





1. Sketch the following in standard position and find their complimentary and supplementary angles:


a. $\theta = 87^\circ$  $\theta_c = 3^\circ$
 $\theta_s = 93^\circ$


b. $\beta = \frac{2\pi}{5}$  $\beta_c = \frac{\pi}{10}$
 $\beta_s = \frac{3\pi}{5}$

c. $\alpha = 128^\circ$  $\alpha_c = \text{DNE}$
 $\alpha_s = 52^\circ$

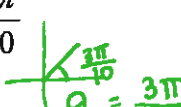
2. Sketch the following in standard position and find a positive and negative co-terminal angle:


a. $\theta = \frac{13\pi}{9}$  $\theta_+ = \frac{31\pi}{9}$
 $\theta_- = \frac{5\pi}{9}$

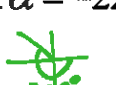
b. $\beta = -234^\circ$  $\beta_+ = 126^\circ$
 $\beta_- = -594^\circ$


c. $\alpha = \frac{5\pi}{8}$  $\alpha_+ = \frac{21\pi}{8}$
 $\alpha_- = \frac{-11\pi}{8}$

3. Sketch the following in standard position and find their reference angles:

a. $\theta = \frac{3\pi}{10}$  $\theta_r = \frac{3\pi}{10}$

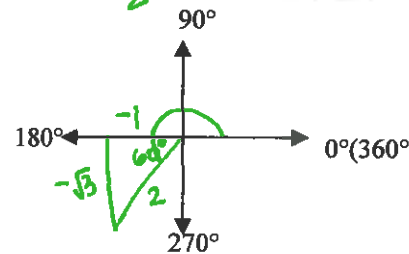
b. $\beta = 333^\circ$  $\beta_r = 27^\circ$

c. $\alpha = -222^\circ$  $\alpha_r = 42^\circ$

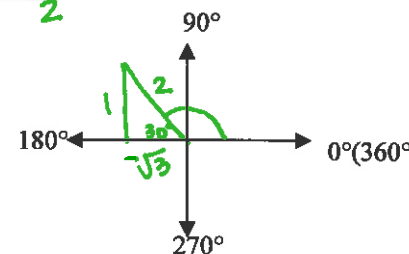
d. $\alpha = -\frac{11\pi}{12}$  $\alpha_r = \frac{\pi}{12}$

For each of the given trigonometric functions: draw the angle, list the reference angle, and find the desired ratio.

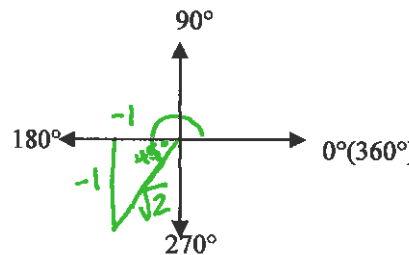
4. $\sin 240^\circ = \frac{-\sqrt{3}}{2}$ ref. angle: 60°



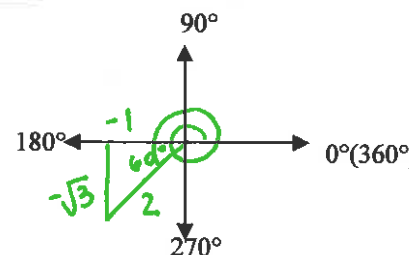
5. $\cos 150^\circ = \frac{-\sqrt{3}}{2}$ ref. angle: 30°



6. $\tan 225^\circ = 1$ ref. angle: 45°

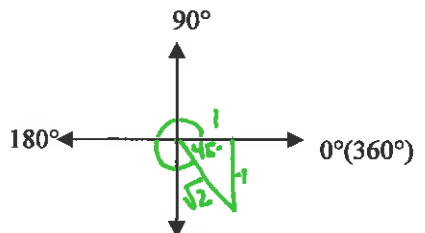


7. $\tan 600^\circ = \sqrt{3}$ ref. angle: 60°



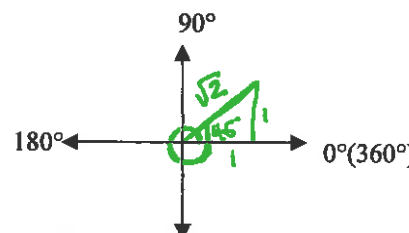
8. $\cos 315^\circ = \frac{\sqrt{2}}{2}$ ref. angle: 45°

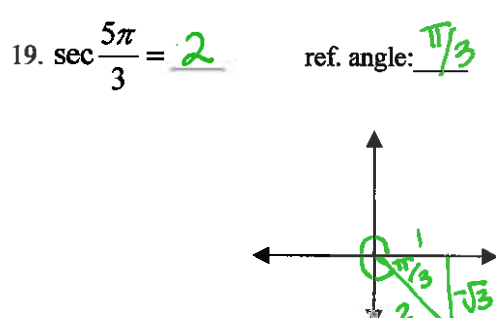
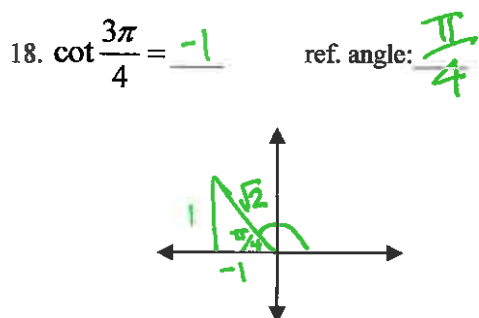
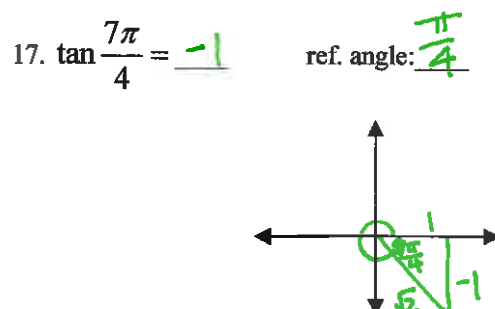
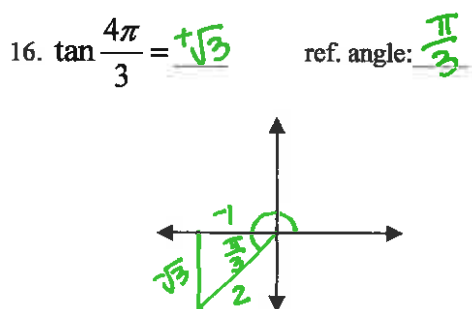
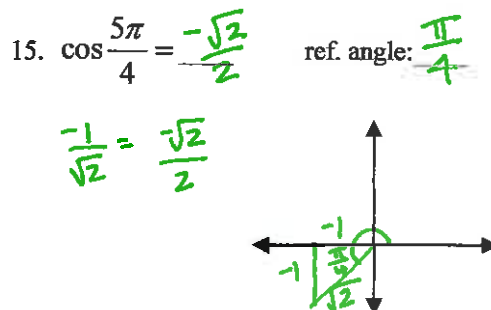
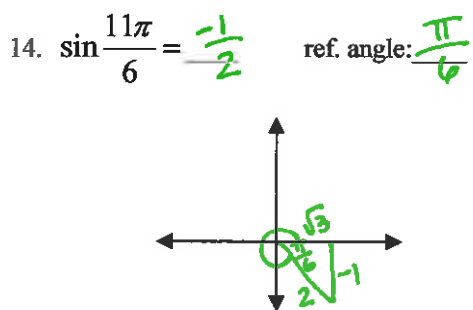
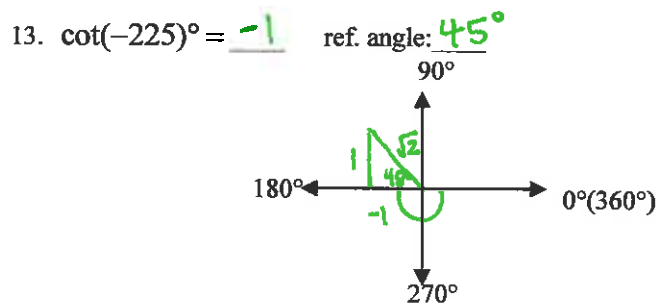
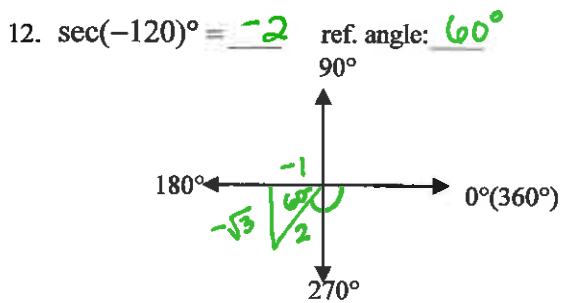
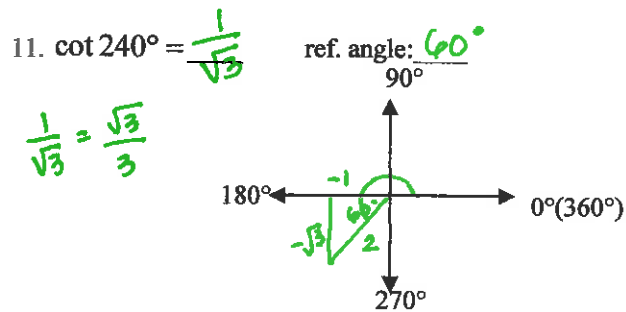
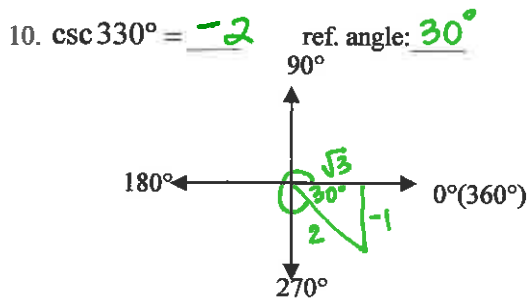
$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$



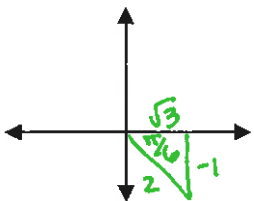
9. $\sin 405^\circ = \frac{\sqrt{2}}{2}$ ref. angle: 45°

$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$



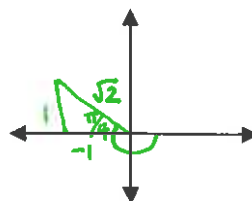


20. $\sin(-\frac{\pi}{6}) = -\frac{1}{2}$ ref. angle: $\frac{\pi}{6}$



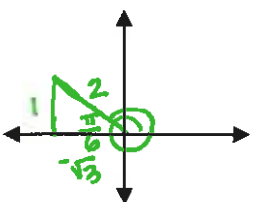
21. $\cos(-\frac{5\pi}{4}) = -\frac{1}{\sqrt{2}}$ ref. angle: $\frac{\pi}{4}$

$-\frac{1}{\sqrt{2}} = -\frac{\sqrt{2}}{2}$

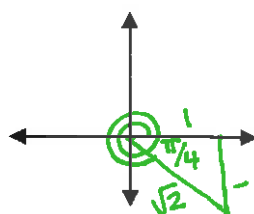


22. $\tan \frac{17\pi}{6} = -\frac{1}{\sqrt{3}}$ ref. angle: $\frac{\pi}{6}$

$-\frac{1}{\sqrt{3}} = -\frac{\sqrt{3}}{3}$



23. $\csc \frac{15\pi}{4} = -\sqrt{2}$ ref. angle: $\frac{\pi}{4}$



Given the following information, determine the quadrantal angle in both radians and degrees.

<p>24. $\cos \theta = 0$ and $\sin \theta = 1$</p> <p>$\theta = \frac{\pi}{2}$ or 45°</p>	<p>25. $\tan \theta = 0$ and $\cos \theta = -1$</p> <p>$\theta = \pi$ or 180°</p>
<p>26. $\tan \theta$ is undefined, and $\sin \theta = -1$</p> <p>$\theta = 270^\circ$ or $\frac{3\pi}{2}$</p>	<p>27. $\sin \theta = 0$ and $\cos \theta \geq 0$</p> <p>$\theta = 0^\circ$ or 2π</p>
<p>28. $\cos \theta = 0$ and $\csc \theta = -1$</p> <p>$\theta = 270^\circ$ or $\frac{3\pi}{2}$</p>	<p>29. $\tan \theta = 0$ and $\sec \theta = 1$</p> <p>$\theta = 0^\circ$ or 2π</p>

Find the values of the six trigonometric function of θ .

30. $\cos \theta = -\frac{4}{5}$ in QIII $\tan \theta = \frac{3}{4}$ $\cot \theta = \frac{4}{3}$
 $\sin \theta = -\frac{3}{5}$ $\csc \theta = -\frac{5}{3}$ $\sec \theta = -\frac{5}{4}$

31. $\tan \theta = -\frac{15}{8}$ and $\sin \theta < 0$ $\csc \theta = -\frac{17}{15}$ $\cot \theta = -\frac{8}{15}$
 $\sin \theta = -\frac{15}{17}$ $\cos \theta = \frac{8}{17}$ $\sec \theta = \frac{17}{8}$

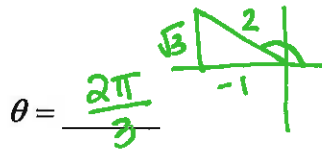
32. $\csc \theta = 4$ and $\cot \theta < 0$
 $\sin \theta = \frac{1}{4}$ $\sec \theta = -\frac{4}{\sqrt{15}}$ $\cot \theta = -\frac{\sqrt{15}}{1}$
 $\cos \theta = -\frac{\sqrt{15}}{4}$ $\tan \theta = -\frac{1}{\sqrt{15}}$

33. $\sec \theta = \frac{5}{3}$ and $\csc \theta < 0$
 $\sin \theta = -\frac{4}{5}$ $\csc \theta = -\frac{5}{4}$ $\tan \theta = -\frac{4}{3}$
 $\cos \theta = \frac{3}{5}$ $\sec \theta = \frac{5}{3}$ $\cot \theta = -\frac{3}{4}$

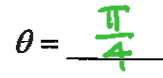
34. $\sin \theta = x$ in QI
 $\csc \theta = \frac{1}{x}$ $\sec \theta = \frac{1}{\sqrt{1-x^2}}$
 $\cos \theta = \sqrt{1-x^2}$
 $\tan \theta = \frac{x}{\sqrt{1-x^2}}$ $\cot \theta = \frac{\sqrt{1-x^2}}{x}$

For each of the following trigonometric ratios and quadrants determine the reference angle (in radians) that would give that ratio and the actual value of θ (in radians).

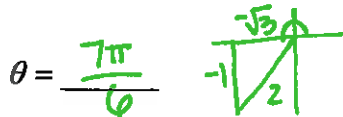
35. $\sin \theta = \frac{\sqrt{3}}{2}$ in QII.
 ref. angle: $\frac{\pi}{3}$



36. $\cos \theta = \frac{\sqrt{2}}{2}$ in QI
 ref. angle: $\frac{\pi}{4}$



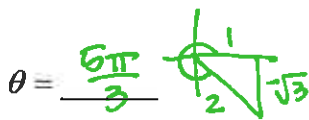
37. $\tan \theta = \frac{1}{\sqrt{3}}$ in QIII.
 ref. angle: $\frac{\pi}{6}$



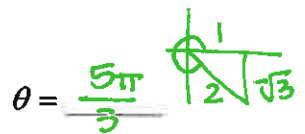
38. $\cos \theta = -\frac{\sqrt{3}}{2}$ in QII
 ref. angle: $\frac{\pi}{6}$



39. $\tan \theta = -\sqrt{3}$ in QIV.
 ref. angle: $\frac{\pi}{3}$



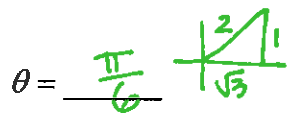
40. $\cot \theta = -\frac{\sqrt{3}}{3}$ in QIV.
 ref. angle: $\frac{\pi}{3}$



41. $\cos \theta = -\frac{1}{2}$ in QIII
 ref. angle: $\frac{\pi}{3}$

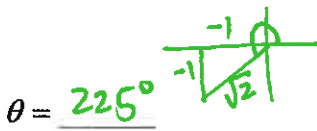


42. $\csc \theta = 2$ in QI
 ref. angle: $\frac{\pi}{6}$

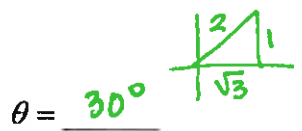


For each of the following trigonometric ratios and quadrants determine the reference angle (in degrees) that would give that ratio and the actual value of θ (in degrees).

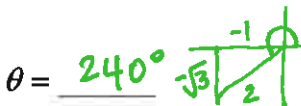
43. $\cos \theta = -\frac{\sqrt{2}}{2}$ in QIII
 ref. angle: 45°



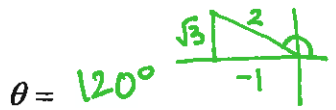
44. $\cos \theta = \frac{\sqrt{3}}{2}$ in QI
 ref. angle: 30°



45. $\tan \theta = \sqrt{3}$ in QIII.
 ref. angle: 60°



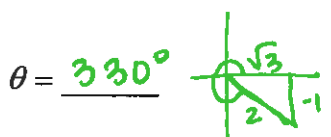
46. $\cos \theta = -\frac{1}{2}$ in QII
 ref. angle: 60°



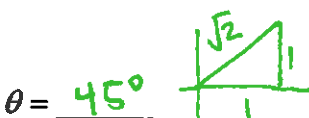
47. $\tan \theta = -1$ in QIV.
 ref. angle: 45°



48. $\sin \theta = -\frac{1}{2}$ in QIV
 ref. angle: 30°



49. $\csc \theta = \sqrt{2}$ in QI.
 ref. angle: 45°



50. $\cot \theta = -\frac{\sqrt{3}}{3}$ in QIV.
 ref. angle: 60°

