

Radian –Degrees Conversion

Name: _____

Read

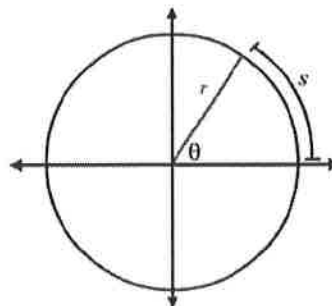
Most of you are used to thinking of a circle in terms of degrees: 360° is the whole circle. 180° is half the circle, etc... Well, radian measure is just a different way of talking about the circle. Radian measure is just a different unit of measure.

Just as we can measure a football field in yards or feet – we can measure a circle in degrees (like the good old days) or in radians (welcome to the big leagues!) One full rotation is 360° or 2π radians.

Think about what the word *radian* sounds like... well, it sounds like ‘radius’, right? It turns out that a radian has a close relationship to the radius of a circle.

What is a radian?

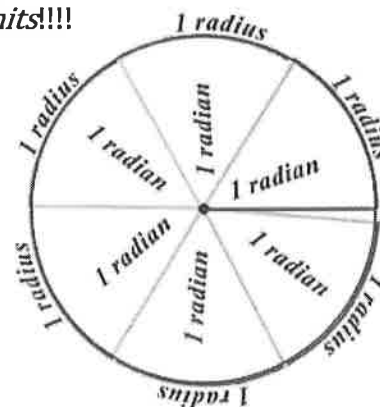
$$\text{radian } (\theta) = \frac{\text{arc length } (s)}{\text{radius } (r)}$$



When we use radians to represent angle measures, we will write “rads” simply to describe the angle measure. Remember though, that “rads” are not the units!!!!

The diagram at right shows that for any given circle, its radius can be wrapped around its circumference a little more than six full times.

$$360^\circ = 2\pi \text{ rad} = 6.28 \text{ rad}$$



Converting between degrees and radians

When converting between degrees and radians, use the following conversion factors:

$$\frac{2\pi}{360^\circ} = \frac{\pi}{180^\circ}$$

or

$$\frac{360^\circ}{2\pi} = \frac{180^\circ}{\pi}$$

Use when converting
from degrees to radians!

Use when converting
from radians to degrees!

Example Solutions

1) Convert 90° into radian measure.

Multiply the degrees by the correct conversion factor:

$$\frac{90^\circ}{1} \cdot \frac{\pi}{180^\circ} \quad \leftarrow \begin{array}{l} \text{use when converting} \\ \text{into radians.} \end{array}$$

: Multiply across the top and bottom

$$= \frac{90\pi}{180} \quad \text{: Simplify the fraction } \frac{90}{180}$$

$$= \frac{\pi}{2} \text{ rad} \quad \text{: Answer in radian measure.}$$

2) Convert -450° into radian measure.

Multiply the degrees by the correct conversion factor:

$$\frac{-450^\circ}{1} \cdot \frac{\pi}{180^\circ} \quad \leftarrow \begin{array}{l} \text{converting to radians} \end{array}$$

: Multiply across the top and bottom

$$= \frac{-450\pi}{180} \quad \text{: Simplify the fraction } \frac{-450}{180}$$

$$= \frac{-5\pi}{2} \text{ rad} \quad \text{: Answer in radian measure.}$$

3) Convert $\frac{\pi}{7}$ rad into degree measure.

Multiply the degrees by the correct conversion factor:

$$\frac{\pi}{7} \cdot \frac{180^\circ}{\pi} \quad \leftarrow \begin{array}{l} \text{converting into degrees} \end{array}$$

: Multiply across the top and bottom

$$= \frac{180\pi}{7\pi} \quad \text{: Simplify the fraction, } \pi \text{ cancels}$$

$$= \frac{180}{7} = 25.7^\circ \quad \text{: divide } \frac{180}{7}, \text{ Answer in degrees}$$

4) Convert $\frac{-3\pi}{15}$ rad into degree measure.

Multiply the degrees by the correct conversion factor:

$$\frac{-3\pi}{15} \cdot \frac{180^\circ}{\pi} \quad \leftarrow \begin{array}{l} \text{Converting into degrees} \end{array}$$

: Multiply across the top and the bottom

$$= \frac{-540\pi}{15\pi} \quad \text{: Simplify the fraction, } \pi \text{ cancels}$$

$$= \frac{-540}{15} = -36^\circ \quad \text{: divide } \frac{-540}{15}, \text{ Answer in degrees}$$

Your Turn

Convert the following degree measures into radian measure. Show all your work.

1. 340°

2. 100°

3. 25°

4. -32°

5. 540°

6. 210°

7. 95°

8. -270°

9. 360°

Convert the following rad measures into degrees. Show all your work.

10. $\frac{\pi}{4}$ rad

11. $\frac{\pi}{10}$ rad

12. $\frac{7\pi}{3}$ rad

13. $\frac{-\pi}{20}$ rad

14. $\frac{13\pi}{6}$ rad

15. $\frac{-3\pi}{2}$ rad

16. $\frac{\pi}{2}$ rad

17. $\frac{-5\pi}{6}$ rad

18. $\frac{2\pi}{3}$ rad

Turn this packet in when you're finished with #'s 1-18. This will be graded!