

## Converting Between Radians and Degrees Notes

What is a radian?

A radian is an angle measuring one radius around the circumference

How many degrees measure the angle of a half circle?

180 degrees

How many radians exactly measure the angle of a half circle?

$\pi$  radians

Write an equation relating radians and degrees of a half circle.

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

$$1 = \frac{\pi \text{ radians}}{180 \text{ degrees}} \quad \text{or} \quad 1 = \frac{180 \text{ degrees}}{\pi \text{ radians}}$$

Use this relationship to convert  $\frac{\pi}{3}$  radians to degrees.

$$\frac{\pi}{3} \text{ radians} \cdot \frac{180 \text{ degrees}}{\pi \text{ radians}}$$

$$= \frac{180}{3} \text{ degrees} = \boxed{60^\circ}$$

How many radians are in  $200^\circ$ ?  
Give an exact value using  $\pi$  in your answer.

$$200 \text{ degrees} \cdot \frac{\pi \text{ radians}}{180 \text{ degrees}}$$

$$= \frac{200\pi}{180} \text{ radians}$$

$$= \boxed{\frac{10\pi}{9} \text{ radians}}$$

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Convert each of the following degree measures to radians. Use  $\pi$  to give exact values.

a.  $180^\circ$

$$180 \text{ degrees} \cdot \frac{\pi \text{ radians}}{180 \text{ degrees}} = \boxed{\pi \text{ radians}}$$

b.  $-36^\circ$

$$-36 \text{ degrees} \cdot \frac{\pi \text{ radians}}{180 \text{ degrees}} = \frac{-36\pi \text{ radians}}{180} = \boxed{-\frac{\pi}{5} \text{ radians}}$$

c.  $2\pi^\circ$

$$2\pi \text{ degrees} \cdot \frac{\pi \text{ radians}}{180 \text{ degrees}} = \boxed{\frac{\pi^2}{90} \text{ radians}}$$

Convert the radian measures to degrees. Leave  $\pi$  in your answer if necessary to give the exact value.

a.  $\frac{3\pi}{2}$  radians

$$\frac{3\pi}{2} \text{ radians} \cdot \frac{180 \text{ degrees}}{\pi \text{ radians}} = \boxed{270 \text{ degrees}}$$

b.  $-\frac{7\pi}{6}$  radians

$$-\frac{7\pi}{6} \text{ radians} \cdot \frac{180 \text{ degrees}}{\pi \text{ radians}} = \boxed{-210 \text{ degrees}}$$

c. 2 radians

$$2 \text{ radians} \cdot \frac{180 \text{ degrees}}{\pi \text{ radians}} = \boxed{\frac{360}{\pi} \text{ degrees}}$$