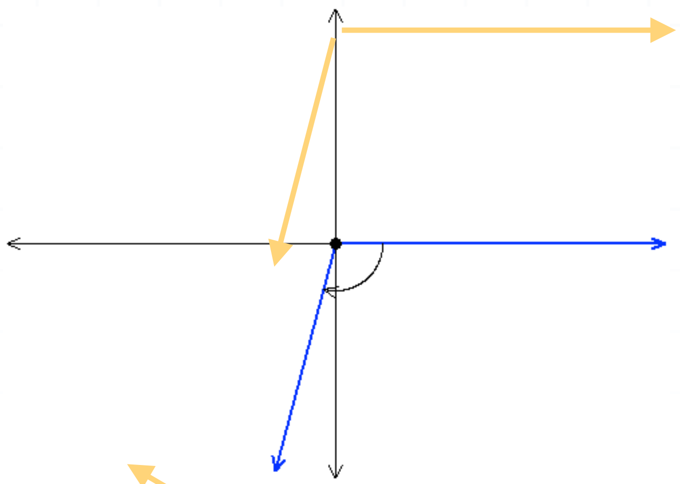
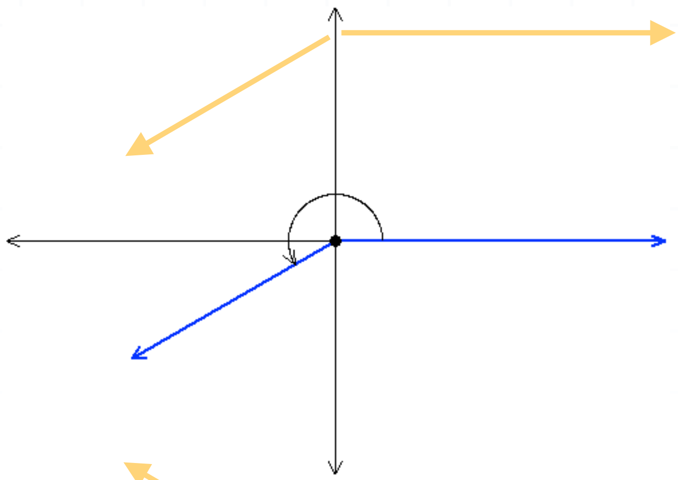
Topic: Sketching angles in standard position

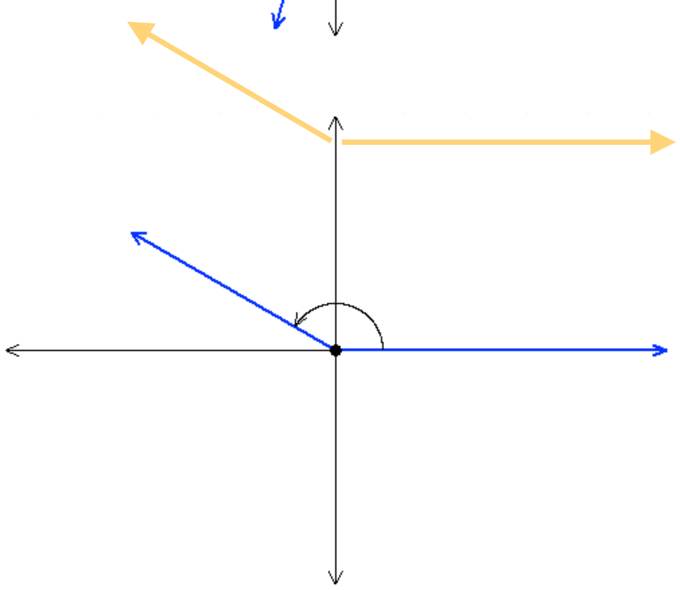
Question: Which of the following is a drawing of the given angle in standard position?

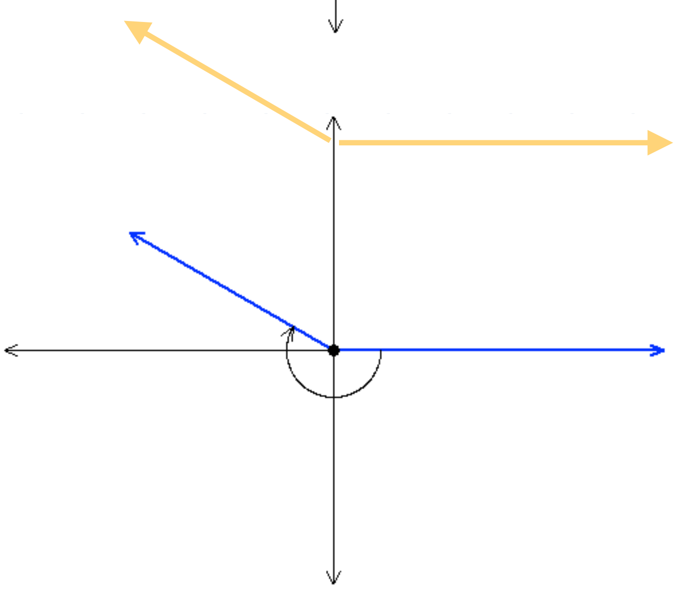
$$-210^\circ$$

Answer choices:

A 

C 

B 

D 

Solution: D

An angle of -210° is negative, so its terminal side is reached from its initial side by making a rotation of 210° in the negative (clockwise) direction about the origin. Note that

$$\frac{-210^\circ}{-360^\circ} = \frac{7}{12}$$

Therefore,

$$-210^\circ = -\frac{7}{12}(360^\circ)$$

Also,

$$-\frac{3}{4}(360^\circ) = -\frac{9}{12}(360^\circ) < -\frac{7}{12}(360^\circ) < -\frac{6}{12}(360^\circ) = -\frac{1}{2}(360^\circ)$$

The terminal side of an angle of $-(3/4)360^\circ$ is on the positive vertical axis, and the terminal side of an angle of $-(1/2)360^\circ$ is on the negative horizontal axis. Since

$$-\frac{3}{4}(360^\circ) < -\frac{7}{12}(360^\circ) < -\frac{1}{2}(360^\circ)$$

the terminal side of an angle of $-(7/12)360^\circ$ is between the positive vertical axis and the negative horizontal axis. Combined with the fact that the terminal side of a negative angle is reached from its initial side by making a negative (clockwise) rotation about the origin, we see that D is the correct answer.

Topic: Sketching angles in standard position

Question: How many turns about the origin are made to reach the terminal side of the angle $(27/4)\pi$ in standard position?

Answer choices:

A Three full rotations, plus an additional $(3/4)\pi$ rotations in the counterclockwise direction

B Three full rotations in the clockwise direction, then $\pi/4$ rotations in the counterclockwise direction

C Two full rotations, plus an additional $5\pi/4$ rotations in the counterclockwise direction

D Three full rotations, plus an additional $3\pi/4$ rotations in the clockwise direction

Solution: A

Since $(27/4)\pi$ is a positive angle, we rotate in the positive (counterclockwise) direction. A full rotation is 2π radians, so we want to divide $(27/4)\pi$ by 2π.

$$\frac{\frac{27}{4}\pi}{2\pi}=\frac{27}{8}=3\frac{3}{8}$$

This tells us that we're making three full rotations, plus another $3/8$ partial rotation. To figure out how much of a full 2π rotation $3/8$ is, we'll multiply $3/8$ by 2π.

$$\frac{3}{8}(2\pi)=\frac{6}{8}\pi=\frac{3}{4}\pi$$

Therefore, the angle $(27/4)\pi$ is three full rotations, plus another $(3/4)\pi$ rotations in the positive (counterclockwise) direction.