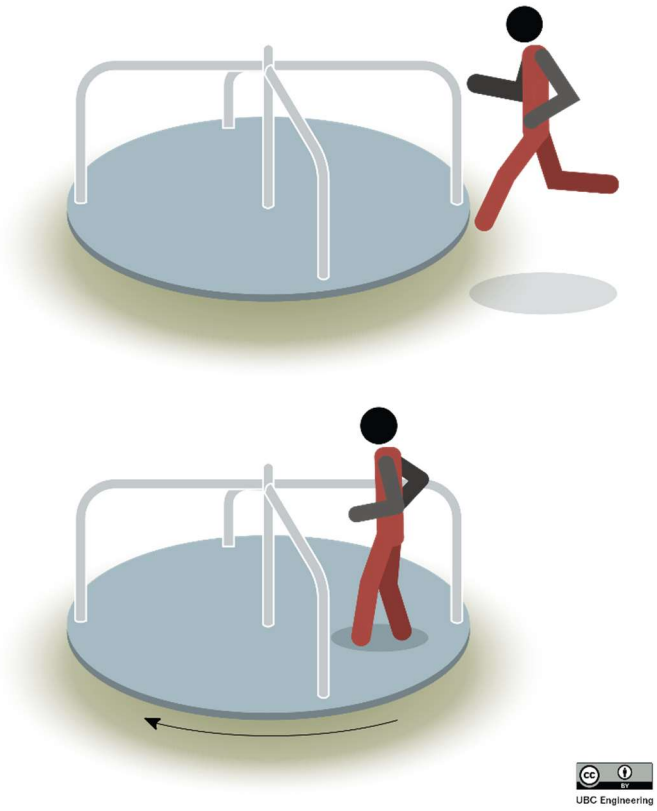
21-P-FA-AG-006



A person is running tangent to the edge of a perfectly friction-less merry-go-round (also known as a playground roundabout). When they reach the merry-go-round, they hop on to the edge in such a way that the merry-go-round begins moving with an angular velocity of ω $\frac{rad}{s}$. In which direction is acceleration acting on the person? How high must the coefficient of static friction between the person's shoes and the merry-go-around so that the person's radial velocity is zero if they weight *m* kilograms?

ANSWER:

Centripetal acceleration always acts radially inwards.

We can find the coefficient of static friction by balancing the forces.

$$\sum F_r = 0 = F_{centripetal} - F_f = m \cdot a_{centripetal} - F_N \cdot \mu_s = m(\omega^2 \cdot r - g \cdot \mu_s)$$

$$\mu_s = \frac{\omega^2 \cdot r}{g}$$