Degree And Radian Measure

# What is a Degree Measure?

One degree is one 360th part of a full circle. To get a more clear idea we define 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°.

That is; for a circle with circumference C units, central angle of ? degrees subtended by an arc of s units, this relationship can be expressed by the following proportion:
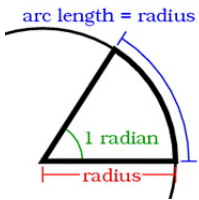
$$\frac{\theta^{\circ}}{360^{\circ}} = \frac{s}{C},$$
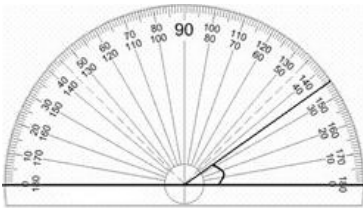
 The degree is further divided in to 60 minutes.

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.
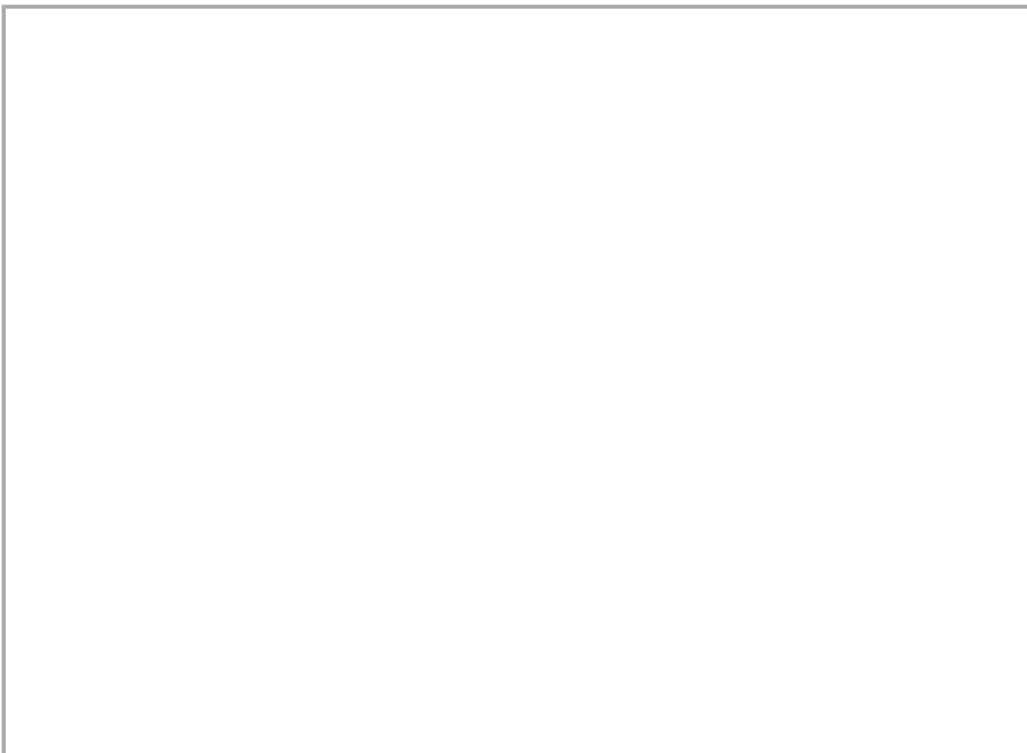
Important Remarks:

- A full angle is 2? radians, so there are 360° per 2? radians, equal to 180° / ?.
- A right angle is ? / 2 radians and a straight angle is ? radians.
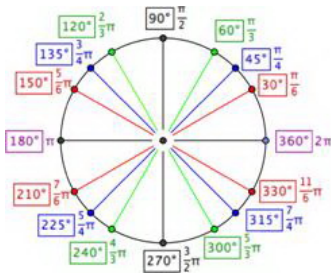
 Relation between Degree and Radian

A circle subtends at the centre an angle whose radian measure is 2? and its degree measure is 360°,

Radian to Degree

We have,

2π radian $= 360°$ or π radian $= 180°$

Also, 1 radian $= 180° / \pi$

Or, Radian Measure $= \dfrac{\pi}{180}$ x Degree Measure

Degree to Radian

We have,

$1° = \pi / 180$ radian

Degree Measure $= \dfrac{180}{\pi}$ x Radian Measure

$$30° \to \text{Radians} = \frac{\pi}{180°}(30°) = \frac{\pi}{6}\text{ rad}$$

$$90° \to \text{Radians} = \frac{\pi}{180°}(90°) = \frac{\pi}{2}\text{ rad}$$

$$\frac{5\pi}{4}\text{rad} \to \text{Degrees} = \frac{180°}{\pi}\left(\frac{5\pi}{4}\right) = 225°$$

$$\frac{3\pi}{2}\text{rad} \to \text{Degrees} = \frac{180°}{\pi}\left(\frac{3\pi}{2}\right) = 270°$$

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

1. Convert 40° 20' into radian measure.

We know, 180° = ? radian

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

2. Convert 6 radians into degree measure.

We know, ? radian = 180°

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

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

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

343° + 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/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

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