

Extra Credit Sledding Activity

Purpose:

Have fun and find the static and kinetic coefficients of friction for various sleds and snow.

Materials:

- Sleds of different sizes and shape
- Bathroom Scale (The old type with a spring inside work best)
- A friend, sibling, or other person.
- Pencil and paper to record data.

Procedures:

Gathering Data:

1. Step on the scale and record your weight in pounds.
2. Holding each sled, weigh yourself holding the sled, and then subtract your weight. Record the weight of each sled.
3. Weigh your friend and record their weight.

Part 1: Determining the static coefficient of friction of each sled on the snow:

1. Have your friend sit on the sled on snow on a level section of ground.
2. Place the scale on their back and start to push horizontally on the scale until the sled just starts to move.
3. Read the highest amount that you get. Repeat several times until you feel comfortable with your measurement. What you've just measured is the maximum force of static friction. Record this Frictional Force F_{fs} .
4. Add the weight of your friend and the sled they are using to get the Normal Force F_N .
5. In accordance with the $F = \mu N$ equation, F_{fs} / F_N is equal to the static coefficient of friction of the sled on the snow.
6. Repeat the above steps with several other sleds.

Compare your results. Are your results similar or different for the various sleds? Why do you think so? Is there a certain sled that just seems like its μ is too high or too low? Why do you think so?



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Part 2: Determining the kinetic coefficient of friction of each sled on the snow:

7. Have your friend sit on the sled on snow on a level section of ground.
8. Place the scale on their back and push horizontally at constant speed on the scale.
9. Read the force that you get. Repeat several times until you feel comfortable with your measurement. What you've just measured is the force of kinetic friction. Record this Frictional Force F_{fk} . The weight of your friend and the sled is the Normal Force F_N .
10. F_{fk} / F_N is equal to the kinetic coefficient of friction of the sled on the snow.
11. Repeat the above steps with several other sleds.

Compare your results. Are your results similar or different for the various sleds? Why do you think so? Is there a certain sled that just seems like it's μ is too high or too low? Why do you think so?