

FISHING FOR FRICTION

*Exploring the levels of sliding friction produced
by different surfaces*

EXPERIMENTAL PURPOSE:

The purpose of this project is to determine which of a variety of surfaces produces the greatest (or least) level of sliding friction.

DRIVING QUESTION:

Which of these materials produces the most sliding friction with a heavy object: aluminum foil, plastic wrap, felt, sandpaper, cotton fabric, or printer paper?

HYPOTHESIS:

I predict that sandpaper, cotton fabric, felt, and plastic wrap will produce some of the most friction. This is because when you feel any of them, you do not feel your hand sliding much over these surfaces. Sandpaper will make the most friction because of its texture, which is rough and bumpy. In the same way, I predict felt, aluminum foil and paper printer will have the least friction. With those surfaces, your hand slides easily. They are slick (if the aluminum foil is flat), so their friction should be small. The paper is the smoothest of those, so it should have the least friction.



MATERIALS:

- Aluminum Foil
- Plastic Wrap
- Felt
- Sandpaper
- Cotton Fabric
- Printer Paper
- Wooden Ramp
- Protractor
- 500g Weight
- Tape

PROCEDURE:

- Get the different surface materials.
- Then, get a long wooden board, a protractor, and a heavy weight (500g).
- Start with the sandpaper.
- Secure the sandpaper on top of the board, using the tape if necessary.
- Put the weight on top of the sandpaper.
- Raise the board slowly until the weight begins to slide.
- When that happens, stop moving the board and measure its angle from the table with the protractor. Record that.

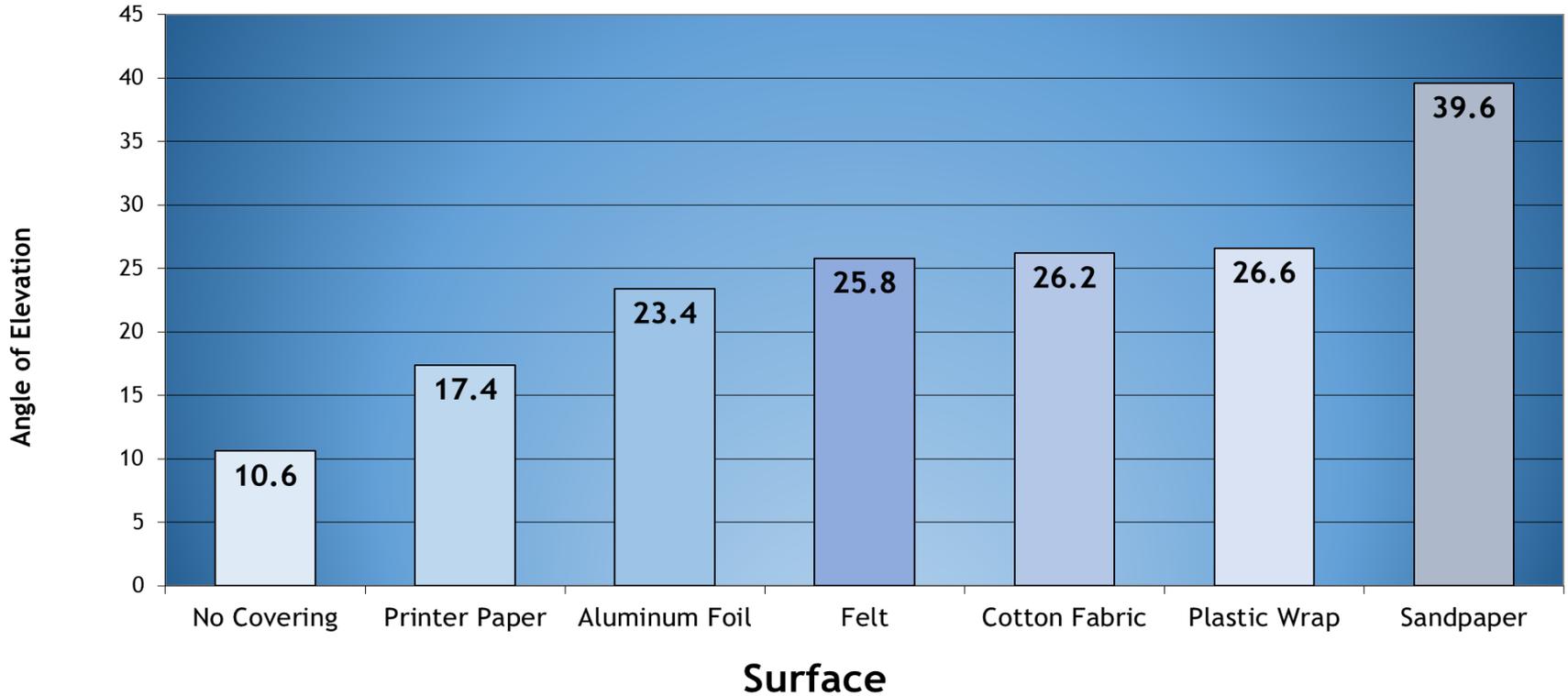
PROCEDURE (continued):

- Repeat this with the weight and sandpaper four more times for a total of five tests.
- Now repeat the entire procedure with each of the other surfaces: aluminum foil, then plastic wrap, then felt, then cotton fabric, and finally printer paper. Also do a set of tests with just the board.
- When all of this is finished, compare the angle measures and determine which surface has the most friction, which will be the one with the greatest angle measurements.

Data: Angle of Elevation of the Ramp Which Causes Weight to Slide for Each Surface (degrees)

Trial	No Covering	Printer Paper	Aluminum Foil	Felt	Cotton Fabric	Plastic Wrap	Sandpaper
1	10	21	21	27	28	28	39
2	13	19	23	24	26	30	42
3	9	16	22	25	28	26	36
4	11	12	25	25	24	24	43
5	10	19	26	28	25	25	38
Average	10.6	17.4	23.4	25.8	26.2	26.6	39.6

Average Ramp Angle Needed to Overcome Friction (degrees of elevation)



RESULTS: *Sandpaper produces a significantly higher level of friction than the other materials.*

CONCLUSION:

My results confirm that what I predicted in my hypothesis is correct. The rougher surfaces produced the most friction, and the smoother surfaces produced the least friction. Sandpaper had the highest level of friction, and it is by far the roughest surface I tested. Similarly, printer paper had the lowest friction, and it was the smoothest surface I tested. My results show that in the case of sliding friction and a heavy object, the roughest item creates the most friction and the smoothest item creates the least friction.

REFERENCES:

Sources utilized when collecting background information to understand friction and its causes:

- *openbooks.library.umass.edu/toggerson-131/chapter/friction/*
- *flexbooks.ck12.org/cbook/physical-science-essentials/what-causes-friction/*
- *www.snexplores.org/article/explainer-friction-force-physics*
- *www.geeksforgeeks.org/physics/factors-affecting-friction/*
- *pages.uoregon.edu/jschombe/glossary/friction.html*