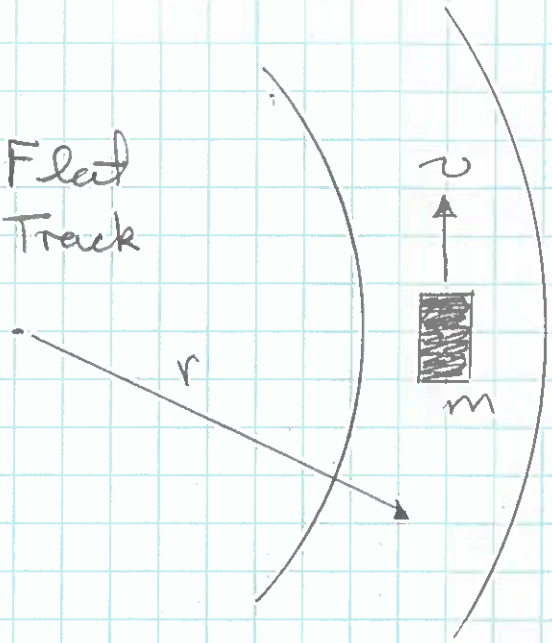

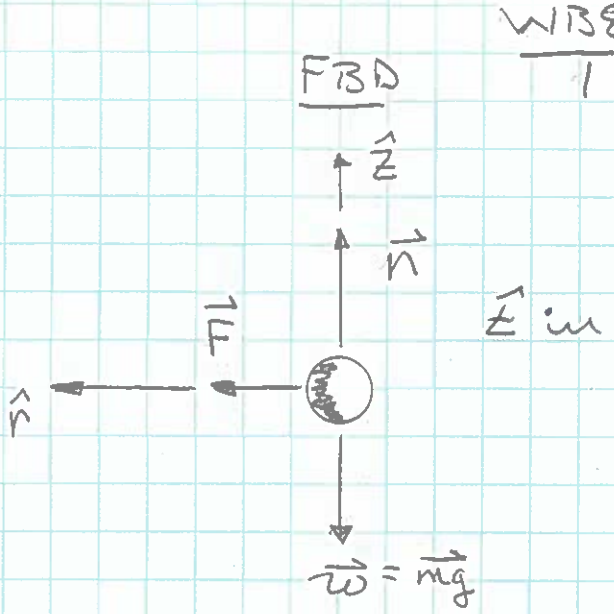

a.) By Newton's 1st, the car would go in straight line; i.e. the impending motion is out (in the $-\hat{r}$ direction). Static friction is the force that points towards the center.

So $\vec{F} = \vec{f}_s$

b.) From FBD, with $\vec{F} = \vec{f}_s$

$$\Sigma F_z = n - mg = ma_z = 0 \Rightarrow n = mg$$

$$\Sigma F_r = f_s = ma_r = \frac{mv^2}{r}$$

Now, when $f_s = f_{s\,max} = \mu_s n$, $v = v_{max}$

So, $\mu_s n = \frac{mv_{max}^2}{r}$

and, $\mu_s mg = \frac{mv_{max}^2}{r} \Rightarrow$ $v_{max} = \sqrt{\mu_s r g}$