Name:

> Answer the questions in the spaces provided. Don't hesitate to ask me or your peers for help, this is not a quiz.

1. Charlie and Alexandria are running around a circular track with a radius of 60 meters. Charlie started at the westernmost point of the track, and at the same time, Alexandra started at the northernmost point. They both run counterclockwise, Alexandra at 3 meters per second. She takes exactly 2 minutes to catch up to charlie.

   Impose a coordinate system with units in meters where the origin is the center of the track, and give the x and y coordinates of Charlie after 1 minute of running.
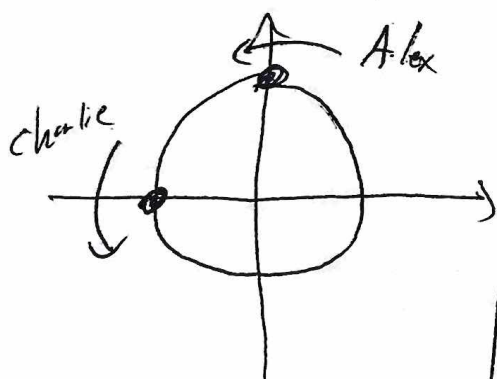
Alex's coords

$R = 60$

$\Theta_0 = \pi/2$

$\omega = ? = \frac{1}{20}$

$(h, k) = (0, 0)$

$v = r \cdot \omega$

$3 = 60 \cdot \omega$

$\omega = \frac{1}{20}$

$x_A(t) = 60\cos\left(\frac{1}{20}t + \frac{\pi}{2}\right)$

$y_A(t) = 60\sin\left(\frac{1}{20}t + \frac{\pi}{2}\right)$

$\Theta_A(t) = \frac{1}{20}t + \frac{\pi}{2}$

$\Theta_C(t) = \omega_B t + \pi$

@ $t = 120$

$\Theta_A = \Theta_B$

$6 + \frac{\pi}{2} = 120\omega_B + \pi$

$6 - \frac{\pi}{2} = 120\omega_B$

$\omega_B = \frac{6 - \pi/2}{120}$

Charlie's coords

$R = 60$

$\Theta_0 = \pi$

$\omega = \frac{6 - \pi/2}{120}$

$(h, k) = (0, 0)$

$x_C(t) = 60\cos\left(\frac{6 - \frac{\pi}{2}}{120}t + \pi\right) = 36.05$

$y_C(t) = 60\sin\left(\frac{6 - \pi/2}{120}t + \pi\right) = -47.99$

$\hookrightarrow$ plug in $t = 60$