A horizontal circular platform rotates counterclockwise about its axis at the rate of 0.893 rad/s. You, with a mass of 70.7 kg, walk clockwise around the platform along its edge at the speed of 1.11 m/s with respect to the platform. Your 21.1-kg poodle also walks clockwise around the platform, but along a circle at half the platform's radius and at half your linear speed with respect to the platform. Your 18.7-kg mutt, on the other hand, sits still on the platform at a position that is 3/4 of the platform's radius from the center. Model the platform as a uniform disk with mass 91.5 kg and radius 1.85 m. Calculate the total angular momentum of the system.

\[ L = I \omega \]

where

- Mass of platform (Uniform disk): \( I = \frac{1}{2} MR^2 = \frac{1}{2} (91.5 \text{ kg}) \times (1.65 \text{ m})^2 = 156.6 \text{ kg m}^2/\text{s} \)
- So \( L_{\text{platform}} = I \omega = 156.6 \times 0.893 \text{ rad/s} = 139.8 \text{ kg m}^2/\text{s} \)

You, \( m = 70.7 \text{ kg} \) walk clockwise at edge speed 1.11 m/s with respect to platform (platform rotates CCW)

\[ v_T = r \omega \rightarrow w_{\text{you/plate}} = \frac{1.11 \text{ m/s}}{1.85 \text{ m}} = -0.60 \text{ rad/s} \]

so \( \omega = \frac{v_T + w_{\text{you/plate}}}{r} = \frac{-0.60 + (-0.893)}{1.85} = -0.393 \text{ rad/s} \)

so \( L_{\text{you}} = 70.7 \text{ kg} \times 1.85 \text{ m}^2 \times 0.393 \text{ rad/s} = 50.9 \text{ kg m}^2/\text{s} \)

Poodle, \( m = 21.1 \text{ kg} \) walk clockwise in half of \( R \) and at \( \frac{1}{2} \) your linear speed wrt platform

\[ v_T = r \omega \rightarrow \omega = \frac{v_T}{r} \]

so \( \omega_{\text{poodle/platform}} = -0.60 \text{ rad/s} \)

\[ L_{\text{poodle}} = mR^2 \omega = 21.1 \text{ kg} \times (0.925 \text{ m})^2 \times (-0.60 \text{ rad/s}) = 5.29 \text{ kg m}^2/\text{s} \]

Mutt, \( m = 18.7 \text{ kg} \) sits on platform so \( \omega_{\text{mutt}} = \omega_{\text{platform}} = 0.893 \text{ rad/s} \)

at \( r = \frac{3}{4} R_{\text{platform}} = 1.3875 \text{ m} \)

so \( L_{\text{mutt}} = 18.7 \text{ kg} \times (1.3875 \text{ m})^2 \times 0.893 \text{ rad/s} = 32.15 \text{ kg m}^2/\text{s} \)

\[ L_{\text{total}} = \sum L_i = 139.8 + 50.9 + 5.3 + 32.15 = 248.2 \text{ kg m}^2/\text{s} \]