

# Degree And Radian Measure

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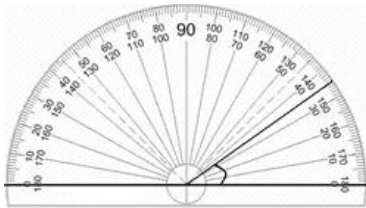
## What is a Degree Measure?

One degree is one 360th part of a full circle. To get a more clear idea we defined [degree measure](#) as follows:

A central angle that is subtended by an arc equal in length to  $1/360$  of the circle's circumference, is said to have a measure of one degree, denoted  $1^\circ$ .

That is; for a circle with [circumference](#)  $C$  units, central angle of  $\theta$  degrees subtended by an arc of  $s$  units, this relationship can be expressed by the following proportion:

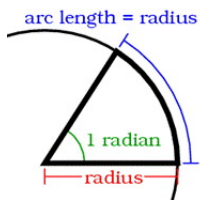
$$\frac{\theta^\circ}{360^\circ} = \frac{s}{C},$$



The degree is further divided into 60 minutes.

For even finer measurements the minute is divided again into 60 seconds; however this last measure is so small, it only used where angles are subtended over extreme distances such as astronomical measurements, and measuring latitude and longitude.

## What is a Radian Measure

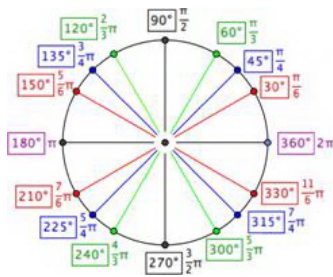


The [radian](#) is the standard unit of angular measure. It describes the plane angle subtended by a circular arc as the length of the arc divided by the radius of the arc.

One radian is the angle made at the center of a circle by an arc whose length is equal to the [radius of the circle](#). The radian is a fixed size no matter what the size of the circle is.

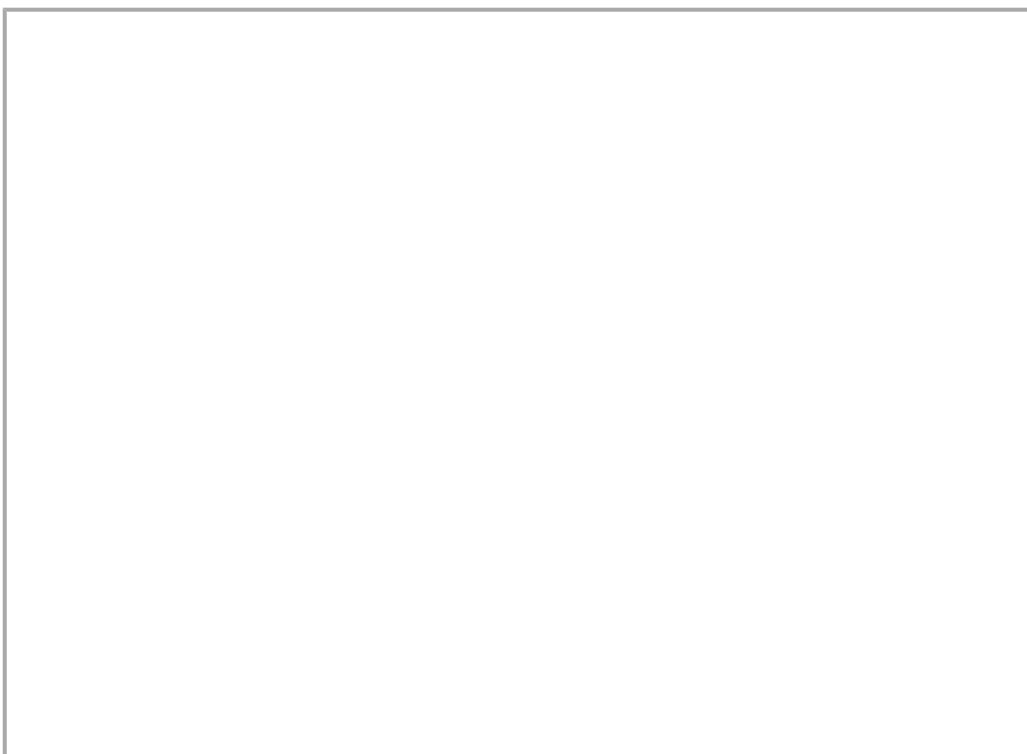
Important Remarks:

- A full angle is  $2\pi$  radians, so there are  $360^\circ$  per  $2\pi$  radians, equal to  $180^\circ / \pi$ .
- A right angle is  $\pi / 2$  radians and a straight angle is  $\pi$  radians.



## Relation between Degree and Radian

A circle subtends at the centre an angle whose [radian measure is  \$2\pi\$](#)  and its [degree measure is  \$360^\circ\$](#) ,



## Radian to Degree

We have,

2? radian =  $360^\circ$  or ?  
radian =  $180^\circ$

Also, 1 radian =  $180^\circ / ?$

Or, Radian Measure =

$$\frac{\pi}{180} \times \text{Degree Measure}$$

## Degree to Radian

We have,

$1^\circ = ? / 180$  radian

$$\text{Degree Measure} = \frac{180}{\pi} \times \text{Radian Measure}$$

$$30^\circ \rightarrow \text{Radians} = \frac{\pi}{180^\circ}(30^\circ) = \frac{\pi}{6} \text{ rad}$$

$$90^\circ \rightarrow \text{Radians} = \frac{\pi}{180^\circ}(90^\circ) = \frac{\pi}{2} \text{ rad}$$

$$\frac{5\pi}{4} \text{ rad} \rightarrow \text{Degrees} = \frac{180^\circ}{\pi} \left( \frac{5\pi}{4} \right) = 225^\circ$$

$$\frac{3\pi}{2} \text{ rad} \rightarrow \text{Degrees} = \frac{180^\circ}{\pi} \left( \frac{3\pi}{2} \right) = 270^\circ$$

On the basis of above discussion, we now solve the following questions:

1. Convert  $40^{\circ} 20'$  into radian measure.

We know,  $180^{\circ} = \pi$  radian

$$40^{\circ} 20' = 40 \frac{1}{3} \text{ degree} = \frac{\pi}{180} \times \frac{121}{3} \text{ radian} = \frac{121 \pi}{540} \text{ radian.}$$

2. Convert 6 radians into degree measure.

We know,  $\pi$  radian =  $180^{\circ}$

$$6 \text{ radians} = \frac{180}{\pi} \times 6 \text{ degree} = \frac{1080 \times 7}{22} \text{ degree}$$

$$343 \frac{7}{11} \text{ degree} = 343^{\circ} + \frac{7 \times 60}{11} \text{ minute [As } 1^{\circ} = 60']$$

$$343^{\circ} + 38' + \frac{2}{11} \text{ minute [As } 1' = 60'']$$

$$343^{\circ} + 38' + 10.9''$$

343°38'11'' approximately

Now try it yourself! Should you still need any help, [click here](#) to schedule live online session with e Tutor!

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### **Reference Links:**

- [http://en.wikipedia.org/wiki/Degree\\_\(angle\)](http://en.wikipedia.org/wiki/Degree_(angle))
- [http://en.wikipedia.org/wiki/Circumference#Circumference\\_of\\_a\\_circle](http://en.wikipedia.org/wiki/Circumference#Circumference_of_a_circle)
- <http://en.wikipedia.org/wiki/Radian>
- <http://en.wikipedia.org/wiki/Radius>
- [http://wiki.answers.com/Q/What\\_is\\_the\\_relationship\\_between\\_radian\\_and\\_degrees](http://wiki.answers.com/Q/What_is_the_relationship_between_radian_and_degrees)

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