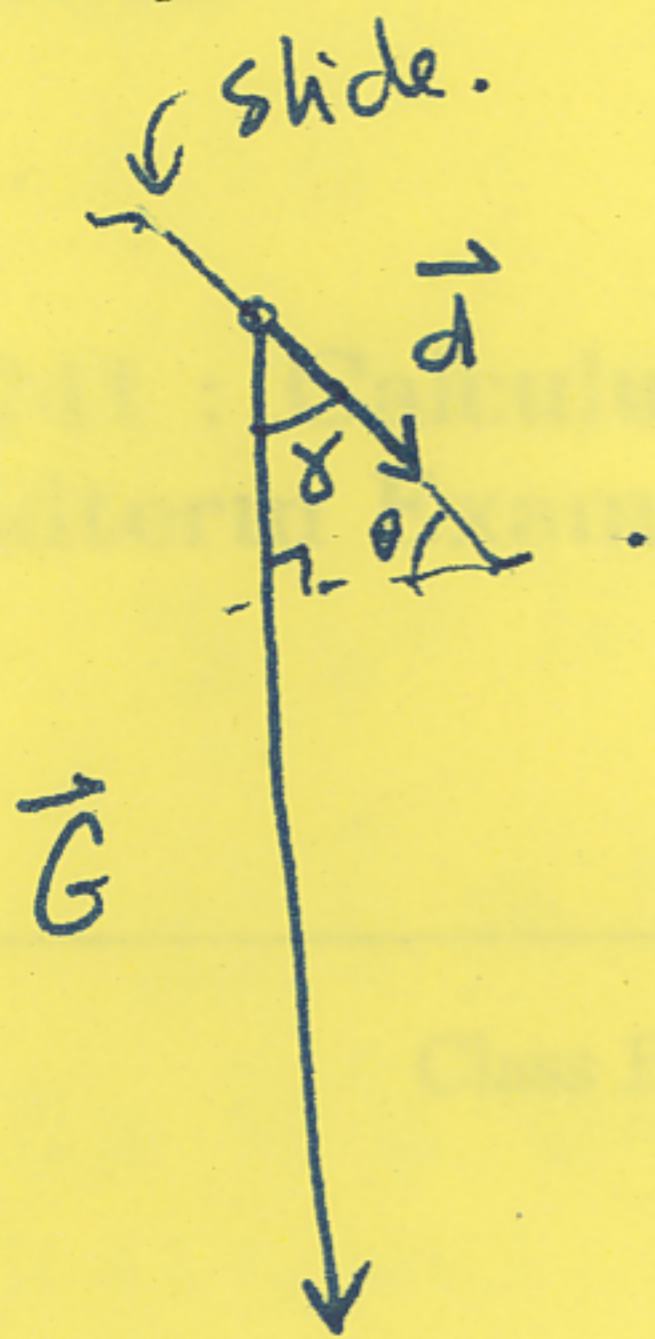


Extra Credit [5 points] Use the general setup from the slide problem to partially explain why you slide down a more steep slide faster than you slide down a less steep slide.



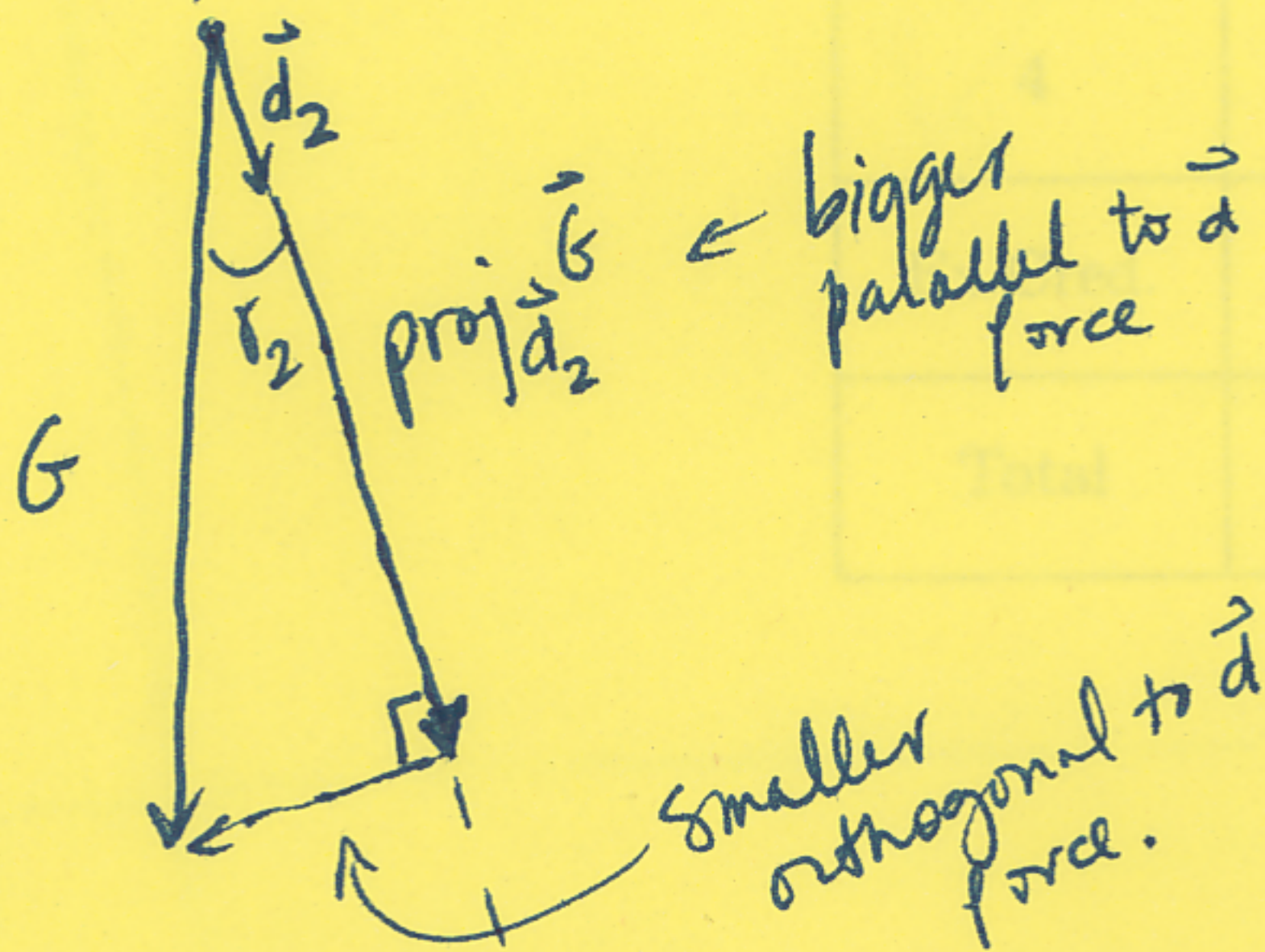
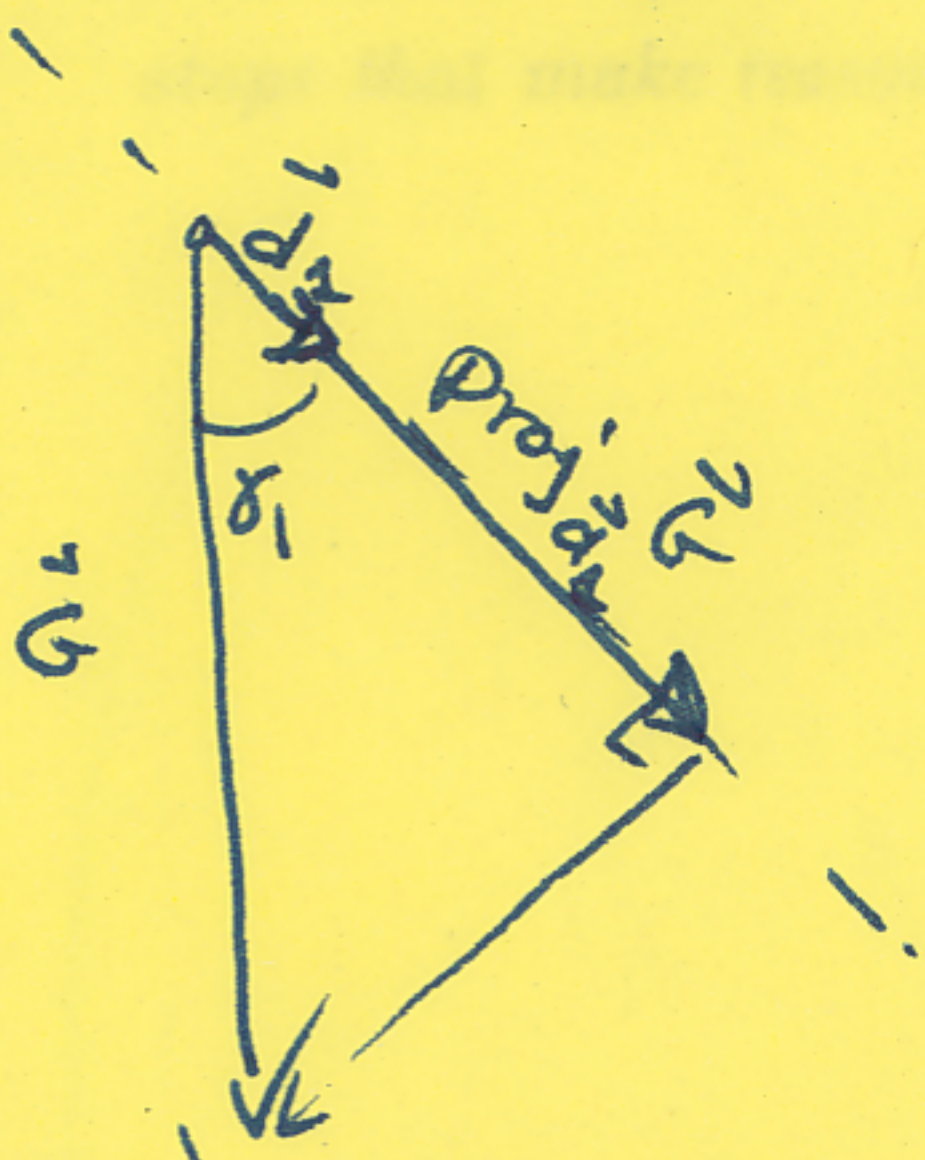
notice that the steeper the slide becomes, the bigger  $\theta$  is, and the smaller  $\gamma$  is.

Since the amount of the gravitational force that goes to pushing the person down the slide is given by

$$\text{proj}_{\vec{d}} \vec{G} = \frac{\vec{G} \cdot \vec{d}}{|\vec{d}|^2} \vec{d} = \frac{|\vec{G}| |\vec{d}| \cos \gamma}{|\vec{d}|^2} \vec{d}$$

key!

as  $\gamma$  gets smaller,  $\gamma \rightarrow 0$  and  $\cos \gamma \rightarrow 1$ . The smaller  $\gamma$  is, the bigger  $\cos \gamma$  is and so the bigger magnitude  $\text{proj}_{\vec{d}} \vec{G}$  will have.



$\gamma_1 > \gamma_2$   
and  
 $|\text{proj}_{\vec{d}_1} \vec{G}| < |\text{proj}_{\vec{d}_2} \vec{G}|$

So the steeper the slide, the more gravitational force aligns with motion down the slide, and the less gravity is used to push you into the slide. This is why you go faster down a steeper slide, but have more chance of falling off it!