

Name:

Period:

The Mu of the Shoe

(Consumer Product Testing)

Preliminary Questions:

1. In pushing a heavy box across the floor, is the force you need to apply to start the box moving greater than, less than, or the same as the force needed to keep the box moving? On what are you basing your choice?
2. How do you think the force of friction is related to the weight of the box? Explain.
3. Do you think different types of shoes have different coefficients of friction? If so, how do you think they differ?
4. Select three different types of shoes to be tested in this experiment. Examples you might want to use are a sneaker, dress shoe, and a boot, but any three shoes will do. Record each shoe type in the data table.
5. Make a hypothesis prediction about how the coefficient of frictions will compare for the different shoes. Rank them 1-3. Defend your ranking and discuss what made you choose this order.
6. Draw a Free-Body Diagram of a shoe that is being dragged along a horizontal surface at a constant velocity.



Data:

Data for Dry Surfaces

Brand/ Type of shoe	Normal Force (F_N)	Static Friction force ($F_{S,max}$)	Kinetic Friction Force (F_K)	Coefficient of Static Friction (μ_s)	Coefficient of Kinetic Friction (μ_k)

Data for Wet Surfaces

Brand/ Type of shoe	Normal Force (F_N)	Static Friction force ($F_{S,max}$)	Kinetic Friction Force (F_K)	Coefficient of Static Friction (μ_s)	Coefficient of Kinetic Friction (μ_k)

Conclusions:

1. Which shoe had the strongest grip under dry conditions?
2. Which shoe had strongest grip under wet conditions?
3. Make a **bar graph** that compares the coefficients of static and kinetic friction for the three brands of shoes you tested.
4. Explain whether the coefficient of static friction or the coefficient of kinetic friction best applies to the situation of walking across the floor.
5. What other qualities besides the grip would a consumer want to have in the shoe they want to buy?
6. Pick out one other quality (from question 5) and describe how you could scientifically test for it in a side by side comparison of different brands
7. Rubber is often placed on stairs and sand is often placed on ice to make them safer. What would this do to the coefficient of friction? Why does this make them safer?