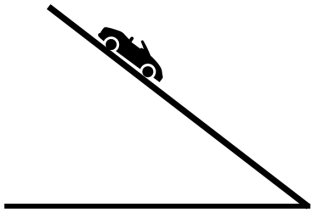
Name _____

Choose x parallel to the incline, y perpendicular to the incline. The angle of the incline with the horizontal will always be the angle the weight vector makes with the y direction (perpendicular to the incline). The weight vector is always the hypotenuse of the triangle.

1. Suppose you park your car on an icy hill (no friction) that is inclined at an angle of 35° with respect to the horizontal and it starts to slide down.



   (a) Draw a free-body diagram of the car above.

   (b) What force, or component of force is responsible for accelerating the car down the hill? **A**:Normal Force, **B**:Weight Force, **C**:Component of the weight parallel to the hill, **D**:Component of the weight perpendicular to the hill.

   (c) What is the acceleration of the car down the hill?

   (d) How fast will your car be moving when it reaches the bottom of the hill if it starts from rest and it slides for 3m?

   (e) Suppose friction acts to prevent the car from sliding down. What must be the magnitude of that force, if your car has a mass of 1000kg?

   Would the magnitude of the friction force change if your car was already sliding down the hill and you wanted to keep it sliding at a constant velocity? **A**:Yes, it will increase, **B**:Yes, it will decrease, **C**: No

   (f) If the hill were any steeper your car would start to slide down. What must be the coefficient of static friction between the hill and the car tires?

2. A 25kg kid slides down a slide that is inclined at an angle of 50° with an acceleration of $3m/s^2$. What must be the magnitude of the kinetic friction force acting on the kid?

3. You are moving and need to push a 35kg couch up a ramp that is inclined by 20° to the horizontal. You know the coefficient of kinetic friction between the couch and the ramp is 0.45. With what force do you need to push on the couch, assuming you push parallel to the ramp?