

Subject	Grade	Standard	Objective
Science	3	II: Students will understand that organisms depend on living and nonliving things within their environment.	1. Classify living and nonliving things in an environment.

Content Big Ideas	ILO Big Ideas	Science, Technology, & Society Big Ideas
(N) There is a relationship between living and nonliving things in an environment	(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts. (NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes. (CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.	(T) People use appropriate tools and models to investigate the world (A) People working alone or in groups often invent new ways to solve problems and get work done. (S) The tools and ways of doing things that people have invented affect all aspects of life.

Content Objective Indicators Framed by ILO Big Ideas

Indicator 1. Identify characteristics of living things (i.e., growth, movement, reproduction).

Indicator 2. Identify characteristics of nonliving things.

Indicator 3. Classify living and nonliving things in an environment.

Science language students should be able to use correctly: Environment, Interaction, Living, Nonliving, Organism, Survive, Observe, Terrarium, Aquarium, Temperature, Moisture, Small-scale

Guidance for Combining Content and Process

Have students identify characteristics of living things. Have students identify characteristics of nonliving things. Have them investigate by asking these and other related questions:
(PoS)(NoS)(CoS)

- Does this thing grow (CT)(N)? Does this thing move by itself(CT)(N)? Can this thing reproduce (create offspring) (CT)(N)?
- What characteristics are similar to other living/ nonliving things (NoS)?

Have students classify a variety of objects as either living or nonliving in an environment.

Take a walk in the schoolyard and observe a specific area to identify, classify, and record living and nonliving things (M)(L)(PoS)(NoS).

Allow students to share their findings with other groups (CoS)(L).

Guidance for Combining Science, Technology & Society

(T) Point out the various tools used while learning this objective. Examples of tools are magnifying glass, ruler, yarn, journal, graphic organizer.
(A) Discuss how through investigating living things we have been able to invent technology and understand environments required for living.
(S) Show that society has benefitted from the use of science in studying living and nonliving things. Examples are wildlife conservation issues, need of living things including medical applications and environmental concerns.

Life Science	Curriculum Connections	Processes, Communication and Nature of Science	Applications: Science, Technology, and Society
(CT) Changes over time (N) Nature of living things	(M) Mathematics (L) Language Arts	(FA) Fine Arts (SS) Social Studies	(T) Tools of science (A) Applications of science (S) Implications of science for people

Subject	Grade	Standard	Objective
Science	3	II: Students will understand that organisms depend on living and nonliving things within their environment.	2. Describe the interactions between living and nonliving things in a small environment.

Content Big Ideas	ILO Big Ideas	Science, Technology, & Society Big Ideas
(N) There is a relationship between living and nonliving things in an environment	(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts. (NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes. (CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.	(T) People use appropriate tools and models to investigate the world (A) People working alone or in groups often invent new ways to solve problems and get work done. (S) The tools and ways of doing things that people have invented affect all aspects of life.

Content Objective Indicators Framed by ILO Big Ideas

- Indicator 1.** Identify living and nonliving things in a small environment (e.g., terrarium, aquarium, flowerbed) composed of living and nonliving things.
- Indicator 2.** Predict the effects of changes in the environment (e.g., temperature, light, moisture) on a living organism.
- Indicator 3.** Observe and record the effect of changes (e.g., temperature, amount of water, light) upon the living organisms and nonliving things in a small-scale environment.
- Indicator 4.** Compare a small-scale environment to a larger environment (e.g., aquarium to a pond, terrarium to a forest).
- Indicator 5.** Pose a question about the interaction between living and nonliving things in the environment that could be investigated by observation.
- Science language students should be able to use correctly:** Environment, Interaction, Living, Nonliving, Organism, Survive, Observe, Terrarium, Aquarium, Temperature, Moisture, Small-scale

Guidance for Combining Content and Process	Guidance for Combining Science, Technology & Society
<p>Have students observe a small environment (aquarium, terrarium, or flowerbed) and identify living and nonliving things in that environment. Use a T-Chart to record data (L)(PoS).</p> <p>Have students predict what would happen to living organisms in a small environment if there was a change in temperature, light, and/or moisture. Have students illustrate their predictions (L)(M)(CT)(N)(FA)(PoS).</p> <p>Change the environmental conditions on a small-scale environment (temperature, amount of water, or light) and have students observe and record the effects of changes on the environment. Have students describe and illustrate their findings and ask additional questions in a journal (L)(M)(FA)(PoS)(NoS)(CoS).</p> <p>Have students create a Venn Diagram comparing a small-scale environment to a large-scale environment (aquarium and pond, terrarium and forest) (L)(M)(PoS)(CoS).</p> <p>Have students create questions about the interaction between living and nonliving things in the environment that they can investigate by observation (L)(SS)(NoS).</p>	<p>(T) Point out the various tools used while learning this objective. Examples of tools are magnifying glass, thermometer, ruler, measuring cups, light source, cover to eliminate light, journal, graphic organizer.</p> <p>(A) Discuss how through investigating living things we have been able to invent technology and understand environments required for living.</p> <p>(S) Show that society has benefitted from the use of science in studying living and nonliving things. Examples are wildlife conservation issues, need of living things including medical applications and environmental concerns.</p>

Life Science (CT) Changes over time (N) Nature of living things	Curriculum Connections (M) Mathematics (L) Language Arts	Processes, Communication and Nature of Science (FA) Fine Arts (SS) Social Studies (PoS) Processes of science (CoS) Communication of science (NoS) Nature of science	Applications: Science, Technology, and Society (T) Tools of science (A) Applications of science (S) Implications of science for people
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Subject	Grade	Standard	Objective
Science	3	I: Students will understand that the shape of Earth and the moon are spherical and that Earth rotates on its axis to produce the appearance of the sun and moon moving through the sky.	1. Describe the appearance of Earth and the moon.
Content Big Ideas		ILO Big Ideas	Science, Technology, & Society Big Ideas
There is a relationship between the Sun, Moon, and Earth.		<p>(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts.</p> <p>(NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes.</p> <p>(CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.</p>	<p>(T) People use appropriate tools and models to investigate the world</p> <p>(A) People working alone or in groups often invent new ways to solve problems and get work done.</p> <p>(S) The tools and ways of doing things that people have invented affect all aspects of life.</p>
Content Objective Indicators Framed by ILO Big Ideas			
<p>Indicator 1. Describe the shape of Earth and the moon as spherical.</p> <p>Indicator 2. Explain that the sun is the source of light that lights the moon</p> <p>Indicator 3. List the differences in the physical appearance of Earth and the moon as viewed from space.</p> <p>Science language students should be able to use correctly: Model, Orbit, Sphere, Moon, Axis, Rotation, Revolution, Appearance</p>			
Guidance for Combining Content and Process		Guidance for Combining Science, Technology & Society	
<p>Suggested Strategies</p> <p>Have students describe the shape of Earth and the moon. Help students identify the shape as spherical (M)(L)(PoS)(CoS).</p> <p>Have students conduct an activity with a flashlight (sun), a ball (Earth), and a mirror (moon). All 3 parts stand in a triangle position and turn off room lights. Turn on the flashlight and shine the light onto the mirror. The light is reflected to the ball. In small groups have students discuss what they observed then report to the whole class (L)(PoS)(NoS)(CoS)(A)(S)(T).</p> <p>Visit http://www.freemars.org/jeff/planets/Luna/Luna.htm and have students observe and compare the images of Earth and the moon from space. Have them journal (list) their observations and create illustrations “to scale” to show the comparisons (M)(L)(T)(PoS)(NoS)(CoS)(A)(S)</p>		<p>(T) Point out the various tools used while learning this objective. Examples of tools are balls, light source, photographs of Earth and moon from space, journal, graphic organizer.</p> <p>(A) Discuss how through investigating the Sun, moon, and Earth we have been able to invent technology and understand how the Sun, moon, and Earth relate to each other.</p> <p>(S) Show that society has benefitted from the use of science in studying the Sun, moon, and Earth.</p>	
Earth and Space Science	Curriculum Connections		Processes, Communication and Nature of Science
(E) Earth Science (S) Space Science	(M) Mathematics (L) Language Arts	(FA) Fine Arts (SS) Social Studies	(PoS) Processes of science (CoS) Communication of science (NoS) Nature of science
Applications: Science, Technology, and Society			
(T) Tools of science (A) Applications of science (S) Implications of science for people			

Subject	Grade	Standard	Objective
Science	3	I: Students will understand that the shape of Earth and the moon are spherical and that Earth rotates on its axis to produce the appearance of the sun and moon moving through the sky.	2. Describe the movement of Earth and the moon and the apparent movement of other bodies through the sky.

Content Big Ideas	ILO Big Ideas	Science, Technology, & Society Big Ideas
There is a relationship between the Sun, Moon, and Earth.	(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts. (NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes. (CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.	(T) People use appropriate tools and models to investigate the world (A) People working alone or in groups often invent new ways to solve problems and get work done. (S) The tools and ways of doing things that people have invented affect all aspects of life.

Content Objective Indicators Framed by ILO Big Ideas
<p>Indicator 1. Describe the motions of Earth (i.e., the rotation [spinning] of Earth on its axis, the revolution [orbit] of Earth around the sun).</p> <p>Indicator 2. Use a chart to show that the moon orbits Earth approximately every 28 days.</p> <p>Indicator 3. Use a model of Earth to demonstrate that Earth rotates on its axis once every 24 hours to produce the night and day cycle.</p> <p>Indicator 4. Use a model to demonstrate why it seems to a person on Earth that the sun, planets, and stars appear to move across the sky.</p> <p>Science language students should be able to use correctly: Model, Orbit, Sphere, Moon, Axis, Rotation, Revolution, Appearance</p>

Guidance for Combining Content and Process

Suggested Strategies

Have students model by role play the rotation (spinning) of Earth and its revolution (orbit) around the Sun. Help them understand that Earth rotates on its axis once every 24 hours to produce the night and day cycle by using a tilted globe and a flashlight. Have students journal and illustrate key vocabulary terms (FA)(L)(NoS) (T)(A)(M).

Over the course of 28 days, monitor the phases of the moon and create a class chart illustrating the changes over time. You can use the following URL:

http://www.calculatorcat.com/moon_phases/phasesnow.php (S)(T)(A)(PoS)(NoS)(CoS) (FA)(M).

Have students observe and record the position of the Sun in the sky 3 different times during the day. Have them discuss in groups what they have noticed. Guide them to realize directionality (East in the morning vs. West in the afternoon) and proximity to the horizon.

Have groups discuss why it appears that the Sun “moves” across the sky. Students should journal their findings (S)(M)(L)(PoS)(NoS)(CoS)(T)(A).

Guidance for Combining Science, Technology & Society

(T) Point out the various tools used while learning this objective. Examples of tools are balls, light source, photographs of Earth and moon from space, journal, graphic organizer.

(A) Discuss how through investigating the Sun, moon, and Earth we have been able to invent technology and understand how the Sun, moon, and Earth relate to each other.

(S) Show that society has benefitted from the use of science in studying the Sun, moon, and Earth.

Earth and Space Science

(E) Earth Science
(S) Space Science

Curriculum Connections

(M) Mathematics
(L) Language Arts

(FA) Fine Arts
(SS) Social Studies

Processes, Communication and Nature of Science

(PoS) Processes of science
(CoS) Communication of science

Applications: Science, Technology, and Society

(T) Tools of science
(A) Applications of science

Subject	Grade	Standard	Objective
Science	3	IV: Students will understand that objects near Earth are pulled toward Earth by gravity.	1. Demonstrate that gravity is a force.
Content Big Ideas		ILO Big Ideas	Science, Technology, & Society Big Ideas
Everything moves as a result of force		(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts. (NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes. (CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.	(T) People use appropriate tools and models to investigate the world (A) People working alone or in groups often invent new ways to solve problems and get work done. (S) The tools and ways of doing things that people have invented affect all aspects of life.
Content Objective Indicators Framed by ILO Big Ideas			
<p>Indicator 1 Demonstrate that a force is required to overcome gravity.</p> <p>Indicator 2. Use measurement to demonstrate that heavier objects require more force than lighter ones to overcome gravity.</p> <p>Science language students should be able to use correctly: Distance, Force, Gravity, Weight, Motion, Speed, Direction, Simple Machine</p>			
Guidance for Combining Content and Process		Guidance for Combining Science, Technology & Society	
<p>Suggested Strategies Conduct a push and pull activity to investigate force. Help students realize that an object cannot be moved unless a force is applied (F)(PoS)(NoS)(CoS). Show video <i>Forces: The Law of Motion</i> (Disney, Bill Nye) 26 minutes Using a spring scale, investigate and compare the amount of force required to move a variety of objects, Graph the amount of force needed for each object (F)(M)(T)(A)(S).</p>		<p>(T) Point out the various tools used while learning this objective. Examples of tools are light and heavy weight objects, spring scales, video, journal, graphic organizer. (A) Discuss how through investigating forces and motion we have been able to invent technology such as the space shuttle. (S) Show that society has benefitted from the use of science in studying force and motion. Examples are the Space Program, Construction, and transportation.</p>	
Physical Science	Curriculum Connections		Processes, Communication and Nature of Science
(A) Atomic and Molecular (F) Force and Motion	(M) Mathematics (L) Language Arts	(FA) Fine Arts (SS) Social Studies	(PoS) Processes of science (CoS) Communication of science
			Applications: Science, Technology, and Society
			(T) Tools of science (A) Applications of science

Subject	Grade	Standard	Objective
Science	3	IV: Students will understand that objects near Earth are pulled toward Earth by gravity.	1b. Describe the effects of gravity on the motion of an object.
Content Big Ideas		ILO Big Ideas	Science, Technology, & Society Big Ideas
Everything moves as a result of force		(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts. (NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes. (CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.	(T) People use appropriate tools and models to investigate the world (A) People working alone or in groups often invent new ways to solve problems and get work done. (S) The tools and ways of doing things that people have invented affect all aspects of life.
Content Objective Indicators Framed by ILO Big Ideas			
<p>Indicator 1. Compare how the motion of an object rolling up or down a hill changes with the incline of the hill.</p> <p>Indicator 2. Observe, record, and compare the effect of gravity on several objects in motion (e.g., a thrown ball and a dropped ball falling to Earth).</p> <p>Indicator 3. Pose questions about gravity and forces.</p> <p>Science language students should be able to use correctly: Distance, Force, Gravity, Weight, Motion, Speed, Direction, Simple Machine</p>			
Guidance for Combining Content and Process			Guidance for Combining Science, Technology & Society
<p>Suggested Strategies</p> <p>Using an adjustable inclined plane, roll an object down the ramp at different levels and measure the speed of the object and the distance traveled (F)(M)(PoS)(CoS)(T)(A). Demonstrate dropping a ball and throwing a ball. Students will record and compare the amount of airtime and distance two motions produce (F)(M)(PoS)(NoS)(Cos)(T)(A). Students can create a paper airplane and reproduce the activity of dropping vs. throwing the airplane. Measure and record the amount of airtime and distance the airplane achieves (F)(M)(PoS)(NoS)(Cos)(T)(A). Have students create new questions about force and gravity. Encourage them to create questions that they would like to investigate themselves as a research or hands-on project to validate understanding. For example, a student may want to know how steep to make a skateboard ramp (F)(L)(M)(PoS)(NoS)(CoS).</p>			<p>(T) Point out the various tools used while learning this objective. Examples of tools are balls of varying weight, scale, adjustable inclined plane, stopwatch, tape measure, paper for airplanes, journal, graphic organizer.</p> <p>(A) Discuss how through investigating forces and motion we have been able to invent technology such as the space shuttle.</p> <p>(S) Show that society has benefitted from the use of science in studying force and motion. Examples are the Space Program, Construction, and transportation.</p>
Physical Science (A) Atomic and Molecular (F) Force and Motion	Curriculum Connections (M) Mathematics (L) Language Arts (FA) Fine Arts (SS) Social Studies		Processes, Communication and Nature of Science (NoS) Nature of Science (PoS) Processes of science (CoS) Communication of science
Applications: Science, Technology, and Society (T) Tools of science (A) Applications of science			

Subject	Grade	Standard	Objective
Science	3	III: Students will understand the relationship between the force applied to an object and resulting motion of the object.	1. Demonstrate how forces cause changes in speed or direction of objects.
Content Big Ideas		ILO Big Ideas	Science, Technology, & Society Big Ideas
Everything moves as a result of force		(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts. (NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes. (CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.	(T) People use appropriate tools and models to investigate the world (A) People working alone or in groups often invent new ways to solve problems and get work done. (S) The tools and ways of doing things that people have invented affect all aspects of life.
Content Objective Indicators Framed by ILO Big Ideas			
<p>Indicator 1. Show that objects at rest will not move unless a force is applied to them.</p> <p>Indicator 2. Compare the forces of pushing and pulling.</p> <p>Indicator 3. Investigate how forces applied through simple machines affect the direction and/or amount of resulting force.</p> <p>Science language students should be able to use correctly: Distance, Force, Gravity, Weight, Motion, Speed, Direction, Simple Machine</p>			
Guidance for Combining Content and Process		Guidance for Combining Science, Technology & Society	
<p>Suggested Strategies</p> <p>Place an object on the table. Have students watch as it moves (or does not move). Have them discuss with a partner what they see. Ask questions to find out why the object did not move (F)(NoS)(PoS)(CoS).</p> <p>Have students move the object. Discuss whether the object was pushed or pulled. Have students discuss how pushing and pulling are similar and different. Complete a diagram to show these similarities and differences (F)(PoS)(NoS)(CoS)(L).</p> <p>Using a spring scale, lift and move an object from the floor and put it on a raised platform. Record the amount of force required for the movement. Repeat the movement using a pulley and string. Record the amount of force required for the movement. Repeat the activity using an inclined plane instead of the pulley. Record the amount of force required to complete the movement. Have students look at the data and predict what would happen if we were to use a combination of a pulley and an inclined plane. Perform the new activity to verify their predictions (F)(M)(L)(PoS)(NoS)(CoS)(T)(A)(SS).</p>		<p>(T) Point out the various tools used while learning this objective. Examples of tools are weighted objects, spring scales, inclined planes, pulleys, string, journal, graphic organizer.</p> <p>(A) Discuss how through investigating forces and motion we have been able to invent technology such as the space shuttle.</p> <p>(S) Show that society has benefitted from the use of science in studying force and motion. Examples are the Space Program, Construction, and transportation.</p>	
Physical Science	Curriculum Connections	Processes, Communication and Nature of Science	Applications: Science, Technology, and Society
(A) Atomic and Molecular (F) Force and Motion	(M) Mathematics (L) Language Arts	(FA) Fine Arts (SS) Social Studies	(NoS) Nature of Science (PoS) Processes of science (CoS) Communication of science
			(T) Tools of science (A) Applications of science

Subject	Grade	Standard	Objective
Science	3	III: Students will understand the relationship between the force applied to an object and resulting motion of the object.	2. Demonstrate that the greater the force applied to an object, the greater the change in speed or direction of the object.

Content Big Ideas	ILO Big Ideas	Science, Technology, & Society Big Ideas
Everything moves as a result of force	<p>(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts.</p> <p>(NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes.</p> <p>(CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.</p>	<p>(T) People use appropriate tools and models to investigate the world</p> <p>(A) People working alone or in groups often invent new ways to solve problems and get work done.</p> <p>(S) The tools and ways of doing things that people have invented affect all aspects of life.</p>

Content Objective Indicators Framed by ILO Big Ideas

- Indicator 1** Predict and observe what happens when a force is applied to an object (e.g., wind, flowing water).
- Indicator 2.** Compare and chart the relative effects of a force of the same strength on objects of different weight (e.g., the breeze from a fan will move a piece of paper but may not move a piece of cardboard).
- Indicator 3.** Compare the relative effects of forces of different strengths on an object (e.g., strong wind affects an object differently than a breeze).
- Indicator 4.** Conduct a simple investigation to show what happens when objects of various weights collide with one another (e.g., marbles, balls).
- Indicator 5.** Show how these concepts apply to various activities (e.g., batting a ball, kicking a ball, hitting a golf ball with a golf club) in terms of force, motion, speed, direction, and distance (e.g. slow, fast, hit hard, hit soft).
- Science language students should be able to use correctly:** Distance, Force, Gravity, Weight, Motion, Speed, Direction, Simple Machine

Guidance for Combining Content and Process

Guidance for Combining Science, Technology & Society

Suggested Strategies

Combine Indicators 1-3 into one activity. Have students predict what will happen when wind is applied to a piece of paper and a piece of cardboard. Turn a fan on low to see what happens to the objects. Record the results. Have students predict what will happen when the fan is turned on high. Perform the activity and record the results (F)(L)(PoS)(NoS)(CoS). Make a ramp to launch balls of varying weights (as close to the same size as possible) to collide with a control ball at a given distance from the ramp. Weigh the three balls and have students predict what will happen when the two balls collide. Conduct the experiment and record the results by measuring the distance the control ball travels after the collision. Compare the amount of force transferred from each of the three balls to the control ball.

(F)(M)(L)(PoS)(NoS)(CoS)(T)

Have students discuss and predict how these concepts apply to various activities (e.g., batting a ball, kicking a ball, hitting a golf ball with a golf club) in terms of force, motion, speed, direction, and distance (e.g. slow, fast, hit hard, hit soft)(A)(F)(CoS)

(T) Point out the various tools used while learning this objective. Examples of tools are fan (with low and high settings), piece of paper and cardboard, ramp, wooden sphere, 2 marbles (1 for launching and 1 for control), ball-bearing, tape measure, journal, graphic organizer.

(A) Discuss how through investigating forces and motion we have been able to invent technology such as the space shuttle.

(S) Show that society has benefitted from the use of science in studying force and motion. Examples are the Space Program, Construction, and transportation.

Physical Science**Curriculum Connections****Processes, Communication and Nature of Science****Applications: Science, Technology, and Society**

(A) Atomic and Molecular
(F) Force and Motion

(M) Mathematics
(L) Language Arts

(FA) Fine Arts
(SS) Social Studies

(NoS) Nature of Science
(PoS) Processes of science
(CoS) Communication of science

(T) Tools of science
(A) Applications of science

Subject	Grade	Standard	Objective
Science	3	V: Students will understand that the sun is the main source of heat and light for things living on Earth. They will also understand that the motion of rubbing objects together may produce heat.	1. Provide evidence showing that the sun is the source of heat and light for Earth.
Content Big Ideas		ILO Big Ideas	Science, Technology, & Society Big Ideas
Heat and light can be natural or man-made.		(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts. (NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes. (CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.	(T) People use appropriate tools and models to investigate the world (A) People working alone or in groups often invent new ways to solve problems and get work done. (S) The tools and ways of doing things that people have invented affect all aspects of life.
Content Objective Indicators Framed by ILO Big Ideas			
<p>Indicator 1. Compare temperatures in sunny and shady places.</p> <p>Indicator 2. Observe and report how sunlight affects plant growth.</p> <p>Indicator 3. Provide examples of how sunlight affects people and animals by providing heat and light.</p> <p>Indicator 4. Identify and discuss as a class some misconceptions about heat sources (e.g., clothes do not produce heat, ice cubes do not give off cold).</p> <p>Science language students should be able to use correctly: Mechanical, Electrical, Temperature, Degrees, Lubricated, Misconception, Heat Source, Machine</p>			
Guidance for Combining Content and Process		Guidance for Combining Science, Technology & Society	

Suggested Strategies

Place one thermometer in a shady place outside and one thermometer in a sunny place outside. Collect, record, and compare data from each thermometer at equal intervals of time.

(H)(M)(L)(PoS)(NoS)(CoS)(T)

Obtain 2 identical plants for each group. Have students predict what will happen to each plant if one is placed in the sunlight and the other is kept in the dark. Water each plant equally throughout the experiment. Have students observe the plants over the course of a week. Have them record and illustrate what they see. Compare your results with three other class members(H)(L)(FA)(PoS)(NoS)(CoS).

As groups, have students brainstorm how sunlight affects people and animals by providing heat and light. Create a class chart based on group suggestions (H)(L)(CoS).

Have a student place an ice cube in a bare hand. Ask the student to describe what is happening. Help students understand that the ice is not bringing cold to the hand but that heat is moving from the warm hand to the ice cube. Students may also think that clothing warms the body rather than keeping heat close to the body (H)(NoS)(PoS)(CoS)(A).

(T) Point out the various tools used while learning this objective. Examples of tools are 2 class thermometers, plants, ice cubes, journal, graphic organizer.

(A)(S) Students can research how solar heat and light can be harnessed and used.

Physical Science**Curriculum Connections****Processes, Communication and Nature of Science****Applications: Science, Technology, and Society**

(A) Atomic and Molecular
(F) Force and Motion

(M) Mathematics
(L) Language Arts

(FA) Fine Arts
(SS) Social Studies

(NoS) Nature of Science
(PoS) Processes of science
(CoS) Communication of science

(T) Tools of science
(A) Applications of science

Subject	Grade	Standard	Objective
Science	3	V: Students will understand that the sun is the main source of heat and light for things living on Earth. They will also understand that the motion of rubbing objects together may produce heat.	2. Demonstrate that mechanical and electrical machines produce heat and sometimes light.
Content Big Ideas		ILO Big Ideas	Science, Technology, & Society Big Ideas
Heat and light can be natural or man-made.		<p>(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts.</p> <p>(NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes.</p> <p>(CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.</p>	<p>(T) People use appropriate tools and models to investigate the world</p> <p>(A) People working alone or in groups often invent new ways to solve problems and get work done.</p> <p>(S) The tools and ways of doing things that people have invented affect all aspects of life.</p>
Content Objective Indicators Framed by ILO Big Ideas			
<p>Indicator 1. Identify and classify mechanical and electrical sources of heat.</p> <p>Indicator 2. List examples of mechanical or electrical devices that produce light.</p> <p>Indicator 3. Predict, measure, and graph the temperature changes produced by a variety of mechanical machines and electrical devices while they are operating.</p> <p>Science language students should be able to use correctly: Mechanical, Electrical, Temperature, Degrees, Lubricated, Misconception, Heat Source, Machine</p>			
Guidance for Combining Content and Process			Guidance for Combining Science, Technology & Society

Suggested Strategies

Have students classify and sort a variety of pictures of mechanical (moving parts) and electrical (heating coils) sources of heat (H).

Using a graphic organizer, students can make a list of examples of mechanical and electrical sources of heat and light based on the sort (L)(H).

Using a computer and a toaster (or other electrical heat producing machine) as reference objects, have students predict which will heat faster and which will produce more heat over time. Measure using a thermometer (thermometer patch will work well) and graph the results(H)(T)(M)(L)(NoS)(PoS)(CoS)(T)(A)

(T) Point out the various tools used while learning this objective. Examples of tools are pictures of heat sources, toaster, thermometers, journal, graphic organizer.

(A)(S) Students can research how mechanical and electrical heat and light are used.

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Subject	Grade	Standard	Objective
Science	3	V: Students will understand that the sun is the main source of heat and light for things living on Earth. They will also understand that the motion of rubbing objects together may produce heat.	3. Demonstrate that heat may be produced when objects are rubbed against one another.
Content Big Ideas		ILO Big Ideas	Science, Technology, & Society Big Ideas
Heat and light can be natural or man-made		<p>(PoS) Observe simple objects and patterns and report their observations. Sort and sequence data according to a given criterion. Make simple predictions based on observations. Compare things and events. Use instruments to measure length, temperature, volume, and weight using appropriate units (M). Distinguish between examples and non-examples of science concepts.</p> <p>(NoS) Demonstrate a sense of curiosity about nature. Read or look at books and other materials about science. Ask questions about objects, events, and processes.</p> <p>(CoS) Explain science concepts and principles using their own words and explanations. Record data accurately when given the appropriate format (eg., table, graph, chart). Report observations with pictures, sentences, and models. Use scientific language appropriate to grade level in oral and written communication. Use available reference sources to obtain information.</p>	<p>(T) People use appropriate tools and models to investigate the world</p> <p>(A) People working alone or in groups often invent new ways to solve problems and get work done.</p> <p>(S) The tools and ways of doing things that people have invented affect all aspects of life.</p>
Content Objective Indicators Framed by ILO Big Ideas			
<p>Indicator 1. Identify several examples of how rubbing one object against another produces heat.</p> <p>Indicator 2. Compare relative differences in the amount of heat given off or force required to move an object over lubricated/non-lubricated surfaces and smooth/rough surfaces (e.g., waterslide with and without water, hands rubbing together with and without lotion).</p> <p>Science language students should be able to use correctly: Mechanical, Electrical, Temperature, Degrees, Lubricated, Misconception, Heat Source, Machine</p>			
Guidance for Combining Content and Process		Guidance for Combining Science, Technology & Society	

Suggested Strategies

Have students identify several examples of how rubbing one object against another produces heat. List the examples on a class chart. Have students try some of them out (H)(PoS)(CoS)(NoS)(A).

Have students rub their dry hands together and put their hands on their faces. Discuss what they notice. Apply baby lotion as a lubricant and repeat the activity. Compare the relative differences in heat produced by each activity (H)(PoS)(NoS)(CoS)(A).

(T) Point out the various tools used while learning this objective. Examples of tools are balls, light source, photographs of Earth and moon from space, journal, graphic organizer.

(A)(S) Students can research how lubricants reduce the amount of heat given off by mechanical machines.

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