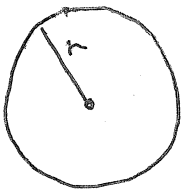
$I = 512\ kg\,m^2$ $\quad r = 2.31\ m$



A child of mass 34.0kg runs toward a merry-go-round that is stationary. 1) Determine the angular speed of child and merry-go-round after the child jumps on if the child was traveling at 3.2 m/s.
2) Determine the child's initial speed if the system rotates at 0.425 rad/s after the collision.

* Inelastic Collision for each case 1) and 2).

$$\Rightarrow \quad \Delta L = 0 = L_f - L_i$$

1)

$L_i = I\omega \qquad I = mr^2$

$\omega = \frac{v}{r}$

$L_i = mr^{\not 2}\left(\frac{v}{\not r}\right) = mrv$

$L_f = (I_m + I_c)\,\omega$

$0 = L_f - L_i$

$L_f = L_i$

$(I_m + I_c)\,\omega = mrv$

$\omega = \frac{mrv}{I_m + I_c} = \frac{mrv}{I_m + mr^2} = \frac{(34.0\,kg)(2.31\,m)(3.2\,m}{512\,kg\,m^2 + (34.0\,kg)(2.3}$

$= 0.362\ \frac{rad}{s}$

$$L_f = L_i$$

$$\left(I_M + mr^2\right)\omega = mrv$$

$$\left(\frac{I_M + mr^2}{mr}\right)\omega = v$$

$$\left[\frac{512.\,kg\,m^2 + 34.0\,kg\,(2.31\,m)^2}{34.0\,kg\,(2.31\,m)}\right] 0.425\,\frac{rad}{s} = \boxed{3.75\,\frac{m}{s}}$$