पु॰ना International School

Shree Swaminarayan Gurukul, Zundal

Grade –6
MATHS
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INDEX

Notes
CHAPTER – 3
Playing WITH NUMBERS

We have discussed multiples, divisors, factors and have seen how to identify factors and multiples.

- We have discussed and discovered the following:

  (a) A factor of a number is an exact divisor of that number.

  (b) Every number is a factor of itself. 1 is a factor of every number.

  (c) Every factor of a number is less than or equal to the given number.

  (d) Every number is a multiple of each of its factors.

  (e) Every multiple of a given number is greater than or equal to that number.

  (f) Every number is a multiple of itself.

- We have learnt that –

  (a) The number other than 1, with only factors namely 1 and the number itself, is **a prime number**. Numbers that have more than two factors are called composite numbers. **Number 1 is neither prime nor composite.**

  (b) The number **2 is the smallest prime number and is even**. Every prime number other than 2 is odd.

  (c) Two numbers with only 1 as a common factor are called **co-prime numbers**.

  (d) If a number is divisible by another number then it is divisible by each of the factors of that number.

  (e) A number divisible by two co-prime numbers is divisible by their product also.

- We have discussed how we can find just by looking at a number, whether it is divisible by small **numbers 2, 3, 4,5,8,9 and 11.** We have explored the relationship between digits of the numbers and their divisibility by different numbers.

(a) Divisibility by 2, 5 and 10 can be seen by just the last digit.

(b) Divisibility by 3 and 9 is checked by finding the sum of all digits.

(c) Divisibility by 4 and 8 is checked by the last 2 and 3 digits respectively.

(d) Divisibility of 11 is checked by comparing the sum of digits at odd and even places.

- We have discovered that if two numbers are divisible by a number then their sum and difference are also divisible by that number.

- We have learnt that –

  (a) The Highest Common Factor (HCF) of two or more given numbers is the highest of their common factors.

  (b) The Lowest Common Multiple (LCM) of two or more given numbers is the lowest of their common multiples.

EX : 3.1

1(1). Write all the factors of 24

Sol.

The given number is: 24
$1 \times 24 = 24$
$2 \times 12 = 24$
$3 \times 8 = 24$
$4 \times 6 = 24$
So, 1, 2, 3, 4, 6, 8, 12 and 24 are the factors of 24.

1(2). Write all the factors of 15

Sol.

$15 = 1 \times 15$
$15 = 3 \times 5$
Thus, all the factors of 15 are 1, 3, 5 and 15.

1(3). Write all the factors of 21

Sol.

$21 = 1 \times 21$
$21 = 3 \times 7$
Thus, all the factors of 21 are 1, 3, 7 and 21.

1(4). Write all the factors of 27

Sol.

$27 = 1 \times 27$
$27 = 3 \times 9$
Thus, all the factors of 27 are 1, 3, 9 and 27.

1(5). Write all the factors of 12

Sol.

$12 = 1 \times 12$
$12 = 2 \times 6$
$12 = 3 \times 4.$
Thus, all the factors of 12 are 1, 2, 3, 4, 6 and 12.

1(6). Write all the factors of 20

Sol.

20 = 1 × 20
20 = 2 × 10
20 = 4 × 5
Thus, all the factors of 20 are 1, 2, 4, 5, 10 and 20.

1(7). Write all the factors of 18

Sol.

18 = 1 × 18
18 = 2 × 9
18 = 3 × 6
Thus, all the factors of 18 are 1, 2, 3, 6, 9 and 18.

1(8). Write all the factors of 23

Sol.

23 = 1 × 23
As 23 is a prime number so its factors are 1 and 23 only.

1(9). Write all the factors of 36

Sol.

36 = 1 × 36
36 = 2 × 18
36 = 3 × 12
36 = 4 × 9
36 = 6 × 6
Thus, all the factors of 36 are 1, 2, 3, 4, 6, 9, 12, 18 and 36.

2(1). Write first five multiples of 5

Sol.

The first five multiplies of 5 can be obtained as follows;
1 × 5 = 5
2 × 5 = 10
3 ×5 = 15
4 × 5 = 20
5 × 5 = 25
So, the first five multiplies are 5, 10, 15, 20 and 25.

2(2). Write first five multiples of 8

Sol.

First five multiplies of 8 are obtained as follows;

1 × 8 = 8

2 × 8 = 16

3 × 8 = 24

4 × 8 = 32

5 × 8 = 40

So,

The first five multiplies of 8 are, 8, 16, 24, 32 and 40.

2(3). Write first five multiples of 9.

Sol.

First five multiplies of 9 are obtained as follows;

1 × 9 = 9

2 × 9 = 18

3 × 9 = 27

4 × 9 = 36

5 × 9 = 45

So,

First five multiplies 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
(vi) 490	(f) Factor of 20

Sol.

We can match the above as follows:

(i) - (b);

35 = 5 × 7

(ii) - (d);

30 = 15 × 2

(iii) - (a);

16 = 8 × 2

(iv) - (f);

20 = 20 × 1

(v) - (e)
50 = 25 × 2
(vi) - (c)
490 = 70 × 7

4. Find all the multiples of 9 upto 100.

Sol.
The multiples of 9 are
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
9 × 12 = 108
Since 108 is greater than 100 therefore all the multiples of 9 upto 100 are 9, 18, 27, 36, 45, 54, 63, 72, 81, 90 and 99.

EX : 3.2

1(1). What is the sum of any two odd numbers?

Sol.
The sum of two odd numbers is even.
Example: 3 + 5 = 8

1(2). What is the sum of any two even numbers?

Sol.
The sum of two even numbers is even.

2(1). The sum of three odd numbers is even.
1) True
2) False

Sol. 2) False

False

2(2). The sum of two odd numbers and one even number is even.
1) True
2) False

Sol. 1) True

True

2(3). The product of three odd numbers is odd.
1) True
2) False

Sol. 1) True

True

2(4). If an even number is divided by 2, the quotient is always odd.
1) True
2) False

Sol. 2) False

False

2(5). All prime numbers are odd.
1) True
2) False

Sol. 2) False

False

2(6). Prime numbers do not have any factors.
1) True
2) False

Sol. 2) False

False

2(7). Sum of two prime numbers is always even.
1) True
2) False

Sol. 2) False

False

2(8). 2 is the only even prime number.
1) True
2) False

Sol. 1) True

True

2(9). All even numbers are composite numbers.
1) True
2) False

Sol. 2) False

False

2(10). The product of two even numbers is always even.
1) True
2) False

Sol. 1) True

True

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.

Sol.
All other such pairs of prime numbers 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.

Sol.
Prime no. = 2, 3, 5, 7, 11, 13, 17, 19
Composite no. = 4,6,8,9,10,12,14,15,16,18

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

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

6(1). Express the sum of two odd primes of 44.

Sol.
The given number can be expressed as 44 = 39 + 5

6(2). Express the sum of two odd primes of 36.

Sol.
The given number can be written as the sum of two odd primes as: 36 = 29 + 7

6(3). Express 24 as the sum of two odd primes.

Sol.
The number can be expressed as: 24 = 17 + 7

6(4). Express the sum of two odd primes of 18

Sol.
The number can be expressed as: 18 = 13 + 5

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

Sol.
The three pairs of prime numbers, whose difference is 2, are as follows:
3, 5; 5, 7; 11, 13.

8(1). Is 23 a prime number or not?

Sol.
Here,
23 = 1 ×× 23
23 = 23 ×× 1
Prime numbers are the numbers that can be divided only by 1 and by number itself.
Since, 23 has only two factors 1 and 23.
Therefore, It is a prime number.

8(2). Is 51 a prime number or not?

Sol.
Here,
51 = 1 ×× 51
51 = 3 ×× 17
51 = 17 ×× 3
51 = 51 ×× 1
Since 51 has four factors 1, 3, 17, and 51. Therefore it is a composite number and not a prime number.

8(3). Is 37 a prime or not.

Sol.
Here,
37 = 1 ×× 37
Prime numbers are the numbers that can be divided by 1 and by the number itself.
Here, 37 has only two factors 1 and 37. So, it is a prime number.

8(4). Is 26 a prime or not.

Sol.
Here,
26 = 1 ×× 26
26 = 13 ×× 2
26 = 2 ×× 13
26 = 26 ×× 1
Clearly, 26 has four factors 1, 2, 13, and 26. So, it's not a prime number and hence it is a composite number.

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

Sol.
Seven consecutive composite numbers less than 100 are
90, 91, 92, 93, 94, 95, 96

10(1). Express 21 as the sum of three odd prime.

Sol.
21 can be written as,
21 = 5 + 5 + 11
where, 5 and 11 are prime numbers.

10(2). Express 31 as the sum of three odd prime.

Sol.
Here,
31 = 5 + 7 + 19
Where, 3, 7, and 19 are prime numbers.

10(3). Express 53 as the sum of three odd prime.

Sol.
Here,
53 = 5 + 17 + 31
Where, 5, 17, and 31 are prime numbers.

10(4). Express 61 as the sum of three odd prime.

Sol.
Here,
61 = 13 + 17 + 31
Where, 13, 17, and 31 are prime numbers.

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

Sol.
2, 3 ; 3, 7 ; 2, 13 ; 3, 17; 7, 13.

12(1). A number having only two factors is called a ________.

Sol 1.
Prime number

12(2). A number which has more than two factors is called a ________.

Sol 1.
Composite number

12(3). 1 is neither ________ nor ________.

Sol 1.
Prime, Composite

12(4). The smallest prime number is ________.

Sol 1.
2

12(5). The smallest composite number is _______.

Sol 1.
4

12(6). The smallest even number is ________.

Sol 1.
2

EX ; 3.3

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):

Number	Divisible by 2								
	2	3	4	5	6	8	9	10	11
128									
990									
1586									
275									
6686									
639210									
429714									
2856									
3060									
406839									

Sol.

Here, we have to divide the given set of numbers by the other set of given numbers to see whether each one of them is divisible or not.

To check this, we follow the divisibility rules as given below:

i. For divisible by 2: Any number that has 0,2,4,6 or 8 in its one's place is divisible by 2.
ii. For divisible by 3: If the sum of all the digits of the number is multiple of 3, then it is divisible by 3.
iii. For divisible by 4: Any number whose last two digits (i.e. one's and ten's place digits) are divisible by 4 then, the number is divisible by 4.
iv. For divisible by 5: Any number that has 0 or 5 in its one's place is divisible by 5.
v. For divisible by 6: If a number a divisible by both 2 and 3, then it is divisible by 6.
vi. For divisible by 8: Any number whose last three digits are divisible by 8 then, the number is divisible by 8.
vii. For divisible by 9: If the sum of all the digits of the number is multiple of 9, then it is divisible by 9.
viii. For divisible by 10: Any number that has 0 in its one's place is divisible by 10.

So, after following these rules, we can see the results as are given below:

Number	Divisible by								
	2	3	4	5	6	8	9	10	11
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
6689	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(1). Using divisibility tests, determine if the number 572 is divisible by

a. 4
b. 8

Sol.
572

i. Divisibility by 4.
The number formed by last two digits = 72

```
4)72(18
  4
  32
  32
   0
```

∵ Remainder is 0.
∴ 72 is divisible by 4.
∴ 572 is divisible by 4 because a no. is divisible by 4 if the no. formed by its last two digits (i.e ones and tens) is divisible by 4.

ii. Divisibility by 8.
The number is 572

```
8)572(71
  56
  12
   8
   4
```

∵ Remainder is not 0.
∴ 572 is not divisible by 8.

2(2). Using divisibility tests, determine if the number 726352 is divisible by

a. 4
b. 8

Sol.

a. Divisibility by 4
The number formed by last two digits = 52

```
4)52(13
  4
  12
  12
  0
```

∵ Remainder is 0

∴ 52 is divisible by 4

∴726352 is divisible by 4 because a no. is divisible by 4 if the no. formed by its last two digits i.e (ones and tens) is divisible by 4

b. Divisibility by 8.

The number formed by last three digits = 352

```
8)352(44
  32
   32
   32
    0
```

∵ Remainder is 0

∴ 352 is divisible by 8.

∴ 726352 is divisible by 8 because a no. with four or more digits is divisible by 8 if the no. formed by its last three digits is divisible by 8.

2(3). Using divisibility tests, determine if the number 5500 is divisible by

a. 4
b. 8

Sol.

i. Divisibility by 4.

The number formed by last two digits = 00, which is divisible by 4.

∴5500 is divisible by 4 because a no. is divisible by 4 if, no. formed by its last two digits(i.e ones and tens) is divisible by 4.

ii. Divisible by 8.

The number formed by last three digits = 500.

```
8)500(62
  48
   20
   16
    4
```

∵ Remainder is not 0

∴ 500 is not divisible by

∴5500 is not divisible by 8 because a no. is divisible by 8 if , the no.formed by its last three digits is divisible by 8.

2(4). Using divisibility tests, determine if the number 6000 is divisible by

a. 4
b. 8

Sol.
(i) Divisibility by 4.
The number formed by last two digits = 00,
which is divisible by 4
∴ 6000 is divisible by 4 because a no. is divisible by 4 if the no. formed by its last two digits (i.e ones and tens) is divisible by 4.
(ii) Divisibility by 8.
The number formed by last three digits = 000,
which is divisible by 8.
∴ 6000 is divisible by 8 because a no. is divisible by 8 if the no. formed by its last three digits is divisible by 8.

2(5). Using divisibility tests, determine if the number 12159 is divisible by

a. 4
b. 8

Sol.

i. Divisibility by 4
The number formed by last two digit = 59
```
4)59(14
  4
  --
  19
  16
  --
   3
```
∵∵ Remainder is not 0
∴∴ 59 is not divisible by 4.
∴∴ 12159 is not divisible by 4 because a no. is divisible by 4 only if its last two digits are divisible by 4.

ii. Divisible by 8
The number formed by last three digits = 159.
```
8)159(19
   8
  --
   79
   72
  --
    7
```
∵∵ Remainder is not 0

∴∴ 159 is not divisible by 8.

∴∴ 12159 is not divisible by 8 because a no. is divisible by 8 only if its last three digits are divisible by 8.

2(6). Using divisibility tests, determine if the no.14560 is divisible by

a. 4
b. 8

Sol.

i. Divisibility by 4.

The number formed by last two digits = 60.

```
4)60(15
  4
 ---
  20
  20
 ---
   0
```

∵∵ Remainder is 0.

∴∴ 60 is divisible by 4.

∴∴ 14560 is divisible by 4 because a no. is divisible by 4 only if the no. formed by its last two digits (i.e ones and tens) is divisible by 4.

ii. Divisibility by 8.

The number formed by last three digits = 560

```
8)560(70
  56
 ---
   0
   0
 ---
   0
```

∵∵ Remainder is 0.

∴∴ 560 is divisible by 8.

∴∴ 14560 is divisible by 8 because a no. is divisible by 8 if the no. formed by its last three digits is divisible by 8.

2(7). Using divisibility tests, determine if the number 21084 is divisible by

a. 4
b. 8

Sol.

i. Divisibility by 4

The number formed by last two digits = 84

```
4)84(21
  8
  --
   4
   4
  --
   0
```

84 is divisible by 4

So 21084 is also divisible by 4 because a no. is divisible by 4 if the no. formed by its last two digits (i.e ones and tens) is divisible by 4.

ii. Divisibility by 8

The number formed by last three digits = 084 = 84

```
8)84(10
  8
  --
   4
   0
  --
   4
```

∵∵ Remainder is not 0.

∴∴ 84 is not divisible by 8.

∴∴ 21084 is not divisible by 8 because a no. is divisible by 8 only if the no. formed by its last three digits is divisible by 8.

2(8). Using divisibility tests, determine if the number 31795072 is divisible by

a. 4
b. 8

Sol.

i. Divisibility by 4.

The number formed by last two digits = 72

```
4)72(18
  4
  --
  32
  32
  --
   0
```

∵∵ Remainder is 0.

∴∴ 72 is divisible by 4.

∴∴ 31795072 is divisible by 4 because a no. is divisible by 4 if the no. formed by its last two digits is divisible by 4.

ii. Divisibility by 8.

The number formed by last three digits = 072 = 72

8)72(9
 72
 0

∵∵ Remainder is 0.
∴∴ 72 is divisible by 8.
∴∴ 31795072 is divisible by 8 because a no. is divisible by 8 if no. formed by its last three digits is divisible by 8.

2(9). Using divisibility tests, determine if the number 1700 is divisible by

a. 5
b. 10

Sol.

i. Divisibility by 5.
The last digit = 0
∴∴ 1700 is divisible by 5 because a no. is divisible by 5 if it has 0 or 5 in its ones place.

ii. Divisibility by 10.
The last digit = 0
∴∴1700 is divisible by 10 because a no. is divisible by 10 if it has 0 in the ones place.

2(10). Using divisibility tests, determine if the number 2150 is divisible by

a. 4
b. 8

Sol.

i. Divisibility by 4.
The number formed by last two digits = 50
4)50(12
 4
 10
 8
 2
∵∵ Remainder is not 0.
∴∴ 50 is not divisible by 4.
∴∴ 2150 is not divisible by 4 because a no. is divisible by 4 only if the no. formed by its last two digits (i.e ones and tens) is divisible by 4.

ii. Divisibility by 8.
The number formed by last three digits = 150

```
8)150(18
  8
  ---
   70
   64
   ---
    6
```

∵∵ Remainder is not 0.
∴∴ 150 is not divisible by 8.
∴∴ 2150 is not divisible by 8 because a no. is divisible by 8 only if the no. formed by its last three digits is divisible by 8.

3(1). Using divisibility tests, determine if number 297144 is divisible by 6.

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

i. Divisibility by 2.
∵∵ Unit's digit = 4
∴∴ 297144 is divisible by 2.

ii. Divisibility by 3.
Sum of the digits = 2 + 9 + 7 + 1 + 4 + 4 = 27,
which is divisible by 3.
∴∴ 297144 is divisible by 3.
Since, 297144 is divisible by 2 and 3 both, so it is divisible by 6.

3(2). Using divisibility test, determine if number 1258 is divisible by 6

Sol.
A number is divisible by 6, if it is divisible by 2 and 3 both.

i. Divisibility by 2.
∵∵ Unit's digit = 8.
∴∴ 1258 is divisible by 2.

ii. Divisibility by 3.
Sum of the digits = 1 + 2 + 5 + 8 = 16,
which is not divisible by 3.
Since, 1258 is divisible by 2 but not by 3, so 1258 is not divisible by 6.

3(3). Using divisibility test, determine if number 4335 is divisible by 6.

Sol.
A number is divisible by 6, if it is divisible by 2 & 3 both.

i. Divisibility by 2
∵∵ Unit's digit = 5, which is not any of the digits from 0, 2, 4, 6 or 8.
∴∴ 4335 is not divisible by 2.

ii. Divisibility by 3
Sum of the digits 4 + 3 + 3 + 5 = 15 which is divisible by 3.
So 4335 is also divisible by 3.
∴∴ 4335 is not divisible by 6 because it is divisible by 3 but not by 2.

3(4). Using divisibility tests, determine if number 61233 is divisible by 6.

Sol.
A number is divisible by 6, if it is divisible by 2&3 both.
Divisibility by 2
∵∵Unit's digit = 3, which is not any of the digits from 0, 2, 4, 6 or 8.
∴∴ 61233 is not divisible by 2.
∴∴61233 is not divisible by 6 because a no . is divisible by 6 only if it is divisible by 2 and 3 both.

3(5). Using divisibility test, determine if number 901352 is divisible by 6.

Sol.

i. Divisibility by 2.
∵∵ Unit's digit = 2
∴∴ 901352 is divisibility by 2.

ii. Divisibility by 3.
Sum of the digits = 9 + 0 + 1 + 3 + 5 + 2 = 20.
which is not divisible by 3.
∴∴ 901352 is not divisible by 3.
Since, 901352 is divisible by 2 but not by 3, so it is not divisible by 6.

3(6). Using divisibility tests, determine if number 438750 is divisible by 6.

Sol.
A number is divisible by 6, if it is divisible by 2&3 both.

i. Divisibility by 2.
∵∵ Unit's digit = 0
∴∴ 438750 is divisible by 2.

ii. Divisibility by 3.
Sum of the digits = 4 + 3 + 8 + 7 + 5 + 0 = 27,
which is divisible by 3
∴∴ 438750 is divisible by 3
Since, 438750 is divisible by 2 and 3 both, so it is divisible by 6.

3(7). Using divisibility tests, determine if 1790184 is divisible by 6.

Sol.
A number is divisible by 6, if it is divisible by 2&3 both.

i. Divisibility by 2
∵∵ Unit's digit = 4
∴∴ 1790184 is divisible by 2.

ii. Divisibility by 3
Sum of the digits = 1 + 7 + 9 + 0 + 1 + 8 + 4 = 30,
which is divisible by 3
∴∴ 1790184 is divisible by 3
Since, 1790184 is divisible by 2 and 3 both, so it is divisible by 6.

3(8). Using divisibility test, determine if 12583 is divisible by 6.

Sol.
A number is divisible by 6, if it is divisible by 2&3 both

i. Divisibility by 2
∵∵ Unit's digit = 3, which is not from the digits 0, 2, 4, 6 or 8.
∴∴ 12583 is not divisible by 2.
∴∴12583 is not divisible by 6.

3(9). Using divisibility tests, determine if 639210 is divisible by 6.

Sol.
A number is divisible by 6 if it is divisible by 2 & 3 both.

i. Divisible by 2
∵∵ Unit's digit = 0
∴∴ 639210 is divisible by 2.

ii. Divisibility by 3
Sum of the digit = 6 + 3 + 9 + 2 + 1 + 0 = 21,
which is divisible by 3
∴∴ 639210 is divisible by 3
Since, 639210 is divisible by 2 and 3 both, so it is divisible by 6.

3(10). Using divisibility tests, determine 17852 is divisible by 6.

Sol.
Sum of digits = 1+7+8+5+2=23
Which is not a multiple of 3.
Therefore, 17852 is not divisible by 3.
Hence, it is not divisible by 6.

4(1). Using divisibility tests, determine if 5445 is divisible by 11.

Sol.
Sum of the digits (at odd places) from the right = 5 + 4 = 9
Sum of the digits (at even places) from the right = 4 + 5 = 9
Difference of these sums = 9 – 9 = 0
∴∴ 5445 is divisible by 11 because a no. is divisible by 11 if difference of sums of digits at odd places and even places (from right) is either 0 or divisible by 11

4(2). Using divisibility test, determine if 10824 is divisible by 11.

Sol.
Sum of the digits (at odd places) from the right = 4 + 8 + 1 = 13
Sum of the digits (at even places) from the right = 2 + 0 = 2.
Difference of these sums = 13 – 2 = 11
∵∵11 is divisible by 11
∴∴ 10824 is divisible by 11 because a no. is divisible by 11 if difference of the sum of the digits at odd places and even places from the right is either 0 or divisible by 11.

4(3). Using divisibility test, determine if 7138965 is divisible by 11.

Sol.
Sum of the digits (at odd places) from the right = 5 + 9 + 3 + 7 = 24
Sum of the digits (at even places) from the right = 6 + 8 + 1 = 15
Difference of these sums = 24 – 15 = 9
∵∵ 9 is not divisible by 11
∴∴ 7138965 is not divisible by 11 because a no. is divisible by 11 if difference of the sum of digits at odd places and even places from the right is either 0 or divisible by 11.

4(4). Using divisibility tests, determine if 70169308 is divisible by 11.

Sol.
Sum of the digits (at odd places) from the right = 8 + 3 + 6 + 0 = 17
Sum of the digits (at even places) from the right = 0 + 9 + 1 + 7 = 17
Difference of these sums = 17 – 17 = 0

∴∴ 70169308 is divisible by 11 because a no. is divisible by 11 if difference of the sum of the digits at odd places and even places from the right is either 0 or divisible by 11

4(5). Using divisibility test, determine if 10000001 is divisible by 11.

Sol.
Sum of the digits (at odd places) from the right = 1 + 0 + 0 + 0 = 1
Sum of the digits (at even places) from the right = 0 + 0 + 0 + 1 = 1
Difference of these sums = 1 – 1 = 0
∵∵ 0 is divisible by 11.
∴∴ 10000001 is divisible by 11 because a no. is divisible by 11 if difference of the sum of the digits at the odd places and even places from the right is 0 or divisible by 11.

4(6). Using divisibility test, determine if 901153 is divisible by 11.

Sol.
Sum of the digits (at odd places) from the right = 3 + 1 + 0 = 4
Sum of the digits (at even places) from the right = 5 + 1 + 9 = 15
Difference of these sums = 15 – 4 = 11
∵∵ 11 is divisible by 11.
∴∴ 901153 is divisible by 11 because a no. is divisible by 11 if difference of the sum of digits at odd places and even places from the right is either 0 or divisible by 11.

5(1). Write the smallest digit and the largest digit in the blank space of number so that the number is divisible by 3 :__6724

Sol.

i. Smallest digit
Sum of the given digits = 6 + 7 + 2 + 4 = 19
∵∵ 19 is not divisible by 3. The no. after 19 which is divisible by 3 is 21. So we will add 2 to make it divisible by 3.
∴∴ Smallest digit (non-zero) is 2.
ii. Largest digit
Sum of the given digits is 19. Largest no. which we can add is 9, so 19+9=28 which is not divisible by 3 hence 8 should be added because 19+8=27 which is divisible by 3.
The largest digit is 8.

5(2). Write the smallest digit and the largest digit in the blank space of number so that the number is divisible by 3 : 4765__2.

Sol.

1. Smallest digit
   Sum of the given digits = 4 + 7 + 6 + 5 + 2 = 24
   ∵∵ 24 is divisible by 3
   ∴∴ Smallest digit is 0.
2. Largest digit
   The largest digit is 9 because 24 + 9 = 33 which is divisible by 3.

6(1). Write digit in the blank space of the number so that the number is divisible by 11 : 92__389

Sol.
92__389
Sum of the given digits (at odd places) from the right = 9 + 3 + 2 = 14
Sum of the given digits (at even places) from the right = 8 + required digit + 9 = required digit + 17
Difference of these sums = required digit + 3
For the above difference to be divisible by 11, required digit = 8
because 8+3=11 which is divisible by 11
Hence, the required number is 928389.

6(2). Write digit in the blank space of number so that the number is divisible by 11 : 8__9484

Sol.
Sum of the given digits (at odd places) from the right = 4 + 4 + required digit = 8 + required digit.
Sum of the given digits (at even places) from the right = 8 + 9 + 8 = 25
Difference of the sums =25 - (8 +required digit)
=17 - required digit
For the above difference to be divisible by 11, required digit = 6 because 17 - 6 = 11, which is divisible by 11.
Hence, the required number is 869484.

EX : 3.4

1(1). Find the common factors of 20 and 28

Sol.
20 and 28
1 × 20 = 20 ; 2 × 10 = 20 ; 4 × 5 = 20.
Therefore Factors of 20 are 1, 2, 4, 5, 10 and 20.
1 × 28 = 28 ; 2 × 14 = 28 ; 7 × 4 = 28.
Therefore Factors of 28 are 1, 2, 4, 7, 14 and 28.
Hence, the common factors of 20 and 28 are 1, 2 and 4.

1(2). Find the common factors of 15 and 25

Sol.
1 × 15 = 15; 3 × 5 = 15.
Therefore Factors of 15 are 1, 3, 5 and 15.
1 × 25 = 25; 5 × 5 = 25.
Therefore Factors of 25 are 1, 5 and 25.
Hence, the common factors of 15 and 25 are 1 and 5.

1(3). Find the common factors of 35 and 50

Sol.
1 × 35 = 35 ; 5 × 7 = 35 .
Therefore Factors of 35 are 1, 5, 7 and 35.
1 × 50 = 50 ; 2 × 25 = 50 ; 5 × 10 = 50
Therefore Factors of 50 are 1, 5, 10, 25 and 50.
Hence, the common factors of 35 and 50 are 1 and 5.

1(4). Find the common factors of 56 and 120

Sol.
1 × 56 = 56 ; 2 × 28 = 56 ; 4 × 14 = 56 ; 7 × 8 = 56
Therefore Factors of 56 are 1, 2, 4, 7, 8, 14, 28 and 56.
1 × 120 = 120 ; 2 × 60 = 120 ; 3 × 40 = 120 ; 4 × 30 = 120 ; 5 × 24 = 120 ; 6 × 20 = 120 ; 8 × 15 = 120 ;
10 ×× 12 = 120.
Therefore Factors of 120 are 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60 and 120.
Hence, the common factors of 56 and 120 are 1, 2, 4 and 8.

2(1). Find the common factors of 4, 8 and 12

Sol.
1 × 4 = 4 ; 2 × 2=4
Factors of 4 are 1, 2 and 4.
1 ×8 = 8 ; 2 × 4 = 8
Factors of 8 are 1, 2, 4 and 8.
1 × 12 = 12 ; 2 × 6 = 12 ; 3 × 4 = 12
Factors of 12 are 1, 2, 3, 4, 6 and 12.
Hence, the common factors of 4, 8 and 12 are 1, 2 and 4.

2(2). Find the common factors of 5, 15 and 25

Sol.
1 × 5 = 5
Factors of 5 are 1 and 5.
1 × 15 = 15 ; 3 × 5 = 15
Factors of 15 are 1, 3 and 5.
1 × 25 = 25 ; 5 × 5 = 25
Factors of 25 are 1, 5 and 25.
Hence, the common factors of 5, 15 and 25 are 1 and 5.

3(1). Find first three common multiples of 6 and 8.

Sol.
6 and 8
Multiples of 6 are 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, ...
Multiple of 8 are 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, ...
∴ Common multiples of 6 and 8 are 24, 48, 72, 96, ...
∴ First three common multiples of 6 and 8 are 24, 48 and 72.

3(2). Find first three common multiples of 12 and 18

Sol.
Multiples of 12 are 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144, ...
Multiples of 18 are 18, 36, 54, 72, 90, 108, 126, 144, ...
∴ Common multiples of 12 and 18 are 36, 72, 108, 144, ...
∴ First three common multiples of 12 and 18 are 36, 72 and 108.

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

Sol.
Multiples of 3 are 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99, 102, 105, 108, ...
Multiples of 4 are 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100,

104, 108, ...
∴ Common multiples of 3 and 4 are 12, 24, 36, 48, 60, 72, 84, 96, 108, ...
∴ All the numbers less than 100 which are common multiples of 3 and 4 are 12, 24, 36, 48, 60, 72, 84 and 96.

5(1). Find if the numbers 18 and 35 are co-primes or not.

Sol.
$1 \times 18=18$; $2\times 9=18$; $3 \times 6= 18$
Factors of 18 are 1, 2, 3, 6, 9 and 18.
$1 \times 35=35$; $5 \times 7= 35$
Factors of 35 are 1, 5, 7 and 35.
∴∴ Common factor of 18 and 35 is 1.
∵∵ 18 and 35 have only 1 as the common factor.
∴∴ 18 and 35 are co-prime numbers.

5(2). Find if the numbers 15 and 37 are co-primes or not.

Sol.
$1 \times 15=15$; $3 \times 5=15$
Factors of 15 are 1, 3, 5 and 15.
$1 \times 37=37$
Factors of 37 are 1 and 37.
∴ Common factor of 15 and 37 is 1.
∵ 15 and 37 have only 1 as the common factor.
∴ 15 and 37 are co-prime numbers.

5(3). Find if the numbers 30 and 415 are co-primes or not.

Sol.
$1 \times 30=30$; $2 \times 15=30$; $3 \times 10=30$; $5 \times 6=30$
Factors of 30 are 1, 2, 3, 5, 6, 10, 15 and 30.
$1 \times 415= 415$; $5 \times 83 = 415$
Factors of 415 are 1, 5, 83 and 415.
∴ Common factors of 30 and 415 are 1 and 5.
∵ 30 and 415 have two common factors.
∴ 30 and 45 are not co-prime numbers.

5(4). Find if the numbers 17 and 68 are co-prime or not.

Sol.
17 and 68 :
$1 \times 17=17$
Factors of 17 are 1 and 17.

1 × 68 = 68 ; 2 × 34= 68 ; 4 × 17= 68
Factors of 68 are 1, 2, 4, 17, 34 and 68.
∴ Common factors of 17 and 68 are 1 and 17.
∵ 17 and 68 have two common factors.
∴ 17 and 68 are not co-prime numbers.

5(5). Find if the numbers 216 and 215 are co-prime or not.

Sol.
216 and 215
Factors of 216 are 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 27, 36, 54, 72, 108 and 216.
Factors of 215 are 1,5 and 43
∴ Common factors of 216 and 215 is 1.
∵ 216 and 215 have only 1 as the common factor.
∴ 216 and 215 are co-prime numbers.

5(6). Find if the numbers 81 and 16 are co-prime or not.

Sol.
81 and 16
Factors of 81 are 1, 3, 9, 27 and 81
Factors of 16 are 1, 2, 4, 8 and 16.
∴ Common factor of 81 and 16 is 1.
∵ 81 and 16 have only 1 as the common factor.
∴ 81 and 16 are co-prime numbers.

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

Sol.
The number will always be divisible by 5 × 12 = 60.

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

Sol.
Factors of 12 are 1, 2, 3, 4, 6 and 12.
Therefore the number will be divisible by 1, 2, 3, 4 and 6.

EX : 3.5

1(1). If a number is divisible by 3, it must be divisible by 9.

1) True
2) False

Sol. 2) False

False.
As -6 is divisible by 3, but it is not divisible by 9.

1(2). If a number is divisible by 9, it must be divisible by 3.

1) True
2) False

Sol. 1) True

True.
18, is divisible by 3 as well as 9. So, yes, If a number is divisible by 9, it must be divisible by 3.

1(3). A number is divisible by 18, if it is divisible by both 3 and 6.

1) True
2) False

Sol. 2) False

False

1(4). If a number is divisible by 9 and 10 both, then it must be divisible by 90.

1) True
2) False

Sol. 1) True

True

1(5). If two numbers are co-primes, at least one of them must be prime.

1) True
2) False

Sol. 2) False

False

1(6). All numbers which are divisible by 4 must also be divisible by 8.
1) True
2) False

Sol. 2) False

False

1(7). All numbers which are divisible by 8 must also be divisible by 4.
1) True
2) False

Sol. 1) True

True

1(8). If a number exactly divides two numbers separately, it must exactly divide their sum.
1) True
2) False

Sol. 1) True

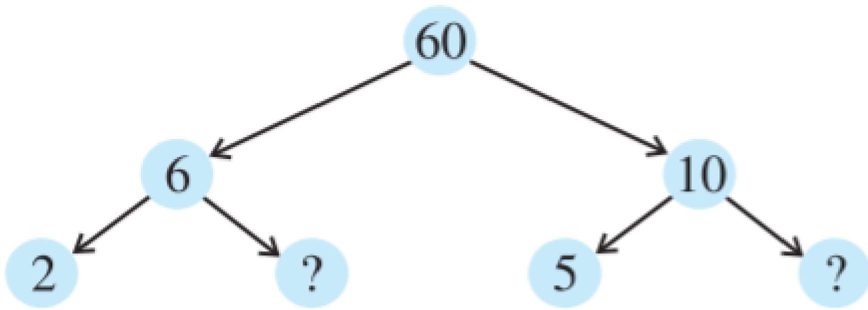
True

1(9). If a number exactly divides the sum of two numbers, it must exactly divide the two numbers separately.
1) True
2) False

Sol. 2) False

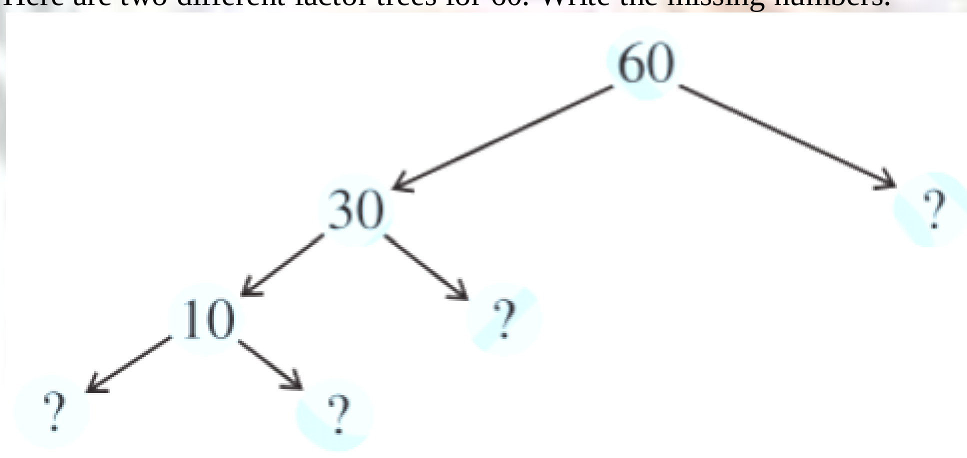
False

2(1). Here are two different factor trees for 60. Write the missing numbers.



Sol.
Lets 'a' be the missing number in the given pattern
So, we have
$2 \times a = 6$
$\Rightarrow a = 6262 = 3$
$\Rightarrow a = 3$
So, 2 ×× 3 = 6 And 5 ×× a = 10
$\Rightarrow a = 105105 = 2$
⇒5 ×× 2 = 10
Missing numbers are 3 and 2.

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



Sol.
As we know that $60 = 30 \times 2$
$30 = 10 \times 3$
$10 = 5 \times 2$
So, the Missing numbers are: 2, 5, 3 and 2.

3. 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.

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

Sol.
The greatest four-digit number is 9999.

3	9999
3	3333
11	1111
101	101
	1

∴ 9999 = 3 ×× 3 ×× 11 ×× 101

5. Write the smallest 5-digit number and express it into the forms of prime factors.

Sol.
The smallest five-digit number is 10000.

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

∴ 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.

Sol.

7	1729
13	247
19	19
	1

∴ 1729 = 7 ×× 13 ×× 19.
All the prime factors of 1729 are 7, 13 and 19.
When arranged in ascending order,
these are: 7, 13, 19.
We observe that 13 - 7 = 6
19 - 13 = 6
The difference of 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.

Sol.
Let the three consecutive numbers be n, (n + 1), (n + 2). The product of these numbers be n(n + 1)(n + 2). We know that the product of three consecutive numbers is always divisible by 3. Out of the three consecutive numbers, one will be even. Which means the product is also divisible by 2.
Hence the product of three consecutive numbers is divisible by 3 and 2. Therefore the product of three consecutive numbers is also divisible by 6.
Ex.1: Take three consecutive number 21, 22 and 23.
21 is divisible by 3.
22 is divisible by 2.
∴ 21 ×× 22 is divisible by 3 ×× 2 (= 6)
∴ 21 ×× 22 ×× 23 is divisible by 6.
Ex.2: Take three consecutive numbers 47, 48 and 49.
48 is divisible by 2 and 3 both.
∴ 48 is divisible by 2 ×× 3 = 6
∴ 47 ×× 48 ×× 49 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.

Sol.
Ex.1 : Take two consecutive odd numbers 5 and 7.
Sum of these numbers = 5 + 7 = 12
12 is divisible by 4.
Ex.2 : 13 and 15.
Sum of 13 and 15 = 13 + 15 = 28
28 is divisible by 4.
So sum of two consecutive odd numbers is divisible by 4

9(1). In the given expressions, prime factorisation has been done or not? 24 = 2 ×× 3 ×× 4

Sol.
Given that, 24 = 2 × 3 × 4
As we can see in this factorization 4 is a composite number, which can be further factorized, so prime factorization has not been done.

9(2). In the given expression, prime factorisation has been done or not? 56 = 7 × 2 × 2 × 2

Sol.
Given: 56 = 7 × 2 × 2 × 2
Since all the factors are prime, so, prime factorization has been done.

9(3). In the given expression, prime factorisation has been done or not? $70 = 2 \times 5 \times 7$

Sol.
Given: $70 = 2 \times 5 \times 7$
Since all the factors are prime numbers, so, prime factorization has been done.

9(4). In the given expression, prime factorisation has been done or not? $54 = 2 \times 3 \times 9$

Sol.
Given: $54 = 2 \times 3 \times 9$
As we can see in this factorization 9 is a composite number, and it can be further factorized, so prime factorization 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]

Sol.
Divisibility of 25110 by 5.
∵ Number in the unit's place of 25110 = 0

∴ 25110 is divisible by 5.
Divisibility of 25110 by 9.
Sum of the digits of the number 25110.
$= 2 + 5 + 1 + 1 + 0 = 9$.
∵∵9 is divisible by 9.
∴∴ 25110 is divisible by 9.
As 25110 is divisible by 5 and 9 both and 5 and 9 are co-prime numbers, so 25110 is divisible by $5 \times 9 = 45$.

11. 18 is divisible by both 2 and 3. It is also divisible by $2 \times 3 = 6$. Similarly, a number is divisible by both 4 and 6. Can we say that the number must also be divided by $4 \times 6 = 24$? If not, give an example to justify your answer.

Sol.
No, we cannot say that the number will be divisible by $4 \times 6 = 24$, if it is divisible by both 4 and 6 because 4 and 6 are not co-prime numbers (they have two common factors 1 and 2)
Ex. 36 is divisible by both 4 and 6.
But, 36 is not divisible by 24.

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

Sol.
Let us take the smallest four different prime numbers i.e 2, 3, 5 and 7.
∴ The smallest number, having four different prime factors is $2 \times 3 \times 5 \times 7 = 210$

EX : 3.6

1(1). Find the H.C.F of numbers:18, 48

Sol.
18, 48
Factors of 18 are 1, 2, 3, 6, 9 and 18.
Factors of 48 are 1, 2, 3, 4, 6, 8, 12, 16, 24 and 48.
∴ Common factors of 18 and 48 are 1, 2, 3 and 6.
Highest of these common factors is 6.
∴ H.C.F. of 18 and 48 is 6.

1(2). Find the H.C.F of the numbers: 30, 42

Sol.
30, 42
Factors of 30 are 1, 2, 3, 5, 6, 10, 15 and 30.
Factors of 42 are 1, 2, 3, 6, 7, 14, 21 and 42.
∴ Common factors of 30 and 42 are 1, 2, 3 and 6.
Highest of these common factors is 6.
∴ H.C.F. of 30 and 42 is 6.

1(3). Find the H.C.F of the numbers: 18, 60

Sol.
Factors of 18 are 1, 2, 3, 6, 9 and 18.
Factors of 60 are 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60.
∴ Common factors of 18 and 60 are 1, 2, 3 and 6.
Highest of these common factors is 6.
∴ H.C.F. of 18 and 60 is 6.

1(4). Find the H.C.F of the numbers: 27, 63

Sol.
Factors of 27 are 1, 3, 9 and 27.
Factors of 63 are 1, 3, 7, 9, 21 and 63.
∴ Common factors of 27 and 63 are 1, 3 and 9.
Highest of these common factors is 9.
∴ H.C.F. of 27 and 63 is 9.

1(5). Find the H.C.F of the numbers: 36, 84.

Sol.
Factors of 36 are 1,2,3,4,6,9,12,18 and 36.
Factors of 84 are 1,2,3,4,6,7,12,14,21,28,42 and 84.
∴ Common factors of 36 and 84 are 1, 2, 3, 4, 6 and 12.
Highest of these common factors is 12.
∴ H.C.F. of 36 and 84 is 12.

1(6). Find the H.C.F of the numbers: 34, 102.

Sol.
Factors of 34 are 1, 2, 17 and 34.
Factors of 102 are 1, 2, 3, 6, 17, 34, 51 and 102.
∴ Common factors of 34 and 102 are 1, 2, 17 and 34.
Highest of these common factors is 34.
So HCF of 34 and 102 is 34

1(7). Find the H.C.F of the numbers: 70, 105, 175

Sol.
Factors of 70 are 1, 2, 5, 7, 10, 14, 35 and 70.
Factors of 105 are 1, 3, 5, 7, 15, 21, 35 and 105.
Factors of 175 are 1, 5, 7, 25, 35 and 175.
∴ Common factors of 70, 105 and 175 are 1,5,7 and 35.
Highest of these common factors is 35.
∴ H.C.F of 70, 105 and 175 is 35.

1(8). Find the H.C.F of the numbers: 91, 112, 49.

Sol.
Factors of 91 are 1,7,13 and 91.
Factors of 112 are 1,2,4,7,8,14,16,28,56 and 112.
Factors of 49 are 1, 7 and 49.
∴ Common factors of 91, 112 and 49 are 1 and 7.
Highest of these common factors is 7.
∴ H.C.F. of 91, 112 and 49 is 7.

1(9). Find the H.C.F of the numbers: 18, 54, 81.

Sol.
Factors of 18 are 1, 2, 3, 6, 9 and 18.
Factors of 54 are 1, 2, 3, 6, 9, 18, 27 and 54.

Factors of 81 are 1, 3, 9, 27 and 81.
∴ Common factors of 18, 54 and 81 are 1, 3 and 9.
Highest of these common factors is 9.
∴ H.C.F of 18, 54 and 81 is 9.

1(10). Find the H.C.F of the numbers: 12, 45, 75.

Sol.
Factors of 12 are 1, 2,3,4,6 and 12.
Factors of 45 are 1,3 ,5,9,15 and 45.
Factors of 75 are 1,3,5,15,25 and 75.
∴ Common factors of 12, 45 and 75 are 1 and 3.
Highest of these common factors is 3.
∴ H.C.F of 12, 45 and 75 is 3.

2(1). What is the HCF of two consecutive numbers?

Sol.
HCF of consecutive numbers = 1

2(2). What is the HCF of two consecutive even numbers?

Sol.
HCF of two consecutive even numbers = 2

2(3). What is the HCF of two consecutive odd numbers?

Sol.
HCF of two consecutive odd numbers = 1

3. HCF of co-prime numbers 4 and 15 was found as follows:
$4 = 2 \times 2$ and $15 = 3 \times 5$
since there is no common factor, so H.C.F. of 4 and 15 is 0. Is the answer correct? If not, what is the correct H.C.F.

Sol.
No! the answer is not correct. The correct answer is as follows:
H.C.F of 4 and 15 is 1.

EX : 3.7

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

Sol.
Factors of 75 are 1, 3, 5, 15, 25 and 75.
Factors of 69 are 1, 3, 23 and 69.
∴ Common factors of 75 and 69 are 1 and 3.
Highest of these common factors is 3.
∴ H.C.F. of 75 and 69 is 3.
Hence, the maximum capacity of weight which can measure the weight of the fertiliser exact number of times is 3kg.

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

Sol.

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

∴ L.C.M. of 63, 70 and 77 = $2 \times 3 \times 3 \times 5 \times 7 \times 11 = 6930$
Hence, the minimum distance each should cover so that all cover the distance in complete steps is 6930cm.

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

Sol.
Factors of 825 are 1, 3, 5, 11, 15, 25, 33, 55, 75, 165, 275 and 825.
Factors of 675 are 1, 3, 5, 9, 15, 25, 27, 45, 75, 135, 225 and 675.
Factors of 450 are 1, 2, 3, 5, 6, 9, 10, 15, 18, 25, 30, 45, 50, 75, 90, 150, 225 and 450.
∴ Common factors of 825, 675 and 450 are 1, 3, 5, 15, 25 and 75.
Highest of these common factors is 75.
Hence, the length of the longest tape which can measure the three dimensions of the room exactly is 75cm.

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

Sol.

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

∴ L.C.M. of 6, 8 and 12 = 2 × 2 × 2 × 3 = 24
Multiples of 24 are 24, 48, 72, 96, 120, 144, ...
Hence, the smallest 3-digit number which is exactly divisible by 6, 8 and 12 is 120.

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

Sol.

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

∴∴ L.C.M. of 8, 10 and 12 = 2 × 2 × 2 × 3 × 5 = 120.
Multiple of 120 are:
120 × 1 = 120, 120 × 2 = 240, 120 × 3 = 360, 120 × 4 = 480, 120 × 5 = 600, 120 × 6 = 720, 120 × 7 = 840, 120 × 8 = 960, 120 × 9 = 1080, ...
Hence, the largest 3-digit number exactly divisible by 8, 10 and 12 is 960.

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

Sol.

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

∴ L.C.M. of 48, 72 and 108 = 2 × 2 × 2 × 2 × 3 × 3 × 3 = 432
432 seconds = 7 min 12 seconds.
Hence, they will change simultaneously again 7 min 12 seconds after 7 a.m.

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.

Sol.

Factors of 403 are 1, 13, 31 and 403.
Factors of 434 are 1, 2, 7, 14, 31, 62, 217 and 434.
Factors of 465 are 1, 3, 5, 15, 31, 93, 155 and 465.
Common factors of 403, 434 and 465 are 1 and 31.
Highest of these common factors is 31.
∴∴ H.C.F of 403, 434 and 465 is 31.
Hence, the maximum capacity of the container that can measure the diesel of the three containers exact number of times is 31 litres.

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

Sol.

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

∴ L.C.M. of 6, 15 and 18 = 2 × 3 × 3 × 5 = 90.
Hence, the required number is 90 + 5 i.e. 95.

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

Sol.

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

∴∴ L.C.M. = 2 × 2 × 2 × 2 × 3 ×× 3 = 288.
Multiples of 288 are :
288 × 1 = 288, 288 × 2 = 576, 288 × 3 = 864, 288 × 4 = 1152, ...
Hence, the smallest four-digit number which is divisible by 18, 24 and 32 is 1152.

10(1). Find the LCM of the numbers: 9 and 4

Sol.
LCM - Lowest common multiple
The LCM of two numbers is the smallest number that is a multiple of both the numbers, and can be obtained as follows:

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

LCM = 2 × 2 × 3 × 3 = 36

10(2). Find the LCM of the numbers: 12 and 5

Sol.
LCM - Lowest common multiple
The LCM of two numbers is the smallest number that is a multiple of both the numbers, and is obtained as follows:

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

LCM = 2 × 2 × 3 × 5 = 60

10(3). Find the LCM of the numbers: 6 and 5

Sol.
LCM - Least common multiple
The LCM of two numbers is the smallest number that is a multiple of both the numbers, and is obtained as follows:

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

LCM = 2 × 3 × 5 = 30

10(4). Find the LCM of the numbers: 15 and 4

Sol.
LCM - Least common multiple
The LCM of two numbers is the smallest number that is a multiple of both the numbers, and is obtained as follows:

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

LCM = 2 × 2 × 3 × 5 = 60

11(1). Find the LCM of the numbers 5, 20 in which one number is the factor of the other. What do you observe in the results obtained?

Sol.
Prime factorisation of 5 and 20 are as follows :
5 = 5
20 = 2 × 2 × 5
∴ L.C.M. of 5 and 20
= 2 × 2 × 5
= 20

11(2). Find the L.C.M. of 6, 18 in which one number is the factor of the other. What do you observe in the results obtained?

Sol.
Prime factorisation of 6 and 18 are as follows :
6 = 2 × 3
18 = 2 × 3 × 3
∴ L.C.M. of 6 and 18 = 2 × 3 × 3 = 18

11(3). Find the L.C.M. of 12, 48 in which one number is the factor of the other. What do you observe in the results obtained?

Sol.
Prime factorisation of 12 and 48 are as follows:
12 = 2 × 2 × 3
48 = 2 × 2 × 2 × 2 × 3
∴ L.C.M. of 12 and 48 = 2 × 2 × 2 × 2 × 3 = 48

11(4). Find the L.C.M. of 9, 45 in which one number is the factor of the other. What do you observe in the results obtained?

Sol.
Prime factorisation of 9 and 45 are as follows:
9 = 3 × 3
45 = 3 × 3 × 5
∴ L.C.M. of 9 and 45 = 3 × 3 × 5 = 45

Worksheet 01
Ch - 3 Playing with Numbers

1. Which of them is not a prime number?
    a. 23
    b. 4
    c. 11
    d. 13
2. _____ is the factor of 68.
    a. 17
    b. 6
    c. 3
    d. 5
3. The sum of two odd and one even numbers is
    a. Even of odd
    b. Odd
    c. even number
    d. Prime
4. Which of the following is divisible by 3?
    a. 15287
    b. 15267
    c. 152638
    d. 15286
5. The number of multiples of a given number is _______.
    a. None of these
    b. infinite
    c. 2
    d. Finite

6. **Match the following:**

Column I	Column II
a. 15	p. Factor of 50
b. 12	q. Factor of 30
c. 25	r. Factor of 65
d. 13	s. Factor of 48

7. **Fill in the blanks:**

   i. 1 is neither _____ nor _____.
   ii. The smallest prime number is _____.
   iii. The smallest composite number is _____.
   iv. the smallest even number is _____.

8. **State whether the following statements are True or False.**

   a. A number with 4 or more digits is divisible by 8, if the number formed by the last three digits is divisible by 8.
   b. If the sum of the digits of a number is divisible by 3, then the number itself is divisible by 9.
   c. All numbers which are divisible by 4 may not be divisible by 8.
   d. The Highest Common Factor of two or more numbers is greater than their Lowest Common Multiple.

9. Find LCM of 60 and 40.
10. Write all the factors of the following number : 27
11. List all the multiples of 7 that lie between 125 and 142.
12. Find the H.C.F of the following numbers. 70, 105, 175
13. Find the H.C.F of the following numbers. 27, 63
14. Find all the multiples of 9 upto 100.
15. Find the least 4-digit number which is exactly divisible by 8, 10, and 12.

CHAPTER 4 BASIC GEOMETRICAL IDEAS

KEY POINTS TO REMEMBER:

The term 'Geometry' is the English equivalent of the Greak word 'Geometron'. 'Geo' mean Earth and 'metron' means Measurement. Geometrical ideas are reflected in fill forms of art, measurements, architecture, engineering, etc. We observe and use different objects. These objects have different shapes. The ruler is straight whereas a ball is round. In this chapter, we shall learn some interesting facts which enable us to know more about the shapes around us.

Let us mark a dot on the paper by a sharp tip of the pencil. Sharper the tip, thinner will be the dot. This almost invisible thinner dot gives us an idea of a point. A point determines a location. The following are some models for a point.

A Line Segment

A line segment is the shortest join of two points. The line segment joining two points A and B is denoted by $\overline{AB}$ or $\overline{BA}$ .The points A and B are called the endpoints of the segment.

Note: $\overline{AB}$ and $\overline{BA}$ denote the same line segment.

A Line

A line is obtained when a line segment like $\overline{AB}$is extended on both sides indefinitely. It is denoted by $\overline{AB}$. Sometimes it is denoted by a single letter like l. Although a line contains a countless number of points, yet two points are enough to determine a line. We say 'two points determine a line'.

Intersecting Lines

Two lines are called intersecting lines if they have one common point.

Parallel Lines

Two lines in a plane are said to be a parallel line if they do not intersect.

A ray is a portion of a line. It starts at one point (called starting point) and goes endlessly in a direction.

Curves

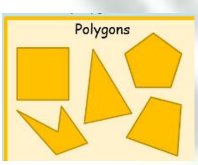
Any drawing (straight or non-straight) drawn without lifting the pencil from the paper and without the use of a ruler is called a curve. In everyday use curve means ‘not straight’ but in mathematics, a curve can be a straight line also. A curve is called a simple curve if it does not cross itself. A curve is said to be a closed curve if its ends are joined; otherwise, it is said to be open.

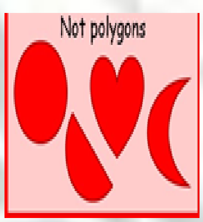
In a closed curve, there are three disjoint parts:

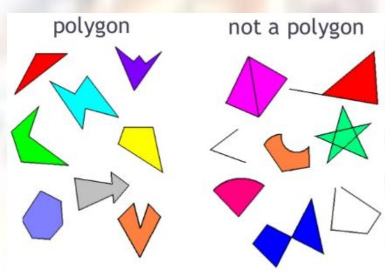
- Interior
- Boundary
- Exterior

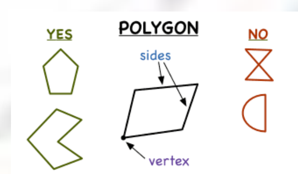
Polygons

A polygon is a closed curve made up entirely of line segments. The line segments forming a polygon are called its sides. The meeting point of a pair of sides is called its vertex. Any two sides with a common endpoint are called the adjacent sides. The endpoints of the same side are called the adjacent vertices. The join of any two non-adjacent vertices is called a diagonal of the polygon.



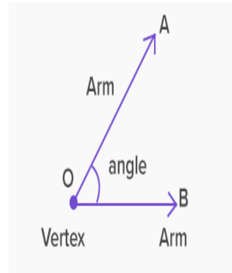






Angles

An angle is made up of two rays starting from a common endpoint. Two rays OP and OQ starting from the common endpoint O form ∠POQ (or also called ∠QOP) at O. Point O is called the vertex of ∠POQ. Rays OP and OQ form two sides of ∠POQ. Note that in specifying an angle, the vertex is always written as the middle letter.



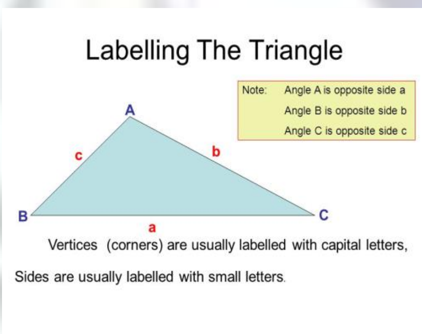
An angle leads to three divisions of a region:

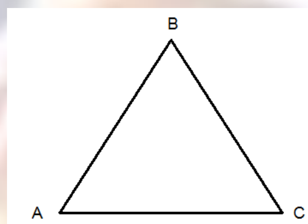
On the angle

The interior of the angle

The exterior of the angle.

Triangles





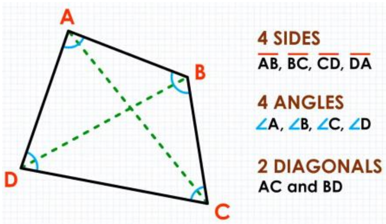
A triangle is a three-sided polygon. Actually, it is a polygon with the least number of sides. Triangle ABC is written as ΔABC. There are three sides of a triangle. Thus, sides of ΔABC are AB¯, BC¯ and CA¯. There are three angles in a triangle. Thus, angles of ΔABC are ∠BAC, ∠ABC, and ∠BCA. The points A, B, and C are called the vertices of the triangle ABC. Like angle, a triangle also has three regions associated with it.

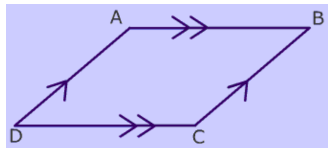
On the triangle

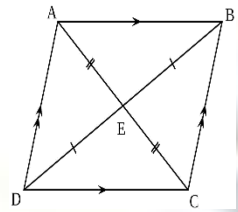
The interior of the triangle

The exterior of the triangle.

Quadrilaterals







A quadrilateral is a four-sided polygon. It has 4 sides and 4 angles. A quadrilateral has 4 vertices which should be named cyclically.

In the quadrilateral ABCD,

$\overline{AB}$, $\overline{BC}$, $\overline{CD}$, $\overline{DA}$ are the four sides

∠A , ∠B , ∠C ,$\angle D$ are the four angles.

$\overline{AB}$, $\overline{BC}$, CD

AB¯, BC¯; [latex1]\bar { BC }[/latex], CD¯; CD¯, DA¯; DA¯, AB¯ are adjacent sides;

AB¯ & DC¯; AD¯ & BC¯ are pairs of opposite sides;

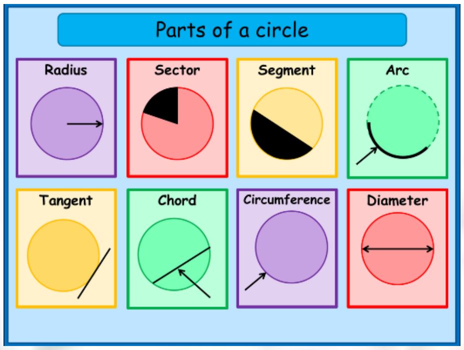
∠A &∠C; ∠B &∠D are pairs of opposite angles;

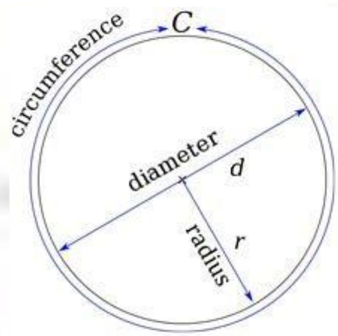
∠A &∠B; ∠B &∠C; ∠C &∠D; ∠D &∠A are adjacent angles.

Circle

A circle is a path of a point moving at the same distance from a fixed point. The fixed point is called the center, the fixed distance is called the radius and the distance around the circle is called the circumference. A chord of a circle is a line segment joining any two points on the circumference. A diameter is a chord passing through the center. A diameter is double the size of a radius. Any diameter of a circle divides it into two semi-circles. Any portion of a circle is called an arc. For two points P and

Q on the circle, we get the arc PQ denoted $\widehat{PQ}$. Like a simple closed curve, there are three regions associated with a circle.





On the circle

The interior of the circle

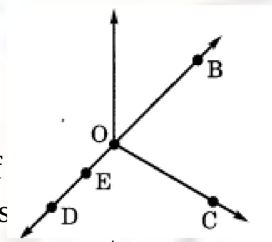
The exterior of the circle.

EXERCISE 4.1

Q.1.Use the figure to name:
(a) Five points
(b) A line
(c) Four rays
(d) Five line segments

Solution:

(a) Five points are: O, B, C, E and D



(b) Name of

(c) Four rays ,$\overrightarrow{OD}$

(d) Five line segments are:

$\overline{OE}$; $\overline{ED}$; $\overline{OD}$; $\overline{OB}$; $\overline{EB}$

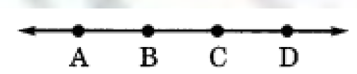
(b) Name of the line is $\overleftrightarrow{DB}$ or $\overleftrightarrow{BD}$

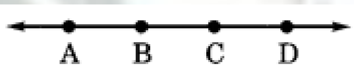
(c) Four rays are :$\overrightarrow{OC}$; $\overrightarrow{OB}$; $\overrightarrow{OE}$; $\overrightarrow{OD}$

(d) Five line segments are:

(e) $\overline{OE}$; $\overline{ED}$; $\overline{OD}$;$\overline{OB}$;$\overline{EB}$

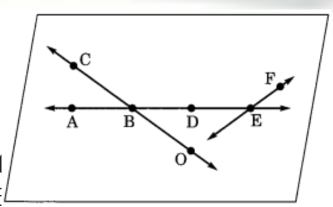
Q.2. Name the line given in all possible (twelve) ways, choosing only two letters at a times from the four given:

Solut  amed as follows:



(i) $\overleftrightarrow{AB}$	(ii) $\overleftrightarrow{AC}$	(iii) $\overleftrightarrow{AD}$
(iv) $\overleftrightarrow{BC}$	(v) $\overleftrightarrow{BD}$	(vi) $\overleftrightarrow{CD}$
(vii) $\overleftrightarrow{BA}$	(viii) $\overleftrightarrow{CA}$	(ix) $\overleftrightarrow{DA}$
(x) $\overleftrightarrow{CB}$	(xi) $\overleftrightarrow{DB}$	(xii) $\overleftrightarrow{DC}$

(b) Line passing through A.
(c) Line on which 0 lies.
(d) Two pairs of intersecting lines.



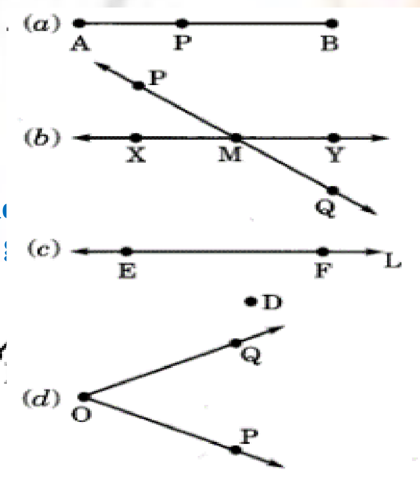
Solut

(a) $\overleftrightarrow{E}$

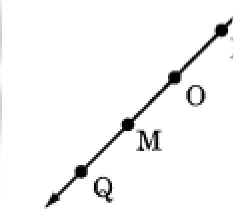
(b) $\overleftrightarrow{AE}$
(c) $\overleftrightarrow{BC}$ or $\overleftrightarrow{BO}$
(d) $\overleftrightarrow{CO}$ or $\overleftrightarrow{AE}$ or $\overleftrightarrow{AE}$ or $\overleftrightarrow{EF}$

Q.4.How many lines can pass through
(a) one given point?
(b) two given points?
Solution:
(a) Infinitely many lines can pass through a given points.
(b) Only one line can pass through two given points.

Q.5.Draw a rough figure and label suitably in each of the following cases:
(a) Point P lies on $\overline{AB}$.
(b) $\overleftrightarrow{XY}$ and $\overleftrightarrow{PQ}$intersect at M.
(c) Linel contains E and F but not D.
(d) $\overleftrightarrow{OP}$ and $\overleftrightarrow{OQ}$meet at O.
Solution:



Q.6. Consider thay whether following statements are true or false**
in context of the

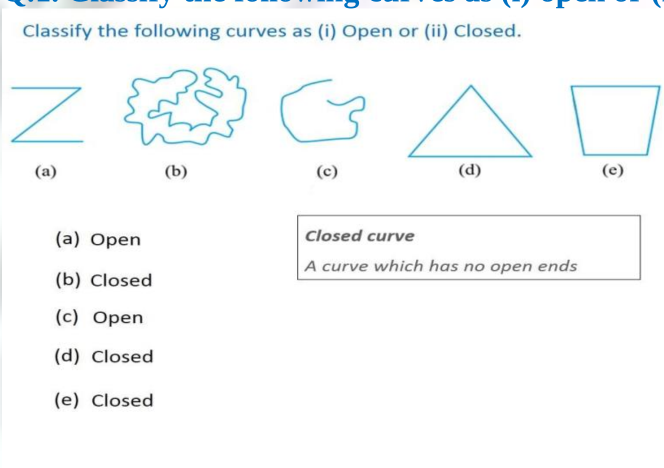


a) Q, M, O, N, P are points on the line$\overleftrightarrow{MN}$.
(b) M, O, N are points on a line segment $\overline{MN}$.
(c) M and N are end points of line segment $\overline{MN}$.
(d) O and N are end points of line segment $\overline{OP}$.
(e) M is one of the end points of line segment $\overline{QO}$.
(f) M is point on ray $\overrightarrow{OP}$.
(g) Ray $\overrightarrow{OP}$is different from ray $\overrightarrow{QP}$.
(h) Ray $\overrightarrow{OP}$is same as ray $\overrightarrow{OM}$.
(i) Ray $\overrightarrow{OM}$ is not opposite to ray $\overrightarrow{OP}$.
(j) O is not an initial point of $\overrightarrow{OP}$.
(k) N is the initial point of $\overrightarrow{NP}$ and $\overrightarrow{NM}$.
Solution:
(a) True
(b) True

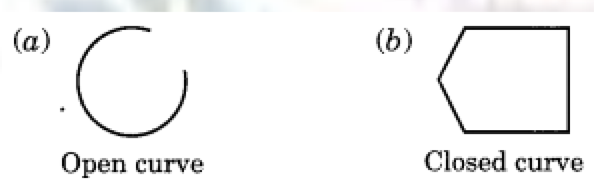
(c) True
(d) False
(e) False
(f) False
(g) True
(h) False
(i) False
(j) False
(k) True

Exercise 4.2

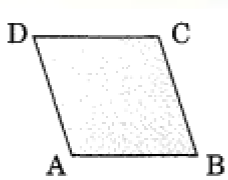
Q.1. Classify the following curves as (i) open or (ii) closed.

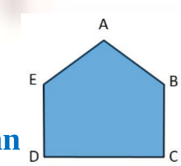


Q.2.Draw rough diagrams to illustrate the following:
(a) Open curve
(b) Closed curve
Solution:



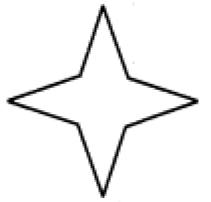
Q.3. Draw any polygon and shade its interior.
Solution:
ABCDE is the required polygon.

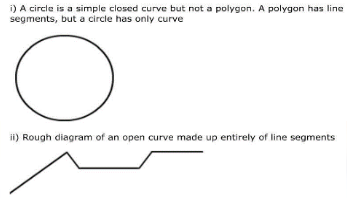




Q.4. Co ure an questions.
(a) Is it

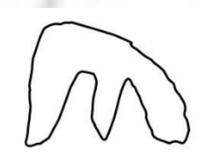
(b) Is it closed?

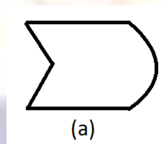


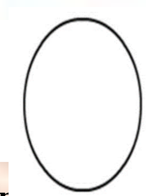


Solution:
(a) Yes, it is a curve.
(b) Yes, it is closed curve.

Q.5. Illustrate, if possible, each one of the following with a rough diagram:
(a) A closed curve that is not a polygon.
(b) An open curve made up entirely of line segments.
(c) A polygon with two sides.
Solution:
(a)

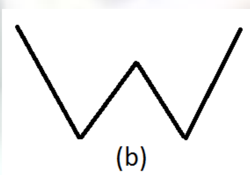


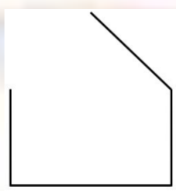


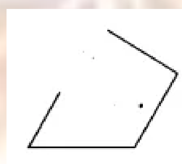


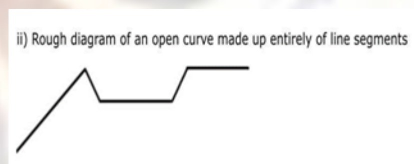
(b) ABCD is an open curve made up of the line segments

(b)





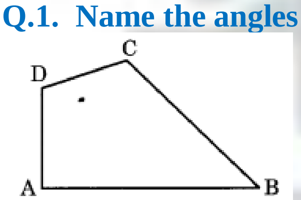




(c) A polygon with two sides is not possible.

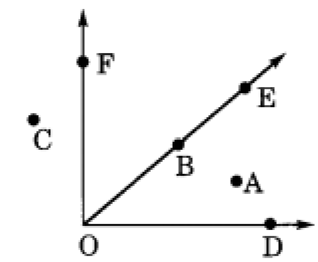
Exercise 4.3

Q.1. Name the angles in the given figure.



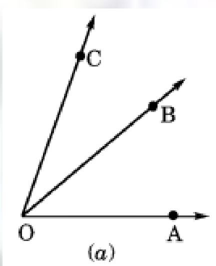
The angles are:
(i) ∠A or ∠DAB
(ii) ∠B or ∠CBA
(iii) ∠C or ∠DCB
(iv) ∠D or ∠ADC.

Q.2.In the given diagram, name the point(s):

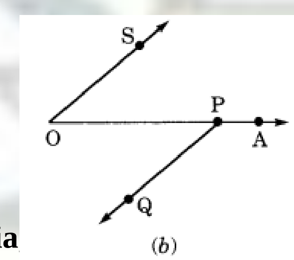


(a) In the interior of ∠DOE
(b) In the exterior of ∠EOF
(c) On ∠EOF
Solution:
(a) A is the point in the interior ∠DOE.
(b) C is the point in the exterior ∠EOF.
(c) B is the point on ∠EOF.

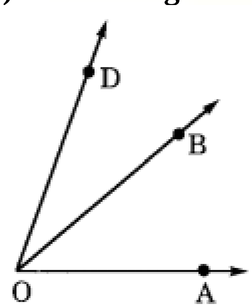
Q.3.Draw rough diagrams of two angles such that they have
(a) one point in common.
(b) two points in common.
(c) three points in common.
(d) four points in common.
(e) One ray in common.
Solution:
(a) In figure (a), O is the common point of ∠AOB and ∠COB.



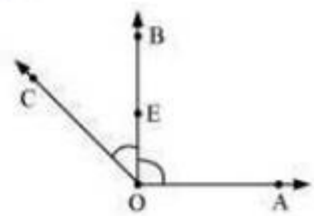
(b) In figure (b), O and P are the common points in ∠SOA and ∠OPQ.



(c) Such a dia
(d) Such a diagram is not possible.

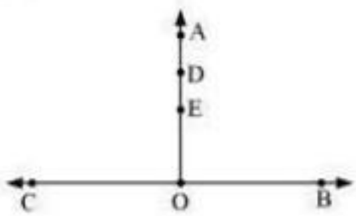


(c)



∠AOB and ∠BOC have points O, E, B in common.

(d)



∠BOA and ∠COA have points O, E, D, A in common.

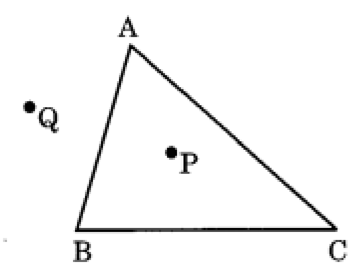
(e)$\overrightarrow{OB}$ is the common ray of ∠AOB and ∠DOB.

EXERCISE 4.4

Q.1. Draw a rough sketch of a triangle ABC. Mark a point P in its interior and a point Q in its exterior. Is the point A in its exterior or in its interior?

Solution:

Triangle ABC is the given triangle.



P is in the interior of ΔABC.

Q is in the exterior of ΔABC.
A is neither in the exterior nor in the interior.

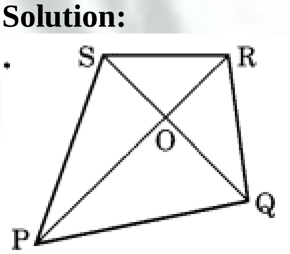
Q.2. (a) Identify three triangles in the figure.
(b) Write the names of seven angles.
(c) Write the names of six line segments.
(d) Which two triangles have ∠B as common?

Solution:
(a) Three triangles are: ΔABC, ΔABD and ΔADC.
(b) (i) ∠ABC
(ii) ∠ADB
(iii) ∠BAD
(iv) ∠ADC
(v) ∠ACD
(vi) ∠DAC
(vii) ∠BAC.

(c) $\overline{AB}$; $\overline{BD}$; $\overline{AD}$; $\overline{AC}$; $\overline{DC}$; $\overline{BC}$;
(d) ΔABC and ΔABD have ∠B as common.

EXERCISE 4.5

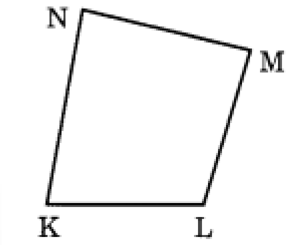
Q.1. Draw a rough sketch of a quadrilateral PQRS. Draw its diagonals. Name them. Is the meeting point of the diagonals in the interior or exterior of the quadrilateral?
Solution:



i) We have a quadrilateral PQRS.
(ii) PR and QS are its two diagonals.
(iii) O is the meeting point of the diagonals PR and QS which is in the interior of the quadrilateral.

Q.2.Draw a rough sketch of a quadrilateral KLMN. State:
(a) two pairs of opposite sides
(b) two pairs of opposite angles
(c) two pairs of adjacent sides
(d) two pairs of adjacent angles.

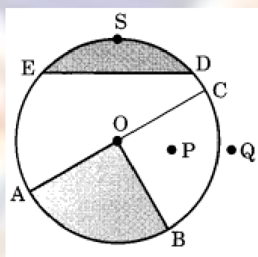
Solution:
KLMN is the given quadrilateral.
(a) $\overline{KL}$; $\overline{NM}$; and $\overline{KN}$; $\overline{LM}$ are the pairs of opposite sides.
(b) ∠K and ∠M, ∠L and ∠N are the pairs of opposite angles.



c)$\overline{KL}$ and $\overline{KN}$; $\overline{NM}$ and $\overline{ML}$ are the pairs of adjacent sides OR
OR $\overline{KN}$ and $\overline{NM}$ and $\overline{ML}$ and $\overline{KL}$ are the pairs of adjacent sides.
(c) ∠K and ∠L, ∠N and ∠M are the pairs of adjacent angles.

EXERCISE 4.6

Q.1. From the figure, identify:
(a) the centre of circle
(b) three radii
(c) a diameter
(d) a chord
(e) two points in the interior
(f) a point in the exterior
(g) a sector
(h) a segment.

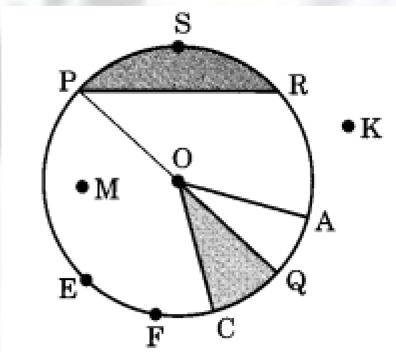


Solution:
In the given figure,
(a) O is the centre of the circle.
(b) Three radii of the given circle are$\overline{OA}$; $\overline{OB}$; $\overline{OC}$
(c) $\overline{AC}$is a diameter of the circle.
(d) $\overline{ED}$is a chord of the circle.
(e) O and P are in the interior of the circle.
(f) Q is a point in the exterior of the circle.
(g) OBA is a sector of the circle.
(h) EDSE, the shaded region is a segment of the circle.

Q.2.(a) Is every diameter of a circle also a chord?
(b) Is every chord of a circle also a diameter?
Solution:
(a) Yes, every diameter is the longest chord of a circle.
(b) No, every chord is not diameter of a circle.

Q.3.Draw any circle and mark
(a) its centre
(b) a radius
(c) a diameter
(d) a sector
(e) a segment
(f) a point in its interior
(g) a point in its exterior
(h) an arc.

Solution:
In the given circle,



(a) O is the center.
(b) $\overline{OA}$is a radius.
(c) $\overline{PQ}$is a diameter.
(d) OQC is a sector (shaded part)
(e) PSR (shaded part) in the segment.
(f) M is in the interior of the circle.
(g) K is in the exterior of the circle.
(h) $\widehat{EF}$ or$\breve{EF}$is an arc of the circle.

Q.4. Say ‘true’ or ‘false’.
(a) Two diameters of a circle will necessarily intersect.
(b) The centre of a circle is always in its interior.

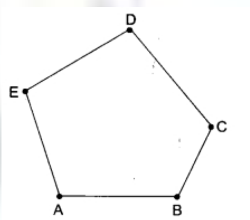
Solution:
(a) True
(b) True

MCQs Questions
Q. 1. How many points are enough to fix a line?
(a) 1
(b) 2
(c) 3
(d) 4
Answer (b)
Q.2.Two intersecting lines intersect in

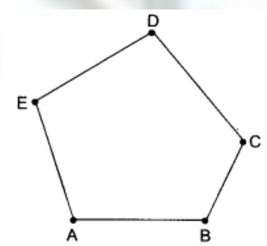
(a) 1 point
(b) 2 points
(c) 3 points
(d) 4 points
Answer: (a)
Q.3. How many lines can pass through one given point?
(a) 1
(b) 2
(c) 4
(d) Countless
Answer: (d)

Q.4. How many lines can pass through two given points?
(a) Only one
(b) 2
(c) 4
(d) Countless
Answer: (a)

Q.5. How many vertices are there in the following figure?

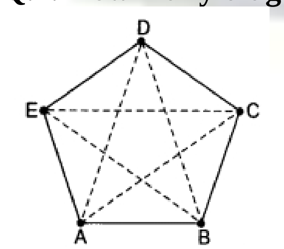


(a) 5
(b) 3
(c) 2
(d) 4
Answer: (a)
Q.6.How many sides are there in the following figure?



(d) 3
Answer: (a)

Q.7. How many diagonals are there in the following figure?

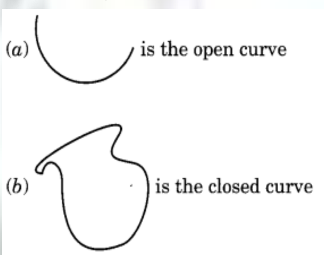


(b) 5
© 2
(d) 3
Answer: (b)

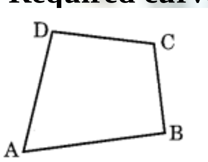
Q.8. How many vertices are there in a triangle?
a) 1
(b) 2
(c) 3
(d) 4
Answer: (c)

Extra Questions Very Short Answer Type:

Q.1. Draw a rough sketch of:
(a) open curve
(b) closed curve
Solution:

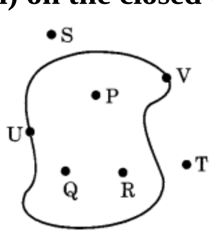


Q.2. Draw a rough sketch of closed curve made up of line segments.
Solution:
Required curve is ABCD closed with the line segments $\overline{AB}$; $\overline{BC}$; $\overline{CD}$ and $\overline{DA}$.



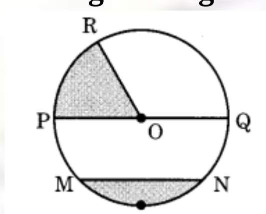
Q.3 Draw two different angles having common point and a common arm.
Solution:
∠AOB and ∠COB are two different angles with common point O and common arm $\overrightarrow{OB}$

Q.4.Identify the points which are:
(i) in the interior
(ii) in the exterior
(iii) on the closed curve in the given figure.



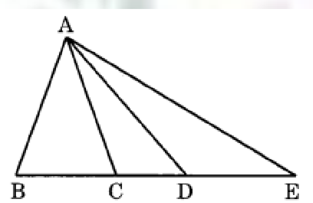
Solution:
(i) Points P, Q and R are in the interior of the closed curve.
(ii) points S and T are in the exterior of the closed curve.
(iii) U and V are on the closed curve.

Q.5.Identify the following in the given figure:
(a) Sector
(b) Chord
(c) Diameter
(d) Segment.



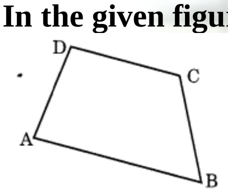
Solution:
(a) OPR (shaded) is the sector of the circle.
(b) $\overline{MN}$is the chord.
(c) $\overline{PQ}$ is the diameter.
(d) MXN (shaded) is the segment.

Q.6.In the given figure, name all the possible triangles



Solution:
Possible triangles are:
(i) ΔABC
(ii) ΔABD
(iii) ΔABE
(iv) ΔACD
(a) ΔACE
(vi) ΔADE

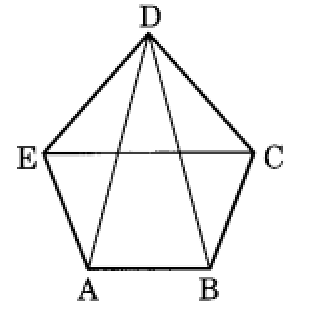
Q.7. Name all the angles in the given figure.
Solution:
In the given figure, the names of all the angles are:



i) ∠ABC
(ii) ∠BCD

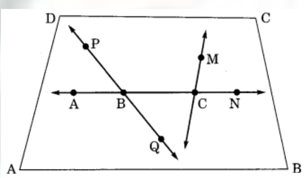
(iii) ∠CDA
(iv) ∠DAB

Q.8. In the given figure, name all the line segments:



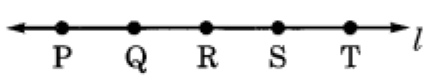
Solution:
In the given figure, the name of the line segments are:
$\overline{AB}$; $\overline{BC}$; $\overline{CD}$; $\overline{DE}$; $\overline{EA}$; $\overline{DA}$; $\overline{DB}$; $\overline{EC}$

Short Answer Type
Q.9. Using the given figure, name the following:



a) Line containing point M.
(b) Line passing through four points.
(c) Line passing through three points.
(d) Two pairs of intersecting lines.
Solution:
(a) $\overleftrightarrow{MC}$ is the line containing the point M.
(b) $\overleftrightarrow{AN}$ is the line passing through four points A, B, C and N.
(c) $\overleftrightarrow{PQ}$ is the line passing through three points P, B and Q.
(d) Pairs for intersecting lines are
(i) $\overleftrightarrow{AN}$ and $\overleftrightarrow{PQ}$
(ii) $\overleftrightarrow{AN}$ and $\overleftrightarrow{MC}$

Q.10. On the given line, some points are given, write down the names of all segments



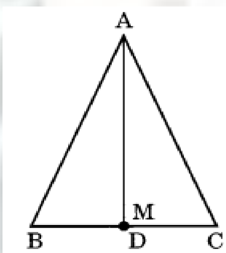
Solution:
Segments are:
$\overline{PQ}$; $\overline{PR}$; $\overline{PS}$; $\overline{PT}$; $\overline{QR}$; $\overline{QS}$; $\overline{QT}$; $\overline{RS}$; $\overline{RT}$; $\overline{ST}$

Q.11. How many lines can pass through
(i) one given point?

(ii) two given points?
(iii) three non-collinear points
Solution:
(i) Infinite number of lines can be passed through one given point.
(ii) Only one line can pass through two given points.
(iii) Three lines can pass through three non- collinear points.

HIGHER ORDER THINKING SKILL (HOTS)

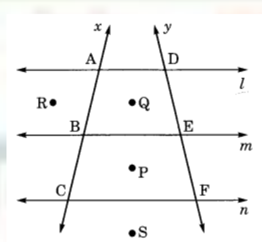
Q.I. Draw an equilateral ΔABC of any size. Draw AD as its median and an altitude AM.
(i) Does AD coincide with AM?
(ii) Name the point on the median which divides it in the ratio 1:2.
(iii) What is the measure of ∠ADC and ∠ADB?
(iv) Are D and M the same points?
Solution:
(i) Yes, AD coincides with AM.



(ii) The point on the median which divides it in the ratio 1 : 2 is called centroid of the triangle.
(iii) ∠ADC = ∠ADB = 90°
(iv) Yes, D and M are the same points.

Q.II. In the given figure, l, m and n are three parallel lines, x andy intersect these lines.
(i) Name the points lying on the line x.
(ii) Name the points lying on the liney.
(iii) Name the points inside the quadrilateral ABED.
(iv) Name the points outside the quadrilaterals ABED and BCFE.
(v) Name the lines passing through three points.

Solution:
(i) A, B and C lie on the line x.
(ii) D, E and F lie on the liney.
(iii) Q is the point inside □ABED



(iv) Points R and S are outside the quadrilaterals ABED and BCFE.
(v) Lines x andy pass through the three points A, B, C and D, E, F respectively.