

2.2 Trigonometric Ratios of Any Angle (II)

Recall that, for angles in standard position, we write trigonometric ratios in terms of x , y , and r .

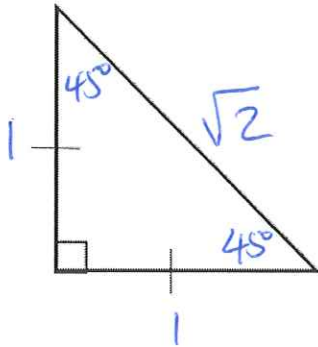
$$\sin \theta = \frac{y}{r}$$

$$\cos \theta = \frac{x}{r}$$

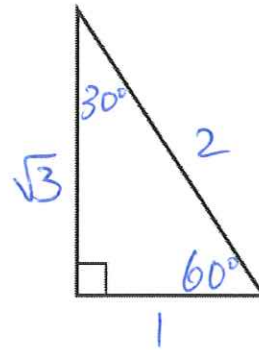
$$\tan \theta = \frac{y}{x}$$

Recall the **Special Triangles** from last class:

$45^\circ - 45^\circ - 90^\circ$

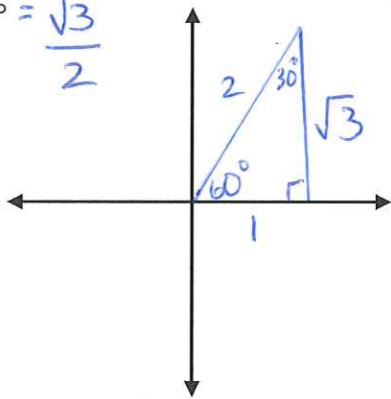


$30^\circ - 60^\circ - 90^\circ$

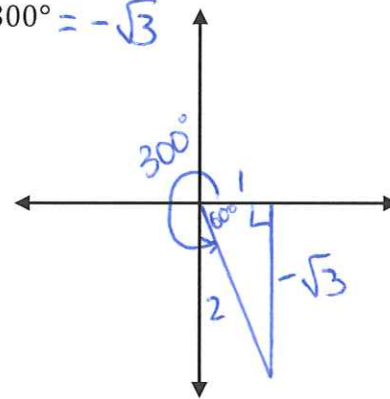


Example: Determine each **exact value** (without a calculator).

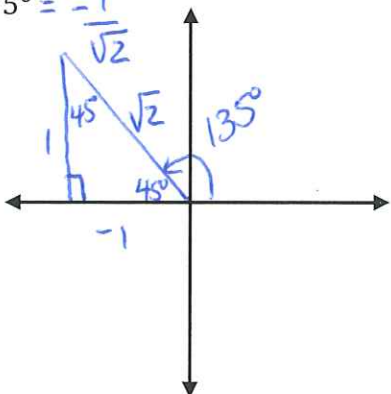
a) $\sin 60^\circ = \frac{\sqrt{3}}{2}$



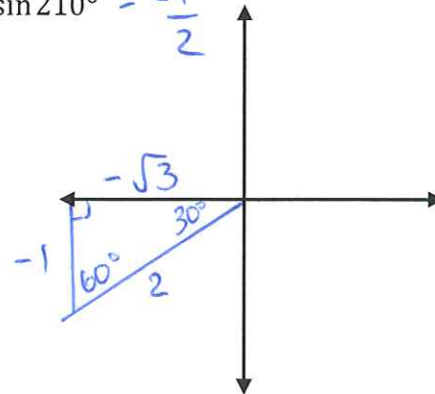
b) $\tan 300^\circ = -\sqrt{3}$



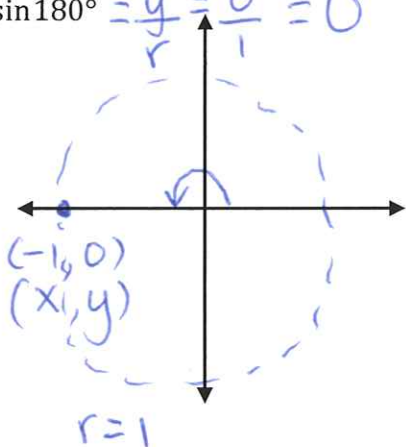
c) $\cos 135^\circ = -\frac{1}{\sqrt{2}}$



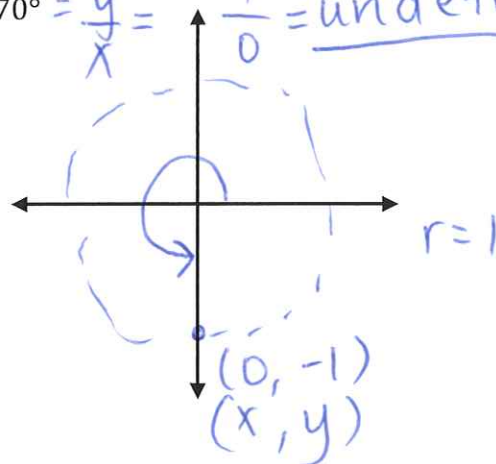
d) $\sin 210^\circ = -\frac{1}{2}$



e) $\sin 180^\circ = \frac{y}{r} = \frac{0}{1} = 0$



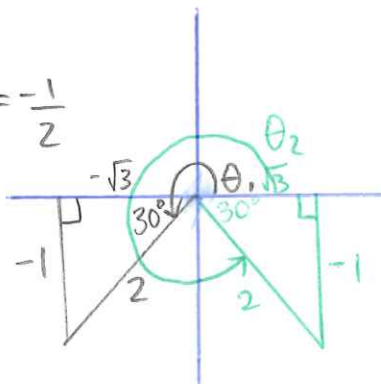
f) $\tan 270^\circ = \frac{y}{x} = \frac{-1}{0} = \text{undefined}$



Example: Solve for θ where $0^\circ \leq \theta < 360^\circ$, using a diagram involving a special triangle (no calculators).

a) $\sin \theta = -0.5 = -\frac{1}{2}$

Quad III or IV

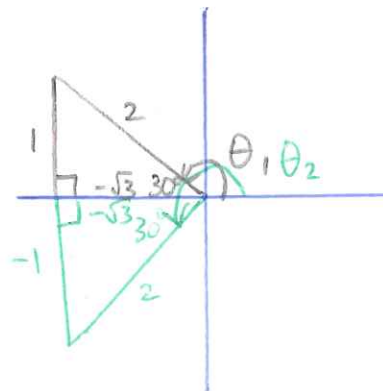


$\theta_1 = 180^\circ + 30^\circ = 210^\circ$

$\theta_2 = 360^\circ - 30^\circ = 330^\circ$

b) $\cos \theta = -\frac{\sqrt{3}}{2}$

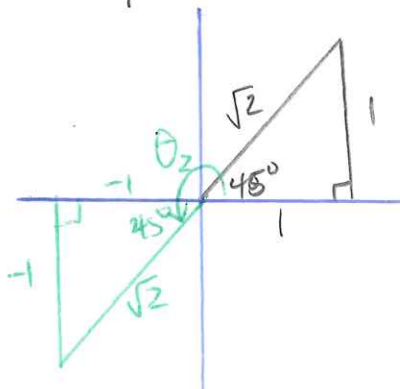
Quad II or III



$\theta_1 = 180^\circ - 30^\circ = 150^\circ$

$\theta_2 = 180^\circ + 30^\circ = 210^\circ$

b) $\tan \theta = 1 \leftarrow \text{Quad I or III}$



$\theta_1 = 45^\circ$

$\theta_2 = 180^\circ + 45^\circ = 225^\circ$