

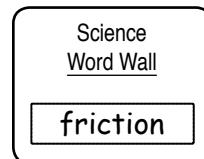
LESSON 30

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

Lesson Preparation

Program Materials

- Science Word Wall card (see *Inset*)
- Children's Booklet C *Investigating Forces and Work* (p. 5)
- Lesson Review 30



Tool Kit Materials

- Cardboard (6 pieces)
- Plastic toy car (see *The Night Before*)

Teacher Collected Materials

- Copy paper (1 piece per child and 2 pieces for demonstration)
- Saltshaker with salt
- Terry cloth hand towel
- 2 crayons that are the same size
- Yellow highlighters (1 per child)

The Night Before

- Remove the balloon from the car.

The Lesson

"In our last science lesson we 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."

- Show children the word card **friction**.

"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."

- Distribute a piece of copy paper to each 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 each 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."

"Let's move to (area of room) where everyone can sit near the demonstration area."

"Put your salt in the trash basket and come to (area of room)."

- Collect the copy paper.

"Let's look at another example of friction."

- Place a hand towel on one half of the cardboard.



"Who would like to describe the texture of the towel and the cardboard?"

- Allow each child to feel the towel and the cardboard.

"Which has a surface with a rougher texture, the towel or the cardboard?"
towel

- Show children the two crayons.

"These crayons are the same size and shape."

- Place one crayon on the towel and one on the board 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 board."

"What do you think will happen if I tilt the board?" *The crayons will roll off.*

"Which crayon do you think will roll off the board more quickly?" *The one that is not on the towel.*

"Why?"

"Let's check our prediction."

"Watch carefully."

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

"What happened?" *The crayon on the board rolled off faster.*

"Why do you think this happened?" *The surface of the board is smoother than the towel.*

"What force pulled the crayons off the board?" *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 board."

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

- Remove the towel from the board.
- Show the toy car to the children.

"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 board?"

- Allow children to offer predictions.

Science 2, Lesson 30

- Put the hand towel on the board.

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

- Slowly tilt the board until the car starts moving.

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

“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 paper from the same height as a flat sheet of 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.”

“When I give you your physics booklet, return to your seat.”

- Distribute the children’s booklets *Investigating Forces and Work* and highlighters.

“Keep your highlighter capped until I tell you it is time to use it.”

“Open your physics booklet to page 5.”

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

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

- Read the following to the children as they follow 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 the children as they follow 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 the children as they follow 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 the children to discuss times when less friction is desirable.

"Let's 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*

"Let's read the sentence together."

- Read the sentence "Friction is an invisible force that can slow or stop a moving object."

"Use your highlighter to draw one line through the words in the sentence 'Friction is an invisible force that can slow or stop a moving object.'"

"Snap the cap on your highlighter and put it at the top of your desk."

"Who would like to share something you learned in today's science lesson?"

- Allow time for the children to share.

"In our next science lesson we will learn about ways to change the amount of friction between two objects."

- Collect the children's booklets and highlighters, unless the lesson review will be completed immediately following the lesson.
- Post the word card **friction** on the Science Word Wall.

Lesson Review

- **Note:** Lesson reviews may be completed on the same day the lesson is taught or on the following day. If the lesson review is completed on the following day, distribute the children's booklets *Investigating Forces and Work* and reread the paragraphs about friction on page 5 to the children before distributing Lesson Review 30.
- Distribute Lesson Review 30.
- Read the directions and questions one at a time to the children, allowing time for the children to answer each question before continuing. Allow children to use their physics booklets to answer the questions.
- Circulate and assist children as they work. If children have difficulty reading, pair children and allow them to work with a partner.
- Review the answers with the children.
- Collect the children's booklets and papers. Record on the Lesson Review Recording Form the completion of the lesson review. Return the papers to the children to take home or store in a science folder.

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 lustres
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 BackWrite **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.



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