

Trigonometry
Change of Angle
Degrees to Radians

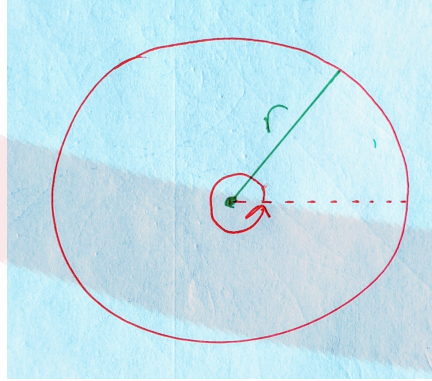
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What is a radian?

We're used to measuring angles in degrees however, there is another measure for angles, radians. What is a radian? Let's consider a circle and its perimeter. The perimeter of a circle is the length of the line that wraps around the circle.



The perimeter of the circle is given by P and the formula below,

$$P = \text{length of the distance around the circle} = 2\pi r$$

If we solve for 2π we get the following,

$$\frac{P}{r} = 2\pi$$

which is the angle revolved around to go around edge of the circle one time. In degrees we know that one revolution around a circle is 360° . This means,

$$\begin{aligned} 2\pi &= 360^\circ \\ \pi &= 180^\circ \text{ or} \\ \pi \text{ radians} &= 180^\circ \end{aligned}$$

Given that π radians = 180° we can convert degrees to radians and vice versa. Let's consider some examples.

Convert 135° to radians.

1. First, let x represent what we are looking for.

$$135^\circ = x \text{ radians}$$

2. Second, write out the relationship between degrees and radians.

$$180^\circ = \pi \text{ radians}$$

3. Third, equate the ratios.

$$\frac{135^\circ}{180^\circ} = \frac{x \text{ radians}}{\pi \text{ radians}}$$

4. Fourth, Solve for x .

$$\frac{135^\circ}{180^\circ} = \frac{x}{\pi}$$

$$\frac{3}{4}\pi = x \text{ radians}$$

Therefore, $135^\circ = \frac{3}{4}\pi$ radians.

Convert 270° to radians.

$$270 = x \text{ radians}$$

$$180 = \pi \text{ radians}$$

$$\therefore \frac{270}{180} = \frac{x}{\pi}$$

$$\frac{270}{180}\pi = x$$

$$\frac{3}{2}\pi = x$$

Therefore, 270° is $\frac{3}{2}\pi$ radians.

Exercises

Convert the following angles to radians.

a) 95°

f) 300°

b) 100°

g) 315°

c) 35°

h) 45°

d) 200°

i) 90°

e) 265°

j) 225°