Flipping Physics Lecture Notes:

What is the Maximum Speed of a Car at the Top of a Hill?

Example: What is the maximum linear speed a car can move over the top of a semi-circular hill without its tires lifting off the ground? The radius of the hill is 1.8 meters.

The faster the car moves, the smaller the Force Normal. When we increase the speed of the car to the point where the Force Normal is zero, then the only force causing circular motion is the Force of Gravity acting on the car. Any faster and the wheels of the car will leave the road.
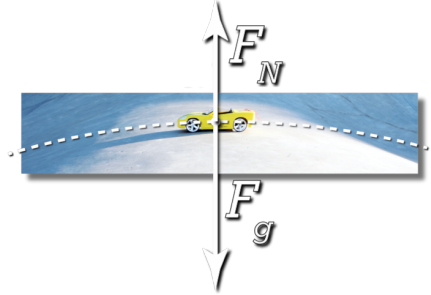
Knowns: $r = 1.8m;\ v_{t\,max} = ?$

$$\sum F_{in} = F_g - F_N = ma_c \Rightarrow mg - 0 = m\frac{v_t^2}{r} \Rightarrow g = \frac{v_t^2}{r} \Rightarrow v_t^2 = gr \Rightarrow v_t = \sqrt{gr}$$

$$\Rightarrow v_t = \sqrt{(9.81)(1.8)} = 4.20214 \approx \boxed{4.2\frac{m}{s}}$$