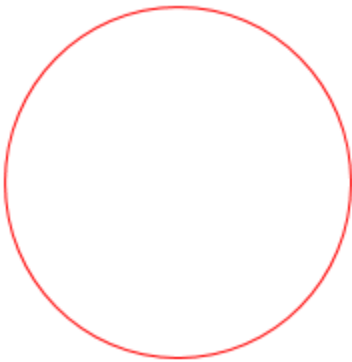# Circle

In geometry, the **circle** is the most important shape to learn. The theoretical importance of a **circle** applied in many subjects such as physics, astronomy, mathematics, etc. In early education, we introduce with many geometrical shapes so that we can understand other subjects where the principles of **circle** apply.

In geometry, a round-shaped figure is called a **circle**. In this section, we will learn the **circle definition, diameter of a circle, circumference of a circle,** and other parts of circle. Along with this we will also learn the **types of circle, properties,** and **formulas**.

Circle Definition

A curved line that has the same distance from the center and connects at the point where it starts, called the **circle**. In other words, it is the locus of all points that have equidistant from the origin. The examples of the circle are **wheel, coin, compact disc**, etc. The following figure represents the shape of a circle.
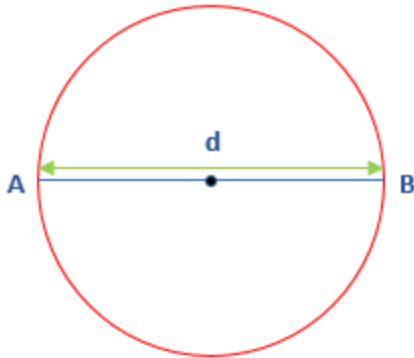

Parts of Circle

There are following parts of a circle:

- o **Diameter:** A line segment that passes through the center and touches the boundary of the circle at both sides, called the **diameter**. It is the longest chord of the circle. It is twice the length of the diameter. It is denoted by **d**.

In the following figure, the line segment **AB** is the diameter.

- ○ **Radius:** A line segment that touches the center from one side and touches the boundary from another side, called the **radius**. In other words, the distance between the center and circumference is called the **radius**. It is half the length of the diameter. It is denoted by **r**. In the following figure, the line segment **OA** is the radius.
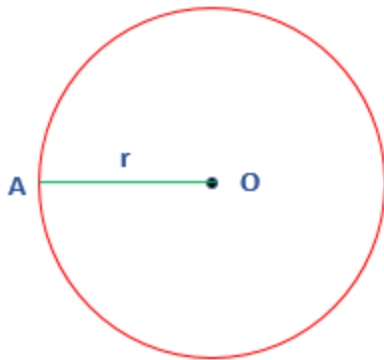

- ○ **Circumference:** The distance around the circle is called the **circumference**. In other words, the arc length of the circle is called the circumference. It is the perimeter of the circle. It is denoted by The following figure, the green

dotted   line   denotes   the   circumference.

Circumference (C)
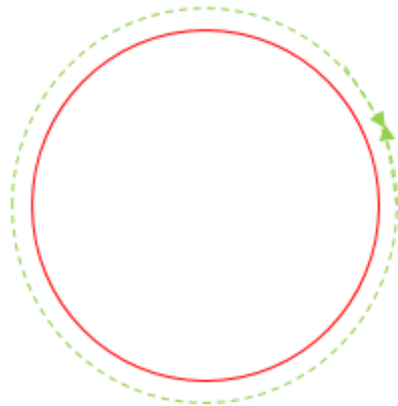
○ **Origin or Center:** A point in the middle of the circle that has equidistant from all the points on the circle called the **origin**. It is also known as **center**. It is denoted by **O**. In the following figure, O denotes the origin or   center   of   the   circle.
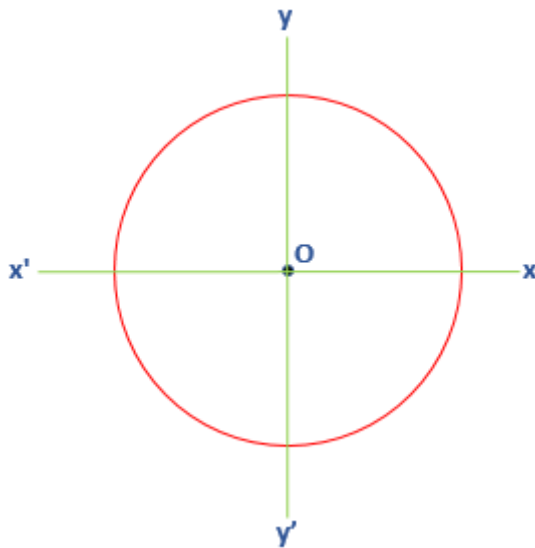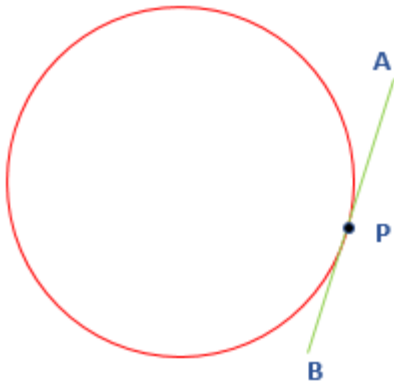

○ **Tangent:** A line segment that touches the circle at a common point is called a **tangent**. It is always drawn out of the circle. In the following figure,

the   line   segment **AB** is   a   tangent.

A

B
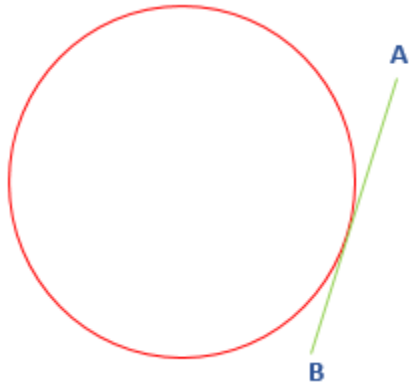
o   **Tangency Point:** The point where the tangent line touches the circle is called **tangency point.** In the following figure, the line segment **AB** touches the circle at point **P.**


A

P

B

o   **Chord:** A line segment whose endpoints lies on the circle is called **chord**. It also divides the circle into two parts. In the following figure, the line segment **AB** is   a   chord.


A

B
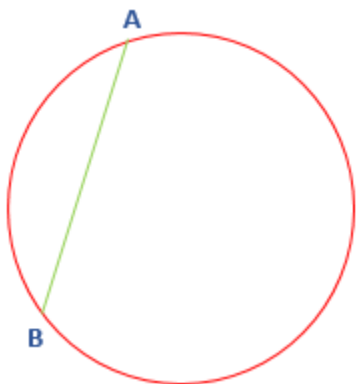
o   **Arc:** A part of the circumference is called an **arc**. There are two parts of the arc:

- **Minor Arc:** The smaller part of the arc is called the **minor arc**. In the following figure, green arc shows the minor arc.
- **Major Arc:** The larger part of the arc is called the **major arc**. In the following figure, red arc shows the major arc.
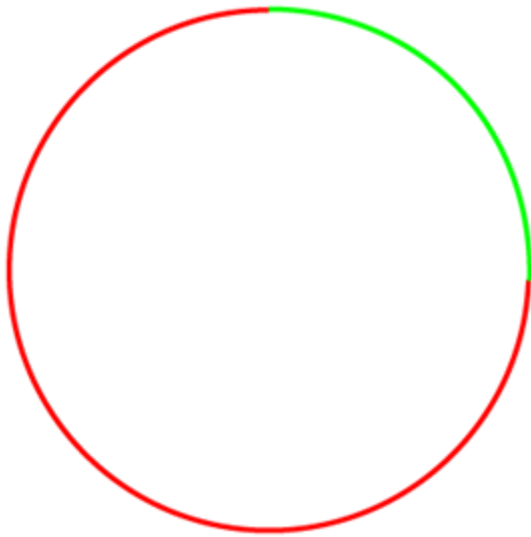

- **Segment:** The region enclosed between arc and chord is called the **segment**. There are two parts of segments:
  - **Minor Segment:** The smaller part of the circle's segment is called the **minor arc.**
  - **Major Segment:** The larger part of the circle's segment is called the **major arc.**

The following figure shows the minor and major segment of the circle.
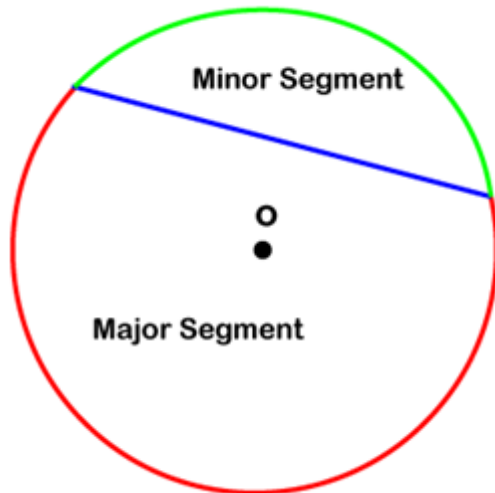
- ○ **Sector:** The region enclosed between two radii of equal length is called the **sector** of the circle.
    - ○ **Minor Sector:** The smaller part of the circle's sector is called the **minor sector.**
    - ○ **Major Sector:** The larger part of the circle's sector is called the **major sector.**

The following figure shows the minor and major sector of the circle.
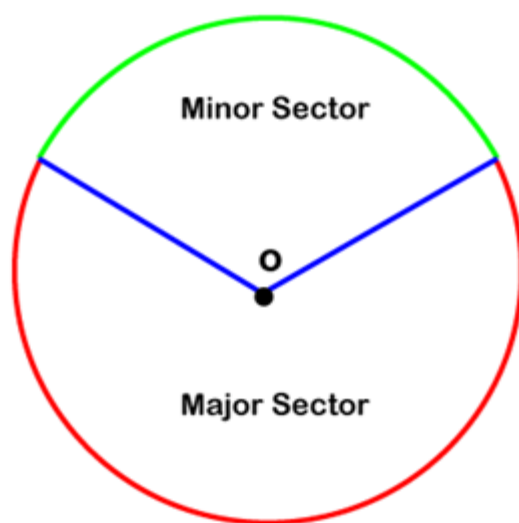
- o **Secant:** A line segment that intersects the circle at two points is called **secant**. In the following figure, the line segment **AB** is a secant.
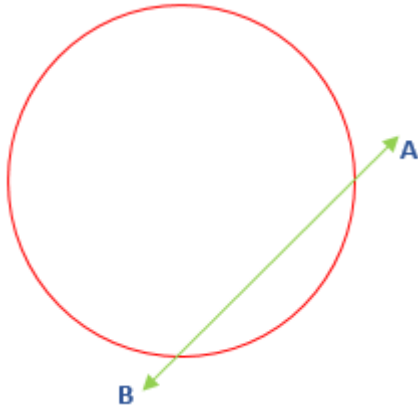

Types of Circle

There are three types of circle are as follows:

- o **Tangent Circle:** It is a circle that intersects more than two circles at a common point is called **tangent circles**. It does not share the common center. The following figure shows tangent circle. All the three circles intersect each other at common point **P**.
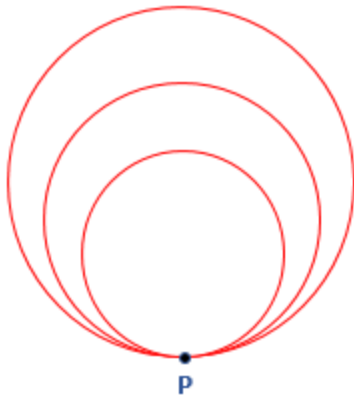

- o **Concentric Circle:** Two or more than two circles that have the same center are called the **concentric circle.** These circles are of different radii. In the following figure, there are three circles of different radii having the same

center **O**.
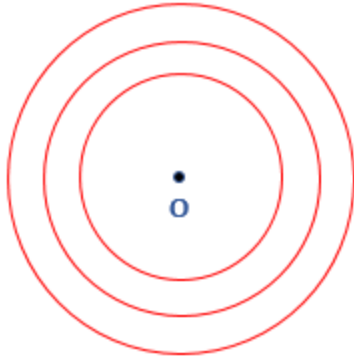
- o **Congruent Circle:** Two or more than two circles with the same radii but different centers are called **congruent circle**. In the following figure, there are two circles with the same radii but having two different centers.
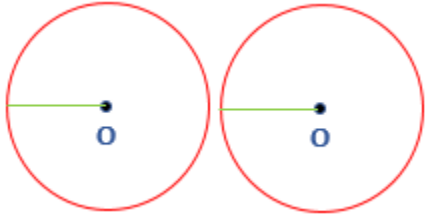
Circle Formulas

- o Area of Circle $(A) = \pi r^2$
- o Diameter $(d) = 2 \times$ radius (r)
- o Radius $(r) = \dfrac{\text{Diameter}}{2}$
- o Circumference $(C) = 2\pi r$

We can also find the radius by using the following formula. It applies when circumference is given in the question.

- $r = \dfrac{c}{2\pi}$

Circle Properties

Some of the important properties of the circle are as follows:

- o The circles having equal radii are called congruent.

- The diameter of a circle is the longest chord of a circle.
- Perpendicular dropped from the center divides a chord into two equal parts.
- Radius is always perpendicular to the tangent at the point where it touches the circle.
- Angles formed by the same arc on the circumference of the circle is always equal.
- An angle formed by an arc at the center is twice the inscribed angle formed by the same arc.