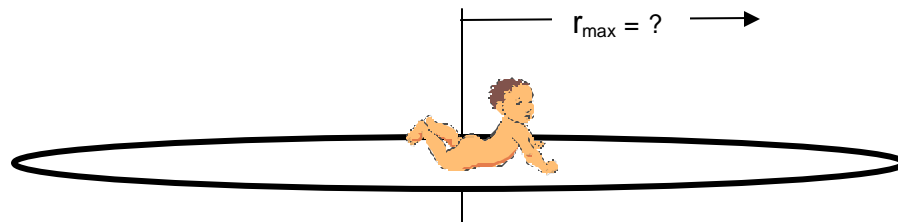


AP Physics - Uniform Circular Motion Olympics

1. Consider an amusement park Ferris wheel gone wild. Initially at rest, a child sitting on the outer edge of the wheel ($r = 18.5 \text{ m}$) experiences a tangential velocity of $V = 0.250t$.
 - A. Predict their centripetal acceleration when their rotational period, $T = 1.00$ minute.
 - B. Predict the total acceleration at $t = 1.00$ minute.
 - C. Predict the time at which the total acceleration is directed at 45.0° from the centripetal acceleration.
 - D. Assume the child (24.0 kg) is at the bottom of the Ferris wheel when at the time predicted in part C. Predict the percent difference between their apparent weight and their true weight. Neglect any horizontal forces.

2. Consider a large circular platform, surrounded by pillows, oriented parallel to the ground, rotating once every 20.0 seconds. A baby begins at the center of the platform and slowly crawls outward towards the edge. The coefficient of static friction between the baby and the platform is $\mu_s = 0.610$.
 - A. Predict the maximum radial position the baby can crawl to such that they can maintain uniform circular motion.
 - B. Predict the total acceleration of the baby just before he begins to skid out of uniform circular motion.
 - C. Sketch a graph of f vs. V .



3. Consider a 1.00 kg steel ball attached to a vertical rod by two strings each 1.00 m long. The strings are attached to a rod at points 1.00 m apart. The rod-strings-ball system is rotating about the axis of the rod with both strings taut and forming an equilateral triangle with the rod as shown. The tension in the upper string is 25.0 N .
 - A. Predict the tension in the lower string.
 - B. Predict the ball's period of revolution.

