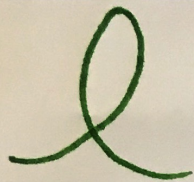


# CIRCULAR MOTION @ THE AMUSEMENT PARK

ROLLER COASTER LOOP: CLOTHOID SHAPE "TEARDROP"

- LARGE RADIUS @ BOTTOM  
SMALL RADIUS @ TOP



BOTTOM

$$F_N - mg = \frac{mv^2}{r} \rightarrow F_N = \frac{mv^2}{r} + mg$$

BIGGER  $r$   
MEANS LESS  
 $F_N$

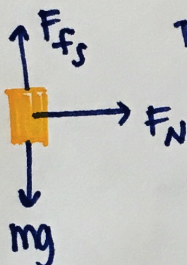
TOP

$$F_N + mg = \frac{mv^2}{r}$$

IF ROLLER COASTER JUST  
MAKES IT AROUND,  $v = \sqrt{gr}$

w/smaller  $r$ , smaller  
MIN SPEED TO CLEAR  
LOOP

SPIN OUT



WHY DOES ROOM NEED  
TO SPIN FAST FOR A  
PERSON TO BE STUCK TO WALL?

$$\sum F_y = 0$$

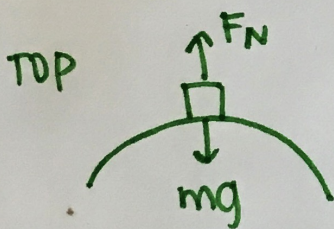
$$\mu_s F_N = mg$$

$$\sum F_r = ma_r$$

$$F_N = \frac{mv^2}{r}$$

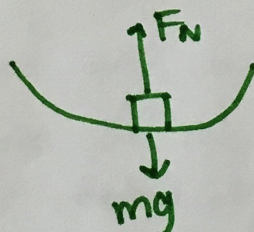
FERRIS WHEEL

WHAT IS NORMAL FORCE ACTING ON A PERSON  
@ TOP, BOTTOM, MIDPOINT?

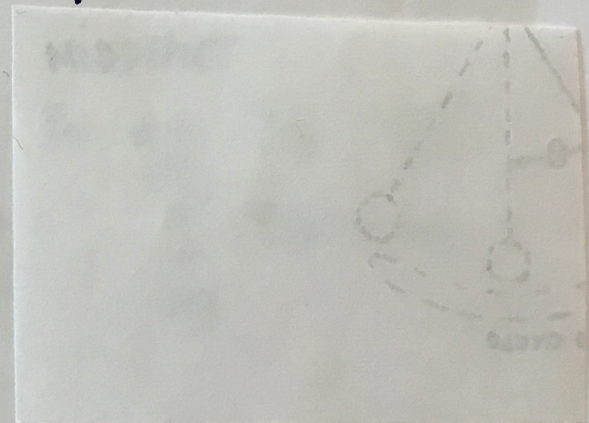


$$mg - F_N = \frac{mv^2}{r}$$

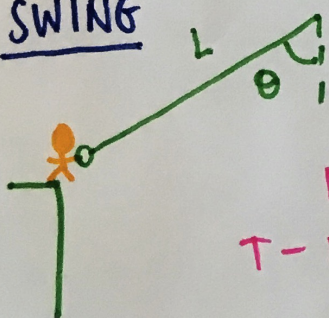
BOTTOM



$$F_N - mg = \frac{mv^2}{r}$$



SWING



DETERMINE MIN & MAX TENSION

FIND  $v$  USING CONSERVATION OF ENERGY

BOTTOM:

$$T - mg = \frac{mv^2}{r}$$

TOP:

$$T - mg \cos \theta = 0$$

$$T = mg \cos \theta$$