Quiz 6

Name: _____

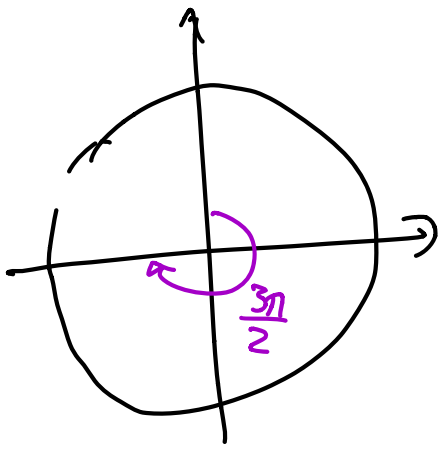
Paula and Jing are running around a circular track. They start running at the same time.

Paula starts from the northernmost point and runs clockwise at 2 radians per minute.

Jing starts from the westernmost point of the track and runs counterclockwise.

Jing and Paula pass each other after they have been running for 1.4 minutes.

Each question can be answered independently.



1. What is Jing's angular speed?

$$\omega_P \cdot 1.4 + \omega_J \cdot 1.4 = \frac{3\pi}{2}$$

$$\Rightarrow \quad 2 \cdot 1.4 + \omega_J \cdot 1.4 = \frac{3\pi}{2}$$

$$\Rightarrow (2 + \omega_J) = \frac{3\pi}{2.8}$$

$$\Rightarrow \omega_J = \frac{3\pi}{2.8} - 2 \approx 1.366 \text{ rad/min}$$

2. Suppose the radius of the track is 140 meters. Impose a coordinate system where the origin is at the center of the track. What are the coordinates of Paula at the moment when she has been running for 2 minutes?

$$\theta_P(2) = \frac{\pi}{2} - 2 \cdot 2 = \frac{\pi}{2} - 4$$

Coordinates:

$$\left(140\cos\left(\frac{\pi}{2} - 4\right), 140\sin\left(\frac{\pi}{2} - 4\right)\right) \approx (-106, -91.5)$$