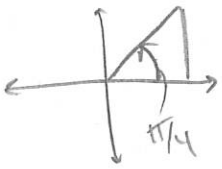
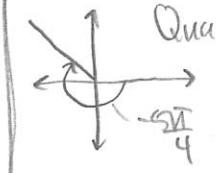
§1.1 & 1.2: Angular Measure & the Unit Circle

1.] Determine the quadrant in which each angle lies:

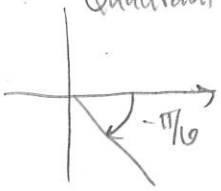
a.) $\frac{\pi}{4}$



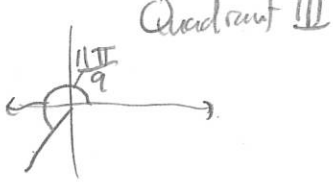
b.) $-\frac{5\pi}{4}$



c.) $-\frac{\pi}{6}$



d.) $\frac{11\pi}{9}$



2.] Determine two coterminal angles (one positive and one negative) for each angle below:

a.) $\frac{\pi}{6}$

$\theta = \frac{\pi}{6} + 2\pi = \frac{\pi}{6} + \frac{12\pi}{6} = \boxed{\frac{13\pi}{6}}$

$\phi = \frac{\pi}{6} - 2\pi = \frac{\pi}{6} - \frac{12\pi}{6} = \boxed{-\frac{11\pi}{6}}$

b.) $\frac{2\pi}{3}$

$\theta = \frac{2\pi}{3} + 2\pi = \frac{2\pi}{3} + \frac{6\pi}{3} = \boxed{\frac{8\pi}{3}}$

$\phi = \frac{2\pi}{3} - 2\pi = \frac{2\pi}{3} - \frac{6\pi}{3} = \boxed{-\frac{4\pi}{3}}$

3.] Find (if possible) the complement and supplement of each angle below:

a.) $\frac{\pi}{6}$

Complement: $\frac{\pi}{2} - \frac{\pi}{6} = \frac{3\pi}{6} - \frac{\pi}{6} = \frac{2\pi}{6} = \boxed{\frac{\pi}{3}}$

Supplement: $\pi - \frac{\pi}{6} = \frac{6\pi}{6} - \frac{\pi}{6} = \boxed{\frac{5\pi}{6}}$

b.) $\frac{\pi}{4}$

Complement: $\frac{\pi}{2} - \frac{\pi}{4} = \frac{2\pi}{4} - \frac{\pi}{4} = \boxed{\frac{\pi}{4}}$

Supplement: $\pi - \frac{\pi}{4} = \frac{4\pi}{4} - \frac{\pi}{4} = \boxed{\frac{3\pi}{4}}$

4.] Convert the following degree measures to radians:

a.) $120°$

$120^{\circ}\left(\frac{\pi}{180^{\circ}}\right) = \boxed{\frac{2\pi}{3}}$

b.) $-20°$

$-20^{\circ}\left(\frac{\pi}{180^{\circ}}\right) = \boxed{-\frac{\pi}{9}}$

5.] Convert the following radian measures to degrees:

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

$\frac{3\pi}{2}\left(\frac{180^{\circ}}{\pi}\right) = \boxed{270^{\circ}}$

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

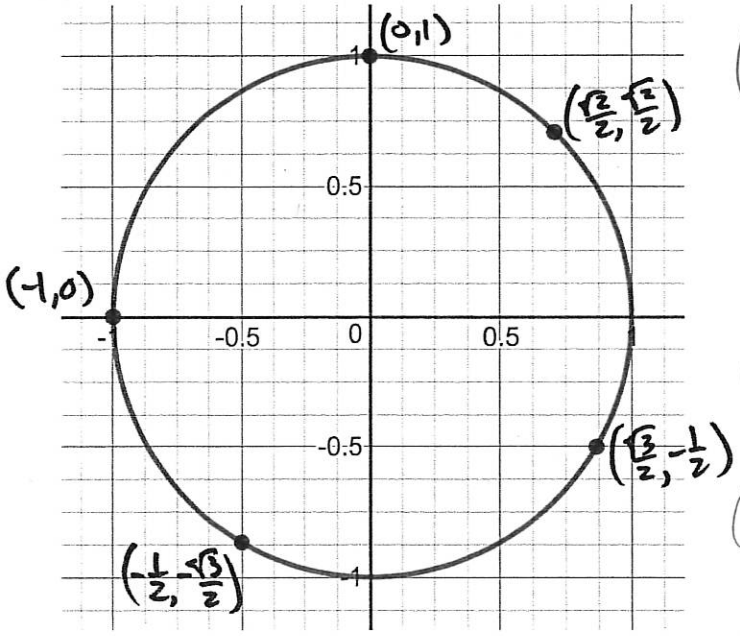
$-\frac{7\pi}{6}\left(\frac{180^{\circ}}{\pi}\right) = \boxed{-210^{\circ}}$

6.] Find the length of the arc on a circle of radius $r = 15$ inches intercepted by an angle of $\theta = 120°$.

$s = r\theta$ $r = 15$

$\theta = 120°\left(\frac{\pi}{180°}\right) = \frac{2\pi}{3}$ $s = 15 \cdot \frac{2\pi}{3} = \boxed{10\pi \text{ inches}}$

7.] Show that each point below satisfies the equation $x^2 + y^2 = 1$.



$\left(\frac{\sqrt{2}}{2}\right)^2 + \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{2}{4} + \frac{2}{4} = 1$ ✓

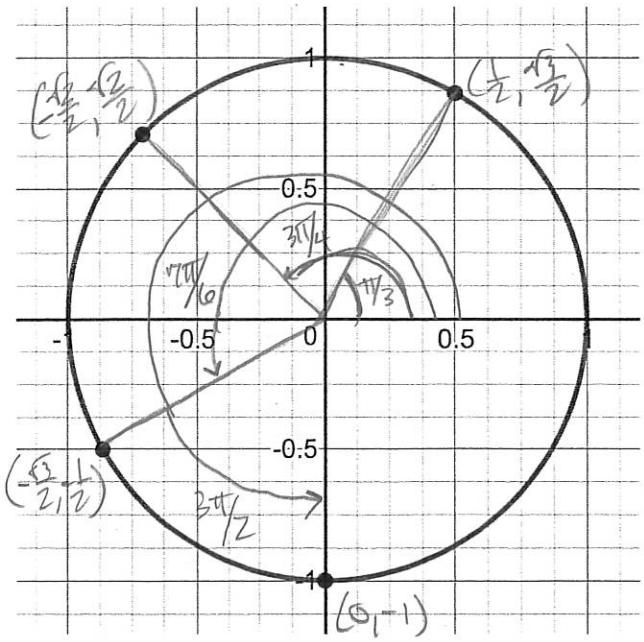
$(0)^2 + (1)^2 = 0 + 1 = 1$ ✓

$(-1)^2 + (0)^2 = 1 + 0 = 1$ ✓

$\left(-\frac{1}{2}\right)^2 + \left(-\frac{\sqrt{3}}{2}\right)^2 = \frac{1}{4} + \frac{3}{4} = 1$ ✓

$\left(\frac{\sqrt{3}}{2}\right)^2 + \left(-\frac{1}{2}\right)^2 = \frac{3}{4} + \frac{1}{4} = 1$ ✓

8.] Determine the positive angle that corresponds to each point on the unit circle below, and find the cosine and sine of that angle.



$\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$, $\sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$

$\cos\left(\frac{3\pi}{4}\right) = -\frac{\sqrt{2}}{2}$, $\sin\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}$

$\cos\left(\frac{7\pi}{6}\right) = -\frac{\sqrt{3}}{2}$ $\sin\left(\frac{7\pi}{6}\right) = -\frac{1}{2}$

$\cos\left(\frac{3\pi}{2}\right) = 0$ $\sin\left(\frac{3\pi}{2}\right) = -1$