Republic of the Philippines
Department of Education
NATIONAL CAPITAL REGION
Misamis Street, Bago-Bantay, Quezon City

UNIFIED SUPPLEMENTARY LEARNING MATERIALS

(USLeM)

SCIENCE 6

Week 1

Writer / Illustrator
Margie S. Mahinay

Layout Artist
Margie S. Mahinay

Content and Language Editor
Nelsie B. Caculitan

MANAGEMENT TEAM

Malcolm S. Garma
Regional Director

Romela M. Cruz
Schools Division Superintendent

Genia V. Santos **CLMD Chief**	Alyn G. Mendoza **CID Chief**	Micah G. Pacheco **EPS, CLMD (Science)**
Dennis M. Mendoza **Regional LR EPS**	Roxane S. Villanueva **EPS, SDO (Science)**	Nancy Mabunga **Regional Librarian**
Ruby E. Baniqued **SDO LR EPS**	Dorothy Grace I. Reyes **SDO PDO II - LRMDS**	Calixto N. Camangeg **SDO Librarian**

UNIFIED SUPPLEMENTARY LEARNING MATERIALS
Grades 6 SCIENCE

LESSON 1: STATIC FRICTION

EXPECTATIONS:

This Unified Supplementary Learning Material will help you infer how friction affects the movement of different objects. In this lesson, you will:

1. investigate why a moving object slows down and eventually stop; and
2. describe and define static friction.

PRETEST

Directions: Write **FACT** if the statement about friction is correct and **BLUFF** if not. Write your answer in the space provided.

_____ 1. All objects immediately stop when a force is applied opposite to their motion.
_____ 2. Friction causes moving objects to slow down.
_____ 3. Static friction is present even when an object is at rest.
_____ 4. Rubbing two surfaces against each other will produce friction.
_____ 5. Friction resists the movement of a moving object in the same direction.

LOOKING BACK TO YOUR LESSON

Directions: Choose the activity that shows movement due to force applied. Put a check (✓) inside the box for your answer.

1. ☐

Carving Meat Slicing - Free vector graphic on Pixabay

2. ☐

Vintage Line Drawing - Free vector graphic on Pixabay

3. ☐

Bike Biking Man On Vintage - Free vector graphic on Pixabay

4. ☐

Girl football kicking drawing free image (pixy.org)

5. ☐

Hammering Hammer Carpentry - Free vector graphic on Pixabay

6. ☐

File:Handbag (drawing).jpg - Wikimedia Commons Download Table Free Download Png HQ PNG Image | FreePNGImg

BRIEF INTRODUCTION

When a cabinet is pushed and does not move, there is a force that opposes the motion of the cabinet against the surface of the floor. This is an example of when static friction is present. But when a force great enough is applied to push the cabinet, static friction is overcome, and the cabinet moves with a different kind of friction – kinetic friction.

To understand static friction, think of the times when you tried to push a heavy object, like a table or sofa, across the floor. No matter how much force you exert, and still, the sofa does not move, the static friction acting opposite your pushing force is strong enough to prevent the sofa from moving. But let us say you ask your mother for help. You and your mother now exert a greater amount of force, and the sofa starts to move. In this case, the static friction has been overcome. Note that in this case, we see the static friction as being present in the surfaces that are in contact with each other. You can also see that heavy objects will experience strong static friction that is more difficult to overcome, as compared to lighter objects (like your bag or books) which you can push or pull more easily.

ACTIVITY 1A "Let's Move It!"

What to expect: Investigate static friction by pushing an object.

What you need: plastic table (or one that you can push), notebook and pen

Pushing a table

What to do:
1. Push the table gently and observe what happens.
2. Then, push the table a little harder and observe what happens.
3. This time, apply an even greater push on the table and observe what happens.

Record your observations on the table below:

Force Applied	Observations
Small force (gently)	
Medium force (a little harder)	
Large force (even greater push)	

What to answer:

a. Did the table move when you push the table gently? Why do you think so?

b. At which applied force (small, medium, large) have you succeeded in making the table move? What does it tell you about the force needed to move the table from rest?

c. Two forces are acting in the opposite direction as you push the table – one when the table is not yet moving and the other one when the table is already moving. What are these forces and what is the difference between them?

ACTIVITY 2B "Just Hold On!"

What to expect: Investigate static friction through the movement of an object in a slanting or sloping position.

Table tilted on one side first at 15 degrees and then at 45 degrees

Desk Furniture School - Free vector graphic on Pixabay

What you need:
a plastic table whose side you can easily raise (or a wooden plank)
a 10-peso coin
a notebook
a book

What to do:
1. Place the 10-peso coin near the edge of the table or plank. Make sure it lays flat near the edge.
2. Gently raise the edge of the table or plank where you placed the coin so that it is tilted at an angle of approximately 15 degrees with the horizontal. Observe what happens to the coin.
3. Repeat Step 2 but this time increase the tilting to approximately an angle of 45 degrees. Observe what happens to the coin.
4. Do Steps 2 and 3 for the notebook and the book.

Record your observations:

Objects	Observations	
	Table tilted at 15 degrees	***Table tilted at 45 degrees***
10-peso coin		
notebook		
book		

What to answer:

1. Did the coin, notebook, and book move when you slightly lift the table (or plank) at an angle of approximately 15 degrees? Why?

2. What do you think caused them to stay in their position?

3. When you tilt the table at approximately an angle of 45 degrees, did the objects move? Note down any differences in the way the objects move when the table was tilted at this angle.

4. What do you think made the objects move? Discuss your answer.

REMEMBER

Friction is a force that opposes the motion of an object. It acts in opposite direction to the movement of an object. When there is friction, the object slows down and then eventually stops.

Static Friction is a kind of friction that prevents the object from moving against a surface. It prevents the object from sliding or slipping against the surface it is in contact with when an external force is applied. When the object has moved due to an external force applied, the static friction has been overcome.

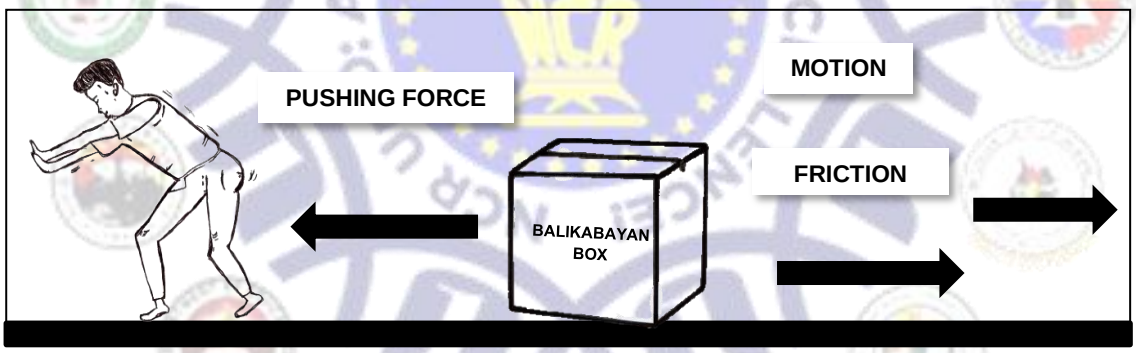
CHECKING YOUR UNDERSTANDING

Problem:

Mang Ricky is an OFW who has come home due to the Covid-19 pandemic after undergoing a swab test and fifteen days of quarantine. He brings with him all of his stuff which are placed in a balikbayan box. As he unpacks his stuff, he wants to move the heavy balikbayan box across the floor in his room.

What to Do:

Relating this to friction, create a diagram using the given words, images, and arrows to show the movement between the balikbayan box and the floor when the box is being pushed by Mang Ricky. Draw your answer on the space provided.



POST TEST

Directions: Write **TRUE** if the statement about friction is correct and if **FALSE**, change the underlined word to make the statement correct. Write your answers in the space provided.

_____ 1. The leaves falling from a mahogany tree have *static friction*.

_____ 2. When you push the table and *it does not move*, there is static friction.

_____ 3. Friction is present when two hands are rubbed against each other.

_____ 4. *Kinetic friction* acts on a car parked on the side of the road.

_____ 5. When the object's motion is to the right, friction acts to the *right.*

Lesson 2: KINETIC FRICTION

EXPECTATIONS

In this lesson, you will describe and define kinetic friction.

PRETEST

Directions: Determine whether **STATIC FRICTION** or **KINETIC FRICTION** is present in each situation**.** Write your answer in the space provided.

_____ 1. Rolly is riding on a skateboard going to the plaza.
_____ 2. Two men push on stalled car that does not move.
_____ 3. An airplane is flying through the clouds.
_____ 4. A mother tries to push a heavy bed which remains in position.
_____ 5. A boy swims in a swimming pool.

LOOKING BACK TO YOUR LESSON

Directions: Circle the 12 words listed below. Words may appear straight across, backward, up, down, or diagonally.

Words: *slowdown, direction, pull, rough, static friction, opposite, smooth, rest, stop, fast, resist, motion, force, push*

S	X	B	V	P	M	D	T	Y	P	U	L	L	N
L	O	P	P	O	S	I	T	E	Q	T	D	F	S
O	B	N	T	H	F	R	Z	W	B	F	R	P	M
W	V	T	T	G	V	E	P	E	C	R	O	F	O
D	Y	H	S	U	P	C	X	U	N	T	M	S	O
O	S	G	I	O	N	T	W	G	S	R	E	S	T
W	F	V	S	R	G	I	E	H	S	H	U	W	H
N	A	B	E	S	M	O	T	I	O	N	Y	Q	P
F	S	M	R	A	H	N	O	Y	M	G	H	K	L
S	T	A	T	I	C	F	R	I	C	T	I	O	N

UNIFIED SUPPLEMENTARY LEARNING MATERIALS
Grades 6 SCIENCE

BRIEF INTRODUCTION

Directions: Fill in the boxes with the missing letters to identify the words depicted by the pictures.

Skating Skater drawing free image (pixy.org)

https://www.iconspng.com/image/112352/aborigine-fire-starting

https://pixy.org/4368629/

Drawing of an airplane in the clouds free image (pixy.org)

		N				C		F								N

When you roll a ball across the floor, you see that it eventually stops. The ball stops because it experiences kinetic friction. Kinetic friction is the force acting in opposite direction to the motion of a moving object, slowing it down until it eventually stops. Just like static friction, kinetic friction is present between surfaces that are in contact with each other. You have probably seen how easy it is to slide on a newly polished floor, and you can probably imagine how that will not be possible on a rough floor. As you can see, kinetic friction is affected by the nature of the surfaces that are in contact with each other. Kinetic friction can be rolling, sliding, and fluid friction.

ACTIVITY 1 "Just Keep Moving"

What to expect: Compare the movement of a toy car on different surfaces.

What you need:

a toy car	bath towel	ruler
baby powder	handkerchief	chalk or tape (as marker)

What to do:

Set-up A

1. Measure a 1-meter distance on the floor.
2. Using chalk or tape, mark a starting line and finishing line.
3. Spread the baby powder on the floor.
4. Push the toy car over the floor with baby powder and observe.
5. Measure how far the toy car has moved from the starting line once it has stopped.

Set-up B

1. At the same distance (1-meter), place a bath towel on the floor.
2. Push the toy car with approximately the same force you exerted in the first set-up over the bath towel and observe.
3. Measure how far the toy car has moved from the starting line once it has stopped.

Set-up C

1. At the same distance (1-meter), place handkerchiefs on the floor.
2. Push the toy car with approximately the same force you exerted in the first set-up over the handkerchief and observe.
3. Measure how far the toy car has moved from the starting line once it has stopped.

Complete the table:

Set-up	**Distance from Starting Point** *How far the toy car has moved (in cm)*	**Movement** Motion of the toy car (fast or slow)	**Surface** *Surface of the floor. (smooth or rough)*
floor with baby powder			
floor with a bath towel			
floor with handkerchief			

What to answer:

1. On which set-up did the toy car move the shortest? Farthest?

2. Did the different surfaces on which the toy car moved to affect its motion? Explain your answer.

3. Rolling friction is a kind of kinetic friction that exists between the different surfaces of the floor and the wheels of the toy car. Based on the activity, describe rolling friction.

ACTIVITY 2

Directions: Identify the kind of kinetic friction described in the statements/illustrations. Choose from **sliding, rolling, or fluid friction**. Write your answer on the blanks.

_____1. Friction keeps us not to slip away when we are walking.

_____2. James enjoys playing slides with his brother.

_____ 3. A ship on the water experienced being drag and slows down when sailing.

Drawing of an airplane in the clouds free image (pixy.org)

Rope jump boy drawing free image (pixy.org)

Skating Skater drawing free image (pixy.org)

Boy and a swimming pool free image (pixy.org)

_____*4.* _____*5.* _____*6.* _____*7.*

REMEMBER

Kinetic Friction is a frictional force caused by molecular adhesion between the two surfaces that are rubbed against each other. It acts opposite to the motion of an object. The amount of friction depends on the kinds of surfaces where the object moves. More friction exists on rough surfaces and less friction on smooth surfaces. The types of kinetic friction are **rolling friction, sliding friction, and fluid friction.**

CHECK YOUR UNDERSTANDING

Directions: Answer the following questions.

1. How does friction help your mother in cleaning your clothes?

2. What do you think will happen if there is no friction between the road and the wheels of buses or vehicles? Explain.

POST-TEST

Directions: Draw a star ★ if the statement about kinetic friction is correct. If the statement is incorrect, change the underlined word to make the statement correct.

_____1. *Kinetic friction* is a force that opposes the motion of the object.

_____2. Bullet train has an aerodynamic shape that allows *air to flow smoothly*.

_____3. Rollers on a cabinet make it *hard to move* it on the floor.

_____4. Spiked shoes of a football player grip on the ground to keep the player from *sliding*.

_____5. Oil or grease is applied to the blockchain of a bike to *reduce friction*.

REFERENCES

Openstax CNX. “What is Friction” Inside Collection Text Book – College Physics https://legacy.cnx.org/content/m42139/1.7/?collection=col11406/1.9&legacy=true

Amigo, Judith Speed .2018. “Velocity, Acceleration, and Friction Module. LRMDS Portal. https://lrmds.deped.gov.ph/detail/6565

ck-12 “Types of Friction – Introduction to static, rolling, sliding and fluid friction”- accessed November 21, 2019 (harvested February 8, 2021) https://www.ck12.org/physics/types-of-friction/lesson/Types-of-Friction-MS-PS/

ANSWER KEY

Lesson 1: Static Friction

Pretest:	Looking back to your lesson
1. BLUFF 2. FACT 3. FACT 4. FACT 5. BLUFF	1. ✓ 2. ✓ 3. ✓ 4. ✓ 5. ✓ 6.

Activity 1: "Let's Move It"

a. Did the table move when you push the table gently? Why?
Possible answer: No, the table does not move because, the push is little than the weight of the table and the floor is rough, so it does not move.

b. When you push the table harder than the first push, did the table move? Why?
Possible answer: Yes, the table moves because greater force hard overcome the friction between the surface at the bottom of the table and the surface of the floor.

c. How does the surface at the bottom of the table moves on the surface of the floor when you push the table hard?
Possible answer: The surface at the bottom of the table slides on the floor to the direction where the table is pushed.

e. What force is present when the table does not move? Moves? Explain.
Possible answer: The force of pushing the table is not enough to move the table when it was pushed gently, but when it is pushed harder the pushing force is great which makes the table to move to the direction where table is pushed.

Activity 2: "Just Hold On"

1. Did the coin, notebook, and a book move when you slightly lift the table (or plank) at an angle of approximately 15 degrees? Why?
The coin, notebook, and book does not move due to the slight tilt of the table. The surfaces between the coin, notebook, and book and the surface of the table is not moving since the force is not great to overcome the weight of the coin, notebook, and book.

2. What do you think caused them to stay in their position?
The surfaces between the coin, notebook, and book and the surface of the table is not moving since the force is not great to overcome the weight of the coin, notebook, and book.

Pretest:	Looking back to your lesson:
1. KINETIC FRICTION 2. STATIC FRICTION 3. KINETIC FRICTION 4. STATIC FRICTION 5. KINETIC FRICTION	

Brief Introduction:

Activity 1: "Just Keep Moving"
Learner's answer may vary

Activity 2:
1. Sliding friction
2. Sliding friction
3. Fluid friction
4. Fluid Friction
5. Fluid / sliding friction
6. Rolling Friction
7. Fluid friction

Check your understanding:

1. Possible answer:
When the mother is doing the laundry, there is **fluid friction** between the water and the clothes inside the washing machine. The friction between the water and the clothes with the help of powdered detergent and the spin of the washing machine, makes the clothes clean.

2. Possible answer:
Friction makes the wheels of buses and vehicles grip on the road. It helps the buses and vehicles to move towards their destination. Grooves on the wheels add more friction and greater grip on the road. If there is no friction between the road and the wheels of buses and vehicles, it would be very dangerous to travel.

Posttest
1. TRUE
2. TRUE
3. FALSE- easy to move
4. TRUE
5. TRUE