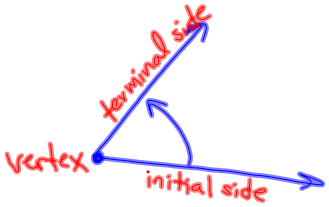
Day 11



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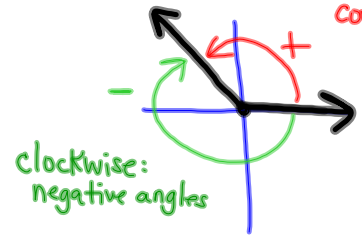
Angles in standard position:

1. Vertex is at the origin
2. Initial side is on the positive x-axis.



Counterclockwise: positive angles

Clockwise: negative angles

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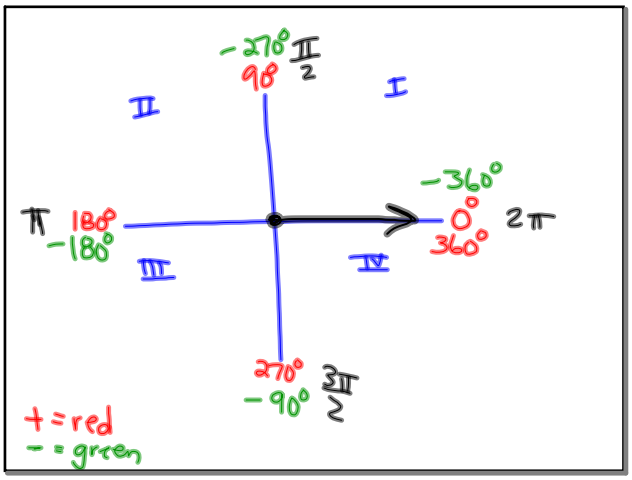

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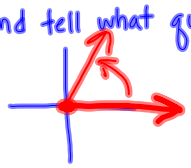
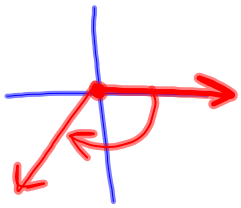
Example: Sketch each angle in standard position and tell what quadrant the angle lies

1. 80°



2. -135°



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Coterminal Angles

Add/Subtract 360°

75° +: 75+360 = 435°
−: 75 − 360 = −285°

−470° +: −470+360 = −110+360 = 250°
−: −830

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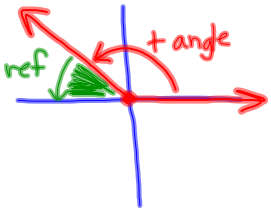
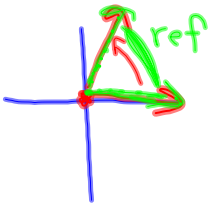
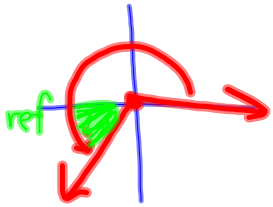
Reference Angles

- Always between 0° − 90°



determine ref ∠:
1. terminal side
2. closest part of the x-axis to the terminal side





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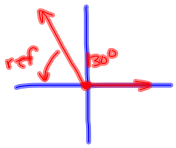
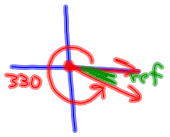
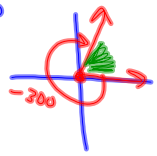
Example: Find the reference angle

③ 130° 

50°
$180-130$

④ 330° 

30°
$360-330$

⑤ -300° 

60°
$360-300$

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Angle Measures

① Degrees
② Radians (π)

Degrees $\longrightarrow$ Radians: degree $\cdot \frac{\pi}{180}$

Radians $\longrightarrow$ Degrees: radian $\cdot \frac{180}{\pi}$

90°: $90 \cdot \frac{\pi}{180} = \frac{90\pi}{180} = \frac{\pi}{2}$ $\quad \frac{1}{2}\pi \cdot \frac{180}{\pi} = 90$

360°: $360 \cdot \frac{\pi}{180} = \frac{360\pi}{180} = 2\pi$

240°: $240 \cdot \frac{\pi}{180} = \frac{240\pi}{180} = \frac{4\pi}{3}$

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Example: Find 1 positive and 1 negative coterminal angle.

⑥ 47° $\quad +: 407^\circ$ $\quad -: -313^\circ$

⑦ $\frac{\pi}{3}$ $\quad \frac{\pi}{3} + 2\pi \frac{6\pi}{3} = \frac{7\pi}{3}$

$\frac{\pi}{3} - 2\pi \frac{6\pi}{3} = -\frac{5\pi}{3}$

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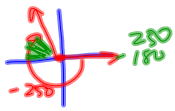
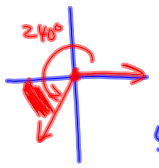
Example: Find the reference angle.

⑧ -250° 

70°

⑨ $\frac{4\pi}{3}$ $\quad \frac{\pi}{3}$



$60^\circ \cdot \frac{\pi}{180} = \frac{60\pi}{180}$

$\frac{4\pi}{3} \cdot \frac{180}{\pi} = 240$

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Degrees° Minutes' Seconds"

$72^\circ 47' 35''$ $\quad 72.79305556$

Ans ▶ DMS

54.37 ▶ DMS $\quad 54^\circ 22' 12''$

Jan 25-11:14 AM