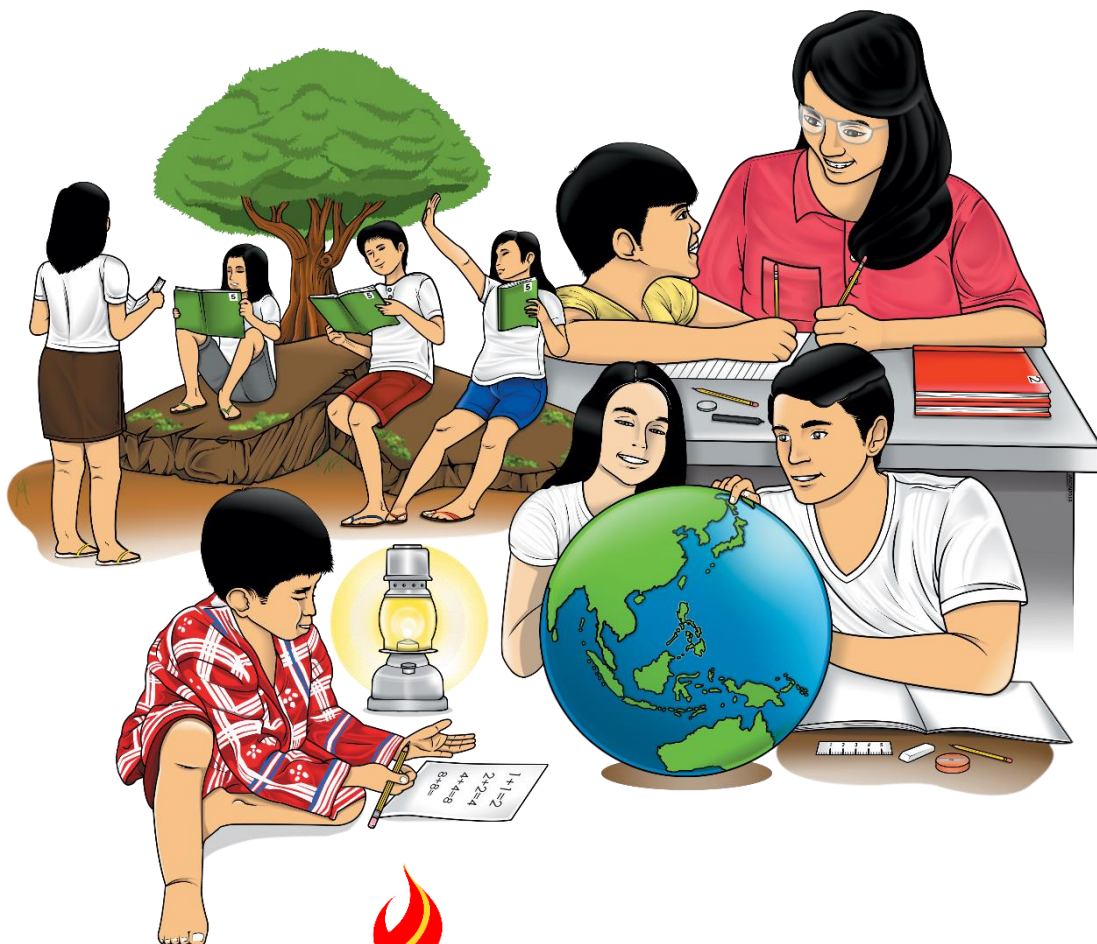


Science

Quarter 4 – Module 5: Conservation of Mechanical Energy (Activities)




ALTERNATIVE DELIVERY MODE
ADM

Science – Grade 9
Alternative Delivery Mode
Quarter 4 – Module 5: Conservation of Mechanical Energy (Activities)
First Edition, 2020

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SCIENCE

Quarter 4 – Module 5: Conservation of Mechanical Energy (Activities)

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.



What I Need to Know

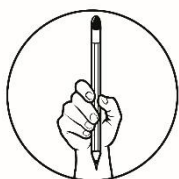
This module was designed and written with you in mind. It is here to help you master the different constellations that we observe at the different times of the year. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module focuses on achieving this learning competency:

**Perform activities to demonstrate conservation of mechanical energy.
(S9FE-IVd-40)**

After going through this module, you are expected to:

1. Define potential energy and kinetic energy; and
2. Identify daily activities to demonstrate conservation of mechanical energy.



What I Know

Multiple Choice: Read the statements carefully. Choose the BEST answer. Write the letter of your answers on a separate sheet.

1. Which of the following statements is true?
 - A. The principle of the conservation of mechanical energy states that the total mechanical energy in a system remains constant as long as the only forces acting are conservative forces.
 - B. Total energy is conserved for every system of particles on which there is an external work done.
 - C. Some kinetic energy of an object will not be transformed into potential energy and other forms of energy.
 - D. Total energy is not conserved for every system of particles.

2. The potential energy of the object at the highest point compared to its Kinetic energy at the lowest point is
 - A. lesser
 - B. greater
 - C. equal
 - D. not related

3. The total mechanical energy of the object at the highest point compared to its total mechanical energy at the lowest point is
 - A. lesser
 - B. greater
 - C. equal
 - D. not related.

4. Mechanical energy is defined as the sum of both the potential energy and the kinetic energy of an object. According to the law of conservation of energy, what happens to mechanical energy if the potential energy of an object decreases?
 - A. Mechanical energy increases.
 - B. Mechanical energy decreases.
 - C. Mechanical energy increases then decreases.
 - D. Mechanical energy remains unchanged.

5. Why would a system have less energy than it originally started with?
 - A. The energy was lost as heat.
 - B. The energy was destroyed.
 - C. More energy was created at the beginning than at the end.
 - D. The temperature was too low to create heat.

6. Which best describes potential energy?
 - A. Energy of motion
 - B. Energy as heat
 - C. Stored energy
 - D. Energy that is doing work

7. What is the energy of a motorcycle moving down the hill?
 - A. entirely kinetic
 - B. entirely potential
 - C. entirely gravitational
 - D. both Kinetic and Potential

8. Which of the following are two types of Mechanical Energy? (ME)
 - A. Kinetic and Potential Energy
 - B. Kinetic and Nuclear Energy
 - C. Potential and Chemical Energy
 - D. Thermal and Kinetic Energy

9. Which example best represents kinetic energy?
- A. stretched rubber band
 - B. glass of milk
 - C. A computer
 - D. A flying kite
10. Another word for kinetic energy could be _____ energy.
- A. moving
 - B. safe
 - C. potential
 - D. stored

Lesson**1****Potential Energy
and Kinetic Energy*****What's In*****Activity 1**

A. Identify whether the following has Potential or Kinetic Energy. Write the number in each corresponding column. If the activity is classified as potential energy, indicate the specific type of potential energy.

- | | |
|--|--|
| 1. A mango fruit high up in a tree | 6. A jeepney traveling down the road |
| 2. A ball rolling down a hill | 7. A paper airplane flying through the air |
| 3. A large stick of dynamite | 8. An asteroid falling towards the earth |
| 4. A stretched rubber band | 9. Standing on the stage |
| 5. A set of double "A" batteries in a remote control | 10. A book on top of a table |

Potential Energy	Kinetic Energy

B. Classify whether the description pertains to Potential Energy (PE) or Kinetic Energy (KE). Write PE or KE in the space provided.

- _____ 1. Energy possessed by a moving tricycle.
- _____ 2. An energy of motion, observable as the movement of an object, particle, or set of particles.
- _____ 3. Energy due to the position of an object
- _____ 4. Energy waiting to be used



What's New

Activity 2: The Pictures Tell It All!

Below are different task you usually perform at home.



Photo credit by: Rhea Jane R. Micabalo

A baby running towards the ball.



Photo credit by: Rhea Jane R. Micabalo

A mother holding bulk of clothes.



Photo credit by: Rhea Jane R. Micabalo

A father carrying a sack of rice.



Photo credit by Rhea Jane R. Micabalo

A girl sweeping the floor.

Identify what energy is usually needed to perform the task.

1. _____
2. _____
3. _____
4. _____



What is It

There are two basic forms of mechanical Energy: Potential energy which is defined as the energy associated with height or position ($PE = mgh$) and kinetic energy which is associated with motion ($KE = \frac{1}{2}mv^2$). Potential energy is type of energy that is waiting to be used or considered a stored energy.

There are 3 different types of Potential energy.

a. Gravitational Potential Energy (GPE)

The energy possess by an object due to its position or location. Thus, the higher the position of the object, the higher the GPE.

An object is lifted possess GPE

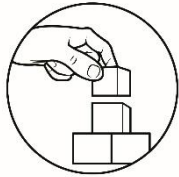
b. Elastic Potential Energy (EPE)

Anything that can act like a spring or a rubber band can have elastic potential energy.

c. Chemical Potential Energy (CPE)

A chemical bond can be thought of as an attractive force between atoms.

Mechanical energy conservation applies to GPE and EPE. The principle of the conservation of mechanical energy states that the total **mechanical energy in a system** (i.e., the sum of the potential plus kinetic energies) remains constant as long as the only forces acting are conservative forces. This means that potential energy can become kinetic energy, or vice versa, but energy cannot “disappear”. It is only converted from one form to another form like potential energy converted to kinetic or vice versa.

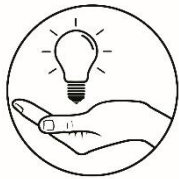


What's More

Activity 3 Fill in the Table

Study the different activities which can be easily performed and then explain how energy is conserved.

Activity	Explain
1. Hammering a nail	
2. Playing basketball with your friends	
3. Biking in a mountain	
4. A mother dancing with a baby in her arms	
5. A man stretching a bow string Flying arrow	



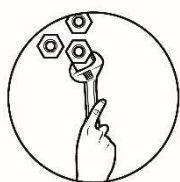
What I Have Learned

Activity 4 Modified TRUE or FALSE

Write TRUE if the statement is correct and if FALSE change the underlined word to make the statement correct.

- _____ 1. The total mechanical energy of a given system is changeable.
- _____ 2. Conservation of mechanical energy refers to the total sum of the potential energy and kinetic energy of a system that remains the same as long as the only forces acting are conservative forces.
- _____ 3. In the law of conservation of energy, the decrease in potential energy is the same as the increase in kinetic energy.
- _____ 4. A thrown baseball has kinetic energy.
- _____ 5. Potential energy is energy of motion.
- _____ 6. The faster an object moves, the smaller kinetic energy it has.

- _____7. When you are holding a book, energy is stored between the book and Earth; this type of energy is called potential energy.
- _____8. Mechanical energy is the total amount of potential energy and total amount of kinetic energy.
- _____9. The wind blowing through your hair is an example of potential energy.
- _____10. The “Law of Conservation of Mechanical Energy” states that the total mechanical energy in a system remains constant as long as the only forces acting are conservative forces.



What I Can Do

Activity 5 Video Presentation / Illustration of Potential and Kinetic Energy

Choose only one (1) between the two activities below.

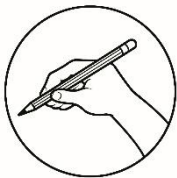
1. Present a video of activities at home showing conservation of mechanical energy is manifested. The length of the video recorded should be 1 minute at most.
2. Illustrate a situation that demonstrates conservation of mechanical energy. You may create a vlog/tiktok video for you to illustrate the conservation of mechanical energy.

Video Presentation/Illustration Rubric

	10	8	6	4
Over-all Content	Great job! Very informative and creatively done.	Your video is on-topic, but it is missing some creativity and insight.	The video is somewhat off-topic.	The video is completely off-topic, as if you did not even understand the topic.

Summary

- Mechanical energy is the sum of the potential and kinetic energies in a system.
- The principle of the conservation of mechanical energy states that the total mechanical energy in a system (i.e., the sum of the potential plus kinetic energies) remains constant as long as the only forces acting are conservative forces. This means that potential energy can become kinetic energy, or vice versa, but energy cannot “disappear”.
- Law of Conservation of Mechanical Energy: The total amount of mechanical energy, in a closed system in the absence of dissipative forces (e.g. friction, air resistance), remains constant.

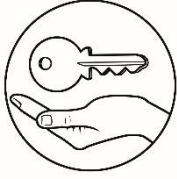


Assessment

Directions: Choose the letter of the correct answer and write it in the separate sheet of paper.

1. What does the law of conservation of mechanical energy state?
 - A. Potential energy is always equal to kinetic energy
 - B. Potential energy is always converted to kinetic energy
 - C. There is always some energy lost as heat
 - D. For any system the total amount of mechanical energy remains the same
2. Why would a system have less energy than it originally started with?
 - A. The energy was lost as heat.
 - B. The energy was destroyed.
 - C. More energy was created at the beginning than at the end.
 - D. The temperature was too low to create heat.
3. Which best describes potential energy?
 - A. Energy of motion
 - B. Energy as heat
 - C. Stored energy
 - D. Energy that is doing work
4. Which of the following happens to the energy of a coconut that falls freely?
 - A. Loses potential and gains kinetic energy.
 - B. Loses both potential and gains kinetic energy.
 - C. Gains potential and loses kinetic energy.
 - D. Gains both potential and kinetic energy.

5. The wind-up toy that is fully wound and at rest possesses
- kinetic but no potential energy
 - potential but no kinetic
 - both potential and kinetic energy in equal amounts
 - neither PE nor KE
6. What is the energy of a motorcycle moving slowly at the top of a hill?
- entirely kinetic
 - entirely potential
 - entirely gravitational
 - both Kinetic and Potential
7. Which of the following statements is true?
- The principle of the conservation of mechanical energy states that the total mechanical energy in a system remains constant as long as the only forces acting are conservative forces.
 - Total energy is conserved for every system of particles on which there is an external work done.
 - Some kinetic energy of an object will not be transformed into potential energy and other forms of energy.
 - Total energy is not conserved for every system of particles.
8. The total mechanical energy of the object at the highest point compared to its total mechanical energy at the lowest point is
- lesser
 - greater
 - equal
 - not related
9. What is mechanical energy?
- Mechanical energy is found in machinery, only.
 - Mechanical energy is usually measured at the atomic level.
 - Mechanical energy is the sum of the chemical and thermal energy of an object.
 - Mechanical energy is the sum of the kinetic and potential energy of an object.
10. Which of the following are two types of Mechanical Energy? (ME)
- Kinetic and Potential Energy
 - Kinetic and Nuclear Energy
 - Potential and Chemical Energy
 - Thermal and Kinetic Energy



Answer Key

<p>What I Know</p> <p>1. A 2. B 3. C 4. D 5. A 6. C 7. D 8. A 9. D 10. A</p>	<p>Activity 1</p> <table border="1" data-bbox="534 627 901 884"> <tr> <td>PE</td> <td>KE</td> </tr> <tr> <td>1. GPE</td> <td>2</td> </tr> <tr> <td>3. CPE</td> <td></td> </tr> <tr> <td>4. EPPE</td> <td></td> </tr> <tr> <td>5. CPE</td> <td>6</td> </tr> <tr> <td>9. GPE</td> <td>7</td> </tr> <tr> <td>10. GPE</td> <td>8</td> </tr> </table> <p>A. B 1. KE 2. KE 3. PE 4. PE</p>	PE	KE	1. GPE	2	3. CPE		4. EPPE		5. CPE	6	9. GPE	7	10. GPE	8	<p>Activity 2</p> <p>1. KE 2. PE 3. PE 4. KE</p>
PE	KE															
1. GPE	2															
3. CPE																
4. EPPE																
5. CPE	6															
9. GPE	7															
10. GPE	8															
<p>Activity 4</p> <p>What I have learned</p> <p>1. Constant/the same 2. TRUE 3. TRUE 4. TRUE 5. Kinetic 6. Higher/greater 7. TRUE 8. TRUE 9. Kinetic 10. TRUE</p> <p>Isolated system</p> <p>1. TRUE 2. Kinetic 3. Greater 4. TRUE 5. TRUE 6. Kinetic 7. Kinetic 8. TRUE</p>	<p>Post Test</p> <p>1. D 2. A 3. C 4. A 5. B 6. D 7. A 8. C 9. D 10. A</p>															

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