CHAPTER 3: PLAYING WITH NUMBERS

CLASS 6 NCERT SOLUTION

Exercise 3.1 page no: 50

1. Write all the factors of the following numbers:

(a) 24

(b) 15

(c) 21

(d) 27

(e) 12

(f) 20

(g) 18

(h) 23

(i) 36

Solutions:

(a) 24

24 = 1 × 24

24 = 2 × 12

24 = 3 × 8

24 = 4 × 6

24 = 6 × 4

Stop here since 4 and 6 have occurred earlier

Hence, the factors of 24 are 1, 2, 3, 4, 6, 8, 12 and 24

(b) 15

15 = 1 × 15

15 = 3 × 5

15 = 5 × 3

Stop here since 3 and 5 have occurred earlier

Hence, the factors of 15 are 1, 3, 5 and 15

(c) 21

21 = 1 × 21

21 = 3 × 7

21 = 7 × 3

Stop here since 3 and 7 have occurred earlier

Hence, the factors of 21 are 1, 3, 7 and 21

(d) 27

27 = 1 × 27

27 = 3 × 9

27 = 9 × 3

Stop here since 3 and 9 have occurred earlier

Hence, the factors of 27 are 1, 3, 9 and 27

(e) 12

12 = 1 × 12

12 = 2 × 6

12 = 3 × 4

12 = 4 × 3

Stop here since 3 and 4 have occurred earlier

Hence, the factors of 12 are 1, 2, 3, 4, 6 and 12

(f) 20

20 = 1 × 20

20 = 2 × 10

20 = 4 × 5

20 = 5 × 4

Stop here since 4 and 5 have occurred earlier

Hence, the factors of 20 are 1, 2, 4, 5 10 and 20

(g) 18

18 = 1 × 18

18 = 2 × 9

18 = 3 × 6

18 = 6 × 3

Stop here since 3 and 6 have occurred earlier

Hence, the factors of 18 are 1, 2, 3, 6, 9 and 18

(h) 23

23 = 1 × 23

23 = 23 × 1

Since 1 and 23 have occurred earlier

Hence, the factors of 23 are 1 and 23

(i) 36

36 = 1 × 36

36 = 2 × 18

36 = 3 × 12

36 = 4 × 9

36 = 6 × 6

Stop here, since both the factors (6) are same. Thus the factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18 and 36

2. Write first five multiples of:

(a) 5

(b) 8

(c) 9

Solutions:

(a) The required multiples are:

5 × 1 = 5

5 × 2 = 10

5 × 3 = 15

5 × 4 = 20

5 × 5 = 25

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

(b) The required multiples are:

8 × 1 = 8

8 × 2 = 16

8 × 3 = 24

8 × 4 = 32

8 × 5 = 40

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

(c) The required multiples are:

9 × 1 = 9

9 × 2 = 18

9 × 3 = 27

9 × 4 = 36

9 × 5 = 45

Hence, the first five multiples of 9 are 9, 18, 27, 36 and 45

3. Match the items in column 1 with the items in column 2.

Column 1	**Column 2**
(i) 35	**(a) Multiple of 8**
(ii) 15	**(b) Multiple of 7**
(iii) 16	**(c) Multiple of 70**

(iv) 20 **(d) Factor of 30**

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

(f) Factor of 20

Solutions:

(i) 35 is a multiple of 7

Hence, option (b)

(ii) 15 is a factor of 30

Hence, option (d)

(iii) 16 is a multiple of 8

Hence, option (a)

(iv) 20 is a factor of 20

Hence, option (f)

(v) 25 is a factor of 50

Hence, option (e)

4. Find all the multiples of 9 upto 100.

Solutions:

9 × 1 = 9

9 × 2 = 18

9 × 3 = 27

9 × 4 = 36

9 × 5 = 45

9 × 6 = 54

9 × 7 = 63

9 × 8 = 72

9 × 9 = 81

9 × 10 = 90

9 × 11 = 99

∴ All the multiples of 9 upto 100 are 9, 18, 27, 36, 45, 54, 63, 72, 81, 90 and 99

Exercise 3.2 PAGE no: 53

1. What is the sum of any two (a) Odd numbers? (b) Even numbers?

Solutions:

(a)The sum of any two odd numbers is even numbers.

Examples: 5 + 3 = 8

15 + 13 = 28

(b) The sum of any two even numbers is even numbers

Examples: 2 + 8 = 10

12 + 28 = 40

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

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

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

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

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

(e) All prime numbers are odd.

(f) Prime numbers do not have any factors.

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

(h) 2 is the only even prime number.

(i) All even numbers are composite numbers.

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

Solutions:

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

Example: 7 + 9 + 5 = 21 i.e odd number

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

Example: 3 + 5 + 8 = 16 i.e is even number.

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

Example: 3 × 7 × 9 = 189 i.e is odd number.

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

Example: 8 ÷ 2 = 4

(e) False, All prime numbers are not odd.

Example: 2 is a prime number but it is also an even number.

(f) False. Since, 1 and the number itself are factors of the number

(g) False. Sum of two prime numbers may also be odd number

Example: 2 + 5 = 7 i.e odd number.

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

(i) False. Since, 2 is a prime number.

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

Example: 2 × 4 = 8 i.e even number.

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

Solutions:

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

17 and 71

37 and 73

79 and 97

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

Solutions:

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

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

Solutions:

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

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

(a) 44

(b) 36

(c) 24

(d) 18

Solutions:

(a) 3 + 41 = 44

(b) 5 + 31 = 36

(c) 5 + 19 = 24

(d) 5 + 13 = 18

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

Solutions:

The three pairs of prime numbers whose difference is 2 are

3, 5

5, 7

11, 13

8. Which of the following numbers are prime?

(a) 23

(b) 51

(c) 37

(d) 26

Solutions:

(a) 23

1 × 23 = 23

23 × 1 = 23

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

(b) 51

1 × 51 = 51

3 × 17 = 51

Therefore 51 has four factors 1, 3, 17 and 51. Hence, it is not a prime number, it is a composite number.

(c) 37

1 × 37 = 37

37 × 1 = 37

Therefore 37 has two factors 1 and 37. Hence, it is a prime number.

(d) 26

1 × 26 = 26

2 × 13 = 26

Therefore 26 has four factors 1, 2, 13 and 26. Hence, it is not a prime number, it is a composite number.

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

Solutions:

Seven composite numbers between 89 and 97 both which are prime numbers are 90, 91, 92, 93, 94, 95 and 96

Numbers	Factors
90	1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90
91	1, 7, 13, 91
92	1, 2, 4, 23, 46, 92
93	1, 3, 31, 93
94	1, 2, 47, 94
95	1, 5, 19, 95

96 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96

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

(a) 21

(b) 31

(c) 53

(d) 61

Solutions:

(a) 3 + 5 + 13 = 21

(b) 3 + 5 + 23 = 31

(c) 13 + 17 + 23= 53

(d) 7 + 13 + 41 = 61

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

Solutions:

The five pairs of prime numbers less than 20 whose sum is divisible by 5 are

2 + 3 = 5

2 + 13 = 15

3 + 17 = 20

7 + 13 = 20

19 + 11 = 30

12. Fill in the blanks:

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

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

(c) 1 is neither ______ nor ______.

(d) The smallest prime number is _____.

(e) The smallest composite number is ____.

(f) The smallest even number is _____.

Solutions:

(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 number 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 Page no: 57

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):

Numbers				Divisible by					
	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	…….	…….	…….	…….	…….	…….	…….	…….	…….

Solutions:

Numbers				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

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

(a) 572

(b) 726352

(c) 5500

(d) 6000

(e) 12159

(f) 14560

(g) 21084

(h) 31795072

(i) 1700

(j) 2150

Solutions:

(a) 572

72 are the last two digits. Since, 72 is divisible by 4. Hence, 572 is also divisible by 4

572 are the last three digits. Since, 572 is not divisible by 8. Hence, 572 is not divisible by 8

(b) 726352

52 are the last two digits. Since, 52 is divisible by 4. Hence, 726352 is divisible by 4

352 are the last three digits. Since 352 is divisible by 8. Hence, 726352 is divisible by 8

(c) 5500

Since, last two digits are 00. Hence 5500 is divisible by 4

500 are the last three digits. Since, 500 is not divisible by 8. Hence, 5500 is not divisible by 8

(d) 6000

Since, last two digits are 00. Hence 6000 is divisible by 4

Since, last three digits are 000. Hence, 6000 is divisible by 8

(e) 12159

59 are the last two digits. Since, 59 is not divisible by 4. Hence, 12159 is not divisible by 4

159 are the last three digits. Since, 159 is not divisible by 8. Hence, 12159 is not divisible by 8

(f) 14560

60 are the last two digits. Since 60 is divisible by 4. Hence, 14560 is divisible by 4

560 are the last three digits. Since, 560 is divisible by 8. Hence, 14560 is divisible by 8

(g) 21084

84 are the last two digits. Since, 84 is divisible by 4. Hence, 21084 is divisible by 4

084 are the last three digits. Since, 084 is not divisible by 8. Hence, 21084 is not divisible by 8

(h) 31795072

72 are the last two digits. Since, 72 is divisible by 4. Hence, 31795072 is divisible by 4

072 are the last three digits. Since, 072 is divisible by 8. Hence, 31795072 is divisible by 8

(i) 1700

Since, the last two digits are 00. Hence, 1700 is divisible by 4

700 are the last three digits. Since, 700 is not divisible by 8. Hence, 1700 is not divisible by 8

(j) 2150

50 are the last two digits. Since, 50 is not divisible by 4. Hence, 2150 is not divisible by 4

150 are the last three digits. Since, 150 is not divisible by 8. Hence, 2150 is not divisible by 8

3. Using divisibility tests, determine which of following numbers are divisible by 6:

(a) 297144

(b) 1258

(c) 4335

(d) 61233

(e) 901352

(f) 438750

(g) 1790184

(h) 12583

(i) 639210

(j) 17852

Solutions:

(a) 297144

Since, last digit of the number is 4. Hence, the number is divisible by 2

By adding all the digits of the number, we get 27 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(b) 1258

Since, last digit of the number is 8. Hence, the number is divisible by 2

By adding all the digits of the number, we get 16 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(c) 4335

Since, last digit of the number is 5 which is not divisible by 2. Hence, the number is not divisible by 2

By adding all the digits of the number, we get 15 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(d) 61233

Since, the last digit of the number is 3 which is not divisible by 2. Hence, the number is not divisible by 2

By adding all the digits of the number, we get 15 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(e) 901352

Since, the last digit of the number is 2. Hence, the number is divisible by 2

By adding all the digits of the number, we get 20 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(f) 438750

Since, the last digit of the number is 0. Hence, the number is divisible by 2

By adding all the digits of the number, we get 27 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(g) 1790184

Since, the last digit of the number is 4. Hence, the number is divisible by 2

By adding all the digits of the number, we get 30 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(h) 12583

Since, the last digit of the number is 3. Hence, the number is not divisible by 2

By adding all the digits of the number, we get 19 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

(i) 639210

Since, the last digit of the number is 0. Hence, the number is divisible by 2

By adding all the digits of the number, we get 21 which is divisible by 3. Hence, the number is divisible by 3

∴ The number is divisible by both 2 and 3. Hence, the number is divisible by 6

(j) 17852

Since, the last digit of the number is 2. Hence, the number is divisible by 2

By adding all the digits of the number, we get 23 which is not divisible by 3. Hence, the number is not divisible by 3

∴ The number is not divisible by both 2 and 3. Hence, the number is not divisible by 6

4. Using divisibility tests, determine which of the following numbers are divisible by 11:

(a) 5445

(b) 10824

(c) 7138965

(d) 70169308

(e) 10000001

(f) 901153

Solutions:

(a) 5445

Sum of the digits at odd places = 5 + 4

= 9

Sum of the digits at even places = 4 + 5

= 9

Difference = 9 – 9 = 0

Since, the difference between sum of digits at odd places and sum of digits at even places is 0. Hence, 5445 is divisible by 11

(b) 10824

Sum of digits at odd places = 4 + 8 + 1

= 13

Sum of digits at even places = 2 + 0

= 2

Difference = 13 – 2 = 11

Since, the difference between sum of digits at odd places and sum of digits at even places is 11 which is divisible by 11. Hence, 10824 is divisible by 11

(c) 7138965

Sum of digits at odd places = 5 + 9 + 3 + 7 = 24

Sum of digits at even places = 6 + 8 + 1 = 15

Difference = 24 – 15 = 9

Since, the difference between sum of digits at odd places and sum of digits at even places is 9 which is not divisible by 11. Hence, 7138965 is not divisible by 11

(d) 70169308

Sum of digits at odd places = 8 + 3 + 6 + 0

= 17

Sum of digits at even places = 0 + 9 + 1 + 7

= 17

Difference = 17 – 17 = 0

Since, the difference between sum of digits at odd places and sum of digits at even places is 0. Hence, 70169308 is divisible by 11

(e) 10000001

Sum of digits at odd places = 1

Sum of digits at even places = 1

Difference = 1 – 1 = 0

Since, the difference between sum of digits at odd places and sum of digits at even places is 0. Hence, 10000001 is divisible by 11

(f) 901153

Sum of digits at odd places = 3 + 1 + 0

= 4

Sum of digits at even places = 5 + 1 + 9

= 15

Difference = 15 – 4 = 11

Since, the difference between sum of digits at odd places and sum of digits at even places is 11 which is divisible by 11. Hence, 901153 is divisible by 11

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

(b) 4765 __ 2

Solutions:

(a) __ 6724

Sum of the given digits = 19

Sum of its digit should be divisible by 3 to make the number divisible by 3

Since, 21 is the smallest multiple of 3 which comes after 19

So, smallest number = 21 – 19

= 2

Now 2 + 3 + 3 = 8

But 2 + 3 + 3 + 3 = 11

Now, if we put 8, sum of digits will be 27 which is divisible by 3

Therefore the number will be divisible by 3

Hence, the largest number is 8

(b) 4765 __ 2

Sum of the given digits = 24

Sum of its digits should be divisible by 3 to make the number divisible by 3

Since, 24 is already divisible by 3. Hence, the smallest number that can be replaced is 0

Now, 0 + 3 = 3

3 + 3 = 6

3 + 3 + 3 = 9

3 + 3 + 3 + 3 = 12

If we put 9, sum of its digits becomes 33. Since, 33 is divisible by 3.

Therefore the number will be divisible by 3

Hence, the largest number is 9

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

(a) 92 __ 389

(b) 8 __ 9484

Solutions:

(a) 92 __ 389

Let 'a' be placed here

Sum of its digits at odd places = 9 + 3 + 2

= 14

Sum of its digits at even places = 8 + a + 9

= 17 + a

Difference = 17 + a – 14

= 3 + a

The difference should be 0 or a multiple of 11, then the number is divisible by 11

If 3 + a = 0

a = -3

But it cannot be a negative

Taking a closest multiple of 11 which is near to 3

It is 11 which is near to 3

Now, 3 + a = 11

a = 11 – 3

a = 8

Therefore the required digit is 8

(b) 8 __ 9484

Let ‘a’ be placed here

Sum of its digits at odd places = 4 + 4 + a

= 8 + a

Sum of its digits at even places = 8 + 9 + 8

= 25

Difference = 25 – (8 + a)

= 17 – a

The difference should be 0 or a multiple of 11, then the number is divisible by 11

If 17 – a = 0

a = 17 (which is not possible)

Now, take a multiple of 11.

Let's take 11

17 – a = 11

a = 17 – 11

a = 6

Therefore the required digit is 6

Exercise 3.4 Page no: 59

1**. Find the common factors of:**

(a) 20 and 28

(b) 15 and 25

(c) 35 and 50

(d) 56 and 120

Solutions:

(a) 20 and 28

1, 2, 4, 5, 10 and 20 are factors of 20

1, 2, 4, 7, 14 and 28 are factors of 28

Common factors = 1, 2, 4

(b) 15 and 25

1, 3, 5 and 15 are factors of 15

1, 5 and 25 are factors of 25

Common factors = 1, 5

(c) 35 and 50

1, 5, 7 and 35 are factors of 35

1, 2, 5, 10, 25 and 50 are factors of 50

Common factors = 1, 5

(d) 56 and 120

1, 2, 4, 7, 8, 14, 28 and 56 are factors of 56

1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60 and 120 are factors of 120

Common factors = 1, 2, 4, 8

2. Find the common factors of:

(a) 4, 8 and 12

(b) 5, 15 and 25

Solutions:

(a) 4, 8 and 12

1, 2, 4 are factors of 4

1, 2, 4, 8 are factors of 8

1, 2, 3, 4, 6, 12 are factors of 12

Common factors = 1, 2, 4

(b) 5, 15 and 25

1, 5 are factors of 5

1, 3, 5, 15 are factors of 15

1, 5, 25 are factors of 25

Common factors = 1, 5

3. Find first three common multiples of:

(a) 6 and 8

(b) 12 and 18

Solutions:

(a) 6 and 8

6, 12, 18, 24, 30 are multiples of 6

8, 16, 24, 32 are multiples of 8

Three common multiples are 24, 48, 72

(b) 12 and 18

12, 24, 36, 48 are multiples of 12

18, 36, 54, 72 are multiples of 18

Three common factors are 36, 72, 108

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

Solutions:

Multiples of 3 are 3, 6, 9, 12, 15

Multiples of 4 are 4, 8, 12, 16, 20

Common multiples are 12, 24, 36, 48, 60, 72, 84 and 96

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

(a) 18 and 35

(b) 15 and 37

(c) 30 and 415

(d) 17 and 68

(e) 216 and 215

(f) 81 and 16

Solutions:

(a) 18 and 35

Factors of 18 are 1, 2, 3, 6, 9, 18

Factors of 35 are 1, 5, 7, 35

Common factor = 1

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

(b) 15 and 37

Factors of 15 are 1, 3, 5, 15

Factors of 37 are 1, 37

Common factors = 1

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

(c) 30 and 415

Factors of 30 are 1, 2, 3, 5, 6, 10, 15, 30

Factors of 415 are 1, 5, 83, 415

Common factors = 1, 5

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

(d) 17 and 68

Factors of 17 are 1, 17

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

Common factors = 1, 17

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

(e) 216 and 215

Factors of 216 are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 27, 36, 54, 72, 108, 216

Factors of 215 are 1, 5, 43, 215

Common factors = 1

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

(f) 81 and 16

Factors of 81 are 1, 3, 9, 27, 81

Factors of 16 are 1, 2, 4, 8, 16

Common factors = 1

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

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

Solutions:

Factors of 5 are 1, 5

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

Their common factor = 1

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

Factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

7. A number is divisible by 12. By what other numbers will that number be divisible?

Solutions:

Since, the number is divisible by 12. Hence, it also divisible by its factors i.e 1, 2, 3, 4, 6, 12

Therefore 1, 2, 3, 4, 6 are the numbers other than 12 by which this number is also divisible

Exercise 3.5 Page no: 61

1. Which of the following statements are true?

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

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

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

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

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

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

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

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

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

Solutions:

(a) False, 6 is divisible by 3 but is not divisible by 9

(b) True, as 9 = 3 × 3. Hence, if a number is divisible by 9, it will also be divisible by 3

(c) False. Since 30 is divisible by both 3 and 6 but is not divisible by 18

(d) True, as 9 × 10 = 90. Hence, if a number is divisible by both 9 and 10 then it is divisible by 90

(e) False. Since 15 and 32 are co-primes and also composite numbers

(f) False, as 12 is divisible by 4 but is not divisible by 8

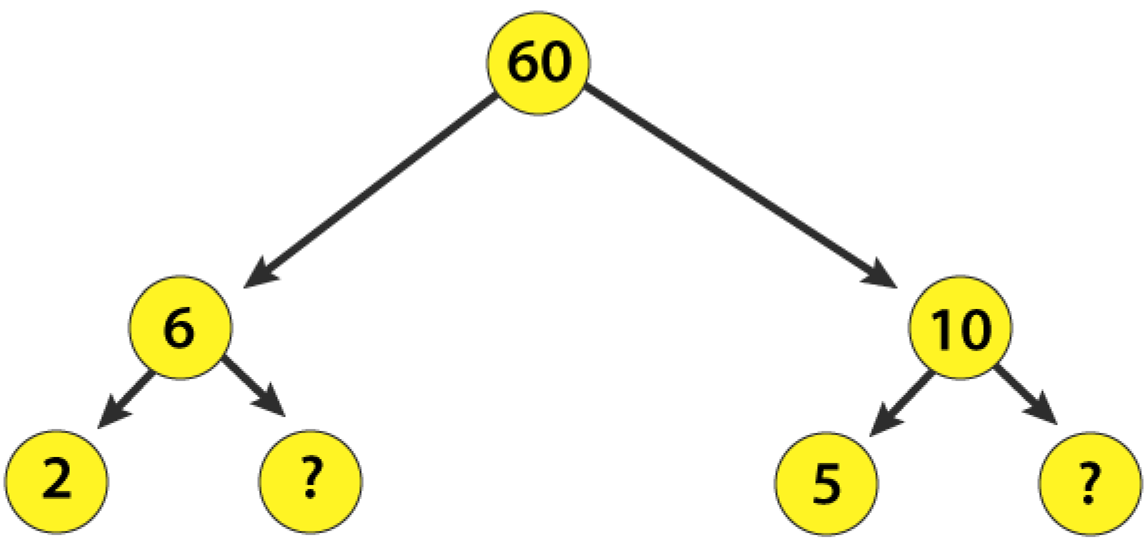
(g) True, as 2 × 4 = 8. Hence, if a number is divisible by 8, it will also be divisible by 2 and 4

(h) True, as 2 divides 4 and 8 and it also divides 12 (4 + 8 = 12)

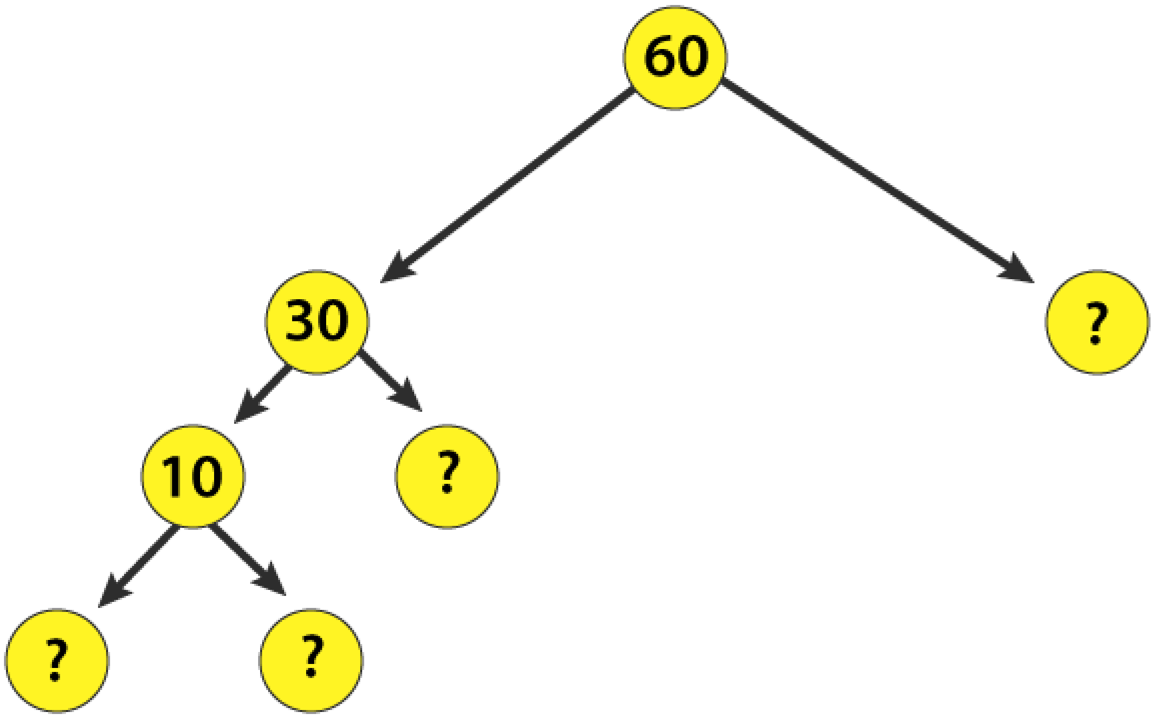
(i) False, since, 2 divides 12 but it does not divide 7 and 5

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

(a)

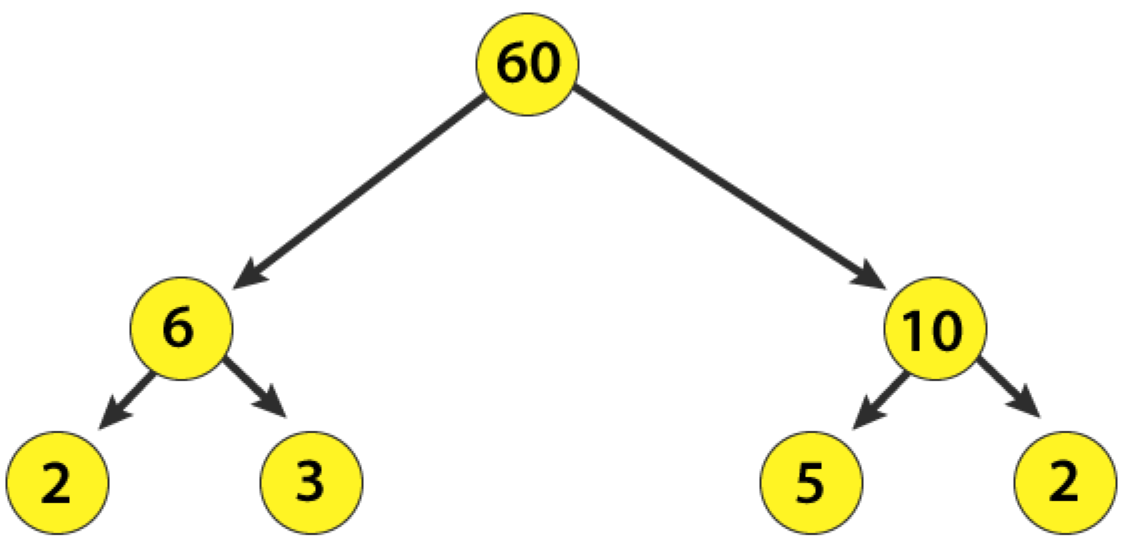


(b)



Solutions:

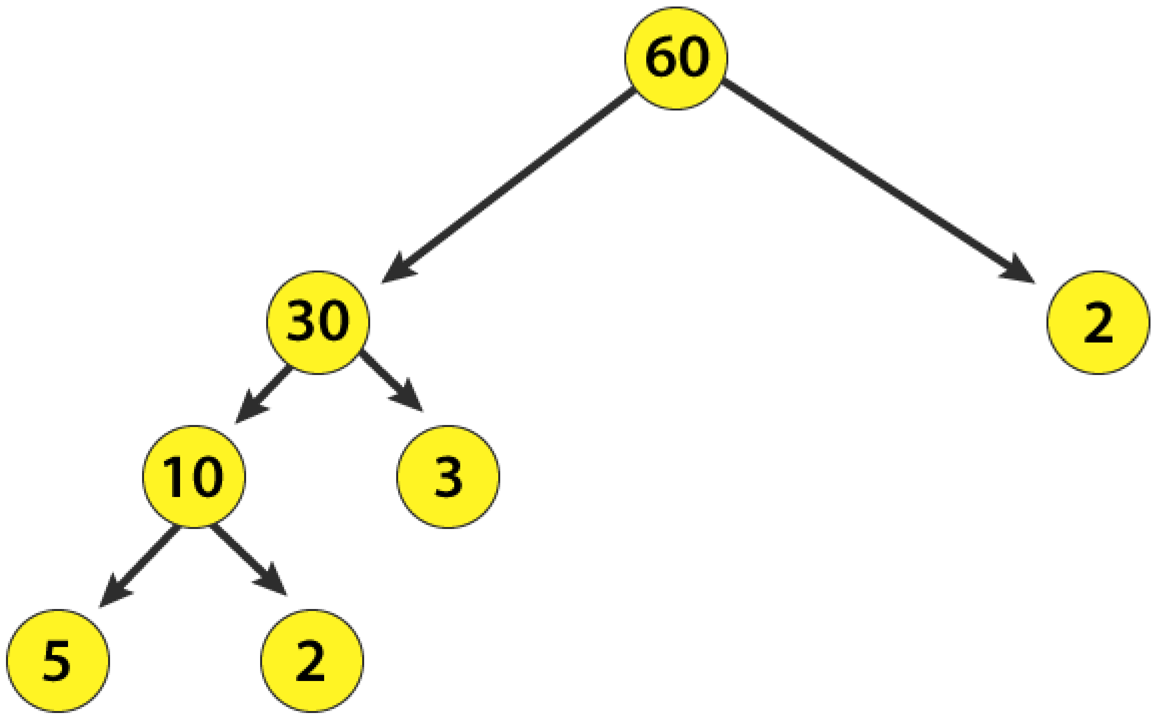
(a) Since, 6 = 2 × 3 and 10 = 5 × 2



(b) Since, 60 = 30 × 2

$30 = 10 \times 3$

$10 = 5 \times 2$



3. Which factors are not included in the prime factorisation of a composite number?

Solutions:

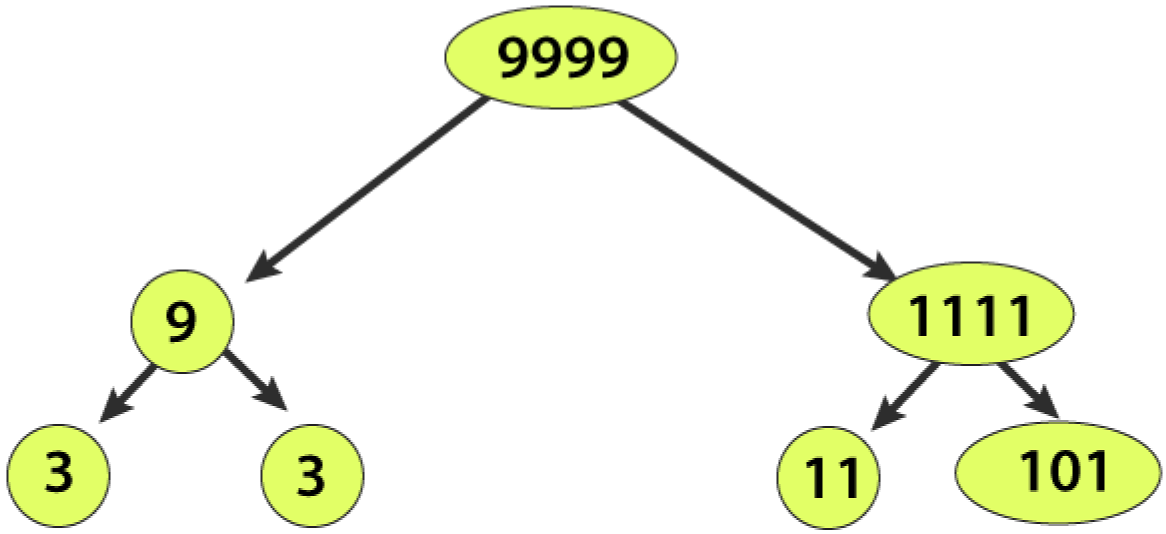
1 and the number itself are not included in the prime factorisation of a composite number.

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

Solutions:

The greatest four digit number is 9999

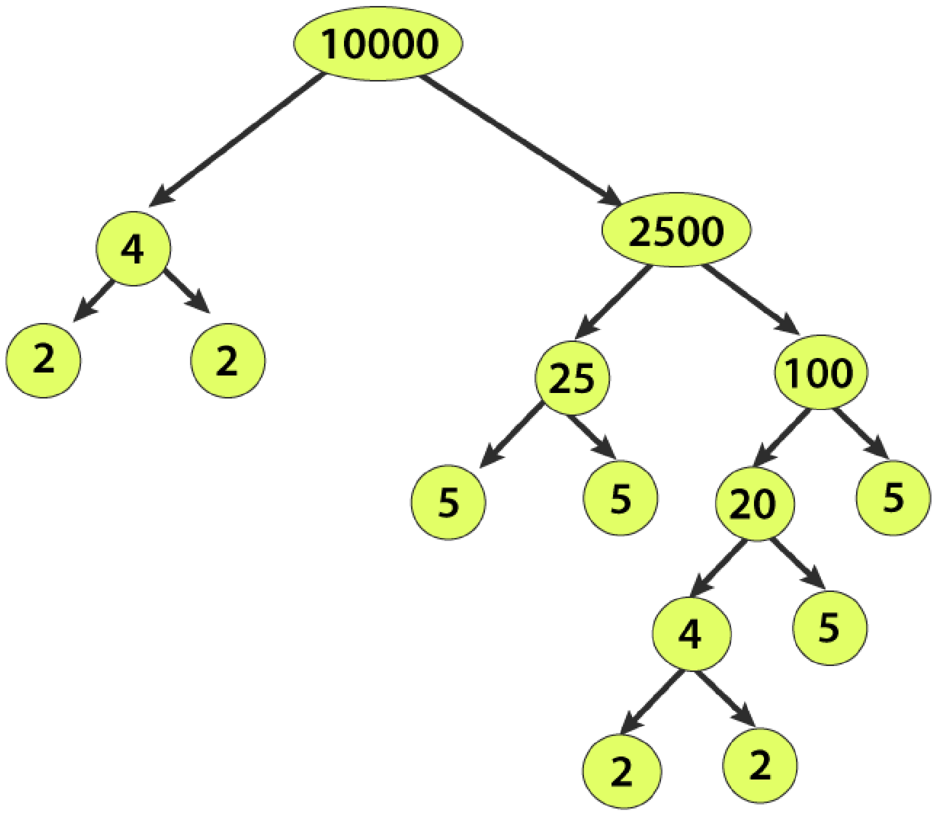
Therefore 9999 = 3 × 3 × 11 × 101



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

Solutions:

The smallest five digit number = 10000



10000 = 2 × 2 × 2 × 2 × 5 × 5 × 5 × 5

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

Solutions:

7	1729
13	247
19	19
	1

1729 = 7 × 13 × 19

13 – 7 = 6

19 – 13 = 6

Hence, the difference between two consecutive prime factors is 6.

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

Solutions:

(i) 2 × 3 × 4 = 24 which is divisible by 6

(ii) 5 × 6 × 7 = 210 which is divisible by 6

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

Solutions:

(i) 5 + 3 = 8 which is divisible by 4

(ii) 7 + 9 = 16 which is divisible by 4

(iii) 13 + 15 = 28 which is divisible by 4

9. 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

Solutions:

(a) 24 = 2 × 3 × 4

Since, 4 is composite. Hence, prime factorisation has not been done

(b) 56 = 7 × 2 × 2 × 2

Since, all the factors are prime. Hence, prime factorisation has been done

(c) 70 = 2 × 5 × 7

Since, all the factors are prime. Hence, prime factorisation has been done

(d) 54 = 2 × 3 × 9

Since, 9 is composite. Hence prime factorisation has not been done

10. Determine if 25110 is divisible by 45. [Hint: 5 and 9 are co-prime numbers. Test the divisibility of the number by 5 and 9].

Solutions:

45 = 5 × 9

1, 5 are factors of 5

1, 3, 9 are factors of 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

= 9

Since, the sum of digits of 25110 is divisible by 9. Hence, 25110 is divisible by 9

Since the number is divisible by both 5 and 9

Therefore 25110 is divisible by 45

11. 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.

Solutions:

No, since, 12 and 36 are both divisible by 4 and 6. But 12 and 36 are not divisible by 24

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

Solutions:

Since, it is the smallest number. Therefore it will be the product of 4 smallest prime numbers

2 × 3 × 5 × 7 = 210

Exercise 3.6 Page no: 63

1. Find the HCF of the following numbers :

(a) 18, 48

(b) 30, 42

(c) 18, 60

(d) 27, 63

(e) 36, 84

(f) 34, 102

(g) 70, 105, 175

(h) 91, 112, 49

(i) 18, 54, 81

(j) 12, 45, 75

Solutions:

(a) 18, 48

2	18
3	9
3	3
	1

2	48
2	24
2	12
2	6
3	3
	1

18 **=** 2 × 3 × 3

48 = 2 × 2 × 2 × 2 × 3

HCF = 2 × 3 = 6

Therefore the HCF of 18, 48 is 6

(b) 30, 42

2	30
3	15
5	5
	1

2	42
3	21
7	7
	1

30 = 2 × 3 × 5

42 = 2 × 3 × 7

HCF = 2 × 3 = 6

Therefore the HCF of 30, 42 is 6

(c) 18, 60

2	18
3	9
3	3
	1

2	60
2	30
3	15
5	5
	1

18 = 2 × 3 × 3

60 = 2 × 2 × 3 × 5

HCF = 2 × 3 = 6

Therefore the HCF of 18, 60 is 6

(d) 27, 63

3	27
3	9
3	3
	1

3	63
3	21
7	7
	1

27 = 3 × 3 × 3

63 = 3 × 3 × 7

HCF = 3 × 3 = 9

Therefore the HCF of 27, 63 is 9

(e) 36, 84

2	36
2	18
3	9
3	3
	1

2	84
2	42
3	21
7	7
	1

36 = 2 × 2 × 3 × 3

84 = 2 × 2 × 3 × 7

HCF = 2 × 2 × 3 = 12

Therefore the HCF of 36, 84 is 12

(f) 34, 102

2	34
17	17
	1

2	102
3	51
17	17
	1

34 = 2 × 17

102 = 2 × 3 × 17

HCF = 2 × 17 = 34

Therefore the HCF of 34, 102 is 34

(g) 70, 105, 175

2	70
5	35
7	7
	1

3	105
5	35
7	7
	1

5	175
5	35
7	7
	1

70 = 2 × 5 × 7

105 = 3 × 5 × 7

175 = 5 × 5 × 7

HCF = 5 × 7 = 35

Therefore the HCF of 70, 105, 175 is 35

(h) 91, 112, 49

7	91
13	13
	1

2	112
2	56
2	28
2	14
7	7
	1

7	49
7	7
	1

91 = 7 × 13

112 = 2 × 2 × 2 × 2 × 7

49 = 7 × 7

HCF = 7

Therefore the HCF of 91, 112, 49 is 7

(i) 18, 54, 81

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

$18 = 2 \times 3 \times 3$

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

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

HCF $= 3 \times 3 = 9$

Therefore the HCF of 18, 54, 81 is 9

(j) 12, 45, 75

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 × 3 × 5

75 = 3 × 5 × 5

HCF = 3

Therefore the HCF of 12, 45, 75 is 3

2. What is the HCF of two consecutive

(a) numbers?

(b) even numbers?

(c) odd numbers?

Solutions:

(a) The HCF of two consecutive numbers is 1

Example: The HCF of 2 and 3 is 1

(b) The HCF of two consecutive even numbers is 2

Example: The HCF of 2 and 4 is 2

(c) The HCF of two consecutive odd numbers is 1

Example: The HCF of 3 and 5 is 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?

Solutions:

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

Exercise 3.7 page no: 67

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.

Solutions:

Given, weight of two bags of fertiliser = 75 kg and 69 kg

Maximum weight = HCF of two bags weight i.e (75, 69)

3	75
5	25
5	5
	1

3	69
23	23
	1

75 = 3 × 5 × 5

69 = 3 × 23

HCF = 3

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

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?

Solutions:

First boy steps measure = 63 cm

Second boy steps measure = 70 cm

Third boy steps measure = 77 cm

LCM of 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

LCM = 2 × 3 × 3 × 5 × 7 × 11 = 6930

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

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.

Solutions:

Given length of a room = 825 cm

Breadth of a room = 675 cm

Height of a room = 450 cm

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 × 5 × 5 × 11

675 = 3 × 3 × 3 × 5 × 5

450 = 2 × 3 × 3 × 5 × 5

HCF = 3 × 5 × 5 = 75 cm

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

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

Solutions:

LCM of 6, 8, 12 = smallest number

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

LCM = 2 × 2 × 2 × 3 = 24

Now we need to find the smallest 3-digit multiple of 24

We know that 24 × 4 = 96 and 24 × 5 = 120

Hence, 120 is the smallest 3-digit number which is exactly divisible by 6, 8 and 12

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

Solutions:

LCM 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

LCM = 2 × 2 × 2 × 3 × 5 = 120

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

We may find 120 × 8 = 960 and 120 × 9 = 1080

Hence, 960 is the greatest 3-digit number exactly divisible by 8, 10 and 12

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?

Solutions:

LCM of 48, 72, 108 = time period after which these lights change

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

LCM = 2 × 2 × 2 × 2 × 3 × 3 × 3 = 432

Hence, lights will change together after every 432 seconds

Therefore the lights will change simultaneously at 7 minutes 12 seconds.

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.

Solutions:

HCF of 403, 434, 465 = Maximum capacity of tanker required

403 = 13 × 31

434 = 2 × 7 × 31

465 = 3 × 5 × 31

HCF = 31

Hence, a container of 31 litres can measure the diesel of the three containers exact number of times.

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

Solutions:

LCM of 6, 15, 18

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

LCM = 2 × 3 × 3 × 5 = 90

Required number = 90 + 5

= 95

Hence, 95 is the required number.

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

Solutions:

LCM of 18, 24, 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

LCM = 2 × 2 × 2 × 2 × 2 × 3 × 3 = 288

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

We find 288 × 3 = 864 and 288 × 4 = 1152

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

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?

Solutions:

(a) LCM of 9, 4

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

LCM = 2 × 2 × 3 × 3 = 36

(b) LCM of 12, 5

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

LCM = 2 × 2 × 3 × 5 = 60

(c) LCM of 6, 5

2	6	5
3	3	5
5	1	5
	1	1

LCM = 2 × 3 × 5 = 30

(d) LCM of 15, 4

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

LCM = 2 × 2 × 3 × 5 = 60

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

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?

Solutions:

(a) 5, 20

2	5	20
2	5	10
5	5	5
	1	1

LCM = 2 × 2 × 5 = 20

(b) 6, 18

2	6	18
3	3	9
3	1	3
	1	1

LCM = 2 × 3 × 3 = 18

(c) 12, 48

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

LCM = 2 × 2 × 2 × 2 × 3 = 48

(d) 9, 45

3	9	45
3	3	15
5	1	5
	1	1

LCM = 3 × 3 × 5 = 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.