



- JANUARY**  
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- FEBRUARY**  
*Mahigugmaon*
- MARCH**  
*Matinabungan*
- APRIL**  
*Matinahuron*
- MAY**  
*Mahapsay og Malimpyo*
- JUNE**  
*Maabtik og Masunod sa  
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- JULY**  
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- AUGUST**  
*Maginhuhunahan  
para sa Uban*
- SEPTEMBER**  
*Madaginton*
- OCTOBER**  
*Matinud-unon*
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*Masaligan*
- DECEMBER**  
*Maalampon*

# 6



# SCIENCE

## Quarter 3 - Module 1 Effects of Friction on the Movement of Objects



Name of Learner: \_\_\_\_\_

Grade & Section: \_\_\_\_\_

Name of School: \_\_\_\_\_

**Science – Grade 6**  
**Support Material for Independent Learning Engagement (SMILE)**  
**Quarter 3 – Module 1: Effects of Friction on the Movement of Objects**  
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# Lesson

# 1

# Effects of Friction on the Movements of Objects



## What I Need to Know

In this module, you will learn to **infer how friction affects movements of different objects. (S6FE-IIIa-c-1)**

Specifically, you are expected to:

1. Define friction.
2. Identify the different types of friction.
3. Explain how the different types of friction affect the movement of different objects.



## What's In

In the previous grade, you learned about force and the different kinds of forces that affect the motion of objects. Let us find out how well you can recall the things you have learned by answering the exercises below.

**Directions:** Read each question carefully. Write your answer on the blank before each item.

1. Roger pulls a rope attached to a stationary box. The box begins to move. Which of the following was exerted on the box that makes it move? \_\_\_\_\_

A. force                      B. speed                      C. velocity                      D. distance

2. Force applied on an object can \_\_\_\_\_

- |   |
|---|
| I. change the amount of matter contained in an object |
| II. start an object moving                            |
| III. speed up or slow down a moving object            |
| IV. change the shape or size of an object             |

A. I only                      B. II and III                      C. I and IV                      D. II, III, and IV

3. Which of the following objects can be moved through the force of the wind as it blows on a fine weather? \_\_\_\_\_

A. dump truck                      B. hanging clothes                      C. building                      D. table

4. In the game tug-of-war as shown below, what will most likely happen if there is unequal number of members in each team participating in the game?



- A. The team with three members will have a stronger pull than the boy at the opposite side.  
B. The boy at the right will have a stronger pull than the other team with three members.  
C. Each team will exert equal opposite forces.  
D. The opposing forces of each team will cut the rope.
5. In which situation(s) is/are the forces on the objects balanced? \_\_\_\_\_

- |   |
|---|
| I. a notebook resting on a table<br>II. a rolling ball slowing down<br>III. a mango fruit falling from the tree<br>IV. a parked car starting to run |
|---|

- A. I only                      B. IV only                      C. I and III                      D. I, III, and IV
6. Which of the following situation shows that objects move through the force of water? \_\_\_\_\_
- A. twigs and branches from trees growing along the riverside reached to the sea  
B. a strong typhoon uprooted the big trees in the hills  
C. ripe mango fruits fall off from the mango tree  
D. girl pushing the cart in a grocery store
7. When you place a magnet near the thumbtacks and needles, the thumbtacks and needles begin to move in the direction of the magnet until they are attracted to it. Why does this happen? \_\_\_\_\_
- A. The magnet's opposite poles are attracted to each other.  
B. The magnet has the same properties to the thumbtacks and needles.  
C. The magnet, thumbtacks and needles' metallic properties made them repel.  
D. Magnetic force causes the magnet's attraction to iron-containing materials.
8. The pile of books on the table fall to the floor as Joshua accidentally hits the table while running after her younger sister inside the house. Which of the following causes the movement of the table and the books?

- A. force of Joshua's sister
- B. force of Joshua towards the table
- C. gravitational force of the Earth
- D. air resistance

9. A nail is attracted to a magnet. What force is responsible for this attraction? \_\_\_\_\_

- A. electrical force
- B. gravitational force
- C. magnetic force
- D. nuclear force

10. Which of the following statements is TRUE about forces and motion of objects? \_\_\_\_\_

- A. Forces acting on moving objects can either move them faster or slower.
- B. The change in position of objects can be observed without a reference point.
- C. Forces acting towards the direction of motion slows down the moving object.
- D. Greater forces applied on an object slows down its movement.



## What's New

Examine the activities shown in the pictures below.



[www.dreamstime.com](http://www.dreamstime.com)



[hiclipart.com](http://hiclipart.com)

Are you fond of playing different games in your vacant time? Do you enjoy sliding or skating in the playground as shown in the picture above? Did you have any difficulty in playing such games? Are your experiences in such activities the same in different places or surfaces?

When you walk, run, play and move from one place to another, there are certain forces that affect your rate of motion. Such forces have varying effects as they act on objects on different surfaces.

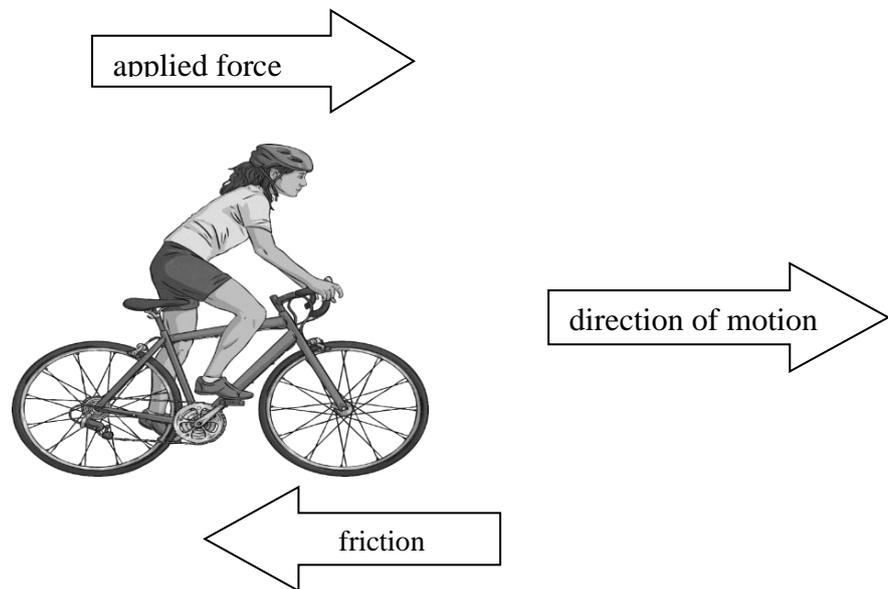
In the pictures above, you have noticed that the moving bodies are in direct contact with the surfaces of an area where they are moving. Contact force is responsible for most of the interactions we experience in daily life. Pushing a cart filled with goods or products in a grocery store, pulling a carabao while plowing the ricefield, pushing a wheelbarrow filled with weeds removed from the garden on the muddy path towards the compost pit, transferring the location of chairs and tables in the classroom or at home, writing your name with a pen, or picking up a textbook from the table are all examples of daily activities that make use of contact forces.

In this lesson, you will investigate further on a contact force that affects the movement of objects. In the examples enumerated, friction plays a great role on why the rate of motion of objects vary in rough and smooth surfaces.

**Friction** is the energy generated when two surfaces rub each other or objects have physical interaction with each other. Since two or more surfaces are in contact with each other, activities affected by frictional force often produce heat, especially if it is done continuously or for a longer period of time. Try rubbing your hands together and place your palms on your neck. How do you feel? Do you feel warm?



## What is it



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**Friction** is a force that acts between two surfaces or objects that are moving or trying to move across each other. For example, when you try to bike on a rocky road, greater friction makes it more difficult to move the bicycle at a faster rate since it acts opposite to the direction of movement of the bicycle. As a result, the movement of the bicycle slows down even if the biker applies the same amount of force as she strikes the pedals forward.

All surfaces create friction on an object moving across them in direct contact. Rough surfaces produce more friction than smooth surfaces. Hence, objects tend to move faster as they get in contact with smooth surfaces where there is less friction.

### Types of Friction:

1. **static friction** - This exists between a stationary object or object at rest and the surface on which it is resting. It prevents the object from moving against the surface or changing its original position.



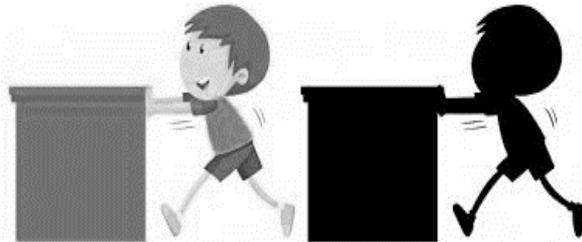
[pngio.com](http://pngio.com)

In the illustration shown in the previous page, static friction prevents the book in falling from the table. If you want to move the book from its original position, you need to overcome the static friction acting between the book and the table on where it is placed.

- 2. sliding friction** – This occurs between two objects as they slide against each other. It is also known as kinetic friction. It is weaker than static friction. Writing with a pencil or pen on a piece of paper or notebook, a toy car sliding on an inclined desk, pushing a table on the floor and pulling a loaded box on the pathway are just few of the examples where sliding friction affects the movement of objects.



[www.clipart-library.com](http://www.clipart-library.com)



[freepik.com](http://freepik.com)

- 3. rolling friction**- This acts on objects when they are rolling over a surface. It is much weaker than sliding friction or static friction. This explains why most forms of ground transportation use wheels, including bicycles, cars, 4-wheelers, roller skates, scooters, and skateboards. This is evident in activities which involve moving objects with wheels or those that have circular or spherical shapes which can roll on surfaces such as skateboards moving on a cemented pathway, rolling a ball on a hill or slope, running a car on the road and pushing a grocery cart in the mall.



[gograph.com](http://gograph.com)

Look at the moving car traveling on the road as shown in the picture. Rolling friction generated between the car tires and the road as they continually get in contact will keep acting in opposite direction to the movement of the car, maintaining a speed that the driver desires. When the driver wants to stop the car, he or she steps on the brakes. The brakes apply force on the tires, causing friction to slow down and stop the motion of the tires.

- 4. fluid friction**- This type of friction acts on objects moving through a fluid. A **fluid** is a substance that can flow and take the shape of its container. Fluids include liquids and gases.

Have you tried pushing your open hand through the water in a tub or in a pail of water? Can you feel the resistance of the water against your hand as you splash the water in its container?

How about playing a paper boat in a basin of water? Can you feel the resistance of the water against your hand as you splash the water to move your paper boat at a distance? The same is true when you paddle the boat along the river or sea. The waves or current of water due to fluid friction also exert force that is opposite to the direction of the movement of the boat. Hence, friction slows down the movement of objects until it stops at a certain distance or location.

Look at the skydiver in the figure below. He's falling towards the ground with a parachute. Resistance of the air against the parachute slows his descent. The faster or larger a moving object is, the greater is the fluid friction resisting its motion. That's why there is greater air resistance against the parachute than the skydiver's body.



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***Air resistance causing fluid friction acts in opposite direction to the downward motion of the parachute.***



## **What's More**

Study the given situation in each item. Identify the type of friction acting on the object or body in motion or at rest. Write either static friction, sliding friction, rolling friction or fluid friction on the blank before each item.

- \_\_\_\_\_ 1. a car parked in a vacant lot
- \_\_\_\_\_ 2. a boy sliding on a smooth and slippery floor
- \_\_\_\_\_ 3. biking on a cemented road
- \_\_\_\_\_ 4. several clothes piled inside the cabinet
- \_\_\_\_\_ 5. ships traveling on the ocean
- \_\_\_\_\_ 6. plates placed on a dish rack
- \_\_\_\_\_ 7. a flat iron being pressed on dry clothes
- \_\_\_\_\_ 8. a girl removing the dirt on the floor using a broom
- \_\_\_\_\_ 9. an airplane traveling across the sky
- \_\_\_\_\_ 10. Kyle uses crayons to apply colors to his drawing.



## What I Have Learned

Directions: Fill in the blank with the appropriate word or phrase that completes the meaning of each sentence in the given paragraphs. Select your answer in the list inside the box below.

sliding friction	smooth	static friction
rough	friction	opposite
fluid friction	gravity	rolling friction

1) \_\_\_\_\_ is the energy generated when two surfaces rub each other or objects have physical interaction with each other. When two or more objects move while in contact with each other, frictional force acts in the 2) \_\_\_\_\_ direction to the force exerted by the moving body. Hence, it slows down or stops the movement of objects.

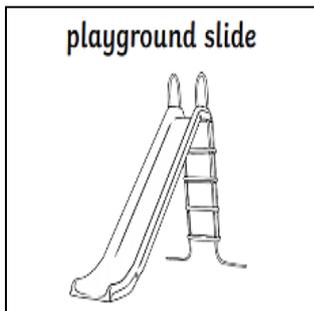
All surfaces create friction on an object moving across them in direct contact. 3) \_\_\_\_\_ surfaces produce more friction than 4) \_\_\_\_\_ surfaces. Hence, objects tend to move faster as they get in contact with smooth surfaces where there is less friction.

There are four types of friction that affect the movement of objects such as 5) \_\_\_\_\_, 6) \_\_\_\_\_, 7) \_\_\_\_\_ and 8) \_\_\_\_\_.



## What I Can Do

Directions: Study the picture in each item. Then answer the question that follows.



What type of surface is commonly observed in a playground slide- rough or smooth? How does friction acting on such type of surface affect the movement of a child sliding on it?

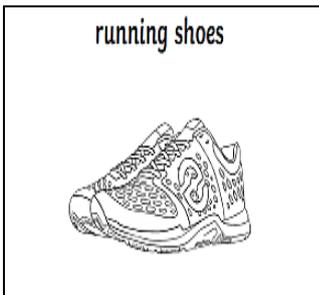
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How does a pair of light rubber shoes help a runner run fast on a race track? Explain how friction between the shoe spikes and the ground affect the movement of the runner?

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## Assessment

**Direction:** Encircle the letter of the correct answer.

1. Which type of friction occurs when an object moves through a liquid or gas?  
A. sliding                      B. static                      C. fluid                      D. rolling
2. Which of the following refers to the energy generated when two surfaces rub each other or objects have physical interaction with each other?  
A. gravity                      B. friction                      C. motion                      D. reaction
3. What kind of friction is observed when the wheels on a bicycle roll against the surface of a cemented road?  
A. static friction                      C. rolling friction  
B. sliding friction                      D. fluid friction

When you want to move an object, you must overcome the static friction.

4. Based on the idea presented above, static friction acts between the object and the \_\_\_\_.  
A. wind that blows the object away  
B. surface on which the object is resting  
C. distance where the object has moved  
D. gravity that pulls the object downward
5. The following situations describe how friction affects motion EXCEPT \_\_\_\_.  
A. Static friction prevents a notebook placed on the table from falling on the floor.  
B. Sliding friction occurs between the tip of the ballpen and the surface of the paper as a person keeps writing notes.  
C. Rolling friction affects the movement of a motorcycle as it runs along a rocky road.  
D. Fluid friction acts toward the direction of motion.
6. The ball rolled on the grassy surface of the park and suddenly stopped. How does friction affect the motion of the ball?  
A. Friction slows down the rolling of the ball and prevents the ball to move farther.  
B. Friction opposes the direction of the ball to change its direction.  
C. Friction decreases the time of the ball to take farther distance.  
D. Friction affects the ability of the ball to take more rolling.

7. A boat sailing on the sea slows down. What kind of friction is acting on it?
- A. static friction                      C. fluid friction  
B. rolling friction                      D. sliding friction
8. On which surface does a car run faster? Why?
- A. rough surface because it has less friction  
B. rough surface because it has much friction  
C. smooth surface because it has less friction  
D. smooth surface because it has much friction
9. Why is it easy to slip when there is water on a smooth floor?
- A. Water reduces the friction between your feet and the floor.  
B. The friction between your feet and the floor changes from kinetic static friction.  
C. The water increases the friction between your feet and the floor.  
D. The friction between your feet and the floor is lost.
10. What is the direction of the frictional force that acts on an object moving to the right?
- A. upward              B. downward              C. to the right              D. to the left



## ***Additional Activities***

Draw about a situation or activity wherein one (1) of the four types of friction affect the motion of object(s). Then, write at least 2 sentences that indicate the type of friction that is evident in the activity and explain how friction affect the motion of object(s) shown. Do it on a long sheet of bond paper.

The following rubric will be used for rating the output.

Criteria	Very Good (3pts.)	Good (2pts.)	Poor (1pt)
1. content and clarity of ideas presented in the sentences			
2. creativity in the drawing			
3. cleanliness/neatness of work			

# Answer Key

**What's In:**

1. A
2. D
3. B
4. A
5. A
6. A

**What's More:**

1. static
2. sliding
3. rolling
4. static
5. fluid
6. static
7. sliding
8. sliding
9. fluid
10. sliding

**What I Have Learned:**

1. Friction
2. opposite
3. rough
4. smooth
5. static friction
6. sliding friction
7. rolling friction
8. fluid friction

**Additional Activities**

1. C	2. B	3. C	4. B	5. D
6. A	7. C	8. C	9. A	10. D

Answers may vary.

**What I Can Do**

1. Playground slides commonly have smooth surfaces. Smooth surface reduces its friction to the child's body sliding on it and facilitates faster sliding movement which is enjoyable for the child.
2. A pair of light rubber shoes with enough thickness of spikes increases friction against the ground and prevents the runner from sliding along the race track. The lighter weight of the shoes also helps him/her run swiftly.

**Assessment**

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