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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Science

Quarter 3
Lesson
1

Lesson Exemplar for Science Grade 7
Quarter 3: Lesson 1 (Week 1)
SY 2024-2025

Development Team

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SCIENCE (PHYSICS) /QUARTER 3/ GRADE 7

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	Scientists and engineers analyze forces to predict their effects on movement.
B. Performance Standards	*By the end of the Quarter*, learners employ scientific techniques, concepts, and models to investigate forces and motion and represent their understanding using scientific language, force diagrams, and distance-time graphs. They use their curiosity, knowledge and understanding, and skills to propose solutions to problems related to motion and energy. They explore how modern technologies might be used to overcome current global energy concerns.
C. Learning Competencies and Objectives	*Identify that forces act between objects and can be measured.* *Lesson Objective 1: Describe what a force is* *Lesson Objective 2: Describe the effects of forces on objects* *Lesson Objective 3: Classify forces as contact and non-contact* *Lesson Objective 4: Identify the different forces acting on an object* *Lesson Objective 5: Measure the forces acting on an object*
D. Content	Balanced and unbalanced forces • A force is a push or a pull that may cause the object to move, move faster or slower, stop moving, or even change its shape. • There are different types of forces. These may be classified as contact forces and non-contact forces. • A spring balance may BE used to measure the magnitude of a force. • The SI unit of the force is Newton (N).
E. Integration	Forces in real life, especially in school, play, and household.

II. LEARNING RESOURCES
• GCSE Physics Revision "Resolving Forces" Retrieved from https://www.youtube.com/watch?v=8RI2_gJy0L0&list=PL9IouNCPbCxUrQkFLoPwB67nDbhw2NfAO&index=6

- The Physics Classroom. Accessed from https://www.physicsclassroom.com/Physics-Interactives/Newtons-Laws/Free-Body-Diagrams/Free-Body-Diagram-Interactive
- Ling, J.S., Sanny, J., & Moebs, B. (2016). University Physics Volume 1. Retrieved from https://openstax.org/details/books/university-physics-volume-1
- Hewitt, P.G. (2014). Conceptual physics. 12th Ed. Pearson
- DepEd. (n.d). Project EASE: Integrated Science I Module 7.

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	**1. Short Review** 1. Present photos of natural phenomena. 2. Ask the students the following questions: a. What are the everyday household chores where you exert effort? b. Can you identify some household chores that you do? Share also how much effort you exert in these chores. c. Why are natural events like lahar, landslides, earthquakes, and typhoons considered dangerous?  https://assets.thenewhumanitarian.org/s3fs-public/images/200809119.jpg 3. Describe the nature of a force. *Optional Activity:* Present a timeline on how the concepts of forces and motion were developed. Identify some personalities, such as Galileo and Isaac Newton, who help advance our understanding of the concept of forces.	The students' answers should be directed to the following concepts: forces are applied by one object to another, and they affect the shape, size, stability, and state of motion of an object. In all parts of the lesson, please emphasize that forces are applied by an object on another object. A force is a push or a pull that acts on an object due to the interaction with another object.

B. Establishing Lesson Purpose	**1. Lesson Purpose** Include a demonstration activity about forces. *(Sample activities for contact and noncontact forces.)* **2. Unlocking Content Area Vocabulary** 1. Present through 4pics one word or guess the word. a. normal b. contact c. non-contact d. tension 2. Allow the learners to relate the photos to these concepts.	For contact forces, the teacher can demonstrate applied forces, tension, etc. For noncontact, electrostatic force using bits of paper and pen demonstration or magnets can be used.
C. Developing and Deepening Understanding	**SUB-TOPIC 1: FORCES** a. **Explicitation** The teacher demonstrates what forces can do to objects using the demonstration strategy applied in Activity 1.1. **Activity 1. What Forces Can Do** *Objectives*: At the end of the demonstration, the student should be able to describe what a force is and its effect on objects. *Materials*: soft rubber ball, rubber band, toy car *Procedures*: 1. Allow the students to describe the size and shape of the soft rubber ball. Push the rubber ball against a wall or a table. Ask them to observe and explain what happened to the ball. Pull the opposite ends of the rubber band and let them compare and contrast their observations. Guide them to answer the following questions: a. What happened to the ball when you pushed it against a wall or table? b. What is applied in the two instances? 2. Place the toy car on the table or the floor. Ask the students how to make the toy car move.	This ***explicitation*** activity can be done through a demonstration led by the teacher or as a short collaborative guided inquiry activity. Students may present their observations in front of the class. The purpose of this activity is for students to have an idea of the effects of forces on objects. At this point, the student should realize that force (a push or a pull) changes the shape or size of the object. At this point, the student should realize that applying force to an object can make it move.

	3. Push the toy car. Let the students describe the motion of the toy car. Ask them how to make the toy car move faster, slower, stop, or even change direction. Let volunteer students demonstrate what they think will be able to change the state of motion of the car. Process their answers. 4. Ask the students to summarize their learning through recitation or sharing. Highlight that the activities demonstrated what a force can do or the effect of forces on objects: ● A force can change the size and shape of an object. ● A force can make a stationary object move. ● A force can speed up, slow down, or stop a moving object. ● A force can change the direction of a moving object. 5. Ask the students to describe a force and its effect on objects using their own words. 6. Examples of real-life situations where forces are applied can be given to students to allow them to identify the effects of these forces. For example, pushing a cart, kicking a soccer ball, modeling a lump of clay, the strong wind that moves a sailboat, or kicking hard an empty can used in a game of *Tumbang Preso*. 2. **Worked Example** Present the activity through the Predict-Observe-Explain (POE) strategy. **Activity 2. Ways by which forces act on an object** *Objectives*: At the end of the POE demonstration, the student should be able to identify how forces act on objects. *Materials*: soft rubber ball *Procedures*: 1. Place the ball on top of a table. Ask students what will happen if the ball is gently pushed. Allow them to observe and then explain their answers. Guide them to answer the following questions: a. What caused the ball to move?	At this point, the student should realize that the force can make a moving object move faster, slower, stop, or even change direction.

	b. Was the hand in contact with the ball when it moved? Explain to them that this is called **contact forces**. 2. Put back the ball on top of the table. Ask the students what will happen if the ball this time is pushed. Ensure you try hard enough for the ball to reach the edge of the table and fall. Allow them to observe and explain again. Use prompts to guide them to answer the following questions: a. What were you able to observe? What caused the ball to move towards the edge of the table? b. What happened to the ball at the edge of the table? c. What changed the direction of the ball? Was there anything that was physically in contact with the ball that changed its direction? What do you think is that force? Explain to them that this force may be classified as a **noncontact force**. (Some students may answer 'gravity,' redirect the discussion to the types of forces and their examples) 2. **Lesson Activity** Let the students form groups and perform activity 3 collaboratively. **Activity 3. Contact and Noncontact Forces** *Objective*: At the end of the activity, the students should be able to identify different forces acting on an object and differentiate contact from noncontact forces. *Materials*: book, string, block of wood, ball, chicken feather, spring, plastic comb or pen, magnet, piece of iron nail, stone, Styrofoam *Procedures*: Identify and label the forces present in each of the scenarios. 1. Lift a book above the table and then release it. What happened to the book as soon as you released it? What makes it move downward? Observe what happens to the book when it hits the table. What keeps it from falling further?	Ask the student to draw all the scenarios presented in this activity and ask them to label the forces present. This can be a springboard in presenting the next lesson, ***force as a vector***.

	2. Tie a string to a block of wood. Hold the end of the string and drop the block of wood. Did the block of wood fall on the floor? What force prevented it from falling? 3. Gently push a ball so that it starts moving across the tabletop. Did the ball continue to move? What could have slowed it down and or eventually stopped it? 4. Crumple a whole sheet of paper and lift it at the same height as uncrumpled paper. Release them at the same time. Which paper reached the floor first? Why do you think this happened? What made the difference in the time of fall of each paper? 5. Attach the block of wood at the end of a spring. Fixed one end of the spring by holding it firmly. Stretch the spring by pulling the wood away from the fixed end of the spring. Do you feel something pulling it back? Release the block of wood? Observe what happened. Why do you think it moved towards the fixed end? What made it move toward the fixed end? 6. Using a cloth, rub a plastic pen several times. Place the plastic pen near bits of paper, but do not touch them. Observe what happens. What made it possible? 7. Place a magnet near a piece of iron nail. Why do you think the iron was attracted to the magnet? What made it possible? 8. Place the block of wood in a glass full of water. Observe what happens. Why do you think it happens? What made it possible?	Item 1 may be done together with the help of the teacher.

Classify the forces you identified by filling out the first column of the table below. Put a check on the second or third row if it is classified as contact or noncontact force.

Situation	Contact Force	Noncontact Force

Allow them to define and differentiate contact and noncontact forces in their own words.

Using fast feedback strategies like a show of hand or colored cards, Ask them if the scenarios presented are classified as contact or noncontact force.

1. Pushing a grocery cart.
2. Rain falling
3. A compass needle always pointing to a certain direction.
4. Your hair is attracted to your comb after you comb your hair.
5. Sitting on a chair.
6. A boat floating on a river.
7. Kicking a soccer ball.
8. A magnet attracts another magnet.
9. A t-shirt hanging on a clothesline.
10. A ball rolling, slowing down, and eventually stops.

Students can recall what force can do, ways by which it can be applied, the difference between contact and noncontact forces, and enumerate the different forces acting on an object.

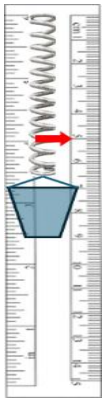
	At this stage, the students will learn that forces can be measured and quantified. The teacher can present a brief history or background about Sir Isaac Newton and the unit of force Newton. Let the students perform Activity 4. **Activity 4. Measuring a Force** **Part A. Designing a force measurer** *Objective*: At the end of the activity, the students should be able to make an improvised force measurer. *Materials*: Ruler, Small Spring (or Coil or Rubber band), paper clip *Procedures*: 1. Attach the spring to the ruler. 2. Hook one end of the spring on the zero-mark of the ruler. 3. Stretch the spring along the ruler, ensuring it is taut. 4. Use the paperclip to secure the other end of the spring at a specific measurement on the ruler. 5. Calibrate the device by applying known forces to the spring at marked intervals and adjust the paperclip accordingly to ensure accurate measurements. 6. To measure the force, attach the object to the paperclip and pull the force measurer.	Discuss clearly that the displacement of the paperclip along the ruler indicates the applied force. Possible explanation: Force can be measured in terms of the changes it produces on elastic objects. The spring in the improvised force measurer, for example, increases in length when it is pulled on both ends. The harder it is pulled, the greater the increase in length. Therefore, the change in length can be used to measure force. Highlight also that the SI unit of force is the Newton (N).

Part B. Measuring the force applied by the Earth on Objects
Objective: At the end of the activity, the students should be able to measure the force applied by the Earth on different objects.

Materials: improvised force measurer constructed in Part A, cup, string, nine marbles of equal masses

Procedures:

1. Set up the materials shown on the right.
2. Place three marbles in the cup.
3. Record the force measurer reading in column two.
4. Do the same, but for six and nine marbles.



Number of Marbles	Measurement
Three	
Six	
Nine	

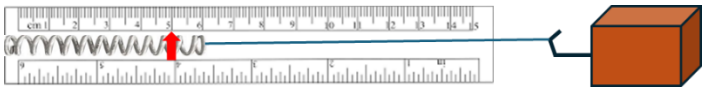
5. Compare the masses of the three setups and compare the readings on the force measurer. What can you say? What factor relates these two quantities?

Part C. Measuring the applied force to start moving an object
Objective: At the end of the activity, the student should be able to measure the applied force by a person to move an object at different surfaces.

Materials: improvised force measurer, three different surfaces (e.i. very smooth, smooth, and rough surface), block of wood with a hook

Procedures:

1. Place a block of wood with a hook on a table, as shown below. Attach the force measurer to the hook.

	 2. Gently pull the measurer horizontally. Measure the reading on the force measurer before the block of wood starts moving on the three different surfaces. 3. Compare the measurements in the three setups. What factors affect the readings? At this point, the students should understand the basic concept of forces. However, the teacher may prepare additional formative assessment activities, such as asking checkpoint questions.	This activity can be used to connect the next topic about force as a vector quantity.
D. Making Generalizations	**1. Learners' Takeaways** 1. Why is it important to understand the different types of forces and their effects? 2. How can measuring forces accurately benefit scientific experiments and practical applications? **2. Reflection on Learning** Compose a one-page reflection discussing what you learned, what you do not understand, and what you want to learn further.	

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**Formative Assessment** 1. Describe force in your own words. 2. List and describe two effects that a force can have on an object. 3. Classify the following forces as contact or non-contact: friction, gravitational force, magnetic force, tension. 4. Identify the different forces acting on a book resting on a table. Describe each force briefly. 5. Describe a method to measure the force of friction acting on a sliding object.	If the school cannot access the internet, the teacher can prepare the assessment task in a PowerPoint presentation.

<table>
<tr><td rowspan="4">B. Teacher's Remarks</td><td>Note observations on any of the following areas:</td><td>Effective Practices</td><td>Problems Encountered</td><td rowspan="4"></td></tr>
<tr><td>strategies explored</td><td></td><td></td></tr>
<tr><td>materials used</td><td></td><td></td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td></td><td>Others</td><td></td><td></td></tr>
<tr><td>C. Teacher's Reflection</td><td colspan="3">Reflection guide or prompt can be on:

▪ <u>principles behind the teaching</u>
What principles and beliefs informed my lesson?
Why did I teach the lesson the way I did?

▪ <u>students</u>
What roles did my students play in my lesson?
What did my students learn? How did they learn?

▪ <u>ways forward</u>
What could I have done differently?
What can I explore in the next lesson?</td><td></td></tr>
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