

# Triangles

## Exercise 12.1

### Question: 1

Take three non- collinear points A, B and C on a page of your notebook. Join AB, BC and CA. what figure do you get? Name the triangle. Also, name

- (i) the side opposite to  $\angle B$  (ii) the angle opposite to side AB
- (iii) the vertex opposite to side BC (iv) the side opposite to vertex B

### Solution:

Let us consider three non- collinear points A, B and C join them.

After joining these points, we get a 'Triangle', as it consists of three sides. The name of the triangle we get is  $\triangle ABC$

- (i) The side opposite  $\angle B$  is AC
- (ii) The angle opposite side AB is  $\angle C$
- (iii) The vertex opposite side BC is A
- (iv) The side opposite vertex B is AC

### Question: 2

Take three collinear points A, B and C on a page of your note book. Join AB, BC and CA. Is the figure a triangle? If not why

### Solution:

Let us consider three collinear points A, B and C and join AB, BC and CA

The figure we get is not a triangle because it is a straight line consisting of only one side. It is also not a closed figure, where as a triangle is defined as a closed figure consisting of three sides

### Question: 3

Distinguish between a triangle and its triangular region.

### Solution:

A triangle is defined as a closed polygon consisting of three sides, where as a triangular region is the region that lies inside the triangle. In the adjoining figure, the shaded region shows the triangular region.

### **Question: 4**

In fig 12.11, D is a point on side BC of a  $\Delta ABC$ . AD is joined. Name all the triangles that you can observe in the figure. How many are they?

### **Solution:**

The figure consists of triangles  $\Delta ADC$ ,  $\Delta ADB$  and  $\Delta ABC$ . Therefore, three triangles are present in the figure.

### **Question: 5**

In fig 12.12, A, B, C and D are four points, and no three points are collinear. AC and BD intersect at O. There are eight triangles that you can observe. Name all the triangles.

### **Solution:**

The following figure consists of triangles, namely  $\Delta ODC$ ,  $\Delta ODA$ ,  $\Delta OBC$ ,  $\Delta OAB$ ,  $\Delta ADB$ ,  $\Delta ACB$ ,  $\Delta DAC$  and  $\Delta DBC$ . Hence, there are a total of eight triangles.

### **Question: 6**

What is the difference between triangle and a triangular region?

### **Solution:**

A triangle is defined as a closed polygon consisting of three sides, where as a triangular region is the region that lies inside the three sides of triangles.

In the adjoining figure, the shaded region shows the triangular region

### **Question: 7**

Explain the following terms:

- (i) Triangle
- (ii) Parts or elements of a triangle
- (iii) Scalene triangle
- (iv) Isosceles triangle
- (v) Equilateral triangle

- (vi) Acute triangle
- (vii) Right triangle
- (viii) Obtuse triangle
- (ix) interior of a triangle
- (x) exterior of a triangle

**Solution:**

- (i) Triangle – A triangle is a closed polygon that consists of three straight lines as its sides.
- (ii) Parts or elements of a triangle – A triangle consists of three sides, three angles and three vertices.
- (iii) Scalene triangle – A triangle, in which the length of all the sides are different.
- (iv) Isosceles triangle – A triangle, in which the length of two sides are equal.
- (v) Equilateral triangle – A triangle, in which the length of all the sides are equal.
- (vi) Acute triangles – A triangle, in which all the angles measure less than  $90^\circ$ .
- (vii) Right triangle – A triangle, which has an angle that measure  $90^\circ$ .
- (viii) Obtuse triangle – A triangle, in which one of the angles measure more than  $90^\circ$ .
- (ix) Interior of a triangle – The region lying inside the boundaries or side of a triangle.
- (x) Exterior of a triangle – The region lying outside the boundaries or sides of a triangle.

**Question: 8**

In fig 12.13, the length (in cm) of each side has been indicated along the side. State for each triangle whether it is a scalene, isosceles or equilateral:

**Solution:**

(i)	(ii)	(iii)
(iv)	(v)	(vi)

- (i) This is a scalene triangle, as all the sides have different length.

- (ii) This is an equilateral triangle, as all the sides are equal in length i.e. 5 cm.
- (iii) This is an isosceles triangle, as two sides are equal in length i.e. 5.6 cm.
- (iv) This is an isosceles triangle, as two sides are equal in length i.e. 6.2 cm.
- (v) This is a scalene triangle, as all the sides have different length.
- (vi) This is an acute angle, as all the angles are less than  $90^\circ$ .

**Question: 9**

In fig 12.14, there are five triangles. The measures of some of their angles have been indicated. State for each triangle whether it is acute, right or obtuse.

**Solution:**

(i)	(ii)
(iii)	(iv)

- (i) This is an obtuse angled triangle, as one of the angle ( $120^\circ$ ) measures more than  $90^\circ$  and less than  $180^\circ$ .
- (ii) This is a right angle triangle, as it contains a  $90^\circ$ .
- (iii) This is an acute angle triangle, as all the angles are less than  $90^\circ$ .
- (v) This is an obtuse angled triangle, as one of the angle ( $110^\circ$ ) measures more than  $90^\circ$  and less than  $180^\circ$ .

**Question: 10**

**Fill in the blanks with the correct word/ symbol to make it a true statement:**

- (i) A triangle has \_\_\_\_\_.
- (ii) A triangle has \_\_\_\_\_.
- (iii) A triangle has \_\_\_\_\_.
- (iv) A triangle has \_\_\_\_\_.

(Angles and sides are part of a triangle. So, three angles and three sides make six parts.)

- (v) A triangle whose no two sides are equal is known as \_\_\_\_\_.

(A triangle whose lengths of all sides are different is called scalene triangle).

(vi) A triangle whose two sides are equal is known as \_\_\_\_\_.

(A triangle whose lengths of two sides are equal is called an equilateral triangle).

(vii) A triangle whose one angle is a right angle is known as \_\_\_\_\_.

(A triangle whose one angle is  $90^\circ$  is called a right angle triangle).

(viii) A triangle whose all angles are less than  $90^\circ$  is known as \_\_\_\_\_.

(A triangle whose all angle are less than  $90^\circ$  is known as Acute triangle).

(x) A triangle whose one side angle is more than  $90^\circ$  is known as \_\_\_\_\_.

(A triangle whose one angle is more than  $90^\circ$  is called Obtuse triangle).

### **Solution:**

(i) A triangle has **three sides**.

(ii) A triangle has **three vertices**.

(iii) A triangle has **three angles**.

(iv) A triangle has **six parts**.

(Angles and sides are part of a triangle. So, three angles and three sides make six parts.)

(v) A triangle whose no two sides are equal is known as **Scalene triangle**.

(A triangle whose lengths of all sides are different is called scalene triangle).

(vi) A triangle whose two sides are equal is known as **Equilateral triangle**.

(A triangle whose lengths of two sides are equal is called an equilateral triangle).

(vii) A triangle whose one angle is a right angle is known as **Right angled triangle**.

(A triangle whose one angle is  $90^\circ$  is called a right angle triangle).

(viii) A triangle whose all angles are less than  $90^\circ$  is known as **an Acute triangle**.

(A triangle whose all angle are less than  $90^\circ$  is known as Acute triangle).

(x) A triangle whose one side angle is more than  $90^\circ$  is known as an **Obtuse triangle**.

(A triangle whose one angle is more than  $90^\circ$  is called Obtuse triangle).

## Question: 11

In each of the following, state if the statement is true or false:

### Solution:

(i) True

(ii) False; a triangle consists of three vertices only.

(iii) False; three line segments joined by three non-collinear points can only form a triangle.

(iv) False; it lies on the triangle.

(v) True

(vi) False; the vertices of a triangle are three non-collinear points.

(vii) True

(ix) False; it can also be an isosceles triangle.

(x) False; it can be an obtuse triangle.

## Exercise 12.2

### Question: 1

Total number of parts of a triangle is

### Solution:

Six: Three sides and three angles

### Question: 2

A perpendicular drawn from a vertex to the opposite side of a triangle is known as

### Solution:

An Altitude: An Altitude is defined as the perpendicular drawn from a vertex to the opposite side of a triangle.

### Question: 3

A triangle

### Solution:

has three altitudes

### Question: 4

Line segment joining the vertices to the mid – points of the opposite side of a triangle is known as

### Solution:

Medians: A median is defined as the line segment joining the vertex to the mid – point of the opposite side of a triangle.

### Question: 5

A triangle whose no two sides are equal is called

### Solution:

A scalene triangle: A Scalene triangle is defined as the triangle in which no sides are equal.

**Question: 6**

A triangle whose two sides are equal is known as

**Solution:**

An isosceles triangle: An isosceles triangle is a triangle that has two equal sides.

**Question: 7**

A triangle whose two sides are equal is called

**Solution:**

An equilateral triangle is defined as a triangle whose all sides are equal.

**Question: 8**

The sum of the lengths of side of a triangle is known as its

**Solution:**

Perimeter: Perimeter is defined as the sum of the length of all the sides of a triangle

**Question: 9**

A triangle having all sides of different length is known as its

**Solution:**

Scalene triangle: A Scalene triangle is defined as a triangle having all sides of different length.

**Question: 10**

A triangle whose one angle is more than  $90^\circ$  is called

**Solution:**

An obtuse triangle: An obtuse triangle is a triangle whose one angle is more than  $90^\circ$