Skate or Die
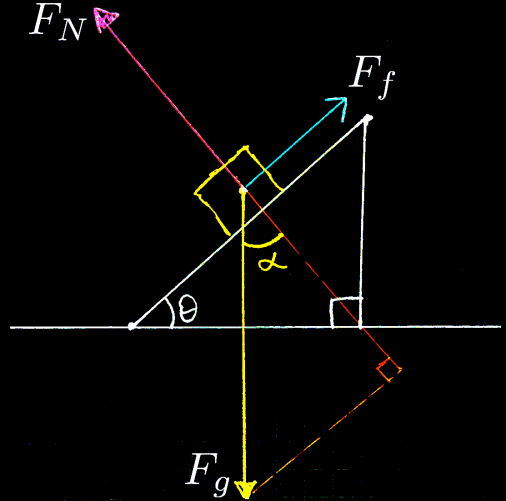
1.) A skater[2] holds a stationary position for a moment at an angle of $\theta = 50°$ to the horizontal floor, shown at the left. A *force diagram* of the skater is shown at the right.

Suppose the **force of gravity** $F_g = 750$ N. This force can be split into two *components*, one perpendicular to the ramp, and one parallel to the ramp. Since the skater is stationary, all of the above forces acting on the skater cancel each other out. Use the force diagram to answer the following questions.

a.) Prove why $\theta = \alpha$.

b.) What is the **normal force** F_N (perpendicular to the ramp)?

c.) What is the **force of friction** on the skater from the ramp, F_f (parallel to the ramp)?

d.) What is the **coefficient of static friction** $\mu_s = \frac{F_f}{F_N}$?

e.) (Extra Credit +3) What is a **durometer** rating, and what does it have to do part (1d)?