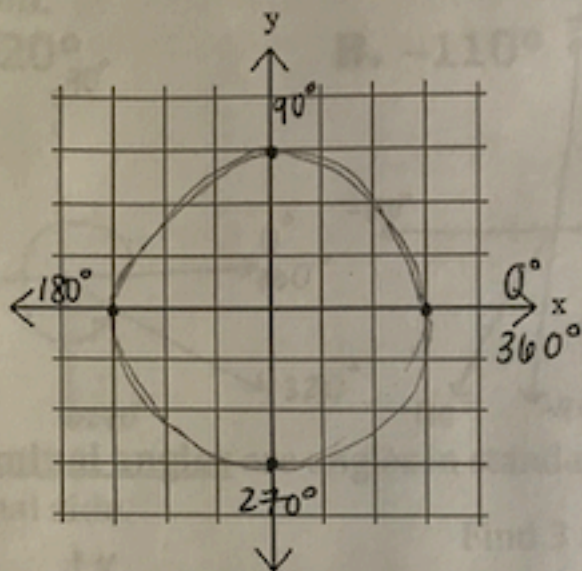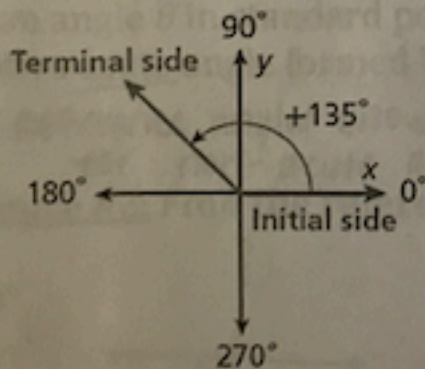Let's say I want to draw a circle in the xy-plane:

How many degrees would be in a circle?

$360°$

An angle is in **standard position** when its vertex is at the origin and one side is on the positive x-axis.
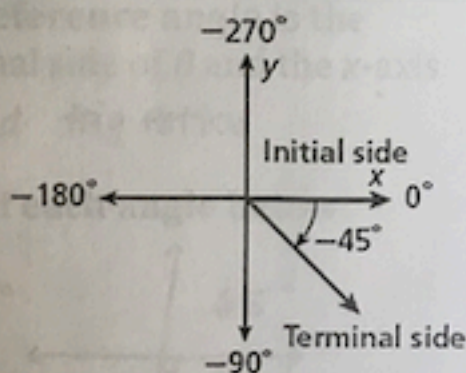- The **initial side** of the angle is the ray on the x-axis.
- The other ray is called the **terminal side** of the angle.

Positive Rotation	Negative Rotation

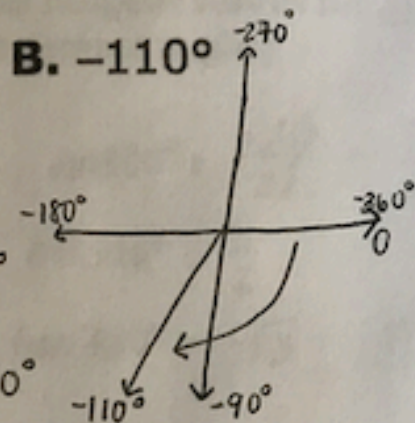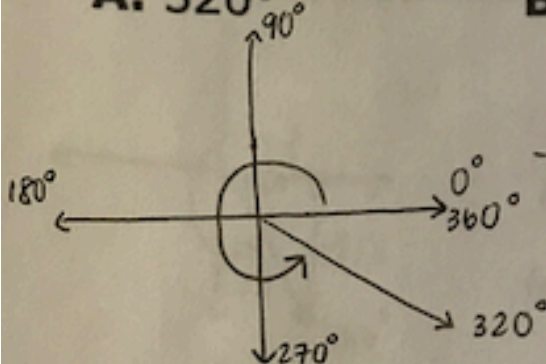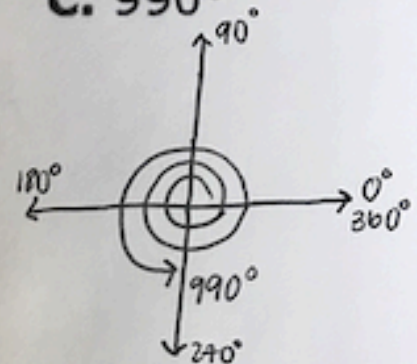

counter-clockwise

clockwise

Example #1: Draw an angle with the given measure in standard position.

A. 320°

B. −110°

C. 990°

320°

−110°   −90°

990°

Coterminal angles are angles in standard position with the same terminal side.

120°

−240°

Reference Angle: 60°

Find 3 additional angles that are co-terminal with 120°.

(Add/subtract 360°)

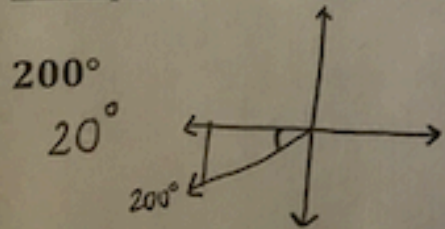$$480°$$
$$840°$$
$$-600°$$
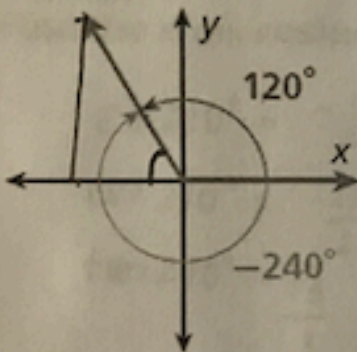
For an angle θ in standard position, the **reference angle** is the positive <u>acute</u> angle formed by the terminal side of θ and the x-axis.

* Reference angles allow us to find trig ratios for non-acute angles.

Example #2: Find the reference angle of each angle below:

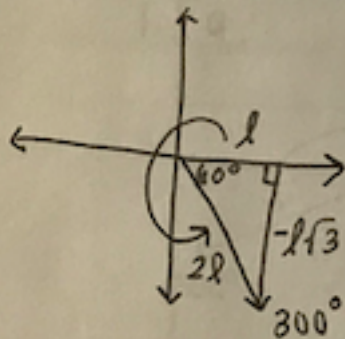200°

20°

200°

295°

65°

295°

100°

100°

80°

20°

20°
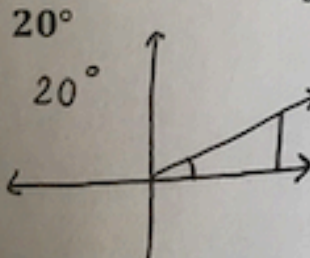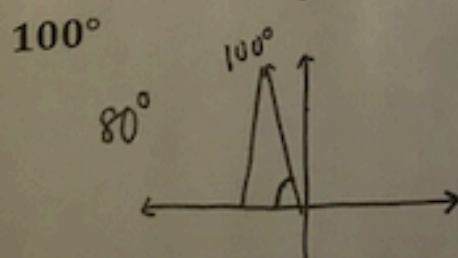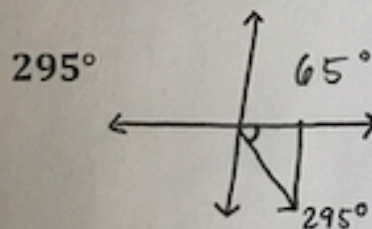
** Remember that the reference angle always connects to the x-axis!!

Standard Angle Positions

Example #3:
Find the sine, cosine, and tangent values for 300°
(Be sure to consider the reference angle!)

$$\sin 300° = \frac{-\sqrt{3}}{2} = \frac{-\sqrt{3}}{2}$$

$$\cos 300° = \frac{1}{2}$$

$$\tan 300° = -\sqrt{3}$$

You try:
Find the sine, cosine, and tangent values for 210°

$$\sin 210° = -\frac{1}{2}$$

$$\cos 210° = \frac{-\sqrt{3}}{2}$$

$$\tan 210° = \frac{\sqrt{3}}{3}$$

Find the sine, cosine, and tangent values for –210°