**Inclined Plane Lab**

**Goal:** To determine the mathematical equation which relates the weight of an object to the component of the weight which is directed parallel to an inclined plane.

**Materials:** Inclined plane (wood board), cart, labquest, force probe, meter stick

**Procedure:**

1. Draw a FBD for the cart on the incline. (Hint: You’ll have FT, Fg, and FN in your diagram)
2. Using the meter stick and trigonometry, incline your wood board at the proper angle.
3. Determine the mass of the cart in kg: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and its weight in N: \_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Place the cart on the inclined plane. Attach the force probe to the string at the end of the cart, making sure the string and probe are parallel to the incline.
5. Record the value of the force necessary to keep the cart from moving.
6. The force which hold the cart at equilibrium is equal to the parallel component of the gravitational force.
7. Using the weight of the cart, determine which of its components – tangent, cosine, or sine – equals (most closely) the force necessary to keep your cart from moving.

**Data:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Incline θ** | **Force [N]** | **Weight of Cart (mg) [N]** | **mgtanθ** | **mgcosθ** | **mgsinθ** |
| 20 |  |  |  |  |  |
| 30 |  |  |  |  |  |
| 45 |  |  |  |  |  |
| 60 |  |  |  |  |  |
| 70 |  |  |  |  |  |

**Analysis:**

1. Which component of the cart’s weight (sine, cosine, or tangent) is responsible for trying to pull it down the incline?
2. Draw the **components** of the gravitational force on the FBD below. (Hint: one of the components should be parallel to the incline; the other should be perpendicular)
3. Based on your diagram, which component of the gravitational force (sine, cosine, or tangent) do you think equals the normal force?