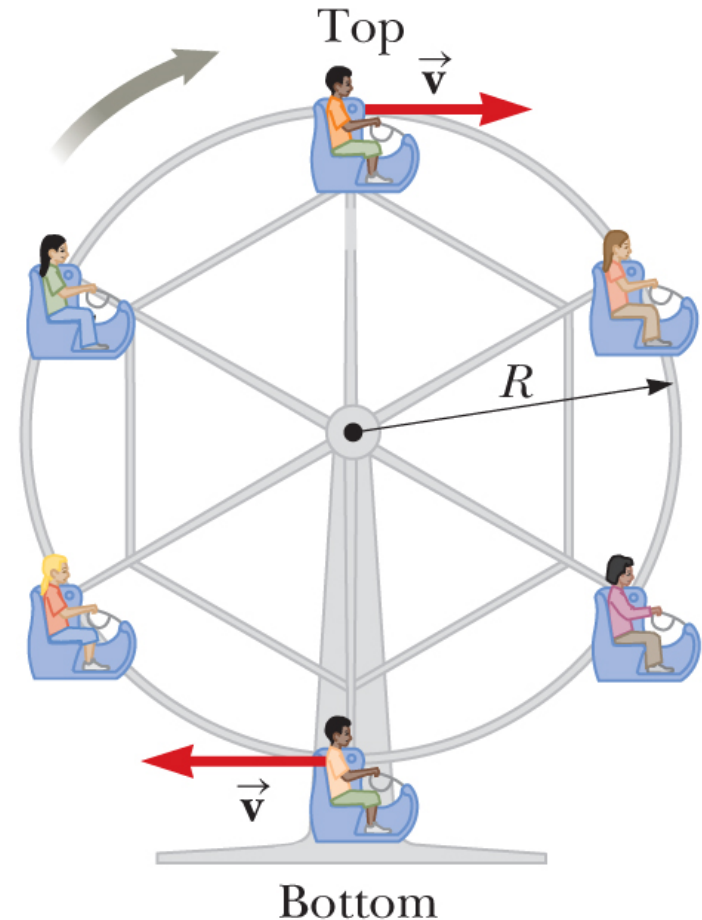## Example 6.5:

Riding the Ferris Wheel

A child of mass m rides on a Ferris wheel as shown in the figure. The child moves in a vertical circle of radius 10.0 m at a constant speed of 3.00 m/s.

(A) Determine the force exerted by the seat on the child at the bottom of the ride. Express your answer in terms of the weight of the child, mg.

Example 6.5:
Riding the Ferris Wheel

$$\sum F = n_{\text{bot}} - mg = m\frac{v^2}{r}$$

$$n_{\text{bot}} = mg + m\frac{v^2}{r} = mg\left(1 + \frac{v^2}{rg}\right)$$

$$n_{\text{bot}} = mg\left(1 + \frac{(3.00 \text{ m/s})^2}{(10.0 \text{ m})(9.80 \text{ m/s}^2)}\right)$$

$$= \boxed{1.09mg}$$

$\vec{\mathbf{n}}_{\text{bot}}$

$m\vec{\mathbf{g}}$

Example 6.5:
Riding the Ferris Wheel

(B) Determine the force exerted by the seat on the child at the top of the ride.

$$\sum F = mg - n_{top} = m\frac{v^2}{r}$$

$$n_{top} = mg - m\frac{v^2}{r} = mg\left(1 - \frac{v^2}{rg}\right)$$

$$n_{top} = mg\left(1 - \frac{(3.00 \text{ m/s})^2}{(10.0 \text{ m})(9.80 \text{ m/s}^2)}\right)$$

$$= \boxed{0.908mg}$$