

Unit 7 Day 2: Converting Between Degree and Radian Measure

Angles are measured in two different ways. The first unit of measurement is degree measure. 360° is equal to one revolution. Most likely the reason we use 360 is from the ancient Babylonians whose year consisted of 360 days. Another measurement for angles is radian measure. In radians, 2π is equal to one revolution. So $360^\circ = 2\pi$ or $180^\circ = \pi$. We can use this to write a formula for converting between radian and degree measure.

Converting from Degrees to Radians

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

$$\frac{280^\circ}{180^\circ} \left| \frac{\pi \text{ radians}}{1} \right. =$$

$$\frac{280\pi}{180} = \frac{14\pi}{9} \text{ radians}$$

Example 1: Convert 280° to radian measure.

$\frac{280 \cdot \pi}{180}$ Now, use your calculator to reduce the fraction! Leave the π in the solution. $280^\circ = \frac{14\pi}{9} \text{ radians}$

Converting from Radians to Degrees

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

Example 2: Convert $\frac{2\pi}{5}$ to degree measure.

$\frac{2\pi}{5} \cdot \frac{180}{\pi}$ Divide the π out and then just simplify the fraction. $\frac{2\pi}{5} = 72^\circ$

$$\frac{2 \cdot 180}{5} = \frac{360}{5} = 72^\circ$$

Practice: Convert the following to radians.

3) $120^\circ \cdot \frac{\pi}{180} = \frac{120\pi}{180} = \frac{2\pi}{3}$ 4) $75^\circ \cdot \frac{\pi}{180} = \frac{5\pi}{12}$ 5) $310^\circ \cdot \frac{\pi}{180} = \frac{31\pi}{18}$

Convert the following to degrees.

6) $\frac{4\pi}{5} \cdot \frac{180}{\pi} = \frac{4 \cdot 180}{5} = 144^\circ$ 7) $\frac{7\pi}{6} \cdot \frac{180}{\pi} = 210^\circ$ 8) $\frac{5\pi}{11} \cdot \frac{180}{\pi} = 81.8^\circ$

P.S ODDS

Unit 9 Day 5 Show all work!

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Convert each degree measure into radians.

1) 255°

$$\frac{17\pi}{12}$$

3) -315°

$$-\frac{7\pi}{4}$$

5) 55°

$$\frac{11\pi}{36}$$

7) -210°

$$-\frac{7\pi}{6}$$

9) 315°

$$\frac{7\pi}{4}$$

2) 120°

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

4) -240°

$$-\frac{4\pi}{3}$$

6) 225°

$$\frac{5\pi}{4}$$

8) 270°

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

10) -30°

$$-\frac{\pi}{6}$$

Convert each radian measure into degrees.

11) $\frac{5\pi}{4}$

$$225^\circ$$

13) $-\frac{3\pi}{2}$

$$-270^\circ$$

15) $-\frac{\pi}{4} \cdot \frac{180}{\pi} = -\frac{180}{4}$

$$-45^\circ$$

17) $\frac{3\pi}{2}$

$$270^\circ$$

19) $\frac{3\pi}{4}$

$$135^\circ$$

12) $-\frac{5\pi}{12} \cdot \frac{180}{\pi} = -\frac{5 \cdot 180}{12} = -75^\circ$

14) $\frac{7\pi}{6}$

$$210^\circ$$

16) $-\frac{7\pi}{6}$

$$-210^\circ$$

18) $\frac{5\pi}{18}$

$$50^\circ$$

20) $\frac{47\pi}{36}$

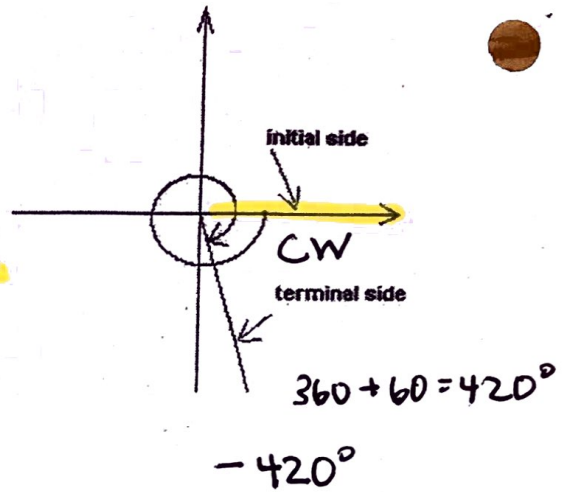
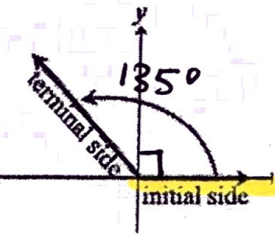
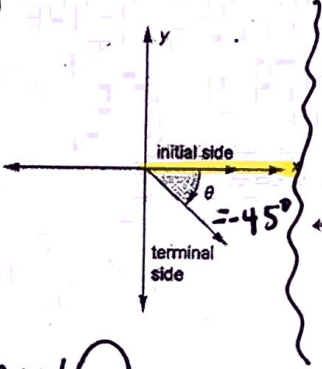
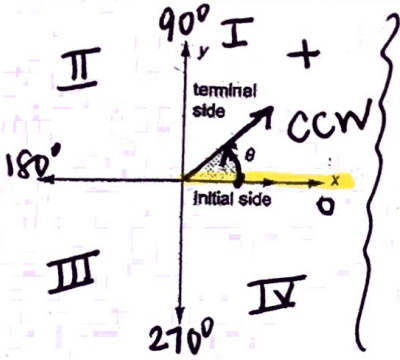
$$235^\circ$$

5

Angles in Standard Position Notes

initial side = positive x-axis

Consider each of the following angles in standard position:



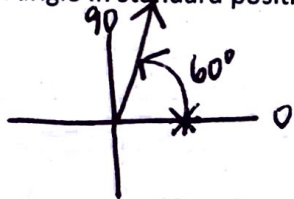
+ angle \rightarrow CCW \curvearrowright

- angle \rightarrow CW \curvearrowleft

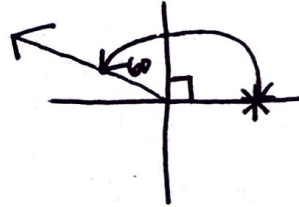
$\theta = \text{theta}$

Sketch each angle in standard position. What quadrant does the terminal side lie in?

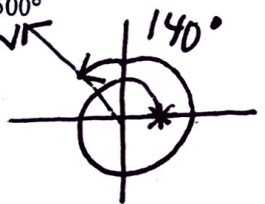
1. 60°
+ CCW
I



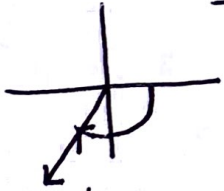
2. 150°
CCW
II



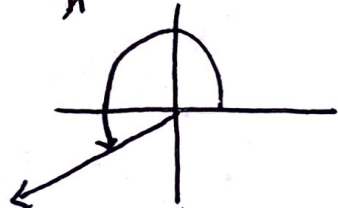
3. 500°
CCW
II



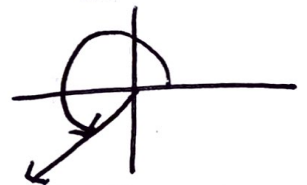
4. $\frac{-2\pi}{3} \cdot \frac{180}{\pi} = \frac{-360}{3} = -120^\circ$
CW
III



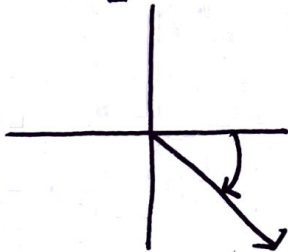
5. $\frac{7\pi}{6} \cdot \frac{180}{\pi} = 210^\circ$ CCW



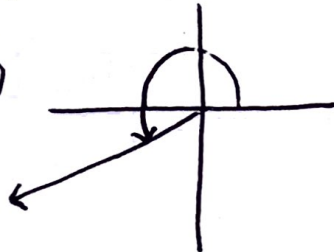
6. $\frac{5\pi}{4} \cdot \frac{180}{\pi} = 225^\circ$



7. -45°
CW
IV



8. 205°
CCW
III



9. $\frac{\pi}{4} \cdot \frac{180}{\pi} = 45^\circ$

