a. How fast is the child moving at the bottom of the slide?

b. If the end of the slide is 0.40 m above the ground, how far from the end does she land?

74. III INT A sports car is advertised to be able to "reach 60 mph in 5 seconds flat, corner at $0.85g$, and stop from 70 mph in only 168 feet."

a. In which of those three situations is the magnitude of the car's acceleration the largest? In which is it the smallest?

b. At 60 mph, what is the smallest turning radius that this car can navigate?

75. II INT A Ford Mustang can accelerate from 0 to 60 mph in a time of 5.6 s. A Mini Cooper isn't capable of such a rapid start, but it can turn in a very small circle 34 ft in diameter. How fast would you need to drive the Mini Cooper in this tight circle to match the magnitude of the Mustang's acceleration?

76. II The "Screaming Swing" is a carnival ride that is—not surprisingly—a giant swing. It's actually two swings moving in opposite directions. At the bottom of its arc, riders are moving at 30 m/s with respect to the ground in a 50-m-diameter circle.

a. What is the acceleration, in m/s^2 and in units of g, that riders experience?

b. At the bottom of the ride, as they pass each other, how fast do the riders move with respect to each other?

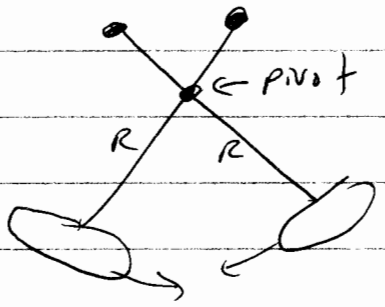
77. II On an otherwise straight stretch of road near Moffat, Colorado, the road suddenly turns. This bend in the road is a segment of a circle with radius 110 m. Drivers are cautioned to slow down to 40 mph as they navigate the curve.

a. If you heed the sign and slow to 40 mph, what will be your acceleration going around the curve at this constant speed? Give your answer in m/s^2 and in units of g.

b. At what speed would your acceleration be double that at the recommended speed?

4.76 Screaming Swing

$R = \frac{1}{2}(50)m = 25\ m$



$v = 30\ m/s$

$a = v^2/R = 36\ m/s^2$

$a = 3.7\ g$'s !

$v_{rel} = 30 - (-30) = 60\ m/s$ whoosh!

4.77 (a) $v = \frac{40\ \text{miles}}{\text{hour}} \times \frac{1609\ m}{\text{mile}} \times \frac{1\ hr}{3600\ s} = 17.9\ m/s$

$R = 110\ m$

$a = v^2/R = 2.91\ m/s^2 = 0.3\ g$

(b) $v_1 = \sqrt{a_1 R}$ $\qquad v_2 = \sqrt{(2a_1)R} = \sqrt{2}\, v_1$.

double $a \Rightarrow v_2 = \sqrt{2}\, v_1$

$v_2 = \sqrt{2}\ 40\ mph = \boxed{57\ mph}$