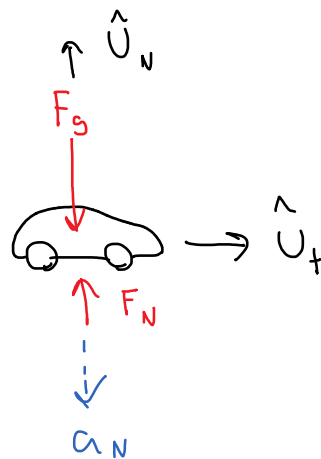
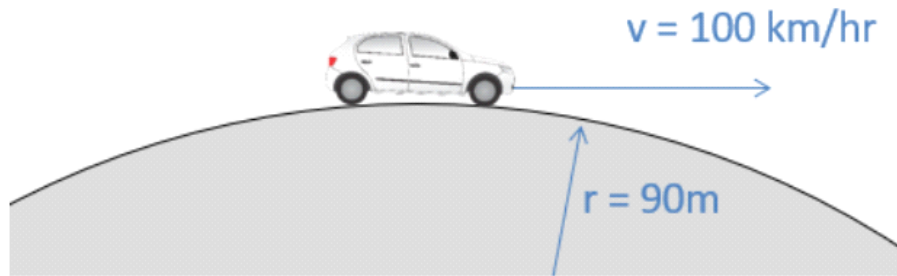


Problem 1

A 1000 kg car travels over a hill with a constant speed of 100 kilometers per hour. The top of the hill can be approximated as a circle with a 90 m radius.

- What is the normal force the road exerts on the car as it crests the hill?
- How fast would the car have to be going to get airborne?



$$v = 100\text{ km/hr} \\ = 27.78\text{ m/s}$$

a)

$$\sum F_N = F_N - F_g = m a_N$$

$$F_N - (1000)(9.81) = (1000) - \frac{v^2}{r}$$

$v^2 \leftarrow 27.78\text{ m/s}$
 $r \leftarrow 90\text{ m}$

$$F_N = 1235\text{ N}$$

b)

$$F_N = 0$$

$$-F_g = m a_N$$

$$-(1000)(9.81) = (1000) - \frac{v^2}{90}$$

$$\begin{aligned} v &= 29.71 \text{ m/s} \\ &= 106.9 \text{ km/hr} \end{aligned}$$