

Life
Physical
Earth and Space

LESSON 30

Observing and describing the effect of friction on the movement of objects

Lesson Preparation

Program Materials

- Science Word List C
- Child's Booklet C *Investigating Forces and Work* (p. 5)
- Lesson Review 30

Tool Kit Materials

- Plastic toy car (see *Before the Lesson*)

Collected Materials

- Scrap paper (3 pieces)
- Saltshaker with salt
- Gameboard (see *Before the Lesson*)
- Terry cloth hand towel
- 2 crayons that are the same size
- Yellow highlighter

Before the Lesson

- Use a folded gameboard from a game such as checkers.
- Remove the balloon from the car.

The Lesson

"In your last science lesson, you learned about gravity."

"What is gravity?" *an invisible force that pulls objects*

"Today you will learn about another invisible force."

"This invisible force is called friction."

- Write the word friction on Science Word List C.

"Friction is a force that slows objects that are moving."

"Friction can also keep objects from moving."

- **Teacher Note:** Static friction occurs when a force is applied to an object, such as a large piano, and the object does not move. If a large enough force is applied, static friction will be overcome. As soon as an object starts to move, kinetic friction occurs.

“Let’s explore friction.”

- Hand a piece of scrap paper to your child.

“Rub your finger tips across the paper.”

“What is the texture of the paper?” *smooth*

“Now I will put salt on the paper.”

- Sprinkle salt on your child’s paper.

“Keep the salt on your paper.”

“Rub your finger tips across the salt.”

“What is the texture now?” *rough or gritty*

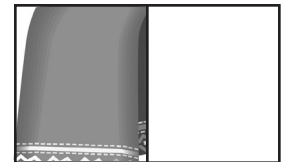
“The salt makes it harder to move our fingers across the paper.”

“The salt creates friction between the paper and your finger tips.”

- Collect and discard the paper with the salt.

“Let’s look at another example of friction.”

- Place a hand towel on one half of the folded gameboard.



“Feel the towel and the gameboard.”

“Which has a surface with a rougher texture, the towel or the gameboard?”
towel

- Show your child the two crayons.

“These crayons are the same size and shape.”

- Place one crayon on the towel and one on the gameboard so that they are positioned to roll when you tilt the board.

“One of the crayons is on the towel and one is on the gameboard.”

“What do you think will happen if I tilt the gameboard?” *The crayons will roll off.*

“Which crayon do you think will roll off the gameboard more quickly?”
The one that is not on the towel.

“Why?”

“Let’s check your prediction.”

“Watch carefully.”

- Slowly tilt the board until at least one crayon starts to move and rolls off.

“What happened?” *The crayon on the gameboard rolled off faster.*

“Why do you think this happened?” *The surface of the gameboard is smoother than the towel.*

“What force pulled the crayons off the gameboard?” *gravity*

“The force of gravity pulls the crayons toward the ground, but the force of friction slows them down.”

“The rougher surface of the towel slows the crayon.”

“There is more friction between the crayon and the towel than between the crayon and the gameboard.”

“Friction is an invisible force that slows or stops moving objects.”

- Remove the towel from the gameboard.
- Show your child the toy car.

“What do you think will happen when I put this car on the board and tilt the board?” *It will roll off.*

“Let’s watch how far I have to tilt the board before the car starts moving.”

- Slowly tilt the board until the car starts moving.

“How much did I have to tilt the board before the car started moving?”
a small amount

“What do you predict will happen if I put a towel between the car and the gameboard?”

- Put the hand towel on the gameboard.

“Let’s watch how far I have to tilt the gameboard before the car starts moving this time.”

- Slowly tilt the gameboard until the car starts moving.

“What happened this time?” *You had to tilt the gameboard farther.*

“Why do you think this happened?” *There is more friction between the car and the towel than between the car and the surface of the gameboard.*

“Air and water can also create friction and can affect how objects move.”

“Is it easier to run in a swimming pool or on the ground?” *ground*

“The water creates friction and slows you down.”

“Air friction can also slow objects.”

“What happened in our gravity experiment in our last science lesson?”

When we dropped two objects from the same height, they hit the ground at the same time.

“When we drop a flat sheet of paper, air friction will cause the paper to float in the air and fall more slowly than a crumpled sheet of paper.”

- Demonstrate by dropping a crumpled sheet of scrap paper from the same height as a flat sheet of scrap paper.

“The friction of the air causes the flat paper to fall more slowly.”

- **Teacher Note:** Walking or running through a swimming pool is an example of fluid friction. All liquids and gases are fluids. The drag on an airplane in flight is another example of fluid friction. Ships and aircraft are designed to minimize fluid friction.

“Let’s read about friction.”

- Hand the booklet *Investigating Forces and Work* and a highlighter to your child.

“Open your physics booklet to page 5.”

“What is the title at the top of this page?” *Friction*

“Point to the words as I read paragraph 1.”

- Read the following to your child as he/she follows along.

Friction is an invisible force that can slow or stop a moving object. Friction can also keep an object from moving.

“What does the word ‘invisible’ mean?” *can’t be seen*

“We can’t see friction.”

“Point to the words as I read paragraph 2.”

- Read the following to your child as he/she follows along.

The friction between two objects depends on the surfaces of the objects. Rougher objects have more friction than smoother objects. If we push with the same force, a toy car will move farther across a tile or wood floor than across a carpeted floor. This is because carpet has a rougher surface than wood or tile.

“Would you need to use more force to roll a ball the same distance across grass or across concrete?” *grass*

“Why?” *The grass creates more friction because it is not as smooth as concrete.*

“Point to the words as I read paragraph 3.”

- Read the following to your child as he/she follows along.

Sometimes it is important to have more friction. Shoes with rough soles, or bottoms, help us avoid slipping when we play games outside or in the gym.

“When would it be good to have less friction?”

- Allow time for your child to discuss times when less friction is desirable.

“Now you will highlight the important information in these paragraphs.”

“Find the sentence in the first paragraph that tells us what friction is.”

“Which sentence is it?” *first sentence*

“Use your highlighter to draw one line through the sentence ‘Friction is an invisible force that can slow or stop a moving object.’”

- Allow time for your child to do this.

“Snap the cap on your highlighter.”

“What is something you learned in today’s science lesson?”

“In your next science lesson, you will learn about ways to change the amount of friction between two objects.”

- **Note:** The gameboard will also be used in Lessons 36, 37, 38, 39, and 42.

Lesson Review

- **Note:** Lesson reviews may be completed on the same day the lesson is taught or on the following day.
- Hand Lesson Review 30 to your child.
- Read the directions and questions one at a time to your child. Allow time for your child to answer each question before continuing. Allow your child to use his/her booklet to answer the questions.
- Correct your child’s paper. Review incorrect answers with your child.

Friction

Lesson 30

1 Friction is an invisible force that can slow or stop a moving object. Friction can also keep an object from moving.

2 The friction between two objects depends on the surfaces of the objects. Rougher objects have more friction than smoother objects. If we push with the same force, a toy car will move farther across a tile or wood floor than across a carpeted floor. This is because carpet has a rougher surface than wood or tile.

3 Sometimes it is important to have more friction. Shoes with rough soles, or bottoms, help us avoid slipping when we play games outside or in the gym.

Lubricants

Lesson 31

1 Lubricants are used to reduce the amount of friction between two objects. Oil, grease, liquid soap, and hand lotion are lubricants because they reduce friction. When there is less friction, things move more easily.

Explain what happened when you put a lubricant on your hands.

Accept reasonable answers.

Four horizontal lines for writing answers.

Name _____ Answer Key _____

Date _____

Lesson Review 30
Science 2 Lesson 30

Friction

Fill in the circle next to the correct answer.

- 1. What is the invisible force that can slow or stop a moving object? (A) sand (B) friction (C) texture
2. The friction between two objects depends on the _____ of the objects. (A) surfaces (B) colors (C) lusters
3. If we push with the same force, across which surface would a toy car move farthest? (A) grass (B) carpet (C) smooth wood

Look Back

Write gravity or friction on the blank to make a true statement. (pp. 4-5)

- 4. An object is pulled down an inclined plane by the force of _____ gravity _____.
5. The force of _____ friction _____ slows moving objects.
6. Draw a picture of something you can move by using force.

A large rectangular box for drawing a picture.