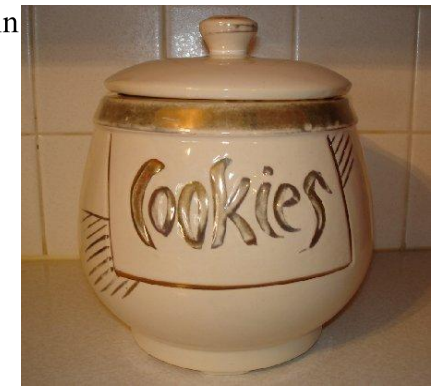
Name: _____ **Problems Solved __/ 6**



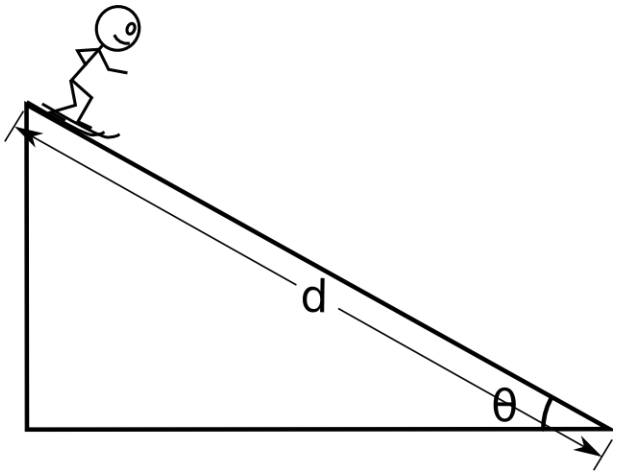
Jane, Bobby, and Sammy are fighting over a cookie jar each pulling it in a different direction. As a result of their tussle, the jar's acceleration is zero. Bobby is pulling with a force of 10 N. Sammy is pulling with a force of 12 N at an angle of 150^{o} degrees with respect to the direction that Bobby is pulling.

a) What is the *Net Force* on the jar? **Don't do any calculations!** You should be able to simply write the answer.

b) Find the x and y components of Jane's force by following these steps:

1) Draw a **Free Body Diagram** of the cookie jar. Include a *coordinate system*.
2) Write **Newton's Second Law** once for each axis.
3) Solve the resulting system of equations for the unknown variables.

A very talented stick skier is accelerating down a VERY slippery slope that makes an angle θ with the horizontal. (there's no friction, that's next period).



a) List all of the forces on the skier.

b) In what direction will the skier accelerate? Draw the acceleration vector in the picture at the right.

c) Draw a *Free Body Diagram* for the skier.

d) Choose a coordinate system and superimpose it on your free body diagram.

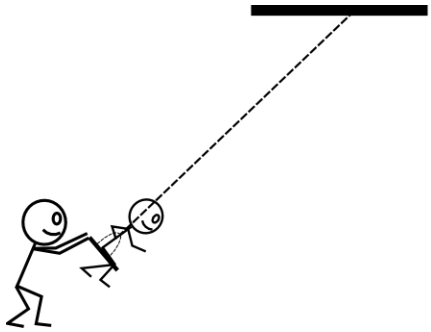
e) Write the x and y versions of Newton's Second Law for the skier based on your coordinate system. Solve these equations for acceleration.

g) What's the skier's velocity after accelerating a distance d?

A block is given an initial velocity of 5 m/s up a frictionless 20° incline. How far up the incline does the block slide before coming to rest?

A 30-kg child is seated in a swing of negligible mass. Her father is pulling her back and is just about to let her go (she is not moving).

How much **horizontal** (*x-axis only*) force must her father apply so that the child and swing is held stationary the chain makes an angle of 32° with the vertical?



A terrible earthquake has happened in San Francisco right in the middle of a critical hockey tournament. As a result of the quake, the ice rink is tilted 15^{o} from horizontal. The 80 kg goalie begins to slide down the slope uncontrollably from his net directly into the opposing goalies net. How fast is he when he crosses the opposite goal line 53 m away?

A 52 kg circus performer slides down a rope that will break if the tension exceeds 425 N.

a) What happens if the performer hangs stationary from the rope?
b) At what acceleration will the performer just avoid breaking the rope?