

Science Curriculum Matrix

Second Grade

August 1, 2009

The Science Vertical Team has revised the Second Grade Science Curriculum Matrix for 2009-2010. In addition to the necessary correlation to the Virginia Science Standards of Learning, the Second Grade science content is organized by both concepts and topics. We encourage you to utilize this document while planning for instruction. A more dynamic version of this matrix is available on our wiki site at <http://acpsscience.pbworks.com/>. We anticipate making additional updates to this document as the school year progresses. Please contact Tony Borash with your comments and suggestions at tborash@k12albemarle.org.

In addition to this document, we recommend that you review the [Second Grade Science Curriculum Framework](#) for additional clarification regarding the Grade 2 Science SOL and the [Second Grade Science Enhanced Scope and Sequence](#) for unit and lesson planning resources.

Thanks,

The Science Vertical Team

Scientific Investigation, Reasoning, and Logic

The Science Vertical Team will work to develop a recommended integration for the science processes and skills generally found in standard 2.1 into the more content specific standards 2.2 through 2.8. In the meantime, Virginia Science SOL 2.1 and the associated essential skills and processes are presented below. Please incorporate these specific science processes and skills into your daily science instruction as much as possible and practical.

2.1 The student will conduct investigations in which:

- a. Observation is differentiated from personal interpretation, and conclusions are drawn based on observations;
- b. Observations are repeated to ensure accuracy;
- c. Two or more attributes are used to classify items;
- d. Conditions that influence a change are defined;
- e. Length, volume, mass, and temperature measurements are made in metric units (centimeters, meters, liters, degrees Celsius, grams, kilograms) and standard English units (inches, feet, yards, cups, pints, quarts, gallons, degrees Fahrenheit, ounces, pounds);
- f. Pictures and bar graphs are constructed using numbered axes;
- g. Unexpected or unusual quantitative data are recognized; and
- h. Simple physical models are constructed.

Essential Skills and Processes

In order to meet this standard, it is expected that students should be able to:

- Conduct simple experiments, make predictions, gather data from those experiments, repeat observations to improve accuracy, and draw conclusions.
- Classify items using two or more attributes, such as size, shape, color, texture, and weight.
- Differentiate among simple observations and personal interpretations. This requires students to comprehend what an observation is and apply the term in novel situations related to second grade SOL concepts.
- Construct and interpret simple models (for example, weathering and erosion of land surfaces – 2.7).
- Analyze sets of objects, numerical data, or pictures, and create basic categories to organize the data (descriptive or numerical).
- Construct and interpret picture and bar graphs with numbered axes depicting the distribution of data.
- Use centimeters, meters, liters, degrees Celsius, grams, and kilograms in measurement.
- Use inches, feet, yards, quarts, gallons, degrees Fahrenheit, ounces, and pounds in measurement.

Physical Science: Force, Motion, and Energy: Force and Motion

GRADE: 2

CONCEPTS: CHANGE & CONSTANCY: Cause & Effect

ENDURING UNDERSTANDING: Observable changes occur in nature, and inferences can be made to explain their causes.

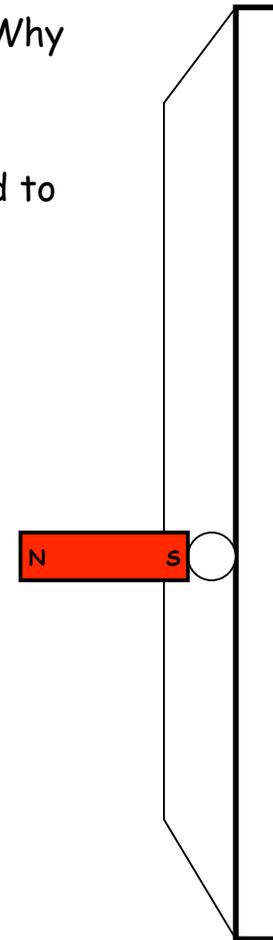
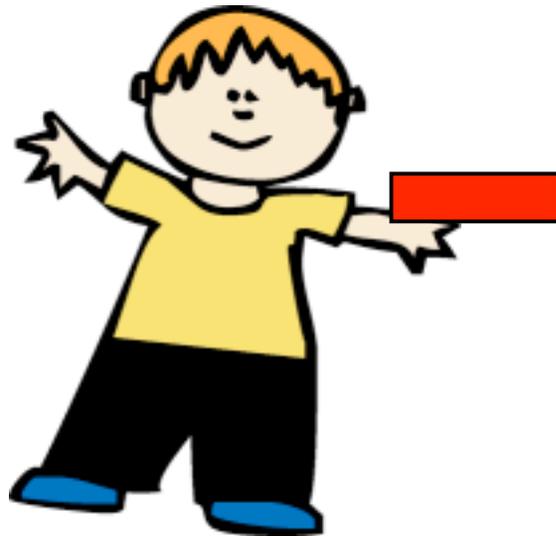
Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
<p>Students should understand:</p> <ul style="list-style-type: none"> Some metals are naturally magnetic. Magnetic force between two objects causes action and change within a magnetic field. 	<p>Knowledge/Comprehension Level</p> <ul style="list-style-type: none"> Give students 2 bar magnets with north and south poles labeled. Demonstrate attraction and repulsion with the two magnets. Have student explain why magnets are attracting or repelling. Give students a magnet with several objects (paperclip, aluminum can, plastic cube, book, and iron nail). Ask students to predict which objects will be attracted to the magnet. Have students test each object and explain their results. <p>Application/Analysis Level</p> <ul style="list-style-type: none"> Give students a paperclip, an iron nail, a bag of iron shavings, and several other magnetic objects. Ask the students, "Why do these objects all fit in the same category?" and "What do they have to do with magnets?" Put 2 circle magnets on a pencil, so that the magnets are repelling (one magnet should be hovering in the air). Ask students to explain why this is happening. <p>Synthesis/Evaluation Level</p> <ul style="list-style-type: none"> Introduce students to the picture and situation presented in Appendix A and have students explain their responses. 	<p>attract iron magnetic magnetic compass magnetic field magnetism nonmagnetic poles repel</p>

SOL: 2.2 The student will investigate and understand that natural and artificial magnets have certain characteristics and attract specific types of metals.

- (a) Magnetism, iron, magnetic/nonmagnetic, poles, attract/repel; and
- (b) Important applications of magnetism, including the magnetic compass.

Joey wants to open the door without touching it. He found that one magnet was attracted to the door handle and he held another magnet. Which pole of Joey's magnet should he use to open the door? Why will it work?

Why do you think the door magnet was attracted to the door handle? What does that tell you about what the door handle is made of?



Physical Science: Matter: Structure

GRADE: 2

CONCEPTS: CHANGE & CONSTANCY: Cause & Effect

ENDURING UNDERSTANDING: Observable changes occur in nature, and inferences can be made to explain their causes.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
<p>Students should understand:</p> <ul style="list-style-type: none">• Matter can be described and categorized by basic properties.• Matter can change from one state to another.	<p>Knowledge/Comprehension Level</p> <ul style="list-style-type: none">• Have students draw a solid, liquid, and gas and label each picture.• Show students pictures that demonstrate melting, freezing, evaporation, and condensation. Have students label each picture with the correct change in the state of matter. Ask students why the change is taking place in each picture. <p>Application/Analysis Level</p> <ul style="list-style-type: none">• Give students a set of pictures that includes at least 3 solids, 3 liquids, and 2 gases. Tell students to place pictures into categories by similar properties. Have students explain their categories when finished.• Have students complete the sheet presented in Appendix A. <p>Synthesis/Evaluation Level</p> <ul style="list-style-type: none">• Have students explain why solids are important in our world (students must name at least 2 solids in the explanation). Repeat for liquids and gases.• Have students complete the sheet presented in Appendix B.	<p>condensation evaporation freezing gas heat liquid mass matter melting property solid volume</p>

SOL: 2.3 The student will investigate and understand basic properties of solids, liquids, and gases.

- (a) Mass and volume; and
- (b) Processes involved with changes in matter from one state to another (condensation, evaporation, melting, and freezing).

Making Water Change

Emily is pouring a cup of water. If she wanted to freeze the water, she would put it _____.

It would change from a _____ to a _____.

If she wanted the ice to melt, she would put it _____.

It would change from a _____ to a _____.

If she wanted the water to evaporate, she would put it _____.

It would change from a _____ to a _____.

If she wanted to show condensation, she would _____

_____.

It would change from a _____ to a _____.



Making Water Change



You spilled a whole bucket of water. How could you make water change so that your clean up would go much faster? _____

What would make that happen? _____



You wish your bubbles would never pop. If your bubbles were in a solid form, you could save them forever. What would make the bubbles turn to solids? _____



You are dying of thirst and you only have this huge block of ice. How will you solve this problem? _____

Why will it work? _____



This desert lizard can't find any liquid water. What time of day should he look for water? _____ Why? _____

Life Science: Life Processes: Organisms

GRADE: 2

CONCEPTS: SYSTEMS: Organization

ENDURING UNDERSTANDING: Systems at various levels of organization can manifest different properties and functions.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
<p>Students should understand:</p> <ul style="list-style-type: none"> Plants and animals go through predictable changes throughout their lives. 	<p>Knowledge/Comprehension Level</p> <ul style="list-style-type: none"> Give students models of the frog and butterfly life cycles that can be manipulated. Have students put the models in order and explain what happens at each stage. Using KidPix or just drawing by hand, have students create a model of the frog, butterfly, or plant life cycle. Students should label their final product. (See Appendices A and B for examples of student work at this level.) <p>Application/Analysis Level</p> <ul style="list-style-type: none"> Have students pick either frog or butterfly AND dog or zebra. Students should draw the life cycle of their 2 chosen animals and then explain the similarities and differences between the life cycles of the two animals. (See Appendix C.) Have students draw and explain similarities and differences between the life cycles of a dog and a plant. (See Appendix C.) <p>Synthesis/Evaluation Level</p> <ul style="list-style-type: none"> Invent a new animal and create its life cycle in a drawing (either in KidPix or by hand). Decide whether its life cycle is more similar to that of a butterfly or a plant and explain why. 	<p>change chrysalis flower fruit larva leaf life cycle pupa root stem</p>

SOL: 2.4 The student will investigate and understand that plants and animals undergo a series of orderly changes in their life cycles. Key concepts include:

- (a) Some animals (frogs and butterflies) undergo distinct stages during their lives, while others generally resemble their parents; and
- (b) Flowering plants undergo many changes, from the formation of the flower to the development of the fruit.

The Butterfly life cycle

by Desmond

This is a crisalis

This is a Butterfly with 2 wings and no legs.

This is an egg

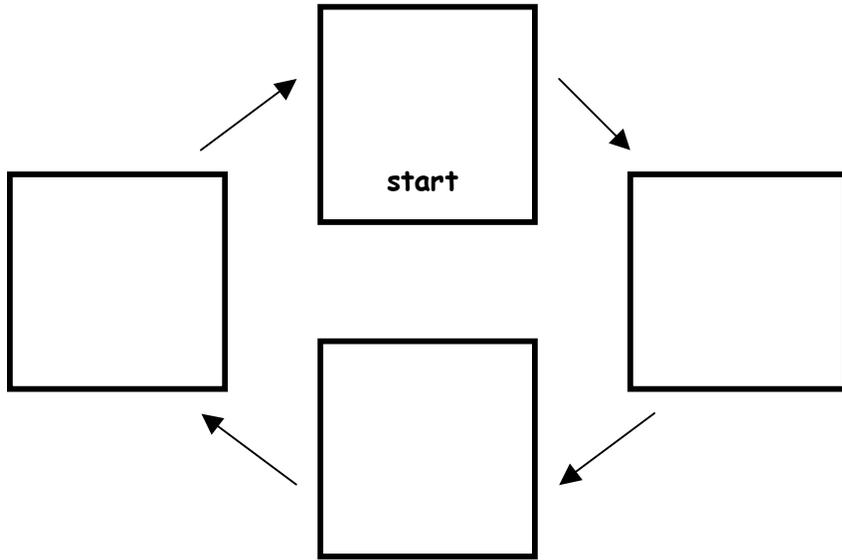
This is a caterpillar with 60 legs.



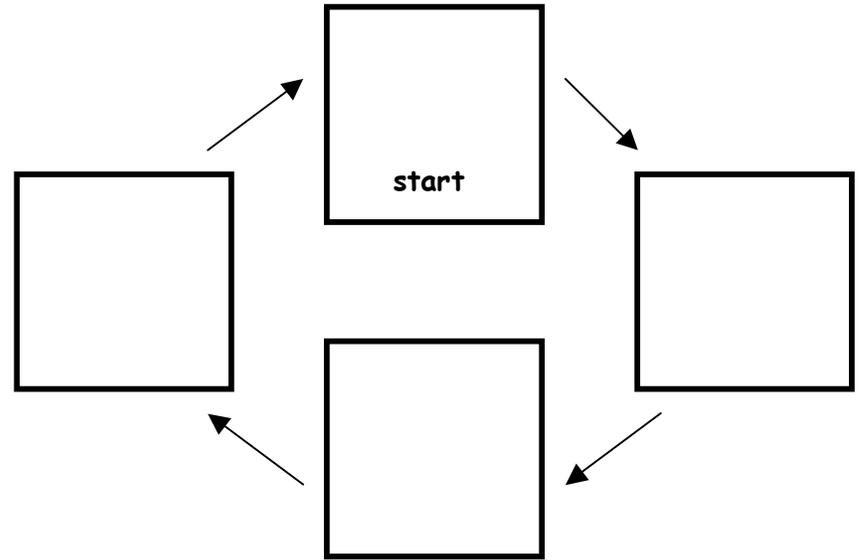
the frog life cycle BY MADAI



The Life Cycle of a _____



The Life Cycle of a _____



The life cycle of a _____ and the life cycle of a _____ are similar because they both _____.

They are different because a _____,

but a _____.

Life Science: Living Systems: Ecosystems

GRADE: 2

CONCEPTS: SYSTEMS: Interactions

ENDURING UNDERSTANDING: Parts of a system interact to form a functional whole.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
<p>Students should understand:</p> <ul style="list-style-type: none">• Animals interact with and are dependent on their surroundings.• Habitats change over time.	<p>Knowledge/Comprehension Level</p> <ul style="list-style-type: none">• Have students describe the fox’s surroundings in terms of water, space, and shelter. (See Appendix A for sheet titled <i>The Fox’s Forest Home</i>.)• Have students draw and explain how the forest changes over the four seasons. (See Appendix B for sheet titled <i>The Forest Changes</i>.) <p>Application/Analysis Level</p> <ul style="list-style-type: none">• Have students compare a forest in the winter with the same forest in the spring using the sheet titled <i>Winter Forest, Spring Forest</i>. (See Appendix C.) <p>Synthesis/Evaluation Level</p> <ul style="list-style-type: none">• Students will determine the damage to animals when a habitat gets destroyed. They will then compare this kind of change to the seasonal changes that a forest goes through. (See Appendix D for the sheet titled <i>Destruction</i>.)	<p>dependent forest grassland habitat interaction living nonliving river season survival</p>

SOL: 2.5 The student will investigate and understand that living things are part of a system.

- (a) Living organisms are interdependent with their living and nonliving surroundings; and
- (b) Habitats change over time due to many influences.

The Fox's Forest Home

What is in a fox's space?



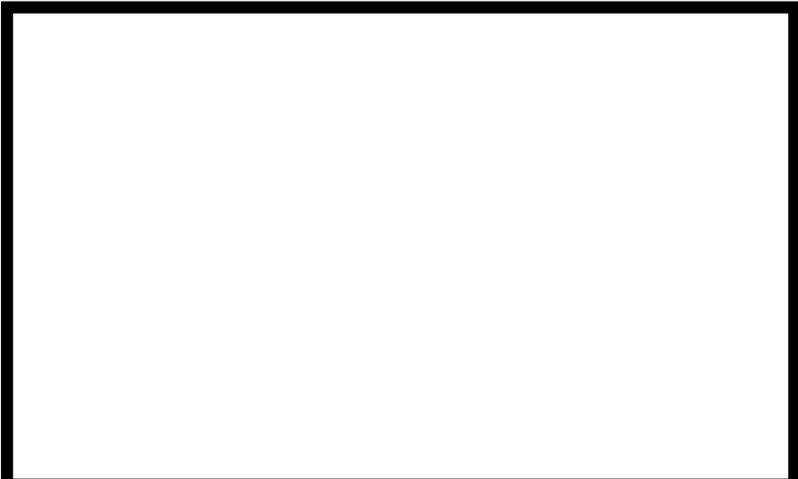
Where does a fox get water?

Where is a fox's shelter?

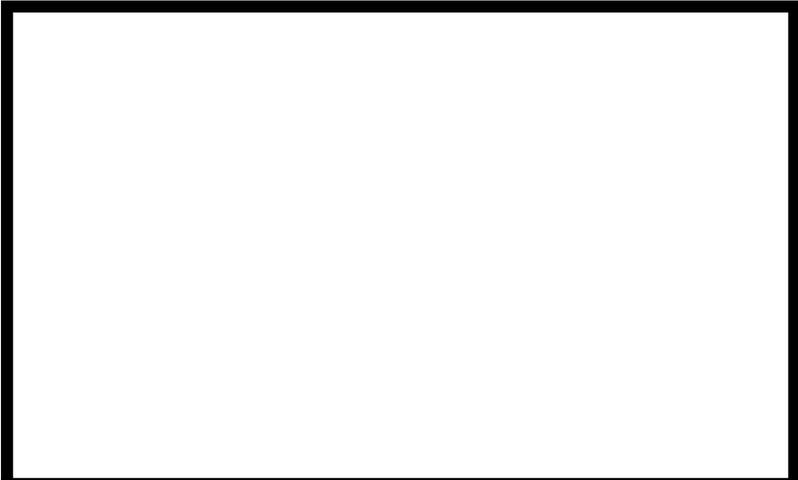
Where does a fox get food?

Why does a fox need the forest?

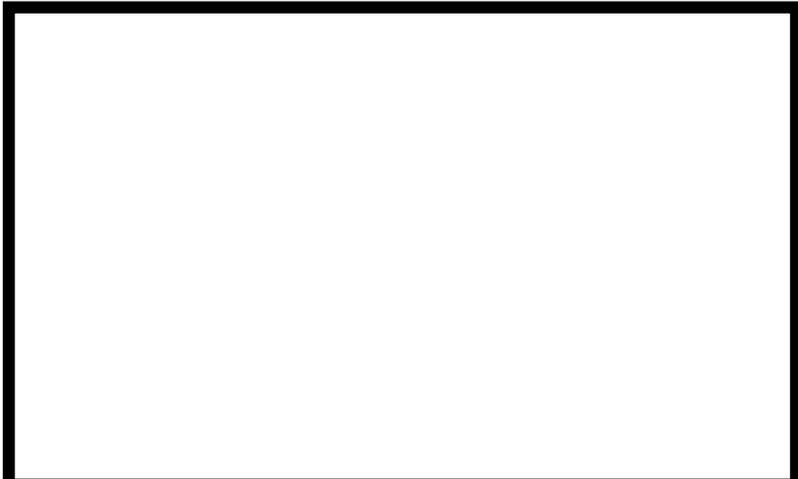
The Forest Changes



Winter:



Summer:

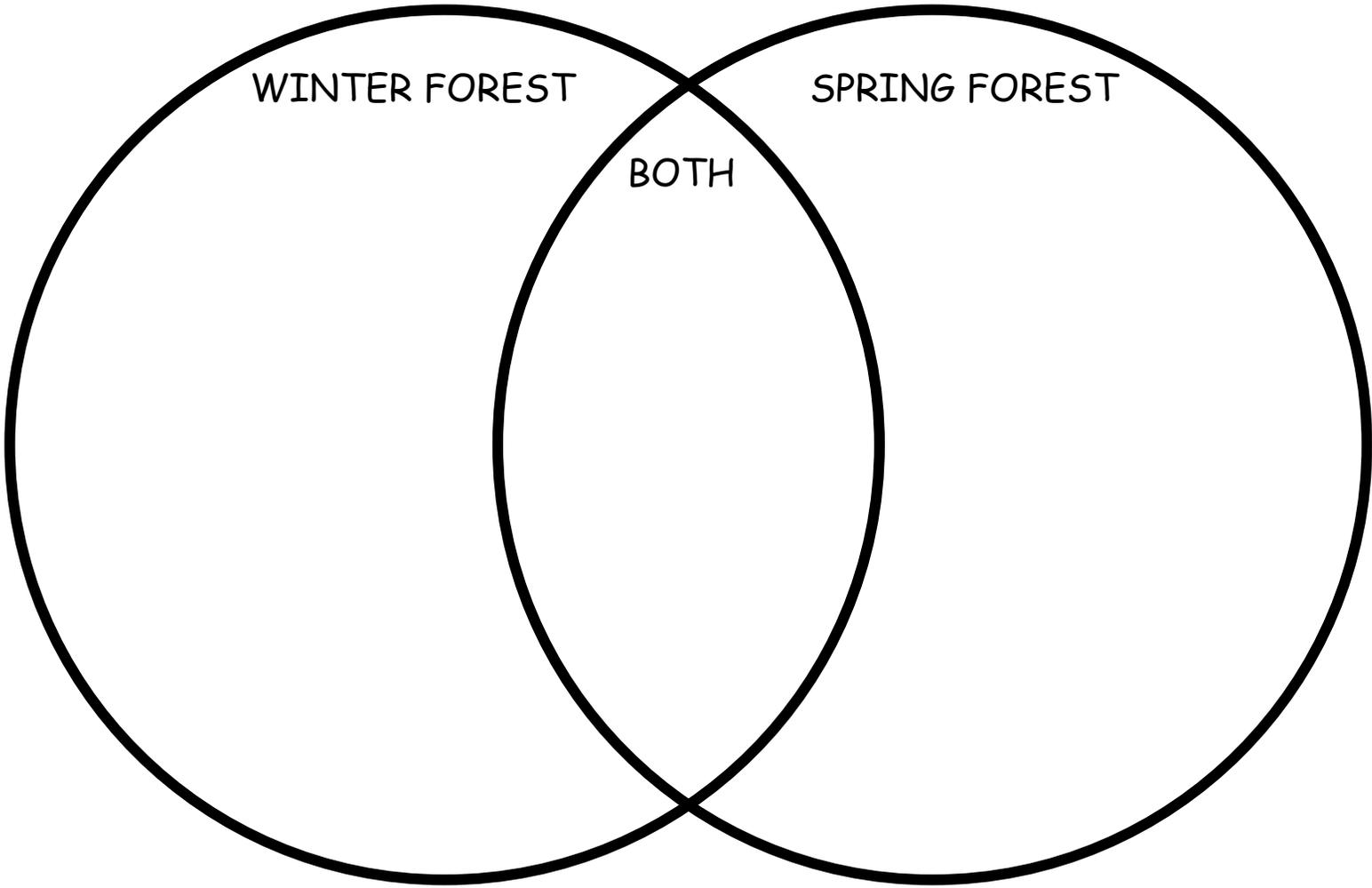


Spring:



Fall:

Winter Forest, Spring Forest



Why do animals have a harder time surviving in the winter than in the spring? →

Destruction



What would happen to this fox if the forest was cut down?

Why does the fox need the forest?

In the winter, the forest changes too.
Which do you think hurts the fox more: winter changes to the forest or cutting the forest down? Why do you think that?

Earth Science: Earth Patterns, Cycles, and Change: Meteorology

GRADE: 2

CONCEPTS: CHANGE & CONSTANCY: Cause & Effect

ENDURING UNDERSTANDING: Observable changes occur in nature, and inferences can be made to explain their causes.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
<p>Students should understand:</p> <ul style="list-style-type: none"> • Earth’s weather changes continuously from day to day. • Weather information is collected and recorded with instruments and then used to predict weather patterns. • Weather influences animal and human activity. 	<p>Knowledge/Comprehension Level</p> <ul style="list-style-type: none"> • Students sort and match various weather instruments with the type of weather information they produce. (See Appendix A.) • Students create a small book that lists different types of weather and how each type of weather affects what people wear and what activities people can do. <p>Application/Analysis Level</p> <ul style="list-style-type: none"> • Students will apply knowledge of various weather instruments by drawing a picture of a storm where each weather instrument would be the best choice to give us the most information. (See Appendix B.) • Students will compare two different storms of their choice along attributes such as storm characteristics, storm dangers, and storm safety. (See Appendix C.) <p>Synthesis/Evaluation Level</p> <ul style="list-style-type: none"> • Students will choose an extreme storm to research and create inquiry questions to guide their research. At least one question must include the effect of the storm on people or animals (for example, “How can people stay safe in a tornado?”). After researching their storm and finding the answers to their questions, students will create a PowerPoint slide show based on the information about their storm and present the slide show to the class. 	<p>blizzard condensation cloud drought evaporation flood hurricane precipitation rain gauge temperature thermometer thunderstorm tornado weather wind</p>

SOL: 2.6 The student will investigate and understand basic types, changes, and patterns of weather.

- (a) Temperature, wind, precipitation, drought, flood, and storms; and
- (b) The uses and importance of measuring and recording weather data.

Weather Instruments Sort



thermometer	how hot or cold it is
wind vane	which way the wind is blowing
rain gauge	how much it rained
temperature	wind direction
rain amount	

Storm Instruments

storm: _____

thermometer

storm: _____

rain gauge

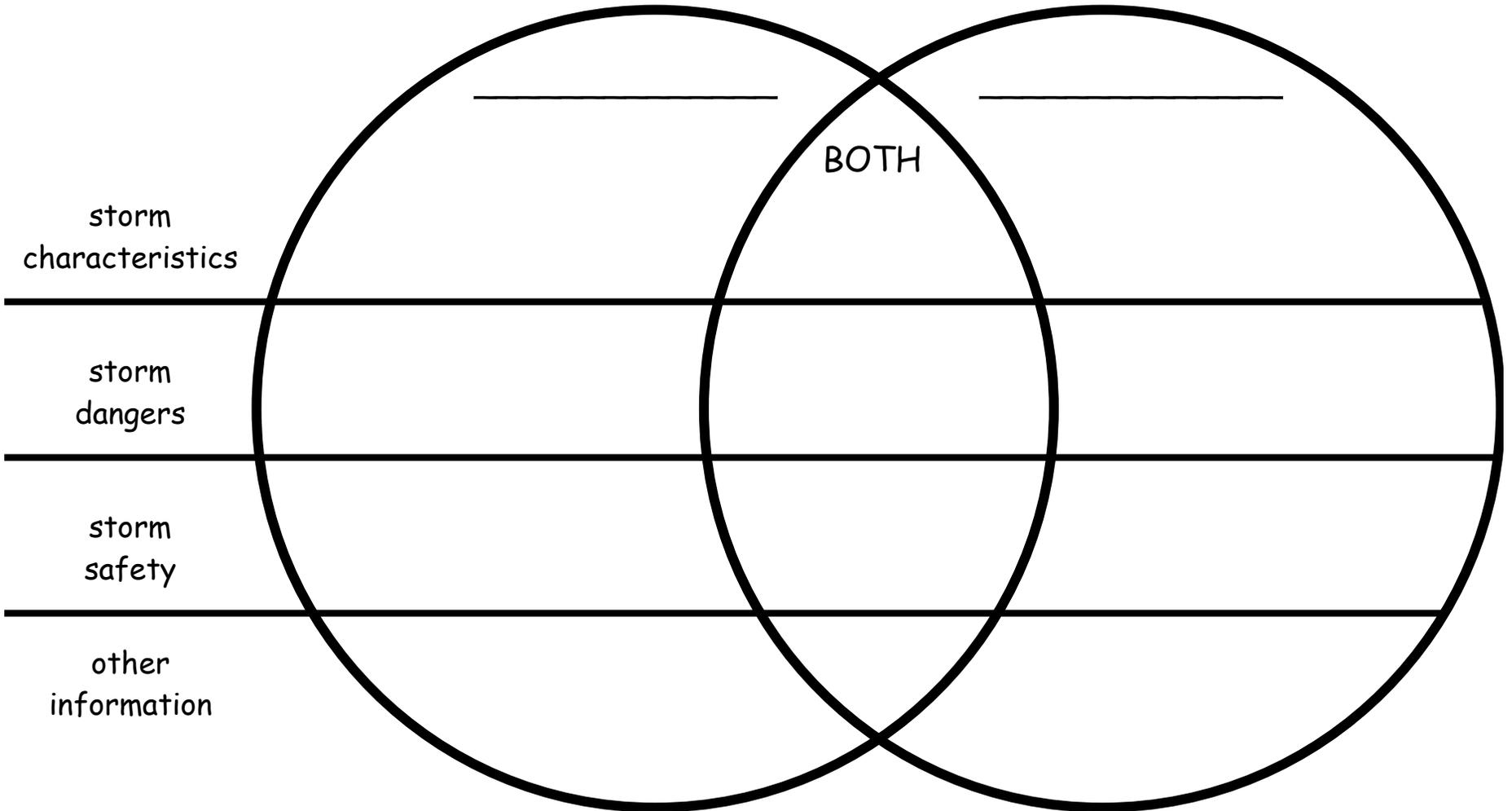
storm: _____

wind vane

storm: _____

wind vane

EXTREME STORMS



What do you think is the most important difference between these 2 storms? Why? →

Earth Science: Interrelationships in Earth/Space Systems: Meteorology

GRADE: 2

CONCEPTS: CHANGE & CONSTANCY: Cause & Effect

ENDURING UNDERSTANDING: Observable changes occur in nature, and inferences can be made to explain their causes.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
<p>Students should understand:</p> <ul style="list-style-type: none"> Weather can cause changes in the land by weathering and erosion. Weather influences animal and human activity. 	<p>Knowledge/Comprehension Level</p> <ul style="list-style-type: none"> Students sort and match examples of animals that migrate, hibernate, and adapt to changing weather/seasonal conditions. (See Appendix A.) Students draw a picture showing a riverbank before and after a rainstorm to demonstrate understanding of erosion. (See Appendix B.) <p>Application/Analysis Level</p> <ul style="list-style-type: none"> Students will compare hibernation and migration using a Venn diagram. They will identify each attribute that is being compared (for example, hibernation involves the animal remaining in its habitat, and migration involves the animal traveling to a different habitat, so the attribute would be LOCATION OF ANIMAL). (See Appendix C.) Students will organize a list of places in order from the most affected by erosion to the least affected. They will explain what characteristics those places least affected have that protect them from erosion. Finally, they will create a plan that will protect the most affected areas from erosion. (See Appendix D.) <p>Synthesis/Evaluation Level</p> <ul style="list-style-type: none"> Students will create a new animal that has never been seen before. This animal must display migration, hibernation, and adaptation for different seasons or different types of weather. Students explain when and why their new animal migrates, hibernates, and adapts. 	<p>adaptation camouflage dormancy erosion hibernation migration weather</p>

SOL: 2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings.

- (a) Effects on growth and behavior of living things (migration, hibernation, camouflage, adaptation, dormancy); and
- (b) Weathering and erosion of the land surface.

Animal Activity Sort



arctic hare



geese



bear



frog



red fox

migrate

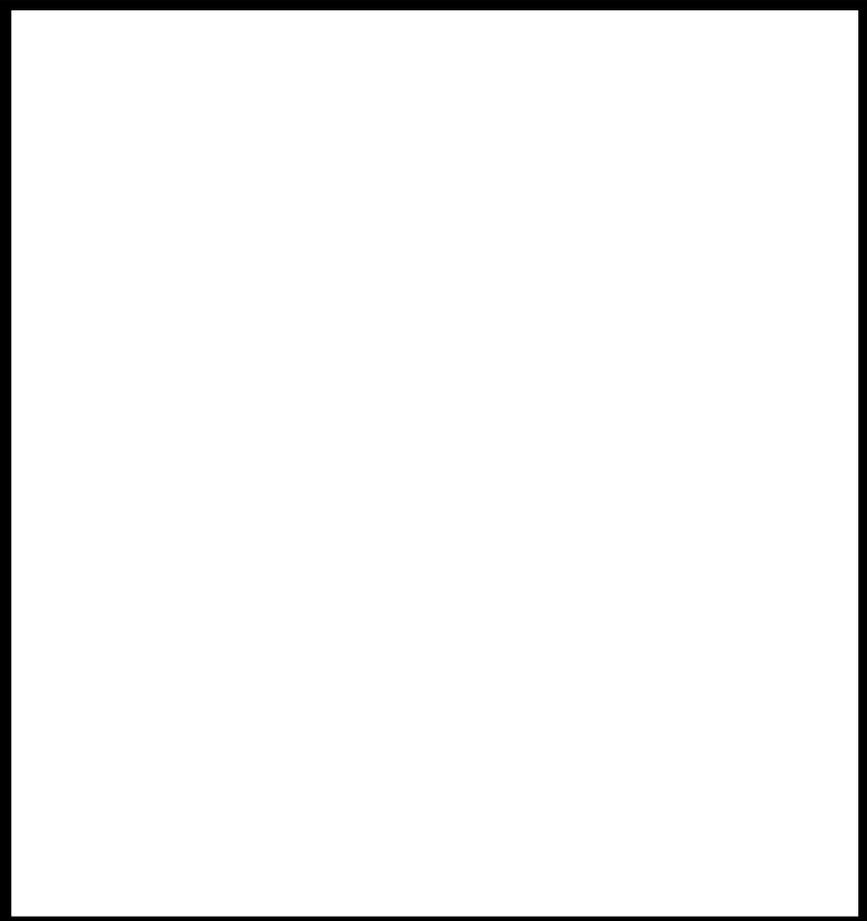
hibernate

camouflage

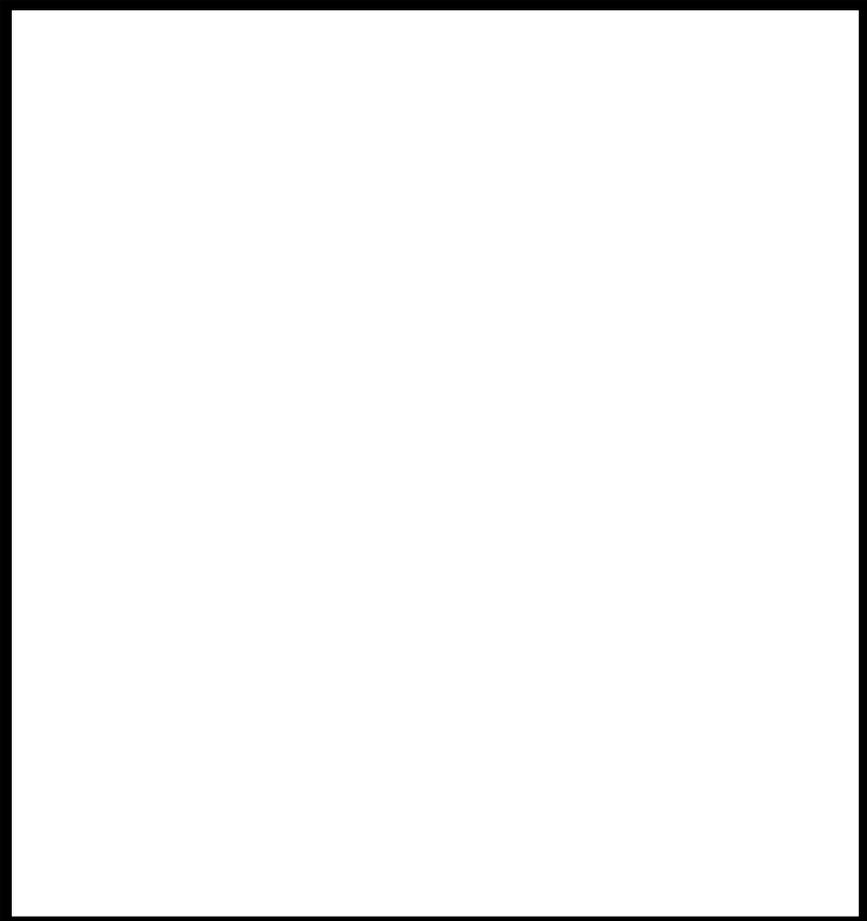
adapt

become dormant

EROSION

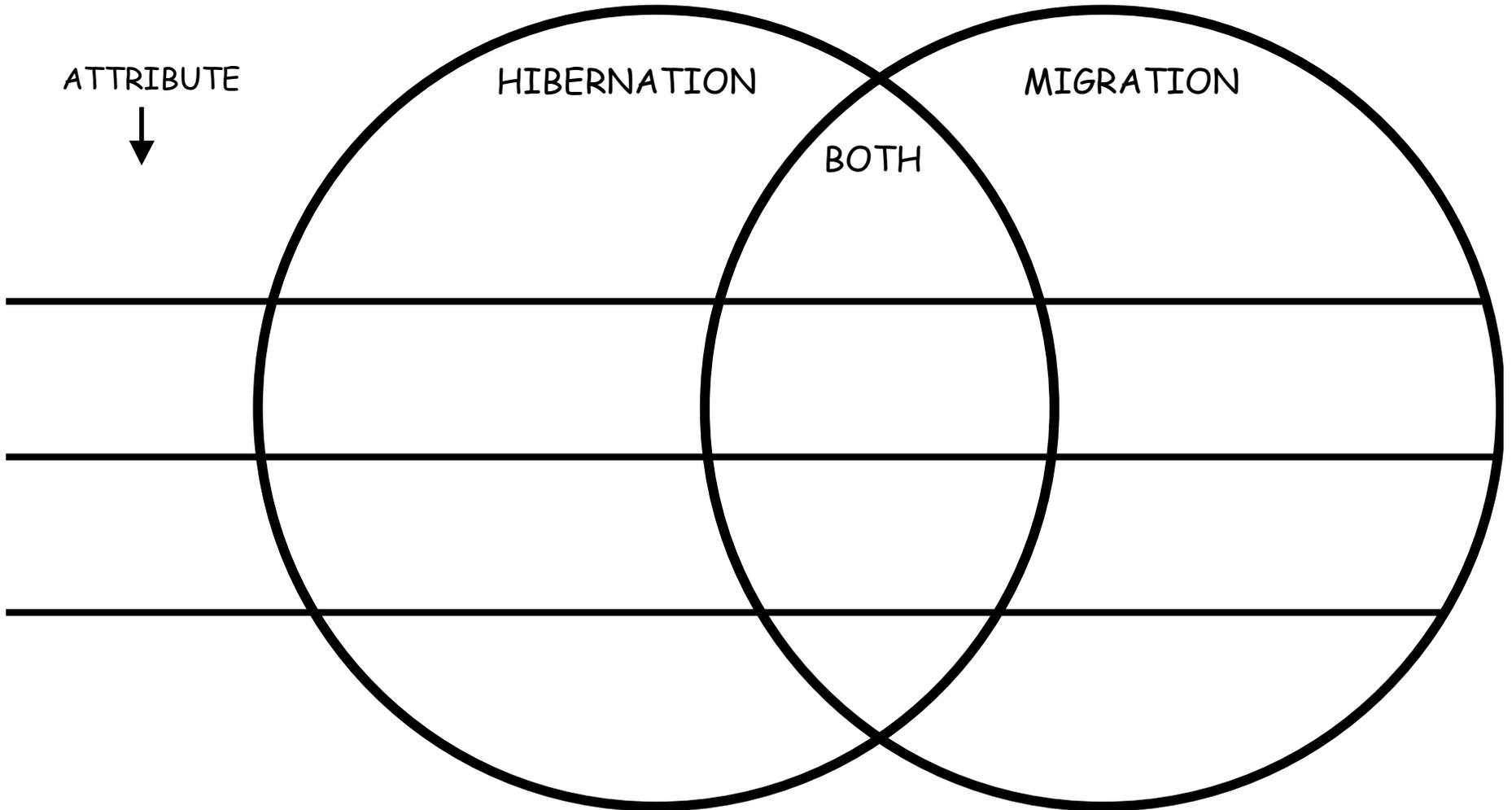


riverbank
BEFORE STORM



riverbank
AFTER STORM

ANIMALS IN THE WINTER



Which one do you think helps animals survive the most in the winter? Why? →

EROSION

Put these places in order by which are most likely to experience erosion after a rain storm and which are least likely:

forest

grassy hill

muddy bank

erosion most likely		erosion least likely
_____	_____	_____

Why is the area that is least likely to experience erosion protected? What does it have that protects it from erosion?

What could you do to the place that experiences the most erosion so that it will be protected in the future?

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Life Science: Living Systems: Ecosystems

GRADE: 2

CONCEPTS: SYSTEMS: Interactions

ENDURING UNDERSTANDING: Parts of a system interact to form a functional whole.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
<p>Students should understand:</p> <ul style="list-style-type: none"> Plants produce oxygen and food. Plants provide many useful products. Humans and animals depend on plants for survival. 	<p>Knowledge/Comprehension Level</p> <ul style="list-style-type: none"> Students sort products that come from plants and products that do not come from plants. (See Appendix A.) Students explain benefits of plants for humans and animals. (See Appendix B.) <p>Application/Analysis Level</p> <ul style="list-style-type: none"> Students view a picture of rainforest destruction and draw conclusions about what is happening in the picture, what the consequences are for the animals in the habitat, what products might be gained, and what could be done to protect the habitat in the future, while still acquiring products from the plants. (See Appendix C.) <p>Synthesis/Evaluation Level</p> <ul style="list-style-type: none"> Students create a new plant that has never been seen before. This plant must produce oxygen, food, and one useful product. Students explain how the plant benefits humans and animals with regard to these 3 products. Animal and/or human dependence on this plant must be proven in students' explanations. 	<p>cotton dependence erosion lumber medicine products rubber soil</p>

SOL: 2.8 The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. Key concepts include:

- (a) Important plant products (fiber, cotton, oil, spices, lumber, rubber, medicines, and paper);
- (b) The availability of plant products affects the development of a geographic area; and
- (c) Plants provide homes and food for many animals and prevent soil from washing away.

Plant Products Sort

products that come from plants

products that come from other places



cotton



chocolate



plastic



glass



rubber



medicine



wax



aluminum

PLANT BENEFITS

Plants give animals _____

Plants give people _____

If plants were all cut down or destroyed, _____

CUT DOWN



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