

How Does Friction Affect an Object's Movement?

Estimated Time:

Prep: 10 min.

Activity: 20–30 min.

Introduction

Overview

Experiment: Students move a block down an **inclined plane** that has been wrapped in various materials.

Key Concepts: Students will understand that **friction** affects the speed of a moving object. They will also understand that changing the **angle** of an inclined plane changes the amount of **force** needed to move an object.

Lead-In

Explain that force—a push or a pull—makes objects move. It is used to push a door open and to pull it closed. Explain that **gravity** is a type of force that pulls on objects. When you throw a ball up in the air, gravity pulls it back down to Earth. Ask students what can change the speed of an object. Explain that they will explore how certain materials can change the speed of a moving object.

Teacher Preparation

Teacher-Provided Experiment Materials:

- Aluminum foil
- Waxed paper
- Construction paper
- Tape
- Scissors

Try This! Materials:

- String*
- Fabric in a variety of sizes
- Wooden block*

Prepare:

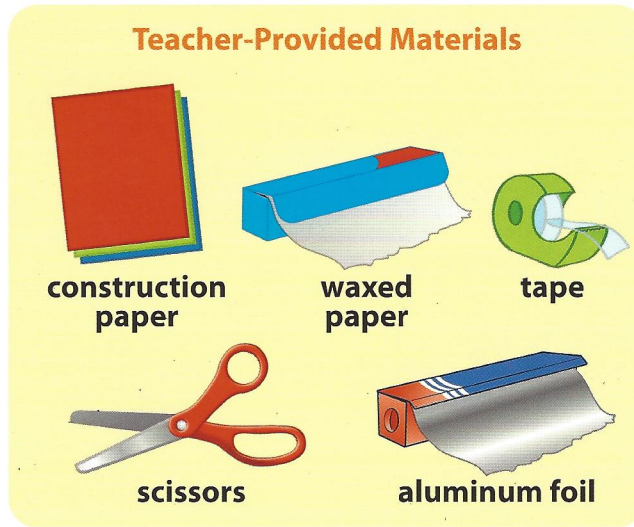
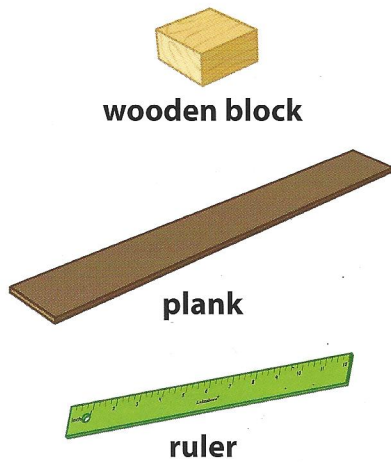
- Make copies of the Experiment Sheet.

**included in kit*

Vocabulary

- ◆ **angle** the space or shape formed where two lines or surfaces meet
- ◆ **force** the push or pull that causes a change in an object's motion
- ◆ **friction** the force that causes a moving object to slow down when it is touching another object
- ◆ **gravity** the natural force that causes things to fall toward Earth
- ◆ **inclined plane** a simple machine with a flat surface and one raised end

You Will Need



Experiment 1: Force, Motion, and Friction

Name _____

How Does Friction Affect an Object's Movement?

My hypothesis is that the plank wrapped with _____ will cause the block to slide the slowest, because _____.

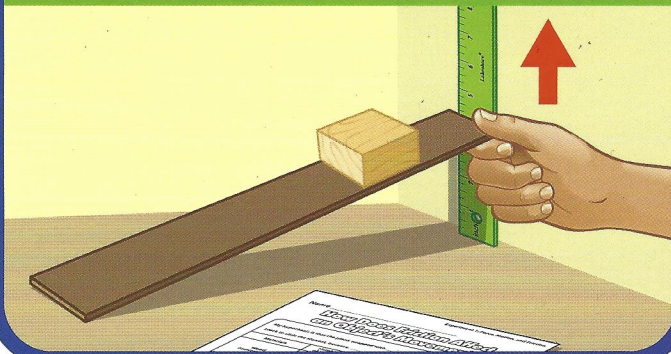
Materials	Height of Plank	Observations
Wood (unwrapped)		
Construction Paper		
Aluminum Foil		
Waxed Paper		

My conclusion is that the plank with _____ caused the block to slide the slowest, because _____.

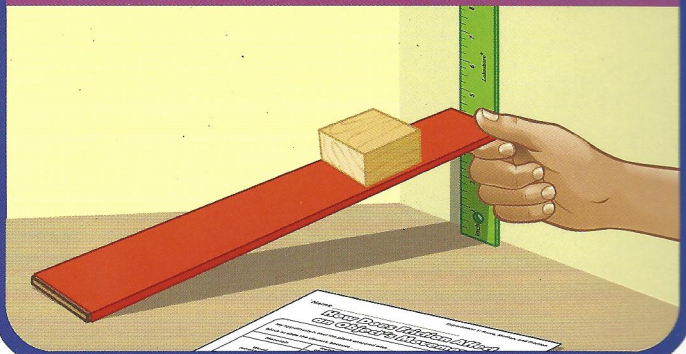
Experiment Sheet

Procedure

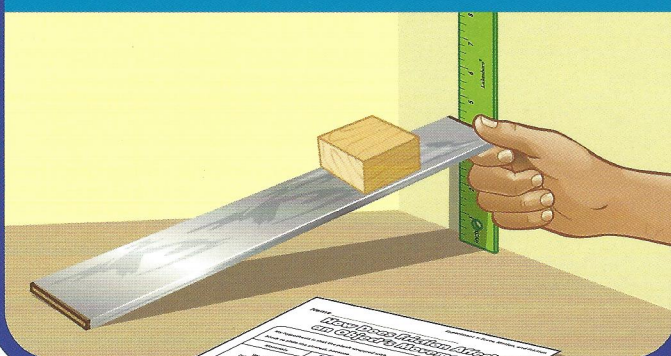
- 1 Attach the ruler vertically to a wall. Place the wooden block on the plank. Slowly raise the end of the plank. Stop when the block begins to move and record the height of the plank. Record your observations.



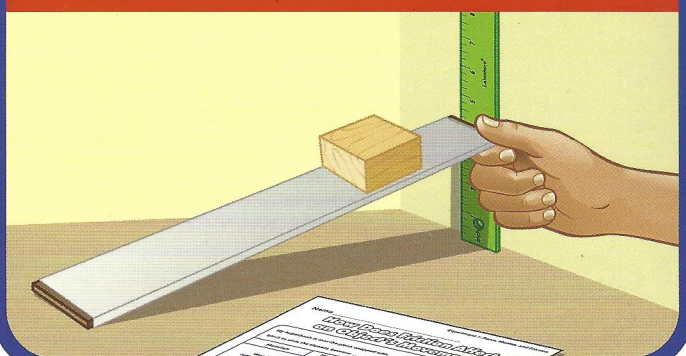
- 2 Read steps 2–4. Write your hypothesis. Wrap the plank in construction paper and repeat step 1. Record your observations.



- 3 Wrap the plank in aluminum foil and repeat step 1. Record your observations.



- 4 Wrap the plank in waxed paper and repeat step 1. Record your observations. Write your conclusion.



Name _____

How Does Friction Affect an Object's Movement?

My hypothesis is that the plank wrapped with _____ will cause the block to slide the slowest, because _____.

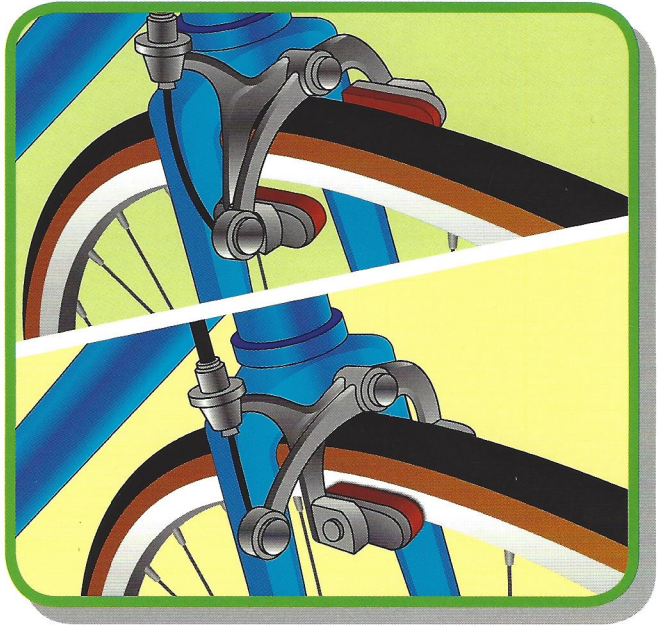
Materials	Height of Plank	Observations
Wood (unwrapped)		
Construction Paper		
Aluminum Foil		
Waxed Paper		

My conclusion is that the plank with _____ caused the block to slide the slowest, because _____.



Why?

Friction is the force that causes a moving object to slow down. For example, on a bicycle, when the brakes are applied, friction is created between the rubber brakes and wheels to stop the bike. When friction increases, more force is needed to make an object go faster. Surfaces that significantly slow movement down are called high-friction surfaces, while surfaces that allow more movement are called low-friction surfaces.



Discussion Prompts & Questions

- Which material has a high-friction surface? How can you tell?
- Which material has a low-friction surface? How can you tell?
- What caused the block to move?
- Why did the height needed for the block to move change when the plank was wrapped in different materials?
- What was the highest measurement of the plank? Why?



Sentence Frames

- I think objects move slowly on _____, but they move quickly when _____.
- I had to move the plank the highest when _____.
- I had to move the plank the lowest when _____.



Try This!

Air resistance is another type of friction. It occurs between a moving object and air. Discuss how streamlining the shapes of cars and airplanes reduces friction. Then explain how parachutes increase friction. Have students explore making parachutes with string and different-size fabric pieces. Tie a wooden block or similar weight to the parachute. How did the size of the fabric change the block's speed as it fell to the ground?