CHAPTER 3

Playing with Numbers

Understanding the Lesson

- Simplification of brackets, multiples and factors.
- Order of four operations DMAS.
- Grouping symbols most commonly used.
- BODMAS Rule and its applications.
- Divisibility rules of 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11.
- Even/odd, prime/composite and co-prime numbers.
- Sieve of Eratosthenes.
- Common Factors and common multiples.
- Prime Factorisation.
- Highest Common Factor [HCF].
- Lowest Common Factor [LCM].
- Problems based on HCF and LCM.

Conceptual Facts

- A number which divides a given number exactly is called a factor of the given number.
- Every number is a factor of itself and 1 is a factor of every number.
- Every number is a multiple of its factors.
- Every factor is less than or equal to its multiple.
- Every multiple of a given number is greater than or equal to that number.
- A natural number which is not divisible by any number except 1 or itself is called prime number.
- 2 is the only natural number which is even as well as prime. All the prime numbers except 2 are odd.
- 2 is the smallest prime number.
- Numbers which are not prime are called composite numbers.
- 1 is neither prime nor composite number.
- Two numbers are called co-prime if they have only 1 as common factor.
- Pairs of prime numbers differ by 2 are called twin primes.
- The factors of a given number are Finite but it may have infinite number of multiples.
- Rule for divisibility:
  - (*i*) A number is divisible by 2 if it has 0 or even digits at its units place.
  - (*ii*) A number is divisible by 3 if the sum of its digits is also divisible by 3.
  - (*iii*) A number with 3 or more digits is divisible by 4 if the number found by last two digits of the number is divisible by 4.
  - (*iv*) A number is divisible by 5, if it has only 0 or 5 in its units place.
  - (*v*) A number is divisible by 6, if it is divisible by 2 and 3 both.
  - (*vi*) A number with 4 or more digits is divisible by 8 if the number formed by its last 3 digits are divisible by 8.

(*vii*) A number is divisible by 9 if the sum of all the digits of the number is divisible by 9.

(*viii*) A number is divisible by 11 if the difference between the sum of the digits at odd places taken from the right, and the sum of all the digits at even places is either 0 or divisible by 11.

- The HCF of two or more given numbers is called the highest common factor.
- The LCM of two or more given numbers is called lowest common multiple.
- HCF of co-prime numbers is 1.
- LCM of co-prime numbers is equal to their product.
- Product of any two numbers is equal to the product of their HCF and LCM.
- To simplify expressions involving brackets, the four fundamental operations (–, +, ×, ÷) and 'of' operations, we always use the BODMAS Rule.
- To simplify numerical expressions, we remove parenthesis ( ), curly brackets { } and square brackets [ ], strictly in this order.

TRY THESE (*PAGE 48*)

Q1. Find the possible factors of 45, 30 and 36.

Sol. (*i*) Factors of 45 are:

$45 = 1 \times 45$; $45 = 3 \times 15$; $45 = 5 \times 9$

Hence, the factors of 45 are: 1, 3, 5, 9, 15 and 45.

(*ii*) Factors of 30 are:

$30 = 1 \times 30$; $30 = 2 \times 15$;

$30 = 3 \times 10$; $30 = 5 \times 6$

Hence, the factors of 30 are: 1, 2, 3, 5, 6, 10, 15 and 30.

(*iii*) Factors of 36 are:

$36 = 1 \times 36$; $36 = 2 \times 18$;

$36 = 3 \times 12$; $36 = 4 \times 9$;

$36 = 6 \times 6$

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

EXERCISE 3.1

Q1. 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

Sol. (*a*) Factors of 24 are:

$24 = 1 \times 24$; $24 = 2 \times 12$; $24 = 3 \times 8$;

$24 = 4 \times 6$

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

(*b*) Factors of 15 are:

$15 = 1 \times 15$; $15 = 3 \times 5$

Hence, all the factors of 15 are: 1, 3, 5 and 15.

(*c*) Factors of 21 are: $21 = 1 \times 21$; $21 = 3 \times 7$

Hence, all the factors of 21 are: 1, 3, 7 and 21.

(*d*) Factors of 27 are: $27 = 1 \times 27$; $27 = 3 \times 9$.

Hence, all the factors of 27 are: 1, 3, 9 and 27.

(*e*) Factors of 12 are:

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

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

(*f*) Factors of 20 are:

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

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

(*g*) Factors of 18 are:

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

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

(*h*) Factors of 23 are: $23 = 1 \times 23$

Hence, all the factors of prime number 23 are: 1 and 23.

(*i*) Factors of 36 are:

$36 = 1 \times 36$; $36 = 2 \times 18$; $36 = 3 \times 12$;

$36 = 4 \times 9$; $36 = 6 \times 6$

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

Q2. Write first five multiples of:

(*a*) 5 (*b*) 8 (*c*) 9

Sol. (*a*) First five multiples of 5 are:

$5 \times 1 = 5$; $5 \times 2 = 10$; $5 \times 3 = 15$;

$5 \times 4 = 20$; $5 \times 5 = 25$

Hence, the required multiples of 5 are: 5, 10, 15, 20 and 25.

(*b*) First five multiples of 8 are:

$8 \times 1 = 8$; $8 \times 2 = 16$; $8 \times 3 = 24$;

$8 \times 4 = 32$; $8 \times 5 = 40$

Hence, the required multiples of 8 are: 8, 16, 24, 32 and 40.

(c) First five multiples of 9 are:
$9 \times 1 = 9$; $9 \times 2 = 18$; $9 \times 3 = 27$; $9 \times 4 = 36$; $9 \times 5 = 45$
Hence, the required multiples of 9 are: 9, 18, 27, 36 and 45.

Q3. Match the items in column I with the items in column II.

Column I	Column II
(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

Sol. (i) ↔ (b) [∵ $7 \times 5 = 35$]
(ii) ↔ (d) [∵ $15 \times 2 = 30$]
(iii) ↔ (a) [∵ $8 \times 2 = 16$]
(iv) ↔ (f) [∵ $20 \times 1 = 20$]
(v) ↔ (e) [∵ $25 \times 2 = 50$]

Q4. Find all the multiples of 9 upto 100.

Sol. $9 \times 1 = 9$; $9 \times 2 = 18$; $9 \times 3 = 27$;
$9 \times 4 = 36$; $9 \times 5 = 45$; $9 \times 6 = 54$;
$9 \times 7 = 63$; $9 \times 8 = 72$; $9 \times 9 = 81$;
$9 \times 10 = 90$; $9 \times 11 = 99$
Hence, all the multiples of 9 upto 100 are:
9, 18, 27, 36, 45, 54, 63, 72, 81, 90 and 99.

TRY THESE (PAGE 52)

Q1. Observe that $2 \times 3 + 1 = 7$ is a prime number. Hence, 1 has been added to a multiple of 2 to get a prime number. Can you find some more numbers of this type?

Sol. Yes, we can find such more numbers.
$2 \times 5 + 1 = 11$ which is a prime number.
$2 \times 8 + 1 = 17$ which is a prime number.
$2 \times 9 + 1 = 19$ which is a prime number.
$2 \times 11 + 1 = 23$ which is a prime number.
$2 \times 14 + 1 = 29$ which is a prime number.

EXERCISE 3.2

Q1. What is the sum of any two: (a) Odd numbers? (b) Even numbers?

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

Q2. 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 only the even prime number.
(i) All even numbers are composite numbers.
(j) The product of any two even numbers is always even.

Sol. (a) False [∵ $3 + 5 + 7 = 15$ (odd)]
(b) True [∵ $3 + 5 + 6 = 14$ (even)]
(c) True [∵ $5 \times 7 \times 9 = 315$ (odd)]
(d) False [∵ $6 \div 2 = 3$ (odd)]
(e) False [∵ 2 is a prime number but it is even]
(f) False [∵ 3 is a prime number having 1 and 3 as its factors]
(g) False [∵ $7 + 2 = 9$ (odd)]
(h) True [∵ 2 is even and the lowest prime number]
(i) False [∵ 2 is even but not composite number]
(j) True [∵ $4 \times 6 = 24$ (even)]

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.

Sol. The required pair of prime numbers having same digits are:
(17 and 71), (37 and 73), (79 and 97).

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

Sol. Prime numbers less than 20 are:
2, 3, 5, 7, 11, 13, 17 and 19
Composite numbers less than 20 are:
4, 6, 8, 9, 10, 12, 14, 15, 16 and 18

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

Sol. The greatest prime number between 1 and 10 is 7.

Q6. Express the following as the sum of two odd primes.
(a) 44 (b) 36 (c) 24 (d) 18

Sol. (a) $44 = 13 + 31$ (b) $36 = 17 + 19$
(c) $24 = 7 + 17$ (d) $18 = 7 + 11$

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

[**Remark:** Two prime numbers whose difference is 2 are called twin primes]

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

Q8. Which of the following numbers are prime?

(*a*) 23 (*b*) 51 (*c*) 37 (*d*) 26

Sol. (*a*) 23 is a prime number [$\because$ $23 = 1 \times 23$]

(*b*) 51 is not a prime number

[$\because$ $51 = 1 \times 3 \times 17$]

(*c*) 37 is a prime number [$\because$ $37 = 1 \times 37$]

(*d*) 26 is not a prime number

[$\because$ $26 = 1 \times 2 \times 13$]

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

Sol. Required seven consecutive composite numbers are:

90, 91, 92, 93, 94, 95 and 96

Q10. Express each of the following numbers as the sum of three odd primes.

(*a*) 21 (*b*) 31 (*c*) 53 (*d*) 61

Sol. (*a*) 21 can be expressed as $3 + 5 + 13$

(*b*) 31 can be expressed as $5 + 7 + 19$

(*c*) 53 can be expressed as $13 + 17 + 23$

(*d*) 61 can be expressed as $11 + 13 + 37$

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

(**Hint:** $3 + 7 = 10$)

Sol. Required pairs of prime numbers less than 20 are:

(*i*) $2 + 3 = 5$ (*ii*) $2 + 13 = 15$

(*iii*) $11 + 9 = 20$ (*iv*) $17 + 3 = 20$

(*v*) $7 + 13 = 20$

Q12. 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 _____.

Sol. (*a*) prime number

(*b*) composite number

(*c*) prime, composite

(*d*) 2 (*e*) 4 (*f*) 2

EXERCISE 3.3

Q1. 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)

Number	*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	—	—	—	—	—	—	—	—	—

Sol.

Number	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

Q2. Using divisibility tests, determine which of 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

Sol. (*a*) Given number = 572

(*i*) Divisibility by 4

Here, the number formed by the last two digits of the given number is 72.

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

Remainder 0. Hence, 572 is divisible by 4.

(*ii*) Divisibility by 8

Here, the number formed by the last three digits of the given number is 572.

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

Remainder 4. Hence, 572 is not divisible by 8.

(*b*) Given number = 726352

(*i*) Divisibility by 4

Here, the number formed by the last two digits of the given number = 52.

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

Remainder = 0. Hence, 726352 is divisible by 4.

(*ii*) Divisibility by 8

Here, the number formed by the last three digits of the given number = 352

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

Remainder = 0. Hence, 726352 is divisible by 8.

(*c*) Given number = 5500

(*i*) Divisibility by 4

Here the last two digits of the given number are 0. Hence, 5500 is divisible by 4.

(*ii*) Divisibility by 8

Here, the number formed by the last three digits of the given number = 500

Now,
$$\begin{array}{r} 62 \\ 8\overline{)\,500} \\ \underline{48} \\ 20 \\ \underline{16} \\ 4 \end{array}$$

Remainder = 4. Hence, 5500 is not divisible by 8.

(*d*) Given number = 6000

(*i*) Divisibility by 4

Here, the last two digits of the given number are 0. Hence, 6000 is divisible by 4.

(*ii*) Divisibility by 8

Here, the last three digits of the given number are 0. Hence, 6000 is divisible by 8.

(*e*) Given number = 12159

(*i*) Divisibility by 4

Here, the number formed by last two digits of the given number = 59

Now,
$$\begin{array}{r} 14 \\ 4\overline{)\,59} \\ \underline{4} \\ 19 \\ \underline{16} \\ 3 \end{array}$$

Remainder = 3.

Hence, 12159 is not divisible by 4.

(*ii*) Divisibility by 8

Here, the number formed by the last three digits of the given number = 159

Now,
$$\begin{array}{r} 19 \\ 8\overline{)\,159} \\ \underline{8} \\ 79 \\ \underline{72} \\ 7 \end{array}$$

Remainder = 7.

Hence, 12159 is not divisible by 8.

(*f*) Given number = 14560

(*i*) Divisibility by 4

Here, the number formed by the last two digits of the given number = 60.

Now,
$$\begin{array}{r} 15 \\ 4\overline{)\,60} \\ \underline{4} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

Remainder = 0. Hence, 14560 is divisible by 4.

(*ii*) Divisibility by 8

Here, the number formed by the last three digits of the given number = 560.

Now,
$$\begin{array}{r} 70 \\ 8\overline{)\,560} \\ \underline{56} \\ 0 \end{array}$$

Remainder = 0. Hence, 14560 is divisible by 8.

(*g*) Given number = 21084

(*i*) Divisibility by 4

Here, the number formed by the last two digits of the given number = 84.

Now,
$$\begin{array}{r} 21 \\ 4\overline{)\,84} \\ \underline{8} \\ 4 \\ \underline{4} \\ 0 \end{array}$$

Remainder = 0. Hence, 21084 is divisible by 4.

(*ii*) Divisibility by 8

Here, the number formed by the last three digits of the given number = 084.

Now,
$$\begin{array}{r} 10 \\ 8\overline{)\,084} \\ \underline{8} \\ 4 \end{array}$$

Remainder = 4.

Hence, 21084 is not divisible by 8.

(*h*) Given number = 31795072

(*i*) Divisibility by 4

Here, the number formed by the last two digits of the given number = 72.

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

Remainder = 0. Hence, 31795072 is divisible by 4.

(*ii*) Divisibility by 8

Here, the number formed by the last three digits of the given number = 072.

Now,
$$\begin{array}{r} 9 \\ 8\overline{)\,072} \\ \underline{72} \\ 0 \end{array}$$

Remainder = 0. Hence, 31795072 is divisible by 8.

(*i*) Given number = 1700

(*i*) Divisibility by 4

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

(*ii*) Divisibility by 8

Here, the number formed by the last three digits of the given number = 700

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

Remainder = 4. Hence, 1700 is not divisible by 8.

(*j*) Given number = 2150

(*i*) Divisibility by 4

Here, the number formed by the last two digits of the given number = 50.

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

Remainder = 2. Hence, 2150 is not divisible by 4.

(*ii*) Divisibility by 8

Here, the number formed by the last three digits of the given number = 150

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

Remainder = 6. Hence, 2150 is not divisible by 8.

Q3. Using divisibility tests, determine which of the 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

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

(*a*) Given number = 297144

The given number 297144 has even digit at its ones place.

So, it is divisible by 2.

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*) Given number = 1258

The given number 1258 has even digit i.e., 8 at its ones place.

So, it is divisible by 2.

The sum of all 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*) Given number = 4335

The digit at ones place of the given number is not even.

So, it is not divisible by 2.

The sum of all the digits of 4335 = 4 + 3 + 3 + 5 = 15 which is divisible by 3.

Since the given number 4335 is not divisible by both 2 and 3 therefore, it is not divisible by 6.

(*d*) Given number = 61233

The digit at ones place of the given number is not even.

So, it is not divisible by 2.

The sum of the digits of the given number 61233 = 6 + 1 + 2 + 3 + 3 = 15 which is divisible by 3.

Since, the given number is not divisible by both 2 and 3, it is not divisible by 6.

(*e*) Given number = 901352

The digit at ones place of the given number is even.

So, it is divisible by 2.

The sum of all the digits of the given number 901352 = 9 + 0 + 1 + 3 + 5 + 2 = 20 which is not divisible by 3.

Since, the given number is not divisible by both 2 and 3 hence, it is not divisible by 6.

(*f*) Given number = 438750

The digit at ones place of the given number is 0.

So, it is divisible by 2.

The sum of all the digits of the given number 438750

= 4 + 3 + 8 + 7 + 5 + 0

= 27 which is divisible by 3.

Hence, the given number is divisible by 6.

(*g*) Given number = 1790184

The digit at ones place of the given number is even.

So, it is divisible by 2.

The sum of all the digits of the given number 1790184

$= 1 + 7 + 9 + 0 + 1 + 8 + 4 = 30$

which is divisible by 3.

Hence, the given number is divisible by 6.

(*h*) Given number = 12583

The digit to ones place of the given number is odd.

So, it is not divisible by 2.

Sum of all the digits of the given number 12583

$= 1 + 2 + 5 + 8 + 3 = 19$

which is not divisible by 3.

Hence, the given number is not divisible by 6.

(*i*) Given number = 639210

The digit at ones place of the given number is 0.

So, it is divisible by 2.

The sum of all the digits of the given number 639210

$= 6 + 3 + 9 + 2 + 1 + 0 = 21$

which is divisible by 3.

Hence, the given number is divisible by 6.

(*j*) Given number = 17852

The digit at ones place of the given number is even.

So, it is divisible by 2.

The sum of all the digits of the given number 17852

$= 1 + 7 + 8 + 5 + 2 = 23$

which is not divisible by 3.

Hence, the given number is not divisible by 6.

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

(*a*) 5445 (*b*) 10824 (*c*) 7138965

(*d*) 70169308 (*e*) 10000001.

Sol. We know that a number is divisible by 11 if the difference between the sum of the digits at odd places (from the right) and the sum of the digits at even places (from the right) of the number is either 0 or divisible by 11.

(*a*) Given number = 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

Hence, the given number is divisible by 11.

(*b*) Given number = 10824

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 which is divisible by 11.

Hence, the given number is divisible by 11.

(*c*) Given number = 7138965

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 which is not divisible by 11.

Hence, the given number is not divisible by 11.

(*d*) Given number = 70169308

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 is divisible by 11.

(*e*) Given number = 10000001

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 is divisible by 11.

Q5. 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.

Sol. We know that number is divisible by 3 if the sum of all the digits of the number is also divisible by 3.

(*a*) ____ 6724

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

The smallest digit to be placed is blank space = 2

Then the sum = 19 + 2 = 21 which is divisible by 3.

The greatest digit to be placed in blank space = 8

Then, the sum = 19 + 8 = 27 which is divisible by 3

Hence, the required digits are 2 and 8.

(*b*) 4765 ___ 2.

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

The smallest digits to be place in blank space = 0

Then, sum = 24 + 0 = 24 which is divisible by 3.

The greatest digit to be placed in blank space = 9.

Then, the sum = 24 + 9 = 33 which is divisible by 3.

Hence, the required digits are 0 and 9.

Q6. 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 (*b*) 8 ___ 9484

Sol. (*a*) 92 ___ 389

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 ∴ ( ) = 11 – 3 = 8

So, the missing digit = 8

Hence, the required number is 928389.

(*b*) 8 ___ 9484

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

Hence, the required number = 869484.

TRY THESE (*PAGE 58*)

Q1. Find the common factors of:

(*a*) 8, 20 (*b*) 9, 15

Sol. (*a*) Given numbers are 8 and 20

Factors of 8 = 1, 2, 4, 8

Factors of 20 = 1, 2, 4, 5, 10, 20

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

(*b*) Given numbers are 9 and 15.

Factors of 9 are 1, 3, 9

Factors of 15 are 1, 3, 5, 15

Hence, the common factors are 1 and 3.

EXERCISE 3.4

Q1. Find the common factors of:

(*a*) 20 and 28 (*b*) 15 and 25

(*c*) 35 and 50 (*d*) 56 and 120

Sol. (*a*) Given numbers are : 20 and 28

Factors of 20 are 1, 2, 4, 5, 10, 20

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

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

(*b*) Given numbers are: 15 and 25

Factors of 15 are 1, 3, 5, 15

Factors of 25 are 1, 5, 25

Hence, the common factors are 1 and 5.

(*c*) Given numbers are: 35 and 50

Factors of 35 are: 1, 5, 7, 35

Factors of 50 are: 1, 2, 5, 10, 50

Hence, the common factors are 1 and 5.

(*d*) Given numbers are: 56 and 120

Factors of 56 are 1, 2, 4, 7, 8, 14, 28, 56

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

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

Q2. Find the common factors of:

(*a*) 4, 8 and 12 (*b*) 5, 15 and 25

Sol. (*a*) Given numbers are: 4, 8 and 12

Factors of 4 are 1, 2, 4

Factors of 8 are 1, 2, 4, 8

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

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

(*b*) Given numbers are: 5, 15 and 25

Factors of 5 are 1, 5

Factors of 15 are 1, 3, 5, 15

Factors of 25 are 1, 5, 25

Hence, the common factors are 1 and 5.

Q3. Find first three multiples of:

(*a*) 6 and 8 (*b*) 12 and 18

Sol. (*a*) Given numbers are 6 and 8

First three multiples of 6 are

6 × 1= 6; 6 × 2 = 12; 6 × 3 = 18.

First three multiples of 8 are

8 × 1 = 8; 8 × 2 = 16; 8 × 3 = 24.

(*b*) Given numbers are 12 and 18.

First three multiples of 12 are

12 × 1 = 12; 12 × 2 = 24;

12 × 1 = 36;

First three multiples of 18 are

18 × 1 = 18; 18 × 2 = 36;

18 × 3 = 54.

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

Sol. Given numbers are 3 and 4.

Multiples of 3 less than 100 are:

$3 \times 1 = 3$, $3 \times 2 = 6$, $3 \times 3 = 9$, $3 \times 4 = (12)$, $3 \times 5 = 15$, $3 \times 6 = 18$, $3 \times 7 = 21$, $3 \times 8 = (24)$, $3 \times 9 = 27$, $3 \times 10 = 30$, $3 \times 11 = 33$, $3 \times 12 = (36)$, $3 \times 13 = 39$, $3 \times 14 = 42$, $3 \times 15 = 45$, $3 \times 16 = (48)$, $3 \times 17 = 51$, $3 \times 18 = 54$, $3 \times 19 = 57$, $3 \times 20 = (60)$, $3 \times 21 = 63$, $3 \times 22 = 66$, $3 \times 23 = 69$, $3 \times 24 = (72)$, $3 \times 25 = 75$, $3 \times 26 = 78$, $3 \times 27 = 81$, $3 \times 28 = (84)$, $3 \times 29 = 87$, $3 \times 30 = 90$, $3 \times 31 = 93$, $3 \times 32 = (96)$, $3 \times 33 = 99$.

Multiples of 4 less than 100 are:

$4 \times 1 = 4$, $4 \times 2 = 8$, $4 \times 3 = (12)$, $4 \times 4 = 16$, $4 \times 5 = 20$, $4 \times 6 = (24)$, $4 \times 7 = 28$, $4 \times 8 = 32$, $4 \times 9 = (36)$, $4 \times 10 = 40$, $4 \times 11 = 44$, $4 \times 12 = (48)$, $4 \times 13 = 52$, $4 \times 14 = 56$, $4 \times 15 = (60)$, $4 \times 16 = 64$, $4 \times 17 = 68$, $4 \times 18 = (72)$, $4 \times 19 = 76$, $4 \times 20 = 80$, $4 \times 21 = (84)$, $4 \times 22 = 88$, $4 \times 23 = 92$, $4 \times 24 = (96)$.

Hence, the common multiples of 3 and 4 less than 100 are:

12, 24, 36, 48, 60, 72, 84 and 96.

Q5. 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

Sol. (*a*) Given number are 18 and 35

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

Factors of 35 are 1, 5, 7, 35

Since, the common factors of 18 and 35 is only 1.

Hence, 18 and 35 are co-prime.

(*b*) Given numbers are 15 and 37

Factors of 15 are 1, 3, 5, 15

Factors of 37 are 1, 37

Since, the common factor of 15 and 37 is only 1.

Hence, they are co-prime.

(*c*) Given numbers are 30 and 415

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

Factors of 415 are 1, 5, 83

Since, the numbers have common factors 1 and 5

Hence, they are not co-prime.

(*d*) Given numbers are 17 and 68

Factors of 17 are 1, 17

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

Since, the numbers have common factors 1 and 17

Hence, they are not co-prime.

(*e*) Given numbers are 216 and 215

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

Factors of 215 are 1, 5, 43

Since only 1 is the common factor of 216 and 215.

Hence, they are co-prime.

(*f*) Given numbers are 81 and 16

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

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

Since only 1 is common to 81 and 16

Hence, they are co-prime.

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

Sol. If the number is divisible by both 5 and 12 this the number will also be divisible by 5×12 *i.e.*, 60.

Q7. A number is divisible by 12. By what other will that number be divisible?

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

Hence the number which is divisible by 12, will also be divisible by its factors *i.e.*, 1, 2, 3, 4, 6 and 12.

TRY THESE (*PAGE 61*)

Q1. Write the prime factorisations of: 16, 28, 38

Sol. (*i*) Given number = 16

2	16
2	8
2	4
2	2
2	1

Hence, the prime factorisations of 16

$= 2 \times 2 \times 2 \times 2$

(*ii*) Given number = 28

2	28
2	14
7	7
	1

Hence, the prime factorisations of 28

$= 2 \times 2 \times 7$

(*iii*) Given number = 38

2	38
19	19
	1

Hence, the prime factorisations of $38 = 2 \times 19$

EXERCISE 3.5

Q1. 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.

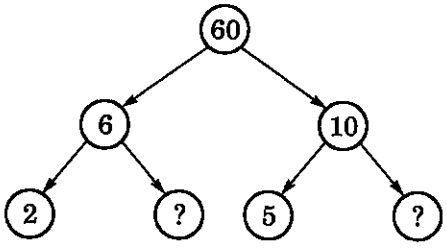
(*g*) All numbers which are divisible by 8 must also be divisible by 4.

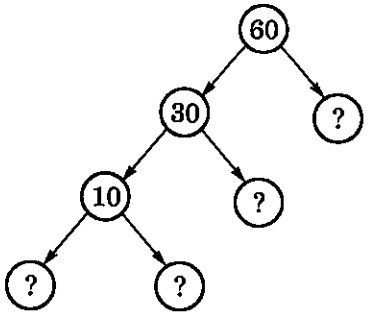
(*h*) If a number exactly divides two numbers separately, it must exactly divide their sum.

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

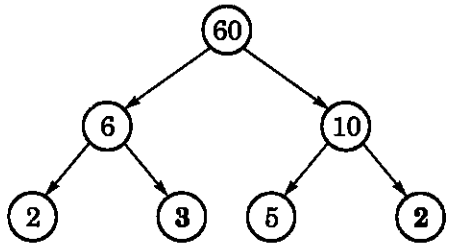
Sol. (*a*) False (*b*) True (*c*) False
(*d*) True (*e*) False (*f*) False
(*g*) True (*h*) True (*i*) False

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





Sol. Given that:



Here, $6 = 2 \times$ missing number

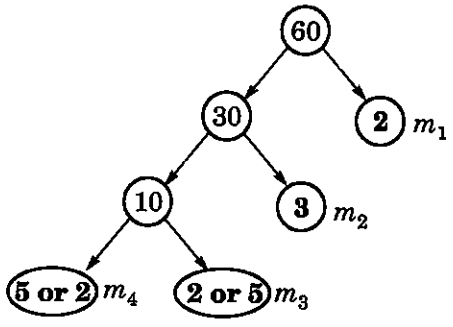
$\therefore$ Missing number $= 6 \div 2 = 3$

Similarly, $10 = 5 \times$ missing number

$\therefore$ Missing number $= 10 \div 5 = 2$

Hence, the missing numbers are 3 and 2.

(*b*) Given that:



Let the missing numbers be m_1, m_2, m_3 and m_4.

$\therefore \quad 60 = 30 \times m_1$

$\Rightarrow \quad m_1 = 60 \div 30 = 2$

$30 = 10 \times m_2$

$\Rightarrow \quad m_2 = 30 \div 10 = 3$

$10 = m_3 \times m_4$

$\Rightarrow \quad m_3 = 2$ or 5 and $m_4 = 5$ or 2

Hence, the missing numbers are 2, 3, 2, 5.

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

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

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

Sol. The greatest 4-digit number = 9999

3	9999
3	3333
11	1111
	101

Hence, the prime factors of 9999 $= 3 \times 3 \times 11 \times 101$.

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

Sol. The smallest 5-digit number = 10000

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

Hence, the required prime factors: 10000
$= 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$.

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

Sol. Given number = 1729

7	1729
13	247
19	19
	1

Hence, the prime factors of
$1729 = 7 \times 13 \times 19$.

Here, $13 - 7 = 6$ and $19 - 13 = 6$

We see that the difference between two consecutive prime factors is 6.

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

Sol. **Example 1:** Take three consecutive numbers 20, 21 and 22.

Here 20 is divisible by 2 and 21 is divisible by 3.

Therefore, the product $20 \times 21 \times 22 = 9240$ is divisible by 6.

Example. 2: Take three consecutive numbers 30, 31 and 32.

Here 30 is divisible by 3 and 32 is divisible by 2.

Therefore, the product $30 \times 31 \times 32 = 29760$ is divisible by 6.

Example 3: Take three consecutive numbers 48, 49 and 50.

Here, 48 is divisible by 3 and 50 is divisible by 2.

Therefore, the product $48 \times 49 \times 50 = 117600$ 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.

Sol. **Example 1:** Let us take two consecutive odd numbers 97 and 99.

Sum = 97 + 99 = 196

Here, the number formed by last two digits is 96 which is divisible by 4.

Hence, the sum of numbers 97 and 99 i.e. 196 is divisible by 4.

Example 2: Let us take two consecutive odd numbers 121 and 123.

Sum = 121 + 123 = 244

Here, the number formed by last two digits is 44 which is divisible by 4.

Example 3: Let us take two consecutive odd numbers 105 and 107.

Sum = 105 + 107 = 212

Here, the number formed by the last two digits is 12 which is divisible by 4.

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

(*a*) $24 = 2 \times 3 \times 4$ (*b*) $56 = 7 \times 2 \times 2 \times 2$

(*c*) $70 = 2 \times 5 \times 7$ (*d*) $54 = 2 \times 3 \times 9$.

Sol. (*a*) $24 = 2 \times 3 \times 4$

Here, 4 is not a prime number.

Hence, $24 = 2 \times 3 \times 4$ is not a prime factorisation.

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

Here, all factors are prime numbers

Hence, $56 = 7 \times 2 \times 2 \times 2$ is a prime factorisation.

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

Here, all factors are prime numbers.

Hence, $70 = 2 \times 5 \times 7$ is a prime factorisation.

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

Here, 9 is not a prime number.

Hence, $54 = 2 \times 3 \times 9$ is not a prime factorisation.

Q10. Determine if 25110 is divisible by 45

Sol. $45 = 5 \times 9$

Here, 5 and 9 are co-prime numbers.

Test of divisibility by 5: unit place of the given number 25110 is 0. So, it is divisible by 5.

Test of divisibility by 9:

Sum of the digits = 2 + 5 + 1 + 1 + 0 = 9 which is divisible by 9.

So, the given number is divisible by 5 and 9 both.

Hence, the number 25110 is divisible by 45.

Q11. 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.

Sol. Here, the given two numbers are not co-prime.

So, it is not necessary that a number divisible by both 4 and 6, must also be divisible by their product 4 × 6 = 24.

Example: 36 and 60 are divisible by 4, both 4 and 6 but not by 24.

Q12. I am the smallest number, having four different prime factors. Can you find me?

Sol. We know that the smallest 4 prime numbers are 2, 3, 5 and 7.

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

TRY THESE (*PAGE 63*)

Q1. Find the HCF of the following:

(*i*) 24 and 36 (*ii*) 15, 25 and 30

(*iii*) 8 and 12 (*iv*) 12, 16 and 28

Sol. (*i*) Given numbers are 24 and 36.

Finding the prime factors of 24 and 36, we get

$24 = \boxed{2} \times \boxed{2} \times 2 \times \boxed{3}$

$36 = \boxed{2} \times \boxed{2} \times 3 \times \boxed{3}$

2	24
2	12
2	6
3	3
	1

2	36
2	18
3	9
3	3
	1

The common factors of 24 and 36 are 2 (occurrence twice) and 3.

Hence, the HCF = 2 × 2 × 3 = 12.

(*ii*) Given numbers are 15, 25 and 30.

Finding the prime factors of 15, 25 and 30, we get

$15 = 3 \times \boxed{5}$

$25 = 5 \times \boxed{5}$

$30 = 2 \times 3 \times \boxed{5}$

3	15
5	5
	1

5	25
5	5
	1

2	30
3	15
5	5
	1

Here, the common factor is 5.

Hence, the HCF = 5

(*iii*) Given numbers are 8 and 12.

Finding the prime factors of 8 and 12, we get

$8 = \boxed{2} \times \boxed{2} \times 2$

$12 = \boxed{2} \times \boxed{2} \times 3$

2	8
2	4
2	2
	1

2	12
2	6
3	3
	1

Here, the common factor is 2 (occurring twice).

Hence, the HCF = 2 × 2 = 4.

(*iv*) Given numbers are 12, 16 and 28.

Finding the prime factors of 12, 16 and 28, we get

$12 = \boxed{2} \times \boxed{2} \times 3$

$16 = \boxed{2} \times \boxed{2} \times 2 \times 2$

$28 = \boxed{2} \times \boxed{2} \times 7$

2	12
2	6
3	3
	1

2	16
2	8
2	4
2	2
	1

2	28
2	14
7	7
	1

Here, common factors are 2 (occurring twice).

Hence, the HCF of 12, 16 and 28 = 2 × 2 = 4.

EXERCISE 3.6

Q1. 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

Sol. (*a*) Given numbers are 18 and 48.

Prime factorisations of 18 and 48 are:

$18 = \boxed{2} \times 3 \times \boxed{3}$

$48 = \boxed{2} \times 2 \times 2 \times 2 \times \boxed{3}$

2	18
3	9
3	3
	1

2	48
2	24
2	12
2	6
3	3
	1

Here, the common factors are 2 and 3.

Hence, the HCF = $2 \times 3 = 6$.

(*b*) The given numbers are 30 and 42.

Prime factorisations of 30 and 42, are:

$30 = \boxed{2} \times \boxed{3} \times 5$

$42 = \boxed{2} \times \boxed{3} \times 7$

2	30
3	15
5	5
	1

2	42
3	21
7	7
	1

Here, the common factors are 2 and 3.

Hence, the HCF = $2 \times 3 = 6$.

(*c*) Given numbers are 18 and 60.

Prime factorisations of 18 and 60 are:

$18 = \boxed{2} \times 3 \times \boxed{3}$

$60 = \boxed{2} \times 2 \times \boxed{3} \times 5$

2	18
3	9
3	3
	1

2	60
2	30
3	15
5	5
	1

Here, the common factors are 2 and 3.

Hence, the HCF of 18 and 60 = $2 \times 3 = 6$.

(*d*) Given numbers are 27 and 63.

Prime factorisations of 27 and 63 are:

$27 = \boxed{3} \times \boxed{3} \times 3$

$63 = \boxed{3} \times \boxed{3} \times 7$

3	27
3	9
3	3
	1

3	63
3	21
7	7
	1

Here, the common factor is 3 (occurring twice).

Hence, the HCF = $3 \times 3 = 9$.

(*e*) Given numbers are 36 and 84.

Prime factorisations of 36 and 84 are:

$36 = \boxed{2} \times \boxed{2} \times \boxed{3} \times 3$

$84 = \boxed{2} \times \boxed{2} \times \boxed{3} \times 7$

2	36
2	18
3	9
3	3
	1

2	84
2	42
3	21
7	7
	1

Here, the common factors are 2, 2 and 3.

Hence, the HCF = $2 \times 2 \times 3 = 12$.

(*f*) Given numbers are 34 and 102.

Prime factorisations of 34 and 102 are:

$34 = \boxed{2} \times \boxed{17}$

$102 = \boxed{2} \times 3 \times \boxed{17}$

2	34
17	17
	1

2	102
3	51
17	17
	1

Here, the common factors are 2 and 17.

Thus, HCF is $2 \times 17 = 34$.

(*g*) The given numbers are 70, 105 and 175.

Prime factorisatios of 70, 105 and 175 are:

$70 = 2 \times \boxed{5} \times \boxed{7}$

$105 = 3 \times \boxed{5} \times \boxed{7}$

$175 = 5 \times \boxed{5} \times \boxed{7}$

2 | 70
5 | 35
7 | 7
1

3 | 105
5 | 35
7 | 7
1

5 | 175
5 | 35
7 | 7
1

Here, common factors are 5 and 7.

Hence, the HCF of 70, 105 and 175 is $5 \times 7 = 35$.

(*h*) Given numbers are 91, 112 and 49.

Prime factorisations of 91, 112 and 49 are:

$91 = \boxed{7} \times 13$

$112 = 2 \times 2 \times 2 \times 2 \times \boxed{7}$

$49 = \boxed{7} \times 7$

7 | 91
13 | 13
1

2 | 112
2 | 56
2 | 28
2 | 14
7 | 7
1

7 | 49
7 | 7
1

Here, the common factor is 7.

Hence, the HCF = 7.

(*i*) Given numbers are 18, 54 and 81.

Prime factorisations of 18, 54 and 81 are:

$18 = 2 \times \boxed{3} \times \boxed{3}$

$54 = 2 \times \boxed{3} \times \boxed{3} \times 3$

$81 = 3 \times \boxed{3} \times \boxed{3} \times 3$

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

Here, the common factor is 3 (occurring twice).

Thus, the HCF = $3 \times 3 = 9$.

(*j*) Given numbers are 12, 45 and 75.

Prime factorisations of 12, 45 and 75 are:

$12 = 2 \times 2 \times \boxed{3}$

$45 = \boxed{3} \times 3 \times 5$

$75 = \boxed{3} \times 5 \times 5$

2 | 12
2 | 6
3 | 3
1

3 | 45
3 | 15
5 | 5
1

3 | 75
5 | 25
5 | 5
1

Here, the common factor is 3.

Hence, the HCF = 3.

Q2. What is the HCF of two consecutive

(*a*) numbers? (*b*) even numbers?

(*c*) odd numbers?

Sol. (*a*) The common factor of two consecutive numbers is always 1.

Hence, the HCF = 1.

(*b*) The common factors of two consecutive even numbers are 1 and 2.

Hence, the HCF = $1 \times 2 = 2$.

(*c*) The common factor of two consecutive odd numbers is 1.

Hence, the HCF = 1.

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

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

Sol. No, answer is not correct.

Reason: 0 is not the prime factor of any number.

1 is always the prime factor of co-prime number.

Hence, the correct HCF of 4 and 15 is 1.

EXERCISE 3.7

Q1. 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.

Sol. Maximum value of weight which can measure the given weight exact number of time = HCF of 75 g and 69 kg

Prime factorisations of 75 and 69 are

$75 = 3 \times 5 \times 5$ $\quad$ $69 = 3 \times 23$

3 | 75
5 | 25
5 | 5
1

3 | 69
23 | 23
1

Here, the common factor is 3.

$\therefore$ HCF of 75 and 69 = 3.

Hence, the required maximum value of weight = 3 kg.

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?

Sol. The minimum distance that each boy should walk must be the least common multiple (LCM) of the measure of their steps.

To find LCM of 63, 70 and 77, we use division method.

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

$\therefore$ LCM of 63, 70 and 77 = $2 \times 3 \times 3 \times 5 \times 7 \times 11 = 6930$

Hence, the required minimum distance = 6930 cm.

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.

Sol. The longest tape required to measure the three dimensions of the room

= HCF of 825, 675 and 450

Prime factorisations of 825, 675 and 450 are

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

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

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

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

Here, common factors are 3, 5 (two times).

$\therefore$ HCF of 825, 675 and 450 = $3 \times 5 \times 5 = 75$

Hence, the required longest tape = 75 cm.

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

Sol. The smallest 3-digit number = 100

Since LCM of 6, 8 and 12 is divisible by them.

So,

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

$\therefore$ LCM of 6, 8 and 12 = $2 \times 2 \times 2 \times 3 = 24$

Since, all the multiples of 24 will also be divisible by 6, 8 and 12.

$\therefore$

$$24 \overline{)100} \quad 4$$
$$-96$$
$$4$$

So, the smallest multiple of 24 in three digits will be just above

$100 = (100 - 4) + 24$

$= 96 + 24 = 120$

Hence, the required number is 120.

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

Sol. To find the LCM of 8, 10 and 12, we have

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

$\therefore$ LCM of 8, 10 and 12 = $2 \times 2 \times 2 \times 3 \times 5 = 120$

The greatest 3-digit number = 999

$\therefore$

$$120 \overline{)999} \quad 8$$
$$-960$$
$$39$$

$\therefore$ Multiple of 120 just below 999 is 960.

Hence, the required number is 960.

Q6. 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?

Sol. To find the LCM of 48, 72 and 108, we have

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

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

So, after 432 seconds, the light will change simultaneously.

Hence, the required time = 432 seconds = 7 minutes 12 seconds *i.e.,* 7 minutes 12 seconds past 7 a.m.

Q7. 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.

Sol. Maximum capacity of the required measure is equal to the HCF of 403, 434 and 465.

Prime factorisations of 403, 434 and 465 are

$403 = 13 \times \boxed{31}$

$434 = 2 \times 7 \times \boxed{31}$

$465 = 3 \times 5 \times \boxed{31}$

13	403
31	31
	1

2	434
7	217
31	31
	1

3	465
5	155
31	31
	1

Common factor = 31.

So, the HCF of 403, 434 and 465 = 31.

Hence, the maximum capacity of the required container = 31 litres.

Q8. Find the least number which when divided by 6, 15 and 18 leave remainder 5 in each case.

Sol. To find the LCM of 6, 15 and 18, we have

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

$\therefore$ LCM of 6, 15 and 18 = $2 \times 3 \times 3 \times 5 = 90$.

Here, 90 is the least number exactly divisible by 6, 15 and 18.

To get a remainder 5, the least number will be 90 + 5 = 95.

Hence, the required number is 95.

Q9. Find the smallest 4-digit number which is divisible by 18, 24 and 32.

Sol. The smallest 4-digit number = 1000. To find the LCM of 18, 24 and 32, we have

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

$\therefore$ LCM = $2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 288$

Since, 288 is the smallest number which is exactly divisible by 18, 24 and 32. But it is not a 4-digit number.

$\therefore$

$$\begin{array}{r|l} & 3 \\ \hline 288 & 1000 \\ & -864 \\ \hline & 136 \end{array}$$

So, the multiple of 288 just above 1000 is: 1000 – 136 + 288 = 1152.

Hence, the required number is 1152.

Q10. 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. (*a*) To find the LCM of 9 and 4, we have

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

$\therefore$ LCM = $2 \times 2 \times 3 \times 3 = 36$.

The product 9 and 4 = $9 \times 4 = 36$.

Hence, the LCM of 9 and 4 = Product of 9 and 4.

(*b*) To find LCM of 12 and 5, we have

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

$\therefore$ LCM = $2 \times 2 \times 3 \times 5 = 60$.

The product of 12 and 5 = $12 \times 5 = 60$.

Hence, the LCM of 12 and 5 = Product of 12 and 5.

(*c*) To find the LCM of 6 and 5, we have

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

$\therefore$ LCM = $2 \times 3 \times 5 = 30$.

The product of 6 and 5 = $6 \times 5 = 30$.

Hence, the LCM of 6 and 5 = Product of 6 and 5.

(*d*) To find the LCM of 15 and 4, we have

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

$\therefore$ LCM = $2 \times 2 \times 3 \times 5 = 60$.

Product of the numbers 15 and 4

$= 15 \times 4 = 60$.

Hence, the LCM of 15 and 4 = Product of 15 and 4.

Q11. 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?

Sol. (*a*) To find the LCM of 5 and 20, we have

2	5, 20
2	5, 10
5	5, 5
	1, 1

$\therefore$ LCM = $2 \times 2 \times 5 = 20$.

Hence, the LCM of 5 and 20 = 20.

(*b*) To find the LCM of 6 and 18, we have

2	6, 18
3	3, 9
3	1, 3
	1, 1

$\therefore$ LCM = $2 \times 3 \times 3 = 18$.

Hence, the LCM of 6 and 18 = 18.

(*c*) To find the LCM of 12 and 48, we have

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

$\therefore$ LCM = $2 \times 2 \times 2 \times 2 \times 3 = 48$.

Hence, the LCM of 12 and 48 = 48.

(*d*) To find the LCM of 9 and 45, we have

3	9, 45
3	3, 15
5	1, 5
	1, 1

$\therefore$ LCM = $3 \times 3 \times 5 = 45$.

Hence, the LCM of 9 and 45 = 45.

From the above examples, we observe that the LCM of the two numbers, where one number is a factor of the other, is the greater number.

Learning More Q & A

I. Very Short Answer (VSA) Questions

Q1. What is the sum of any two (*a*) even numbers (*b*) odd numbers?

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

Example: 4 (even) + 6 (even) = 10 (even)

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

Example: 5 (odd) + 7 (odd) = 12 (even)

Q2. Which of the following numbers is divisible by 3?

(*a*) 1212 (*b*) 625

Sol. (*a*) Given number = 1212

Sum of the digits = 1 + 2 + 1 + 2

= 6, which is divisible by 3.

Hence, 1212 is also divisible by 3.

(*b*) Given number = 625

Sum of the digits = 6 + 2 + 5 = 13, which is not divisible by 3.

Hence, 625 is not divisible by 3.

Q3. If the LCM and HCF of any two numbers are 15 and 4 respectively, find the product of the numbers.

Sol. We know that the product of the number = LCM × HCF = 15 × 4 = 60

Hence, the product of the given numbers = 60.

Q4. Find the HCF of 5 and 7.

Sol. Given numbers are 5 and 7. We observe that 5 and 7 are co-prime numbers.

Hence, the HCF is 1.

Q5. Write first 3 multiples of 25.

Sol. We have 25 × 1 = 25; 25 × 2 = 50; 25 × 3 = 75

Hence, the required multiples are 25, 50 and 75.

Q6. What are the possible factors of (*a*) 12 (*b*) 18?

Sol. (*a*) Possible factors of 12 are:

12 = 1 × 12; 12 = 2 × 6; 12 = 3 × 4

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

(*b*) Possible factors of 18 are:

18 = 1 × 18; 18 = 2 × 9; 18 = 3 × 6

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

Q7. Write first three multiples of 11.

Sol. First three multiples of 11 are:

11 × 1 = 11; 11 × 2 = 22; 11 × 3 = 33

Hence, the required multiples are: 11, 22 and 33.

Q8. Write pairs of twin prime numbers less than 20.

Sol. Pairs of twin prime numbers are: (3, 5), (5, 7), (11, 13), (17, 19).

Q9. Write the number which is even as well as prime.

Sol. 2 is the only even number which is prime number also.

Q10. What is the fundamental theorem of arithmetic?

Sol. Every number greater than 1 has exactly one prime factorisation.

II. Short Answer (SA) Questions

Q11. Simplify: 32 + 96 ÷ (7 + 9)

Sol. Given that: 32 + 96 ÷ (7 + 9)

= 32 + 96 ÷ 16 (Using BODMAS)

= 32 + 6 = 38

Q12. Simplify: 18 + {1 + (5 – 3) × 5}

Sol. Given that: 18 + {1 + (5 – 3) × 5}

(Using BODMAS)

= 18 + {1 + 2 × 5} = 18 + {1 + 10}

= 18 + 11 = 29.

Q13. Without actual division, show that 11 is a factor of 1,10,011.

Sol. Here 1,10,011 = 1,10,000 + 11

= 11 × 10,000 + 11 × 1

= 11 × (10,000 + 1)

= 11 × 10,001

It is clear that 11 is a factor of 11 × 10,001. Hence, 11 is a factor of 1,10,011.

Q14. The sum of two numbers is 25 and their product is 144. Find the numbers.

Sol. The product of two numbers is 144.

∴ The possible factors are

1 × 144, 2 × 72, 3 × 48, 4 × 36, 6 × 24, 8 × 18, 9 × 16, 12 × 12

Here, we observe that out of these factors, we take 9 and 16.

Product = 9 × 16 = 144 and sum = 9 + 16 = 25

Hence, the required numbers are 9 and 16.

Q15. Is 80136 divisible by 11?

Sol. Sum of the digits at odd places = 6 + 1 + 8 = 15

Sum of the digits at even places = 3 + 0 = 3

Difference of the two sums = 15 – 3 = 12, which is neither 0 nor the multiple of 11.

Hence, 80136 is not divisible by 11.

Q16. The HCF and LCM of two numbers are 6 and 120 respectively. If one of the numbers is 24, find the other number.

Sol. Given that: HCF = 6

LCM = 120

Let the two numbers be a and b,

where $a = 24$, $b = ?$

We know that: $a \times b$ = HCF × LCM

$\Rightarrow \quad 24 \times b = 6 \times 120$

$\Rightarrow \quad b = \dfrac{6 \times 120}{24}$

$\Rightarrow \quad b = 30$

Hence, the other number is 30.

Q17. Find the LCM of 12 and 30.

Sol. Given numbers are 12 and 30

12 = 2 × 2 × 3; 30 = 2 × 3 × 5

∴ LCM = 2 × 2 × 3 × 5 = 60

Hence, the LCM of 12 and 30 = 60.

Q18. Find the smallest 4-digit number which is divisible by 18, 24 and 32.

Sol. Given numbers are 18, 24 and 32, we have

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

Thus, LCM = $2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 288$

The smallest 4-digit number = 1000

Now, we write multiples of 288, till we get a 4-digit number.

$288 \times 1 = 288$, $288 \times 2 = 576$,

$288 \times 3 = 864$, $288 \times 4 = 1152$

Hence, 1152 is the required number.

Q19. Find the greatest number which divides 82 and 132 leaving 1 and 6, respectively as remainders.

Sol. Given numbers are 82 and 132 and the remainders are 1 and 6 respectively.

We have, $82 - 1 = 81$ and $132 - 6 = 126$

So, we need to find the HCF of 81 and 126

$81 = 3 \times \boxed{3} \times \boxed{3} \times 3$

$126 = 2 \times \boxed{3} \times \boxed{3} \times 7$

Common factor is 3 (occurring twice).

$\therefore$ HCF $= 3 \times 3 = 9$

Hence, the required number is 9.

Q20. Find the greatest number that will divide 455, 582 and 710 leaving remainders 14, 15 and 17 respectively.

Sol. Given numbers are 455, 582 and 710 and the respective remainders are 14, 15 and 17.

We have $455 - 14 = 441$, $582 - 15 = 567$ and $710 - 17 = 693$.

Now let us find their HCF.

$441 = \boxed{3} \times 3 \times \boxed{7} \times 7$

$567 = \boxed{3} \times 3 \times 3 \times 3 \times \boxed{7}$

$693 = \boxed{3} \times 3 \times \boxed{7} \times 11$

Common factors are 3 and 7.

$\therefore$ HCF $= 3 \times 7 = 21$

Hence, the required number is 21.

III. Long Answer (LA) Questions

Q21. Simplify the following:

$40 + [20 - \{28 \div 7 - 3 + (30 - 5 \text{ of } 4)\}]$

Sol. Using BODMAS Rule, we have

$40 + [20 - \{28 \div 7 - 3 + (30 - 5 \text{ of } 4)\}]$

$= 40 + [20 - \{28 \div 7 - 3 + (30 - 20)\}]$

$= 40 + [20 - \{28 \div 7 - 3 + 10\}]$

$= 40 + [20 - \{4 - 3 + 10\}]$

$= 40 + [20 - 11] = 40 + 9 = 49.$

Q22. Three sets of English, Hindi, and Urdu books are to be stacked in such a way that the books are stored subjectwise and the height of each stack is the same. The numbers of English, Hindi and Urdu books are 336, 192 and 144 respectively. Assuring that the books have that same thickness, determine the number of stacks of English, Hindi and Urdu books.

Sol. To arrange the books in the required way, we have to find the greatest number that divides 336, 192 and 144 exactly.

So, HCF of 336, 192 and 144 is

$336 = \boxed{2} \times \boxed{2} \times \boxed{2} \times \boxed{2} \times \boxed{3} \times 7$

$192 = \boxed{2} \times \boxed{2} \times \boxed{2} \times \boxed{2} \times 2 \times 2 \times \boxed{3}$

$144 = \boxed{2} \times \boxed{2} \times \boxed{2} \times \boxed{2} \times 3 \times \boxed{3}$

Common factors are $2 \times 2 \times 2 \times 2 \times 3 = 48$

$\therefore$ HCF = 48, *i.e.* each stack contains 48 books.

$\therefore$ Number of stacks of English books

$= 336 \div 48 = 7$

Number of stacks of Hindi books $= 192 \div 48 = 4$

Number of stacks of Urdu books $= 144 \div 48 = 3$

Q23. Which of the following statements are true?

(*a*) 1371 is divisible by 3

(*b*) 1155 is not divisible by 9

(*c*) 1478 is not divisible by 4

(*d*) 2470 is divisible by 5

(*e*) If a number is divisible by 9, it is also divisible by 3.

(*f*) If a number is divisible by 3, it is also divisible by 9.

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

(*h*) If a number is divisible by 8, it must be divisible by 6.

(*i*) If a number is divisible by 3 and 6, it is divisible by 18.

(*j*) 1758 is not divisible by 8.

Sol. (*a*) Yes, 1371 is divisible by 3. So it is true statement.

(*b*) Yes, 1155 is not divisible by 9. So it is true statement.

(*c*) Yes, 1478 is not divisible by 4. So it is true statement.

(*d*) Yes, 2470 is divisible by 5. So it is true statement.

(*e*) Yes, it is true statement.

(*f*) No, it is not true statement.

(*g*) Yes, it is true statement.

(*h*) No, it is not true statement.

(*i*) No, it is not true statement.

(*j*) Yes, it is true statement.

IV. Multiple Choice Questions (MCQ)

Q24. Which of the following numbers is divisible by 11?

(*a*) 112111 (*b*) 928389

(*c*) 12011 (*d*) 11111

Sol. (*a*) 112111

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

Sum of the digits at even places = 1 + 2 + 1 = 4

Difference = 4 – 3 = 1 which is neither 0 nor divisible by 11

So, it is not divisible by 11.

(*b*) 928389

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

Sum of the digits at even places = 8 + 8 + 9 = 25

Difference = 25 – 14 = 11 which is divisible by 11

Hence, the correct options is (*b*).

Q25. Match column I with column II.

Column I	Column II
(*a*) A number divisible by 11	(*i*) 2
(*b*) HCF of two consecutive odd numbers	(*ii*) 4
(*c*) The difference between twin prime number	(*iii*) product of the number
(*d*) Number of factors of a prime number	(*iv*) 60
(*e*) Lowest composite number	(*v*) 2
(*f*) LCM of 12 and 5	(*vi*) 4587594
(*g*) The smallest prime number	(*vii*) 1
(*h*) Product of HCF and LCM is equal to	(*viii*) 2

Sol. (*a*) → (*vi*) (*b*) → (*vii*)

(*c*) → (*i*) (*d*) → (*i*)

(*e*) → (*ii*) (*f*) → (*iv*)

(*g*) → (*v*) (*h*) → (*iii*)

V. Higher Order Thinking Skills (HOTS) Questions

Q26. 111 cows, 185 sheep and 296 goats are to be taken across a river. There is only one boat and the boatsman says; he will take the same number and same kind of animals in each trip. Find the largest number of animals in each trip and the number of trips he will have to make.

Sol. We have

Number of cows = 111

Number of sheep = 185

Number of goats = 296

According to the condition of the boatsman, we need to find HCF of 111, 185 and 296

$111 = 3 \times 37$; $185 = 5 \times 37$;

$296 = 2 \times 2 \times 2 \times 37$

$\therefore$ the HCF = 37

So, the number of animals of same kind = 37.

Number of trips

$$= \frac{111}{37} + \frac{185}{37} + \frac{296}{37}$$

$$= 3 + 5 + 8 = 16$$

Hence, the number of animals in each trip = 37 and the number of trips = 16.

Q27. In a seminar, the number of participants in Mathematics, Physics and Chemistry are 60, 96 and 144 respectively. Find the number of rooms required if in each room, the same number of participants are to be seated and all of them are to be in the same subject.

Sol. The number of participants in each room must be the HCF of 60, 96 and 144.

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

$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$

$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$

HCF = $2 \times 2 \times 3 = 12$

Number of rooms required

$$= \frac{60}{12} + \frac{96}{12} + \frac{144}{12}$$

$$= 5 + 8 + 12 = 25$$

Hence, number of participants = 12 in each room and number of rooms required = 25.

Test Yourself

Very Short Answer (VSA) Questions

1. What are the first three composite numbers?
2. Write down all twin prime numbers between 80 and 100.
3. What is the HCF of two consecutive odd numbers?
4. What is the greatest three-digit number which is divisible by 3 and 11?
5. What are the HCF and LCM of two same number?
6. Simplify: $99 \div 9 - 4 + 2 \times 3$
7. Is there any prime number which is an even also?
8. Is there any greatest prime number?
9. Find all the factors of 204.
10. Write all the prime numbers between 60 and 80.

Short Answer (SA) Questions

11. What are the common multiples of 3 and 4 less than 60.
12. Express each of the following numbers as the sum of twin primes.
    (*a*) 36 (*b*) 84 (*c*) 120 (*d*) 144
13. Express each of the following numbers as the sum of odd primes.
    (*a*) 32 (*b*) 56 (*c*) 80 (*d*) 100
14. Check by divisibility test, whether 2317 is divisible by 9 or not.
15. The product of two numbers is 2100. If their HCF is 5, find their LCM.
16. The HCF and LCM of two numbers are 19 and 114 respectively. If one of the number is 38, find the other number.
17. Find the least number which when divided by 6, 15 and 18 leaves remainder 5 in each case.
18. Find the greatest number which divides 78 and 138 leaving 1 and 6 respectively as remainders.
19. Find the smallest 3-digit number which is exactly divisible by 4, 9 and 12.
20. Find the smallest number, which when increased by 15 is exactly divisible by 468 and 520.

Long Answer (LA) Questions

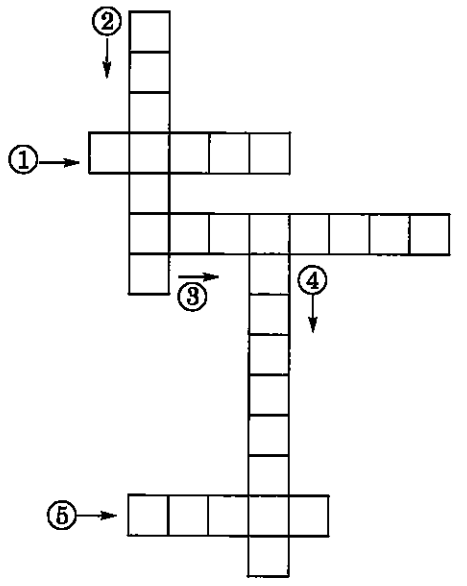
21. Simplify: $84 \div [60 - \{8 \times 7 - (17 - 5 \text{ of } 3)\}]$
22. Simplify: $70 \div \{10 + 15 \text{ of } 3 - (20 + 30 - 45 \div 5)\}$
23. Write seven consecutive composite numbers each less than 100, so that there is no prime number between them.
24. A rectangular courtyard, 20 m 64 cm long and 16 m 8 cm board is to be paved with square stones of the same size. Find the least possible number of such stones.
25. If three planets revolve round the Sun once in 200, 250 and 300 days respectively in their own orbits, when do they all come together again to their present places?
26. Fill in the blanks.
    (*a*) The LCM of two or more numbers is the ..... of their common multiples.
    (*b*) The difference between twin prime numbers is ..... .
    (*c*) The product of HCF and LCM of any two numbers is the ..... of the numbers.
    (*d*) The smallest composite number is .....

ANSWERS

1. 4, 6, 8
2. There are no twin prime number between 80 and 100.
3. 1
4. 990
5. Number itself.
6. 13
7. Yes, 2
8. No limit
9. 1, 2, 3, 4, 6, 17, 34, 51, 68, 102 and 204
10. 61, 67, 71, 73 and 79
11. 12, 24, 36, 48
12. (*a*) 17, 19 (*b*) 41, 43
    (*c*) 59, 61 (*d*) 71, 73
13. (*a*) 3 + 29 (*b*) 13 + 43
    (*c*) 7 + 73 (*d*) 11 + 89
14. not
15. 420
16. 57
17. 95
18. 11
19. 108
20. 4665
21. 14
22. 5
23. 90, 91, 92, 93, 94, 95, 96
24. 5762
25. 3000 days
26. (*a*) Product (*b*) 2
    (*c*) Product (*d*) 4.

Internal Assessment

1. Fill in the blanks.
   (*a*) Smallest prime number is ..... .
   (*b*) Smallest odd number is ..... .
   (*c*) Smallest even number is ..... .
   (*d*) Difference between twin prime numbers is ..... .
   (*e*) 6 and 7 are called ..... numbers.
   (*f*) HCF of 29 and 31 is ..... .
   (*g*) Multiples of 5 less than 20 are ..... .
   (*h*) Value of $60 \div 5 + 12 - 10 =$ ..... .
2. Which of the following numbers are prime?
   (*a*) 23 (*b*) 51
   (*c*) 37 (*d*) 26
3. Which of the following numbers are divisible by 7?
   (*a*) 121212 (*b*) 7120
   (*c*) 8123 (*d*) 7177
4. Two prime numbers whose difference is 2 are called
   (*a*) co-prime numbers
   (*b*) twin prime numbers
   (*c*) composite numbers
   (*d*) consecutive numbers.
5. Complete the following crossword puzzle:



1. A number which is not a ..... is called composite.
2. The numbers are said to be ..... numbers if their HCF is 1.
3. A number is said to be a ..... of any of its factor.
4. Pair of prime numbers differ by 2 are called ..... numbers.
5. 2 is the smallest ..... numbers.

ANSWERS

1. (*a*) 2 (*b*) 1 (*c*) 2
   (*d*) 2 (*e*) co-prime (*f*) 1
   (*g*) 10 and 15 (*h*) 14
2. (*a*) and (*c*) 3. (*a*) 4. (*b*)
5. 1. PRIME →
   2. CO-PRIME ↓
   3. MULTIPLE →
   4. TWIN PRIME ↓
   5. PRIME

Unit Assessment

SET-1

Time: 1 hour *M.M.: 20*

General Instructions

- *All questions are compulsory. However internal choice is given.*
- *Section A consists of 4 questions carrying 1 mark each.*
- *Section B consists of 8 questions carrying 2 marks each.*

SECTION–A

1. What is the successor of 399?
2. Write the place value and face value of 5 in 38503.
3. Write 98 in Roman numeral.
4. Show that 325 + 4964 = 4964 + 325

SECTION–B

5. Find the product 8 × 365 × 125 by suitable arrangement.
6. Evaluate: 92619 ÷ 123
7. Find the value of 4997 × 68 + 4997 × 44 – 4997 × 12
8. Find the HCF of 1045 and 1520 using division method.
9. Find the LCM of 15, 16 and 36.
10. Find the smallest 3-digit number which is exactly divisible by 6, 8 and 12.

OR

The product of two numbers is 864. If their LCM is 72, what is their HCF?

11. Add – 52 to the difference of – 13 and – 92.
12. Ramesh bought $2\frac{1}{4}$ kg of apples. He ate $\frac{3}{4}$ kg. How many kg of apples are left?

OR

If $\frac{1}{3}+\frac{1}{x}=3$, then find the value of x.

Unit Assessment

SET-2

Time: 1 hour *M.M.: 20*

General Instructions: *Same as paper–1*

SECTION–A

1. Reduce $\frac{160}{324}$ in the lowest form.
2. Write the following in increasing order $\frac{2}{6}, \frac{4}{6}, \frac{5}{6}, \frac{3}{6}$.
3. Find the difference between $\frac{5}{6}$ and $\frac{2}{12}$.
4. Add: $\frac{3}{7}$ and $\frac{3}{5}$.

SECTION–B

5. A car travelled 90 km to the north and then 52 km to the south. How far from the initial position was the car finally?
6. Find the LCM of 15, 20 and 30.
7. The LCM of two co-prime numbers is 221. If one of the number is 17, find the other number.
8. Three bells are ringing continuously at intervals of 30, 36 and 45 minutes respectively. At what time will they ring together again, if they ring simultaneously at 8 a.m.?
9. Observe the pattern and fill in the blanks:

$1 \times 1 = 1$

$11 \times 11 = 121$

$111 \times 111 = 12321$

$1111 \times 1111 =$ .....

$11111 \times 11111 =$ .....

10. Determine the product by suitable arrangement: $30921 \times 25 \times 40 \times 2$

OR

Find the value of the following using distributive property: $(6001 \times 172) - (6001 \times 72)$

11. Convert the following improper fraction into mixed fraction.

(*i*) $\frac{135}{14}$ (*ii*) $\frac{88}{17}$

12. On a particular day, A walked $2\frac{1}{2}$ km, B $2\frac{1}{7}$ km and C $1\frac{3}{5}$ km. Write the distance covered by them in descending order.