POPPY SCHOLARS · PHYSICS OF THE UNIVERSE

Home lab 2 · Unit 2 · about 45 minutes

How does the force of friction depend on the surfaces, and does it depend on weight?

Name _____ Date _____

MATERIALS

You supply everything. Tick each item as you gather it.

- ☐ A smooth board about 1 m long
- ☐ A block (a wooden block, a brick wrapped in tape, or a small box of known weight)
- ☐ A rubber mat (shelf liner) and a piece of felt or cloth
- ☐ A ruler or tape measure, and a stack of books for support
- ☐ A second identical block

SAFETY

Keep your hands and feet clear of the sliding block, and use a small, light block. Support the board so that it cannot fall. Stop the block at the bottom of the board.

PROCEDURE

1. Lay the board on a table with one end hanging over the edge, and lift the other end slowly with a stack of books, so that the board is a ramp. Fix the lower end of the board in place.
2. Place the block near the top end. Raise that end slowly until the block just starts to slide. Hold the board there.
3. Measure the rise (height of the raised end above the table) and the run (horizontal distance between the ends). Keep the run at 80 cm each time by placing the foot of the board on a mark.
4. Compute the coefficient of static friction: μ = rise ÷ run.
5. Repeat 3 times on each surface: bare wood, rubber mat taped to the board, and felt taped to the board.
6. Repeat on bare wood with two stacked blocks, to test whether the weight matters.

RECORD YOUR DATA

Surface	Rise at slip, trial 1 (cm)	Trial 2 (cm)	Trial 3 (cm)	Mean rise (cm)	μ = rise ÷ run
Block on wood board					
Block on rubber mat					
Block on felt cloth					
Two stacked blocks on wood					

The run is 80 cm for every trial. Write it down here too.

LAB REPORT

Write a report that gives your table, shows why μ equals rise ÷ run (a free-body diagram of the block at the moment it slips will help), compares the surfaces, and says what the stacked-block trial shows about whether the friction coefficient depends on weight.

Report the numbers you actually got, even when they disagree with the lesson. Write on the lines, or type your report on the website and send it to a teacher there.

Question and hypothesis *State the question in your own words, what you expect to happen, and why you expect it.*

Method *What you changed, what you measured, what you kept the same, and how many trials you ran.*

Observations *Describe what you saw, including anything unexpected. Your data tables are added to the report automatically.*

Calculations *Show each calculation step by step, with units.*

Claim and reasoning *Answer the question using your numbers, then explain why, using the science from the unit.*

Limits and next step *What could have affected your results, and one change you would make next time.*