 2, 4, 17, 34, and 68

Common factors of 17 and 68 is 1 and 17. Hence, they are not co-prime.

(e) 216 and 215
Ans:

Factors of 216 are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 54, 72, 108, and 216
Factors of 215 are 1, 5, and 43

Common factor of 216 and 215 is only 1. Hence, they are co-prime.

(f) 81 and 16
Ans:

Factors of 81 are 1, 3, 9, 27, and 81
Factors of 16 are 1, 2, 4, 8, and 16

Common factor of 81 and 16 is 1. Hence, they are co-prime.

Question 6. A number is divisible by both 5 and 12. By which other will that number be always divisible?
Ans:

If the number is divisible by both 5 and 12 this the number will also be divisible by 60

5 x 12 = 60.

Question 7. A number is divisible by 12. By what other will that number be divisible?
Ans:

If a number divisible by 12, then that number is also divisible by factor of 12
Factors of 12 are 1, 2, 3, 4, 6, and 12

Hence the number which is divisible by 12, will also be divisible by 1, 2, 3, 4, 6 and 12.
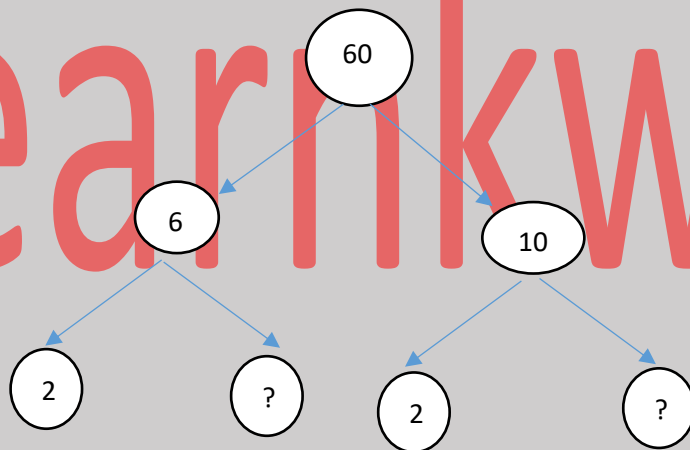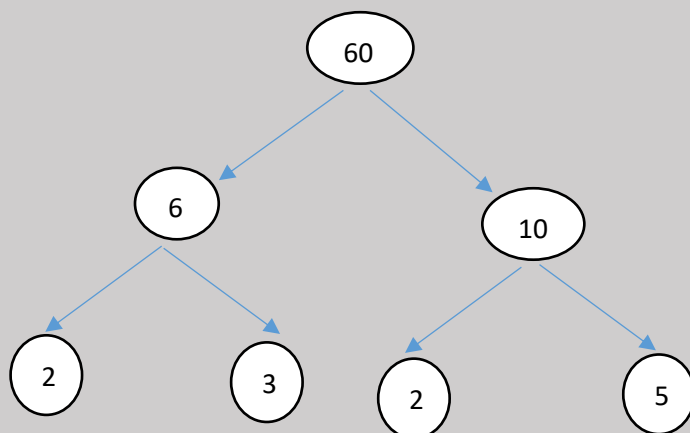
EXERCISE- 3.5

NCERT SOLUTION

Question 1. Here are two different factor trees for 60. Write the missing numbers.

(i) 60

Ans:

(ii)

```
              ( 60 )
             /      \
         ( 30 )     ( ? )
         /    \
      ( 10 )  ( ? )
      /    \
    ( ? )  ( ? )
```

Ans:

```
              ( 60 )
             /      \
         ( 30 )     ( 2 )
         /    \
      ( 10 )  ( 3 )
      /    \
    ( 2 )  ( 5 )
```
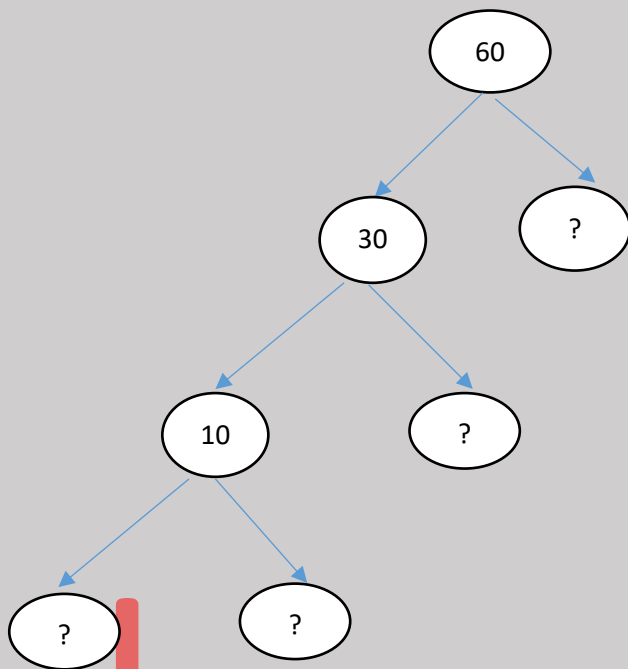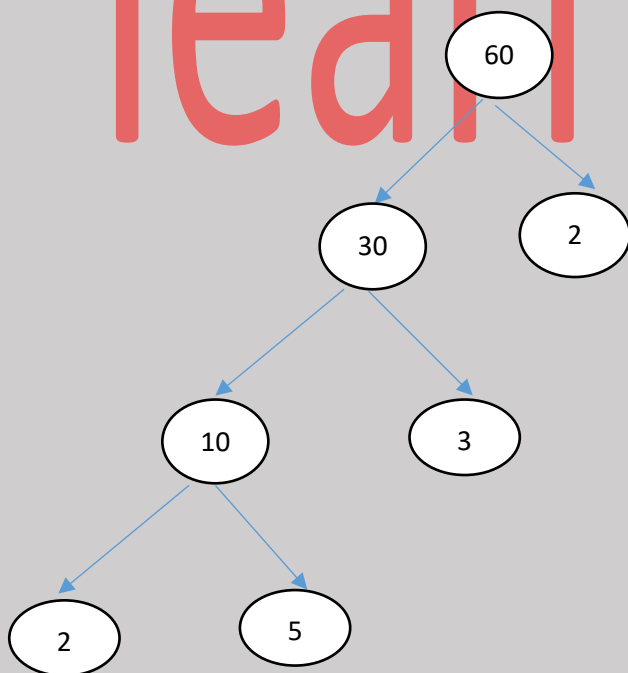
Question 2. Which factors are not included in the prime factorisation of a composite number?

Ans:

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

Question 3. Write the greatest 4-digit number and express it in terms of its prime factors.

Ans:

The greatest 4-digit number = 9999

3	9999
3	3333
11	1111
101	101
	1

Hence, the prime factors of 9999 = 3 x 3 x 11 x 101.

Question 4. Write the smallest 5-digit number and express it in the form of its prime factors.

Ans:

The smallest 5-digit number = 10000

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

Question 5. 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

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

Ans.

(i) 2 x 3 x 4 = 24

(ii) 5 x 6 x 7 = 210

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

Ans.

a) 5 + 3 = 8

b) 5 + 7 = 12

c) 7 + 9 = 16

d) 9 + 11 = 20

8, 12, 16 and 20 are all divisible by 4

Question 8. In which of the following expressions, prime factorisation has been done?

(a) 24 = 2 × 3 × 4 (b) 56 = 7 × 2 × 2 × 2

(c) 70 = 2 × 5 × 7 (d) 54 = 2 × 3 × 9

Ans.

In expression (b) and (c) prime factorization has been done. Because in expression (a) 4 is a composite number and in expression (d) 9 is composite number. So, in case of expression (a) and (d) prime factorisation has not been done.

Question 9. 18 is divisible by both 2 and 3. It is also divisible by 2 × 3 = 6. Similarly, a number is divisible by both 4 and 6. Can we say that the number must also be divisible by 4 × 6 = 24? If not, give an example to justify your answer.

Ans.

No, Since 12, 36 and 60 is divisible by both 4 and 6 but not divisible by 24

Question 10. I am the smallest number, having four different prime factors. Can you find me?

Ans.

4 Smallest prime numbers are 2, 3, 5 and 7.

Hence, the required number = 2 x 3 x 5 x 7 = 210

EXERCISE- 3.6

NCERT SOLUTION

1. Find the HCF of the following numbers:
(a) 18, 48
Ans.

2	18
3	9
3	3
	1

2	48
2	24
2	12
2	6
3	3
	1

18 = 2 x 3 x 3
48 = 2 x 2 x 2 x 2 x 3
H.C.F of 18 and 24 is 2 x 3 = 6

(b) 30, 42
Ans.

2	30
3	15
5	5
	1

2	42
3	21
7	7
	1

30 = 2 x 3 x 5
42 = 2 x 3 x 7
H.C.F of 30 and 42 = 2 x 3 = 6

(c) 18, 60

Ans.

2	18
3	9
3	3
	1

2	60
2	30
3	15
5	5
	1

$18 = 2 \times 3 \times 3$

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

H.C.F of 18 and 60 $= 2 \times 3 = 6$

(d) 27, 63

Ans.

3	27
3	9
3	3
	1

3	63
3	21
7	7
	1

$27 = 3 \times 3 \times 3$

$63 = 3 \times 3 \times 7$

H.C.F of 27 and 63 $= 3 \times 3 = 9$

(e) 36, 84

Ans.

2	36
2	18
3	9
3	3
	1

2	84
2	42
3	21
7	7
	1

$36 = 2 \times 2 \times 3 \times 3$

$84 = 2 \times 2 \times 3 \times 7$

H.C.F of 36 and 84 = 2 x 2 x 3 = 12

(f) 34, 102
Ans.

2	34
17	17
	1

2	102
3	51
17	17
	1

34 = 2 x 17
102 = 2 x 3 x 17
H.C.F of 34 and 102 = 2 x 17 = 34

(g) 70, 105, 175
Ans.

2	70
5	35
7	7
	7

3	105
5	35
7	7
	1

5	175
5	35
7	7
	1

70 = 2 x 5 x 7
105 = 3 x 5 x 7
175 = 5 x 5 x 7
H.C.F of 70, 105 and 175 = 5 x 7 = 35

(h) 91, 112, 49
Ans.

7	91
13	13
	1

2	112
2	56
2	28
2	14
7	7
	1

7	49
7	7
	1

91 = 7 x 13
112 = 2 x 2 x 2 x 2 x 7

$49 = 7 \times 7$

H.C.F of 91, 112 and 49 = 7

(i) 18, 54, 81

Ans.

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

$18 = 2 \times 3 \times 3$

$54 = 2 \times 3 \times 3 \times 3$

$81 = 3 \times 3 \times 3 \times 3$

H.C.F of 18, 54 and 81 = $3 \times 3 = 9$

(j) 12, 45, 75

Ans.

2	12
2	6
3	3
	1

3	45
3	15
5	5
	1

3	75
5	25
5	5
	1

$12 = 2 \times 2 \times 3$

$45 = 3 \times 3 \times 5$

$75 = 3 \times 5 \times 5$

H.C.F of 12, 45 and 75 = 3

2. What is the HCF of two consecutive (a) numbers? (b) Even numbers? (c) Odd numbers?

(a) Number

Ans.

Let the two consecutive number be 2 and 3

The H.C.F of two consecutive number will be 1

(b) Even Number
Ans.
Let the two consecutive even number be 2 and 4
H.C.F of two consecutive even number will be 2

(c) Odd Number
Ans.
Let the two consecutive odd number be 3 and 5
H.C.F of two consecutive odd number will be 1

3. HCF of co-prime numbers 4 and 15 was found as follows by factorisation: 4 = 2 × 2 and 15 = 3 × 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. Zero is not the correct H.C.F of 4 and 15. The correct H.C.F is 1.

EXERCISE- 3.7

NCERT SOLUTION

1. Renu purchases two bags of fertiliser of weights 75 kg and 69 kg. Find the maximum value of weight which can measure the weight of the fertiliser exact number of times.

Ans.

Weight of two bags of fertiliser = 75 kg and 69 kg
Maximum Weight = H.C.F of weight of two bags = 75 and 69

3	75
5	25
5	5
	1

3	69
23	23
	1

75 = 3 x 5 x 5
69 = 3 x 23
H.C.F = 3

The maximum value of weight which can measure the weight of the fertiliser exact number of times is 3kg.

2. 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.

Step's measure of three boys are = 63cm, 70cm and 77cm

Minimum distance each should cover so that all can cover the distance in complete steps = L.C.M of 63, 70 and 77

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

L.C.M = 2 x 3 x 3 x 5 x 7 x 11 = 6930
Minimum distance each should cover so that all can cover the distance in complete steps = 6930cm

3. 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.

Ans.

Length of a room = 825cm
Breadth of a room = 675cm
Height of a room = 450cm

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

$825 = 3 \times 5 \times 5 \times 11$
$675 = 3 \times 3 \times 3 \times 5 \times 5$
$450 = 2 \times 3 \times 3 \times 5 \times 5$
$H.C.F = 3 \times 5 \times 5 = 75cm$

The longest tape which can measure the three dimensions of the room exactly is of 75cm.

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

Ans.

L.C.M of 8, 10 and 12

2	6	8	12
2	3	4	6
2	3	2	3
3	1	1	3
	1	1	1

$L.C.M = 2 \times 2 \times 3 = 24$
Smallest 3 digit number = 100

$$\begin{array}{r} 4 \\ 24\overline{)100} \\ -96 \\ \hline 4 \end{array}$$

Required No. $= 100 + (24 - 4) = 120$

5. Determine the greatest 3-digit number exactly divisible by 8, 10 and 12.
Ans.
L.C.M of 8, 10 and 12

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

L.C.M $= 2 \times 2 \times 2 \times 3 \times 5 = 120$
Largest 3 digit Number $= 999$

$$\begin{array}{r} 8 \\ 120\overline{)999} \\ -960 \\ \hline 39 \end{array}$$

Required Number $= 999 - 39 = 960$

6. The traffic lights at three different road crossings change after every 48 seconds, 72 seconds and 108 seconds respectively. If they change simultaneously at 7 a.m., at what time will they change simultaneously again?
Ans.
We need to first calculate L.C.M of 48, 72 and 108

2	48	72	108
2	24	36	54
2	12	18	27
2	6	9	27
3	3	9	27
3	1	3	9
3	1	1	3
	1	1	1

L.C.M = 2 x 2 x 2 x 2 x 3 x 3 x 3 = 432 seconds
After 432 seconds light will change simultaneously.
Or After 7min 12 sec. i.e., 7min 12 sec past 7am

7. Three tankers contain 403 litres, 434 litres and 465 litres of diesel respectively. Find the maximum capacity of a container that can measure the diesel of the three containers exact number of times.
Ans.
Maximum capacity of container = H.C.F of 403, 434 and 465.

13	403
31	31
	1

2	434
7	217
31	31
	1

3	465
5	155
31	31
	1

403 = 13 x 31
434 = 2 x 7 x 31
465 = 3 x 5 x 31
H.C.F of 403, 434 and 465 = 31
The maximum capacity of a container that can measure the diesel of the three containers exact number of times = 31 litres

8. Find the least number which when divided by 6, 15 and 18 leave remainder 5 in each case.
Ans.

L.C.M of 6, 15 and 18

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

L.C.M = 2 x 3 x 3 x 5 = 90
Therefore, the required number is 90 + 5 = 95

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

Ans.
L.C.M 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

L.C.M = 2 x 2 x 2 x 2 x 2 x 3 x 3 = 288
Smallest 4 digit Number = 1000

$$
\begin{array}{r}
3 \\
288\overline{)1000} \\
-864 \\
\hline
136
\end{array}
$$

Therefore, the required Number is 1000 + (288 - 136) = 1152

10. 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?

(a) 9 and 4
Ans.

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

L.C.M of 9 and 4 = 2 x 2 x 3 x 3 = 36

(b) 12 and 5
Ans.

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

L.C.M of 12 and 5 = 2 x 2 x 3 x 5 = 60

(c) 6 and 5
Ans.

2	6	5
3	3	5
5	1	5
	1	1

L.C.M of 6 and 5 = 2 x 3 x 5 = 30

(d) 15 and 4
Ans.

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

L.C.M of 15 and 4 = 2 x 2 x 3 x 5 = 60

Yes, LCM is the product of two numbers in each case

11. Find the LCM of the following numbers in which one number is the factor of the other. (a) 5, 20 (b) 6, 18 (c) 12, 48 (d) 9, 45
What do you observe in the results obtained?

(a) 5 and 20
Ans

2	5	20
2	5	10
5	5	5
	1	1

L.C.M of 5 and 20 = 2 x 2 x 5 = 20

(b) 6, 18
Ans.

2	6	18
3	3	9
3	1	3
	1	1

L.C.M of 6 and 18 = 2 x 3 x 3 = 18

(c) 12, 48
Ans.

2	12	48
2	6	24
2	3	12
2	3	6
3	3	3
	1	1

L.C.M of 12 and 48 = 2 x 2 x 2 x 2 x 3 = 48

(d) 9, 45
Ans.

3	9	45
3	3	15
5	1	5
	1	1

L.C.M of 9 and 45 = 3 x 3 x 5 = 45