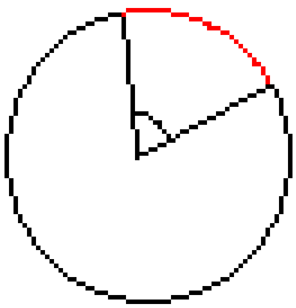
Arcs and Chords:

Consider two points A and B on the circumference of the circle these are the end points of an arc. When they are the end points of an arc, the angle is sometimes called the peripheral angle of the arc.

Central Angle:



Red arc is showing the minor arc

- A similar concept is the central angle. This is the angle subtended at the center of the circle by the two given points.
- The central angle is always twice the inscribed angle.

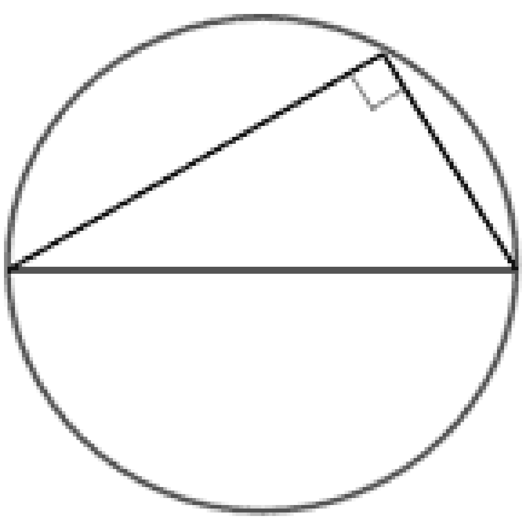


Fig Showing an angle formed in semi circle is Right angle

Thales' Theorem:

Refer to the above figure. If the two points A, B form a diameter of the circle, the inscribed angle will be 90°, which is Thales theorem.

We can verify this by solving the formula above using an arc length of half the circumference of the circle.

The segment is always the smaller part of the circle. This is a definition of a segment. Its Central angle is always less than 180°

In fact, if the chord divides the circle exactly in half (becoming a diameter) neither of the two halves are segments. They are semicircles.

Central Angle: The angle subtended by the segment to the center of the circle of which it is a part.

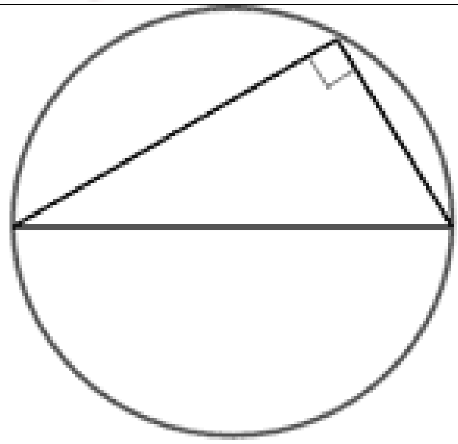
Angle inscribed in a semi - circle:

The angle inscribed in a semicircle is always a right angle 90° OR the inscribed angle ABC will always remain 90°.

The triangle formed by the diameter and the inscribed angle (triangle ABC above) is always a Right angled triangle.

Relationship to Thales' Theorem:

This is a particular case of Thales Theorem, which applies to an entire circle, not just a semicircle.



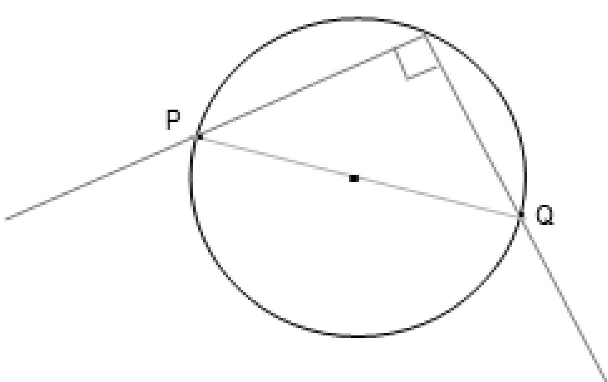
According to the Thales theorem

'Circle subtends a right angle to any point on the circle. No matter where the point is, the triangle formed is always a right angled triangle.

Thales' Theorem: **The diameter of a circle always subtends at a *Right Angle* to any point on the circle**

In another words we can state the theorem as, 'If a triangle has, as one side, the diameter of a circle, and the third Vertex of the triangle is any point on the Circumference of the circle, then the triangle will always be a right triangle'

A practical application – finding the center of a circle



The converse of Thales Theorem is useful in finding the center of a circle.
In the figure, a right angle whose vertex is on the circle always “cuts off” a diameter of the circle. That is, the points P and Q are always the ends of a diameter line.
Since the diameter passes through the center, by drawing two such diameters the center is found at the point where the diameters intersect.

Locate the center of a circle using any right-angled object:

Objective: To find the center of a circle using any right-angled object. In this demonstration we can use 45-45-90 drafting triangle, or anything that has a 90° corner, such as the corner of a sheet of paper.

Construction with Demo work:

Draw a given circle of given measurement with center O.

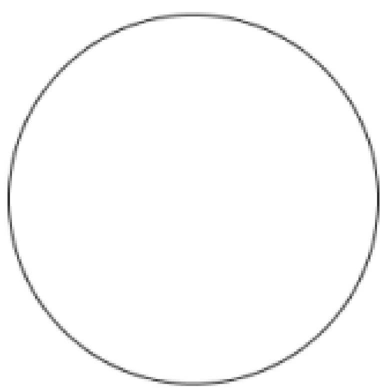


Fig # 1 A circle with center O

Place the right-angle corner of any object at any point on the circle.

Construction with Demo work:

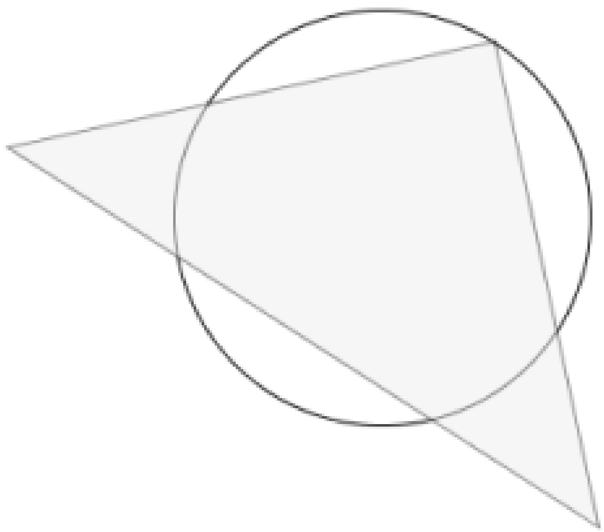


Fig # 2 Obtaining a point on circle by Set-square.

Make a mark where the two sides of the right-angle touch the circle.

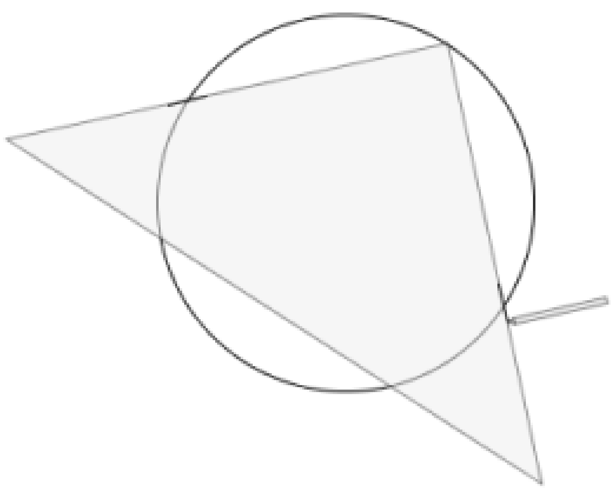


Fig # 3

Construction with Demo work:

Note the position of right angle

Draw a line between these two marks. According to the Thales theorem this is the diameter of the circle.

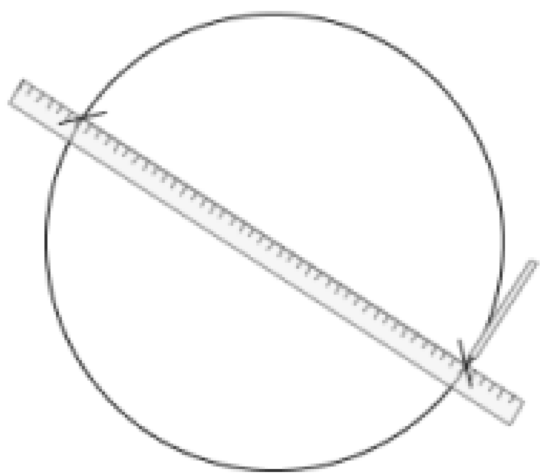


Fig # 4 Marking of points on circumference of circle

Place the right-angle corner of the object at any other point on the circle. We can use any point but for greatest accuracy, make it about a quarter the way round the circle from the first point.

Construction with Demo work:

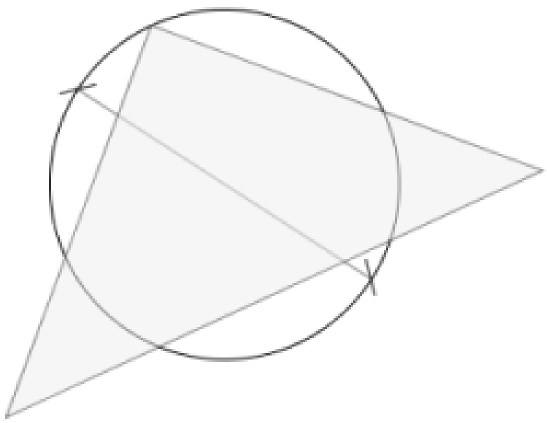


Fig # 5

Note the position of right angle

Make a mark where the two sides of the right-angle cross the circle.

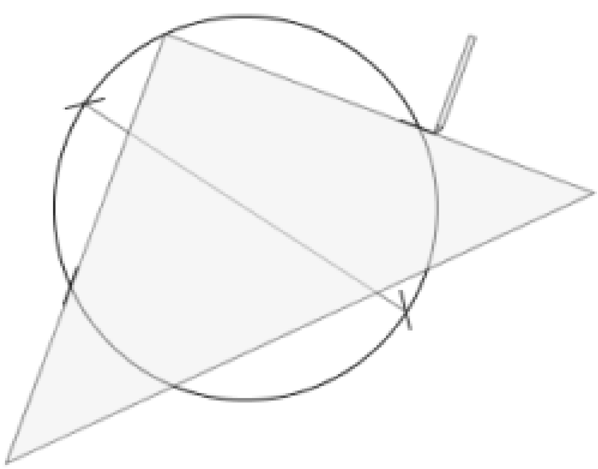


Fig # 6

The point where the two diameters intersect is the center of the circle.

Construction with Demo work:

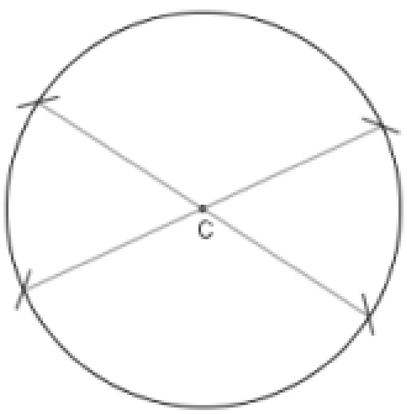


Fig # 7

Center of the Circle

The point 'c' is representing the center of the circle, the point where the two diameters intersect each other.