Science Curriculum Matrix

First Grade

August 1, 2009

The Science Vertical Team has revised the First Grade Science Curriculum Matrix for 2009-2010. In addition to the necessary correlation to the Virginia Science Standards of Learning, the First 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 First Grade Science Curriculum Framework for additional clarification regarding the Grade 1 Science SOL and the First Grade Science Enhanced Scope and Sequence for unit and lesson planning resources.

Finally, please note that Science SOL 1.1 (Science Investigation, Reasoning, and Logic) is incorporated into the content-based Science Standards of Learning (i.e. Science SOL 1.2 through 1.8).

Thanks,

The Science Vertical Team

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

GRADE: 1

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
Students should understand: • Objects move in different ways. • Sound is made from vibrations. • Movement of an object can be changed.	**Knowledge/Comprehension Level** • Have student label pictures of different kinds of motion on the sheet titled *Label the Kinds of Motion*. (See Appendix A.) • Have student draw ways to change the motion of objects on the sheet called *Change the Motion*. (See Appendix B.) This activity also incoporates SOL 1.1 f, g and h. **Application/Analysis Level** • Have student analyze two groups of objects to determine the similarities between the objects in each group. Complete the *What Fits?* sheet. (See Appendix C.) This activity also incoporates SOL 1.1 a, c and d. **Synthesis/Evaluation Level** • Students will decide what kind of motion rubber bands make and defend their choice on the *Rubber Band Motion* sheet. (See Appendix D.) This activity also incoporates SOL 1.1 g and h.	**back-and-forth** **circular** **motion** **pull** **push** **sound** **straight** **vibrate**

SOL: 1.2 The student will investigate and understand that moving objects exhibit different kinds of motion.

(a) Objects may have straight, circular, and/or back-and-forth motions;
(b) Objects may vibrate and produce sound;
(c) Pushes or pulls can change the movement of an object; and
(d) The motion of objects may be observed in toys and in playground activities.

Physical Science: Matter: Matter

GRADE: 1
CONCEPTS: SCALE: Properties
ENDURING UNDERSTANDING: Properties characterize objects, organisms, and substances.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
Students should understand: • Different types of materials react differently when mixed with water. • The temperature of water affects how easily a substance will dissolve in it.	**Knowledge/Comprehension Level** • Have students experiment with different solids mixing with water. Have them record results on the sheet titled *What Dissolves?*. (See Appendix A.) This activity also incorporates SOL 1.1 a, c, d, f, g an h. • Have students experiment with different temperatures of water and the time it takes for food coloring to mix in each one. Record results on the sheet called *Hot vs. Cold*. (See Appendix B.) This activity also incorporates SOL 1.1 b, d, f, g and h. **Application/Analysis Level** • Have student analyze two groups of objects to determine the similarities between the objects in each group. Complete the *What Fits?* sheet. (See Appendix C.) This activity also incorporates SOL 1.1 c, d and h. **Synthesis/Evaluation Level** • Students will experiment on their own (open inquiry) with different liquids and how they mix together. At the end, students decide whether dishwashing liquid is more like milk or oil and defend their choice on the *Crazy Liquids* sheet. (See Appendix D.) This activity also incorporates SOL 1.1 a, g and h.	**dissolve** **heat** **liquid** **mix** **separate** **solid** **temperature**

SOL: 1.3 The student will investigate and understand how different common materials interact with water. Key concepts include:

(a) Some liquids will separate when mixed with water, but others will not;
(b) Some common solids will dissolve in water, but others will not; and
(c) Some substances will dissolve more readily in hot water than in cold water.

Life Science: Living Systems: Organisms

GRADE: 1
CONCEPTS: SYSTEMS: Organization
ENDURING UNDERSTANDING: Systems at different levels of organization can manifest different properties and functions.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
Students should understand: • Plants have needs and functional parts. • Plants can be classified by certain characteristics.	**Knowledge/Comprehension Level** • Have students label a picture of a plant and draw the things that the plant needs on the sheet titled *Label the Parts of the Plant*. (See Appendix A.) • Have students write the category for each plant on the sheet called *Name the Plant*. (See Appendix B.) This activity also incorporates SOL 1.1 c. **Application/Analysis Level** • Have students complete the *What Am I?* sheet. (See Appendix C.) This activity also incorporates SOL 1.1 f. **Synthesis/Evaluation Level** • Students will create their own clues for the *What Am I?* sheet. (See Appendix D.) This activity also incorporates SOL 1.1 h.	Air blossom deciduous edible evergreen flower flowering fruit leaf life cycle light nonedible nonflowering root stem

SOL: 1.4 The student will investigate and understand that plants have life needs and functional parts and can be classified according to certain characteristics.

(a) Needs (food, air, water, light, and a place to grow);
(b) Parts (seeds, roots, stems, leaves, blossoms, fruits); and
(c) Characteristics (edible/nonedible, flowering/nonflowering, evergreen/deciduous).

Life Science: Living Systems: Organisms

GRADE: 1
CONCEPTS: SYSTEMS: Organization
ENDURING UNDERSTANDING: Systems at different levels of organization can manifest different properties and functions.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
Students should understand: • Animals (including people) have life needs. • Animals can be classified by certain characteristics.	**Knowledge/Comprehension Level** • Students will create a picture of an animal and include all things the animal needs to survive. (See Appendix A for sheet titled *The Bird's Needs*.) • Have students label an animal's body parts and specific characteristics of the animal. (See Appendix B for sheet titled *Wild Animals*.) This activity also incorporates SOL 1.1 c. **Application/Analysis Level** • Have students compare a fish and a bird using a Venn diagram. Have them include the survival needs, body coverings, appendages, and movement of each in their comparison. (See Appendix C for sheet titled *Fish vs. Bird*.) This activity also incorporates SOL 1.1 c and d. **Synthesis/Evaluation Level** • Have students compare characteristics of birds and mammals to create a list of common characteristics of each. (See Appendix D for sheet titled *Birds vs. Mammals*.) This activity also incorporates SOL 1.1 a, c and d. Students will then examine a picture of a bat and explain why it doesn't fit the pattern. (See Appendix E for sheet titled *Where Do Bats Fit In?*.) This activity also incorporates SOL 1.1 a, c and h.	appendages bird body covering body shape fish land homes mammal movement needs shelter tame water homes wild

SOL: 1.5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics.

(a) Life needs (air, food, water, and a suitable place to live);
(b) Physical characteristics (body coverings, body shape, appendages, and methods of movement); and
(c) Other characteristics (wild/tame, water homes/land homes).

Earth Science: Interrelationships in Earth/Space Systems: Astronomy

GRADE: 1

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
Students should understand: • Sunlight changes the temperature of land, air, and water. • Earth rotates once per day. • Earth's rotation causes day and night.	**Knowledge/Comprehension Level** • Students will label sunny places "warm" and shady places "cool" on a picture. (See Appendix A for sheet titled *Warm and Cool*.) This activity also incorporates SOL 1.1 a and h. • Students will label "day" and "night" in the appropriate places of the Earth and explain the rotation of the Earth. (See Appendix B for sheet titled *Day and Night*.) **Application/Analysis Level** • Students will explain why sunny seats at a racetrack cost less than shady seats at the same racetrack. (See Appendix C for sheet titled *Sunny Seats*.) This activity also incorporates SOL 1.1 f. • Students will think of activities they can do on each side of the Earth, based on whether it is day or night. They will also explain the rotation of the Earth. (See Appendix D for sheet titled *Day and Night*.) This activity also incorporates SOL 1.1 f and h. **Synthesis/Evaluation Level** • Students will predict, choose, and explain which picture comes next based on an initial picture of two children eating ice cream in the sun. (See Appendix E for sheet titled *Which Picture Comes Next?*) This activity also incorporates SOL 1.1 a, f, g and h. • Students will create a new planet and explain how night and day happen on that planet. They will compare their new planet to Earth and explain how it is similar to or different from Earth's rotation. (See Appendix F for sheet titled *A New Planet*.)	axis Earth rotation sunlight temperature

SOL: 1.6 The student will investigate and understand the basic relationships between the sun and the Earth.

(a) The sun is the source of heat and light that warms the land, air, and water; and
(b) Night and day are caused by the rotation of the Earth.

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

GRADE: 1
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
Students should understand: • Plants change based on changes in seasons and weather. • Animals and people change their behavior based on changes in seasons and weather.	**Knowledge/Comprehension Level** • Students will complete a complex sorting activity where they put each plant, animal, or human behavior in the appropriate category and season. (See Appendix A for sheet titled *Season Changes*.) This activity also incorporates SOL 1.1 a and c. **Application/Analysis Level** • Students will complete a Venn diagram comparing animal, plant, and human changes during the spring and fall seasons. (See Appendix B for sheet titled *Spring vs. Autumn Changes*. This activity also incorporates SOL 1.1 a, c, d and f. **Synthesis/Evaluation Level** • Students will create two seasons for a new land. The seasons must be seasons that are different from ones that we experience in the United States. Students should also indicate what the temperature and weather is like during the two seasons. Look for connection between temperature/weather and animal/plant/human behavior. (See Appendix C for sheet titled *New Seasons*.)	budding growth habitat hibernation migration precipitation recreation sunlight temperature wilting

SOL: 1.7 The student will investigate and understand the relationship of seasonal change and weather to the activities and life processes of plants and animals. How temperature, light, and precipitation bring about changes in:

(a) Plants (growth, budding, falling leaves, and wilting);
(b) Animals (behaviors, hibernation, migration, body covering, and habitat); and
(c) People (dress, recreation, and work).

Earth Science: Resources

GRADE: 1
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
Students should understand: • Natural resources provide us with the things we need in order to live, including food, clothing, water, air, shelter, land, and energy. • Many natural resources are limited and cannot be renewed. Other resources are limited and cannot be renewed, but may last a very long time. • What we put into the air, especially the products of the fuels we burn, affects the quality of the air. Animal, including human, and factory wastes can affect the quality of water. Some pollution washes from yards, streets, and farms. • Recycling recovers used materials. Many materials can by recycled and used again, sometimes in different forms. • Resources will last longer if we recycle them, reuse them, or reduce consumption of them.	**Knowledge/Comprehension Level** • Have students list the benefits of recycling. This can be narrowed to specific resources, such as paper, aluminum cans, etc. **Application/Analysis Level** • Have each student bring one small item from home for "Show and Tell" focusing on natural resources and conservation. Is the item made from one or more natural resources? Are one or more of these natural resources in limited supply on the Earth? Can the item be reused or recycled? This activity also incorporates SOL 1.1 a, b, c, d and f. **Synthesis/Evaluation Level** • Have students design and implement a classroom-recycling program.	natural resources conservation recycle reuse

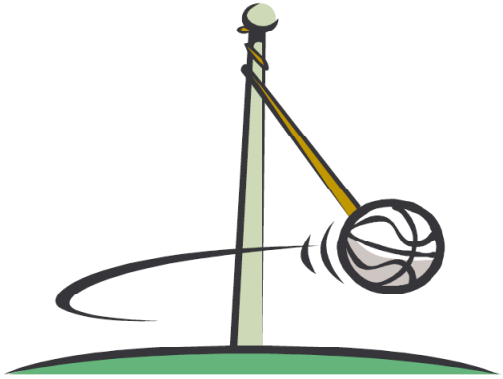
SOL: 1.8 The student will investigate and understand that natural resources are limited.

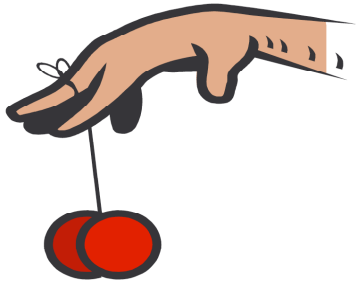
(a) Identification of natural resources (plants and animals, water, air, land, minerals, forests, and soil);
(b) Factors that affect air and water quality; and
(c) Recycling, reusing, and reducing consumption of natural resources.

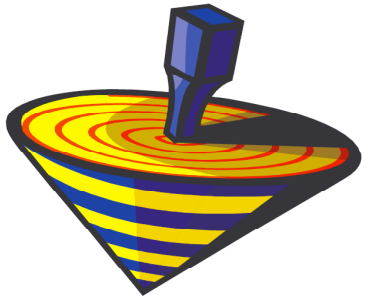
SOL 1.2 – Appendix A

Label the Kinds of Motion

What kind of motion is shown in each picture? Write back-and-forth, circular, or straight under each picture.







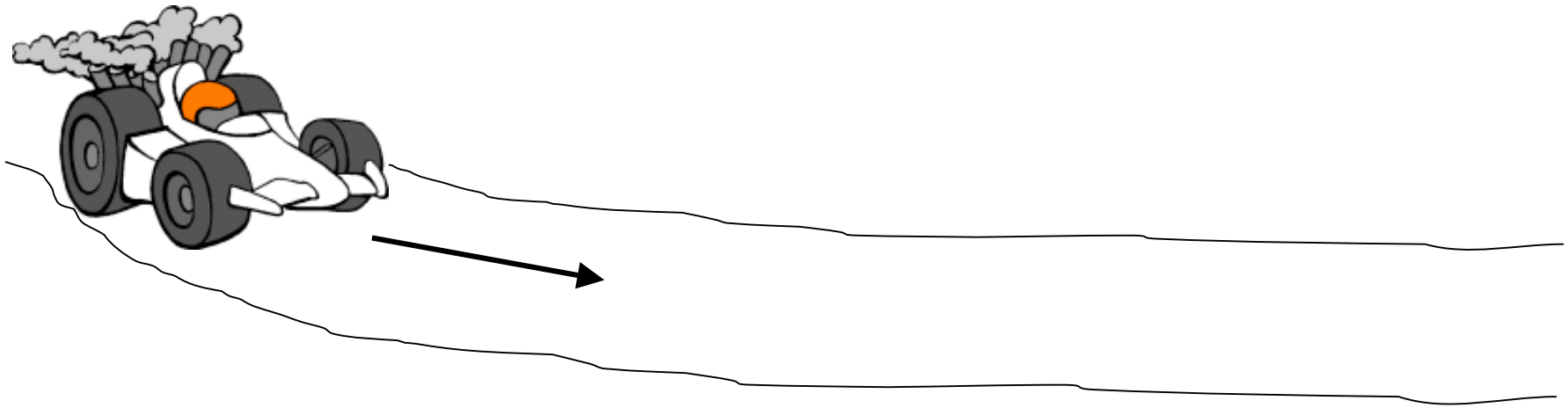
straight

circular

SOL 1.2 – Appendix B

Change the Motion

This racecar is driving down the road. Draw something that would change the motion of the racecar.

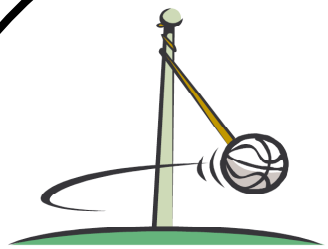


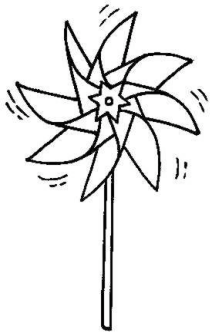
This box is filled with heavy books. Draw something that would change the motion of this box.

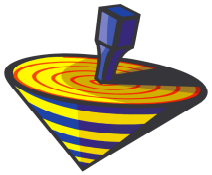
SOL 1.2 – Appendix C

What Fits?

GROUP A



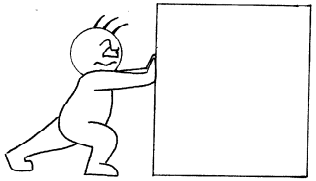




This circle has three things that are the same in some way. What do you think they all have in common?

Draw something else in the circle that fits.

GROUP B

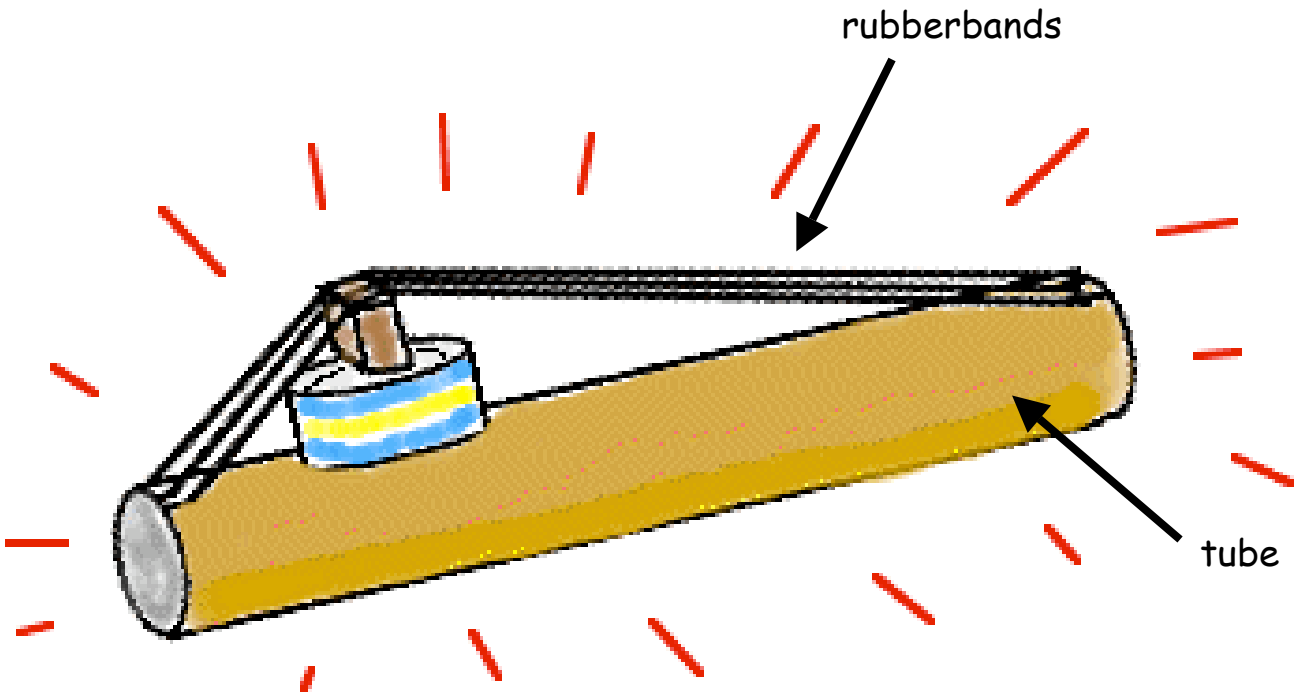


This circle has three things that are the same in some way. What do you think they all have in common?

Draw something else in the circle that fits.

SOL 1.2 – Appendix D

Rubberband Motion



When you pluck these rubberbands, they make sound. Is the motion of the rubberbands more like "straight motion" or "circular motion"?

_____

Why do you think it's more like that kind of motion?

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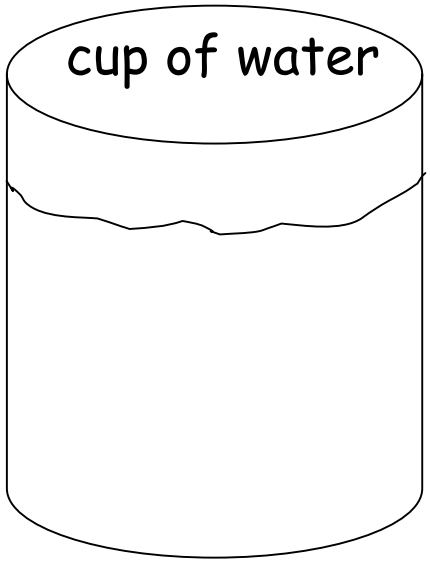
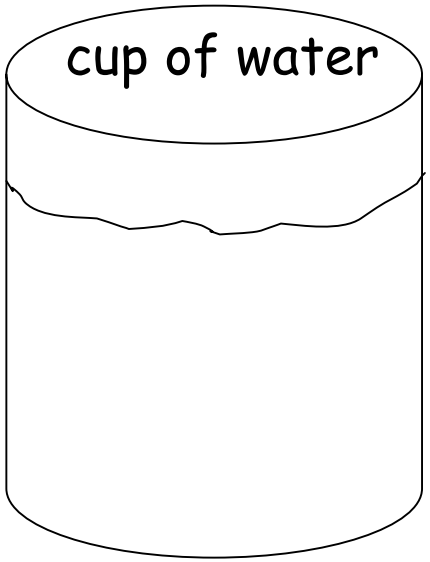
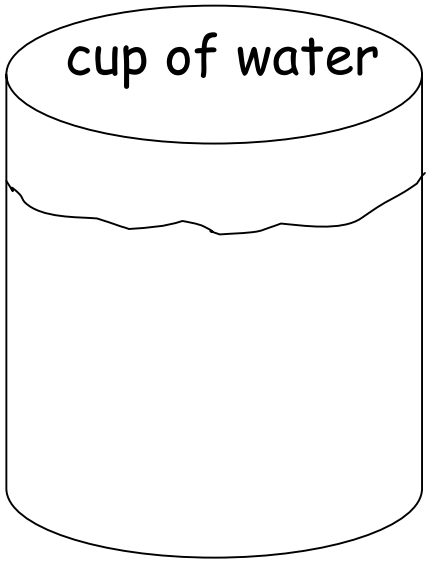
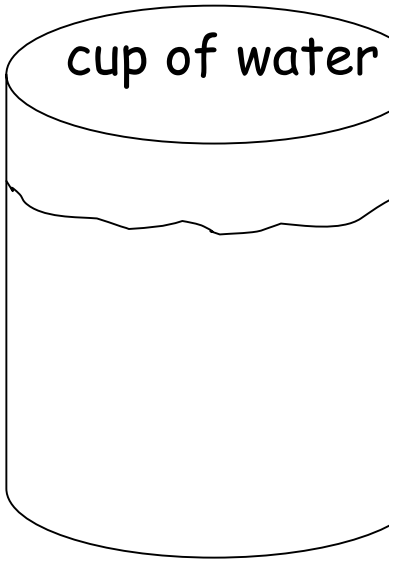
SOL 1.3 – Appendix A

What Dissolves?

You have 4 cups of water and 4 solids to mix in each cup. Make a hypothesis that shows what you think will happen when you add each solid to a cup of water. Then add the solids and draw what happens.

HYPOTHESIS:	dissolve or not dissolve	dissolve or not dissolve	dissolve or not dissolve	dissolve or not dissolve
				
	add soil	add sand	add sugar	add rocks
RESULT:	dissolve or not dissolve	dissolve or not dissolve	dissolve or not dissolve	dissolve or not dissolve

SOLIDS THAT DISSOLVE	SOLIDS THAT DO NOT DISSOLVE

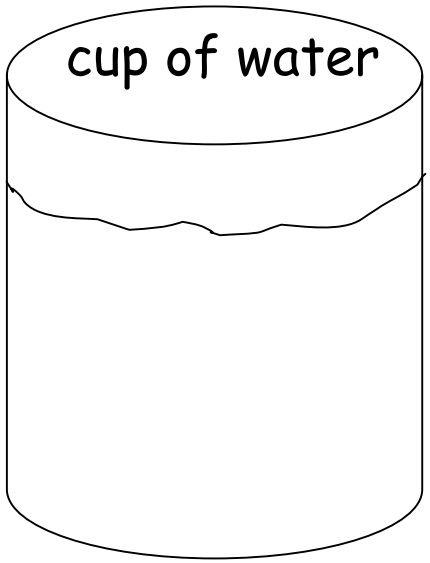
SOL 1.3 – Appendix B

Hot vs. Cold

You have 3 cups of water, all at different temperatures. Measure the temperature of each cup and record measurement. Add a drop of blue, green, and red food coloring to each cup and time how long it takes for the color to be completely mixed. Draw what happened each cup and record the results.

HYPOTHESIS:

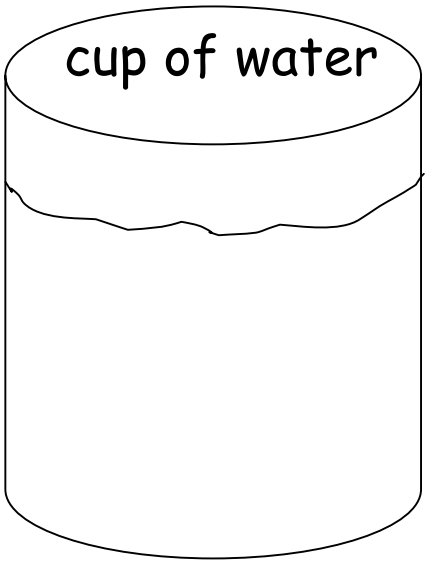
fast or slow



cold water temp: _____

RESULT: _____min _____sec

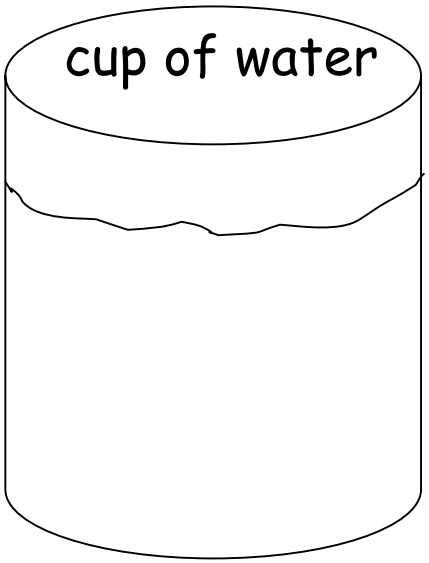
fast or slow



warm water temp: _____

_____min _____sec

fast or slow



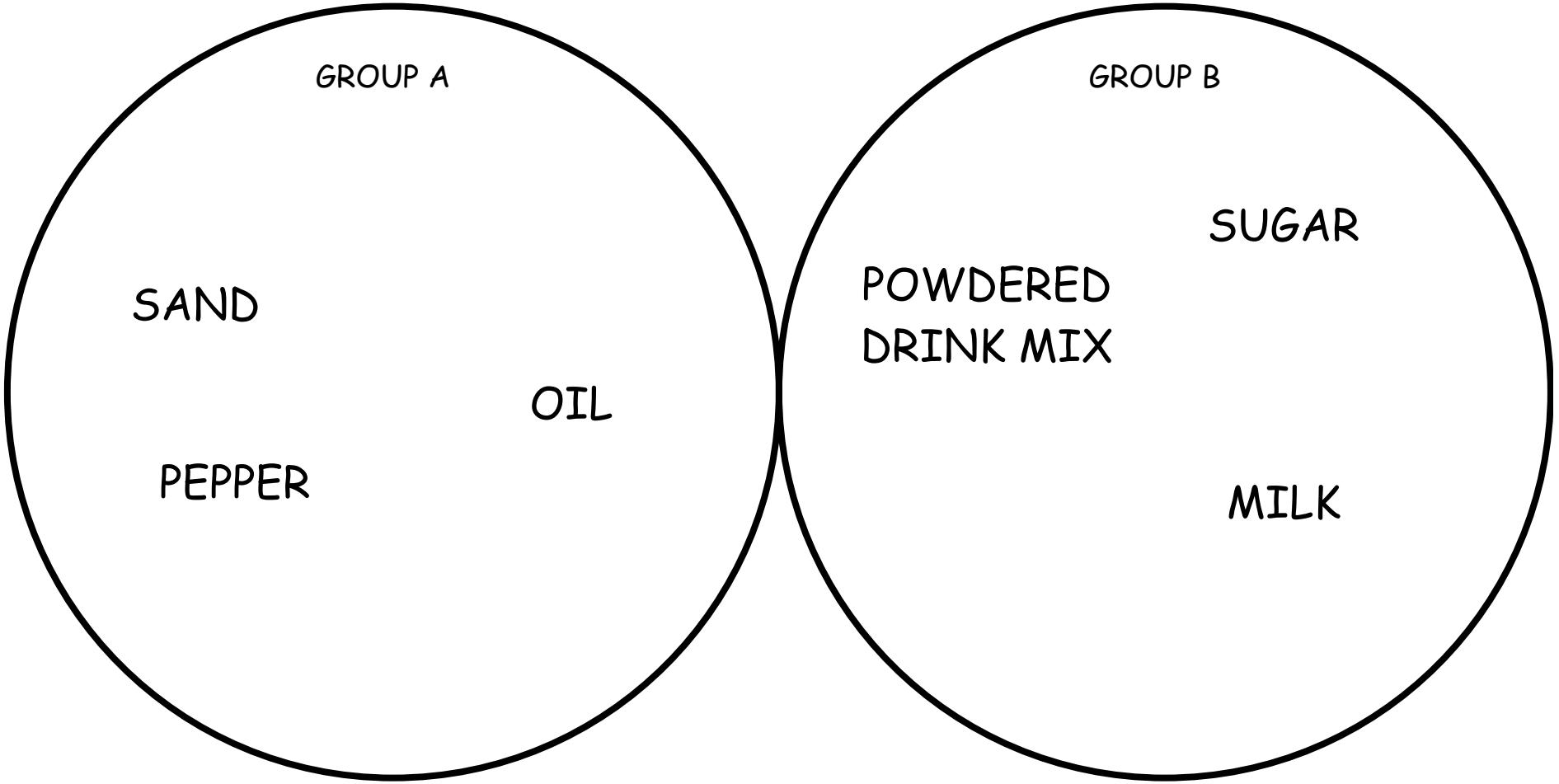
hot water temp: _____

_____min _____sec

How is hot water different from cold water when you are mixing something with water?

SOL 1.3 – Appendix C

What Fits?



This circle has three things that are the same in some way. What do you think they all have in common?

_____

Write two more things in the circle that fit.

This circle has three things that are the same in some way. What do you think they all have in common?

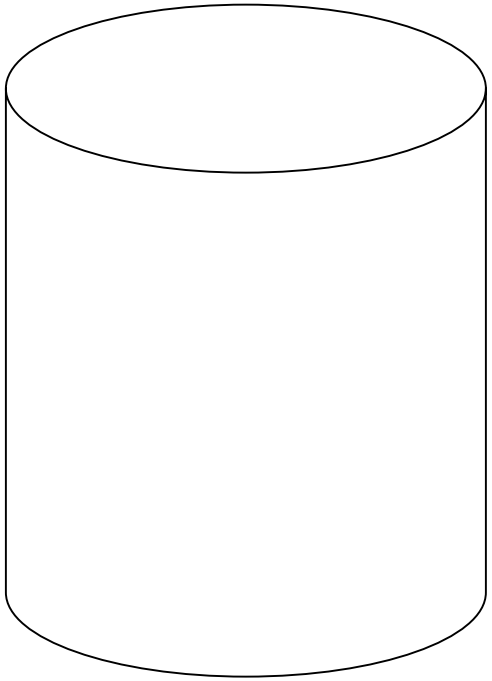
_____

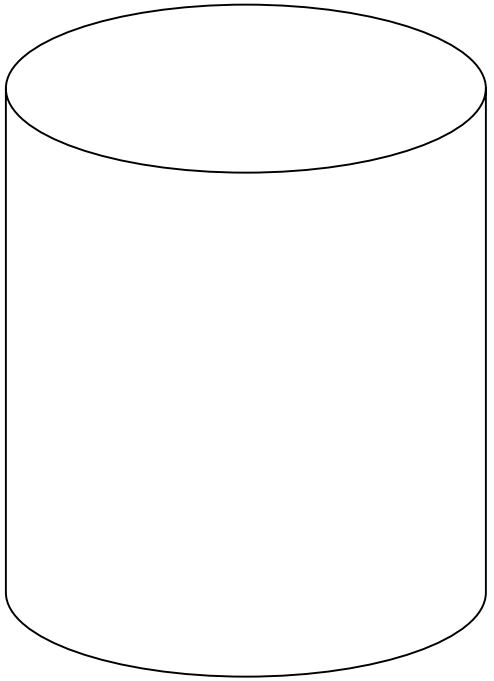
Write two more things in the circle that fit.

SOL 1.3 – Appendix D

Crazy Liquids

Experiment with water, oil, dishwashing liquid, milk, and honey. Choose 2 things that happened and draw and label what happened. Where is each liquid? Did they mix? Which ones?





If you had to put dishwashing liquid in to a category, would it fit better with milk or with oil? Why do you think that?

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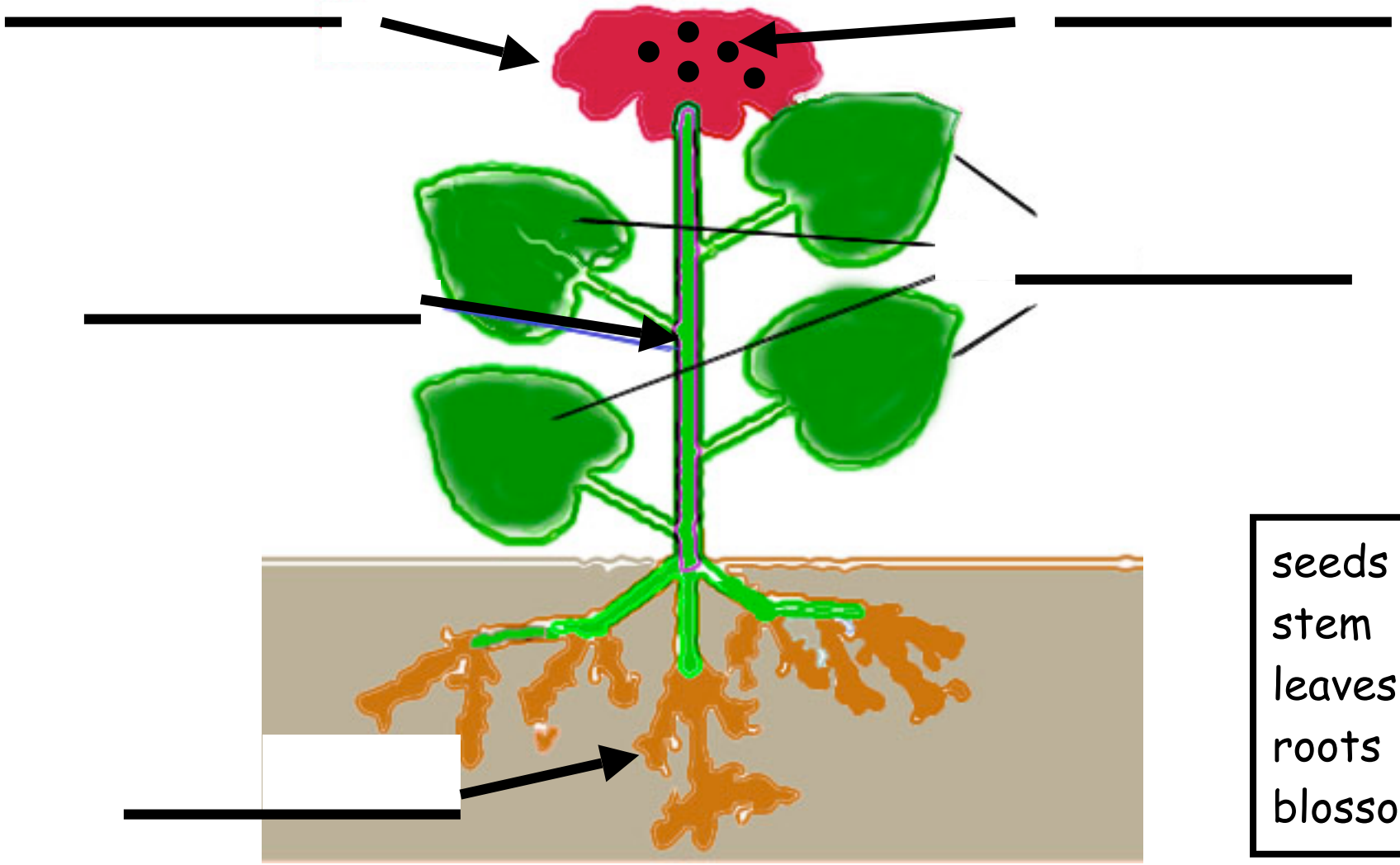
SOL 1.4 – Appendix A

Label the Parts of the Plant



seeds
stem
leaves
roots
blossom

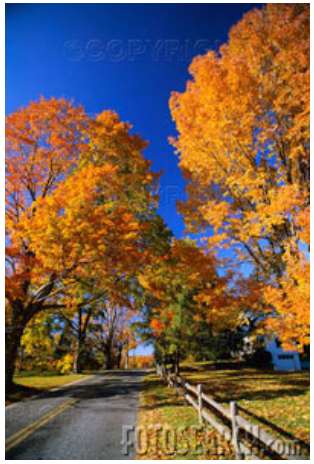
SOL 1.4 – Appendix B

Name the Plants

deciduous or evergreen?

edible or nonedible?

flowering or nonflowering?



SOL 1.4 – Appendix C

What Am I?

I bring water from the roots to the rest of the plant. What am I?	I make food for the plant using air, water, and sunlight. What am I?	I make seeds so the plant can make new plants. What am I?	I gather water from the soil. What am I?
answer:	answer:	answer:	answer:
I protect the seeds. What am I?	A new plant will grow from me. What am I?	I grow fruit on me that people or animals can eat. What am I?	I do not grow any fruit on me that people or animals can eat. What am I?
answer:	answer:	answer:	answer:
I grow flowers on me at some point in the year. What am I?	I do not grow any flowers on me ever. What am I?	I have needles and stay green all year long. What am I?	I lose my leaves in the winter and grow them back in the fall. What am I?
answer:	answer:	answer:	answer:

SOL 1.4 – Appendix D

What Am I?

answer: root	answer: stem	answer: leaf	answer: blossom
answer: seed	answer: fruit	answer: evergreen	answer: deciduous
answer: edible	answer: nonedible	answer: flowering	answer: nonflowering

SOL 1.5 – Appendix A

The Bird's Needs

SHELTER

FOOD

?

?

What else does the bird need to survive?

SOL 1.5 – Appendix B

WILD ANIMALS

movement:	walk	swim	fly
body covering:	fur	feathers	scales
appendages:	wings	fins	legs

movement:	walk	swim	fly
body covering:	fur	feathers	scales
appendages:	wings	fins	legs

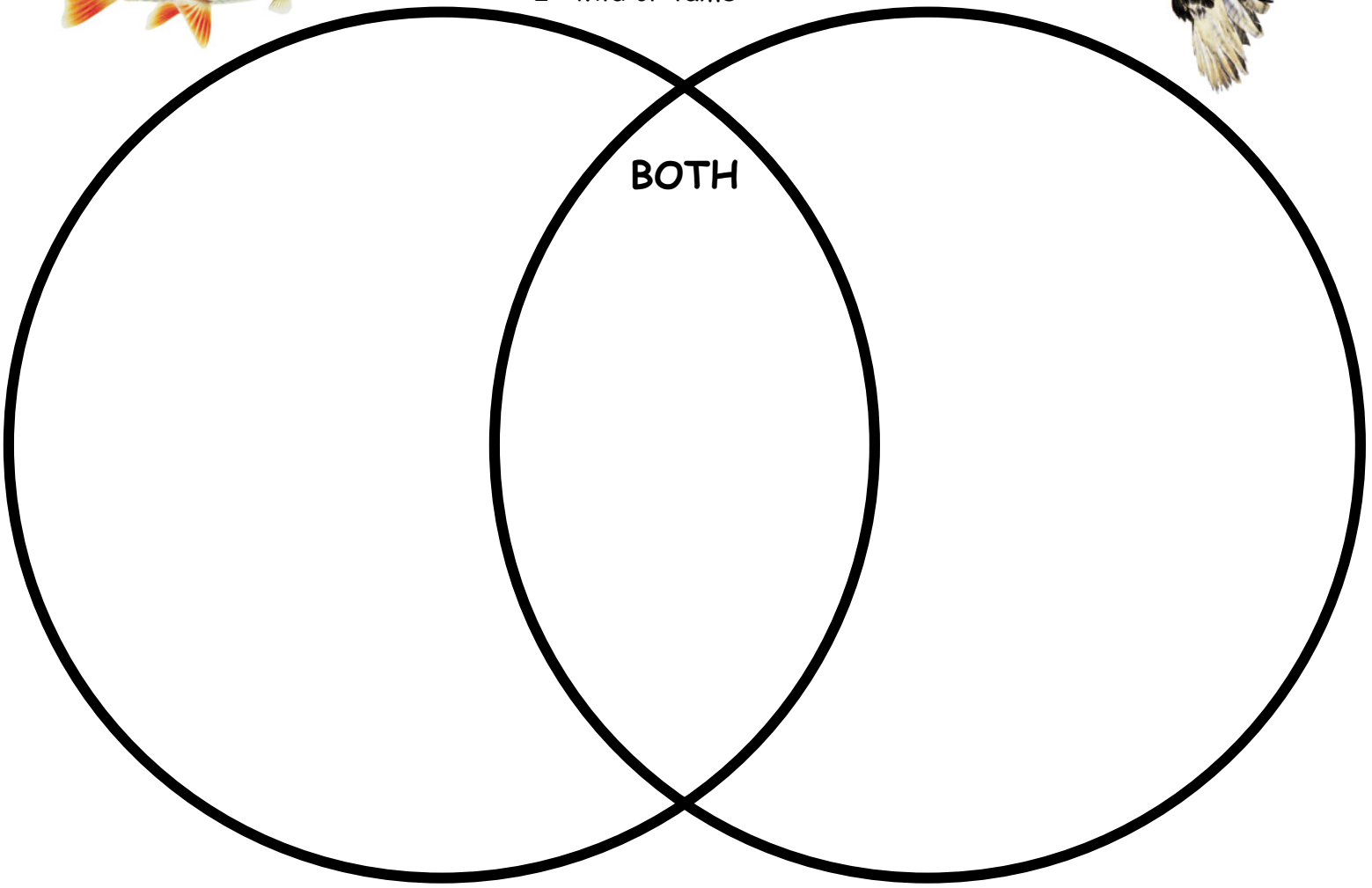
movement:	walk	swim	fly
body covering:	fur	feathers	scales
appendages:	wings	fins	legs

SOL 1.5 – Appendix C

Fish vs. Bird

Did you include:

- ❑ appendages
- ❑ body covering
- ❑ movement
- ❑ survival needs
- ❑ wild or tame



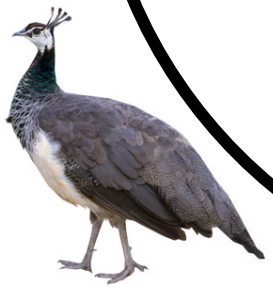
SOL 1.5 – Appendix D

Birds vs. Mammals

Did you include:

- appendages
- body covering
- movement
- survival needs

BOTH



SOL 1.5 – Appendix E

Where Do Bats Fit In?

ALL BIRDS

All birds _____.
(movement)

All birds _____.
(body covering)

All birds _____.
(appendages)

ALL MAMMALS

All mammals _____.
(movement)

All mammals _____.
(body covering)

All mammals _____.
(appendages)

BATS

Bats _____.
(movement)

Bats _____.
(body covering)

Bats _____.
(appendages)

BATS ARE MAMMALS

Why is that strange?

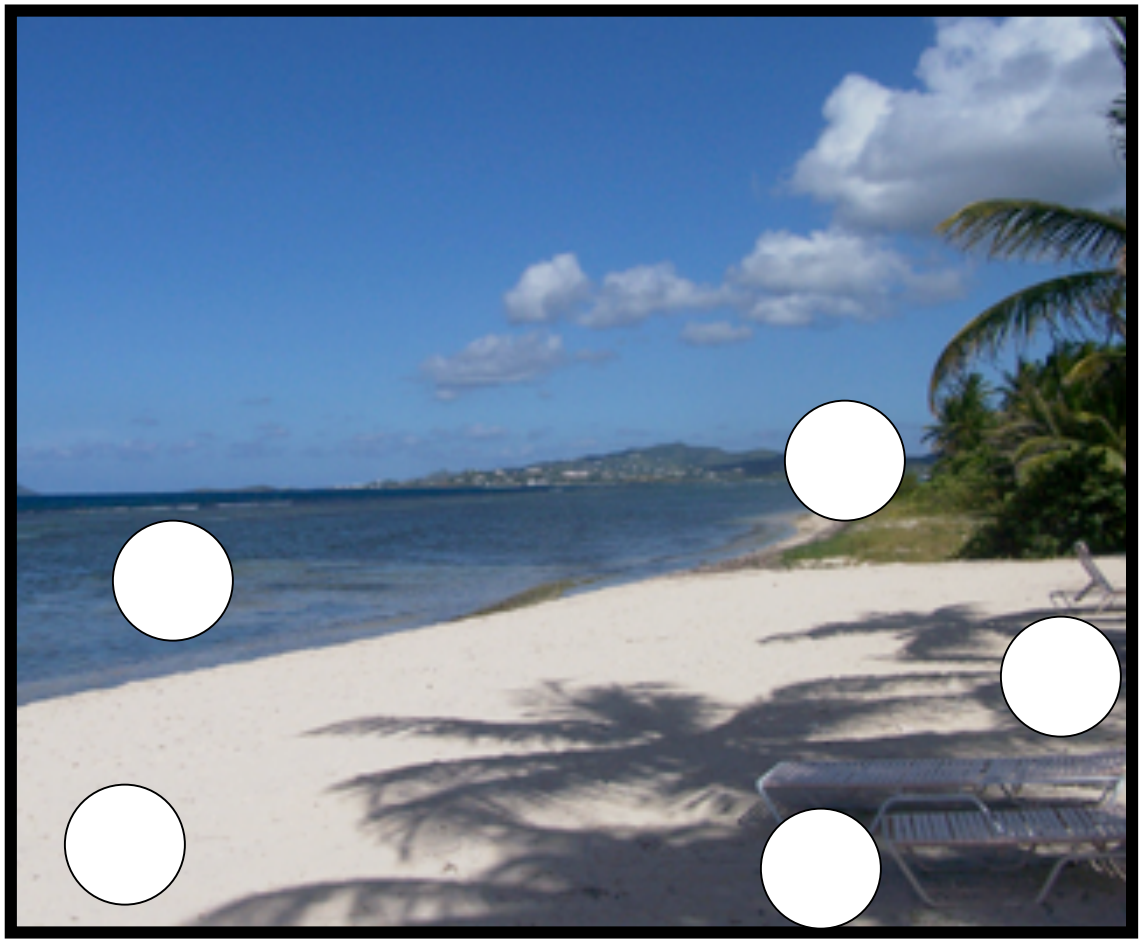
SOL 1.6 – Appendix A

Warm and Cool

Look at each circle on the picture. Is it warm or cool in that spot? If the spot is warm, color the circle RED. If the spot is cool, color the circle BLUE.

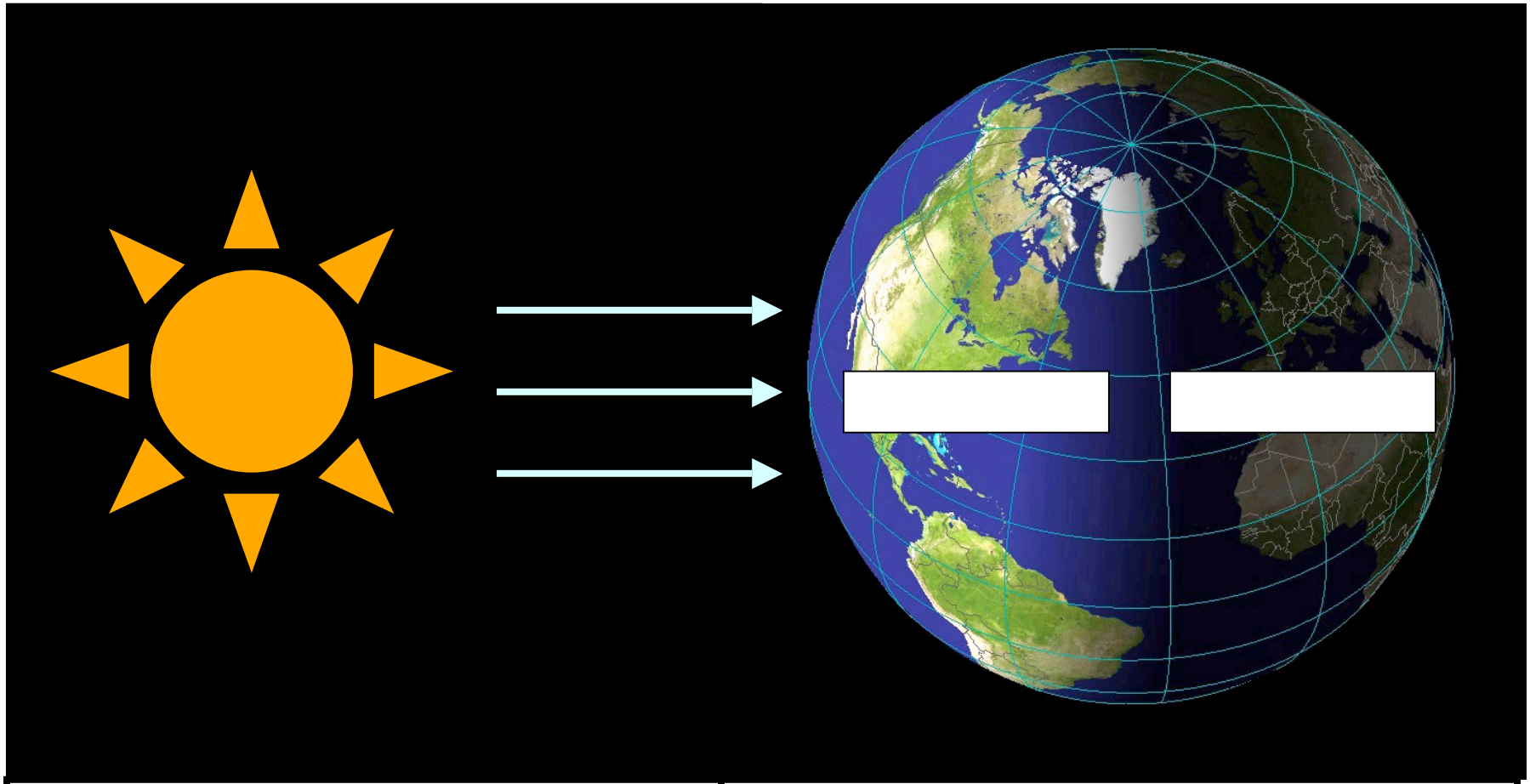
WARM → red

COOL → blue



SOL 1.6 – Appendix B

DAY AND NIGHT



Where is it day and night on our planet? Write the words "day" and "night" in the correct boxes.

It is day at our school. What does the Earth have to do to make it change to nighttime at our school?

Sunny Seats

Where would you rather sit – in the shade or in the sun? Why?

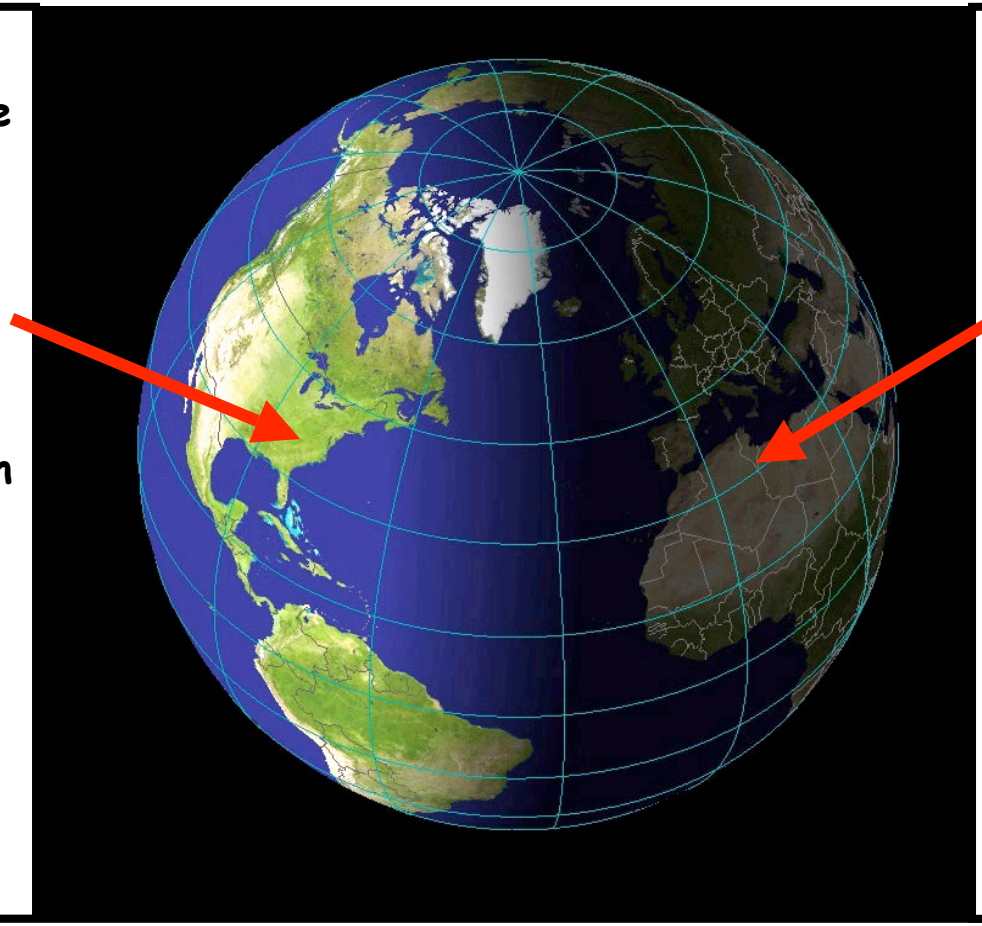
This is a picture of a racetrack. People come here to watch races. At the races, people are sitting outside all day long. The seats in the shade cost more than the seats in the sunlight. Why?

SOL 1.6 – Appendix D

DAY AND NIGHT

Is it day or night on this side of the Earth?

What are some things you could do if you lived on this side of the Earth right now?



Is it day or night on this side of the Earth?

What are some things you could do if you lived on this side of the Earth right now?

One day, Kevin was able to play basketball outside in the day *and* sleep at night. How is he able to do BOTH things without moving to the other side of the Earth?

Which Picture Comes Next?

A

B

On this sunny day, which picture (A or B) shows what will happen to the ice cream cones IF the kids did not eat them? Why?

On the same sunny day, what would you do to your ice cream cone to keep it from melting? Why?

SOL 1.6 – Appendix F

A NEW PLANET

Create a new planet that has never been seen before! **Draw** a picture that shows how it could be night and day on your planet at the same time. **Label** your picture!

What does your planet do to make night and day change?

Is this the same as or different from Earth? How?

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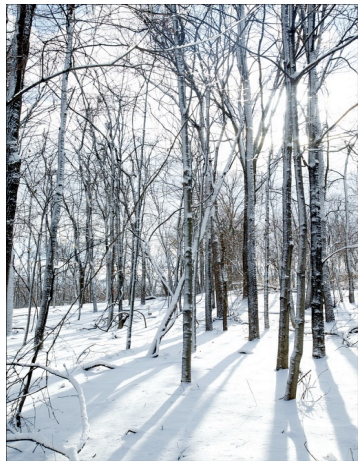
SOL 1.7 – Appendix A

Season Changes

summer



winter

autumn

spring

PLANT CHANGES

ANIMAL CHANGES

PEOPLE CHANGES

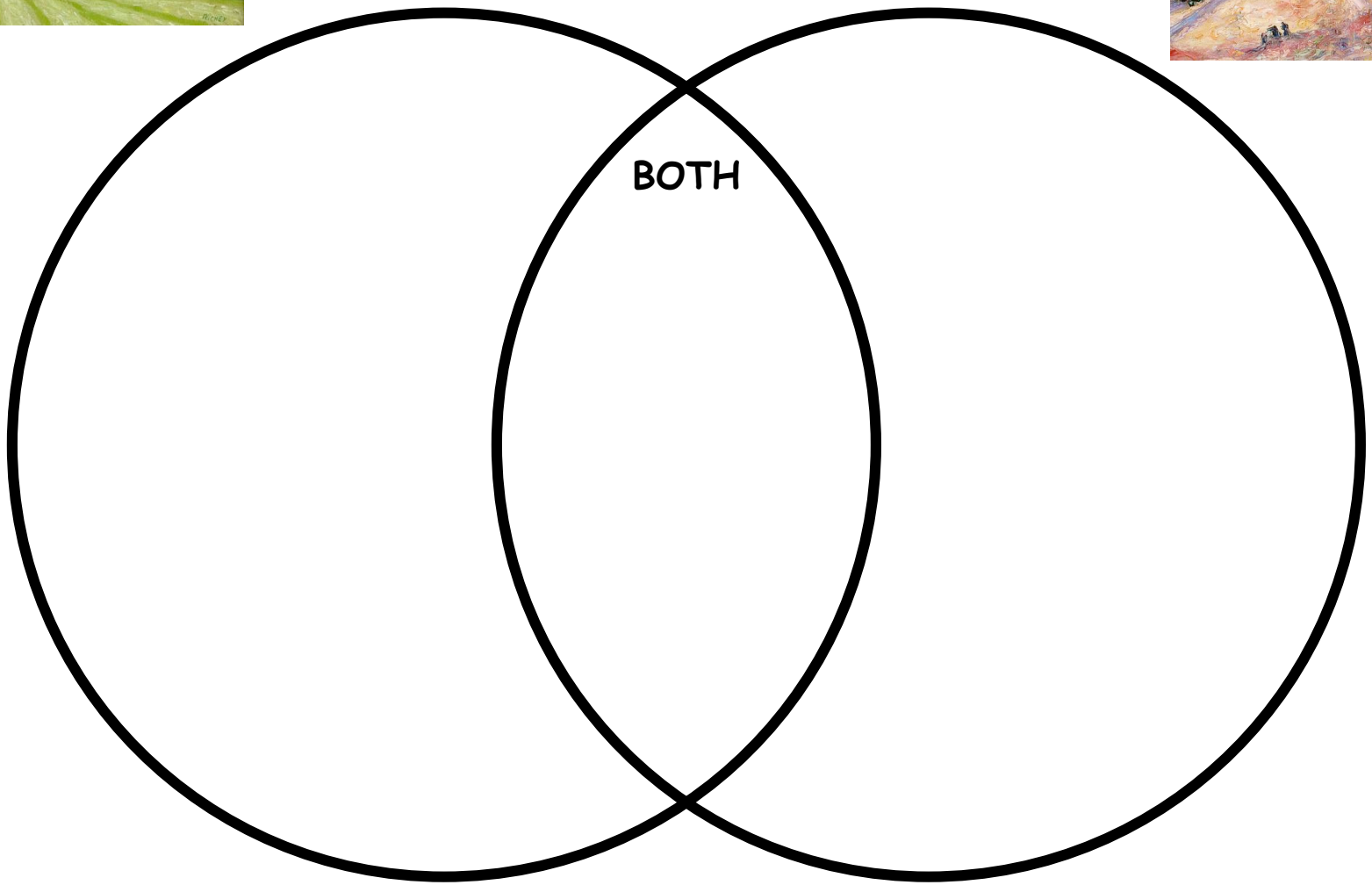
squirrels store acorns	squirrels hibernate	people go sledding
bluebirds migrate	wilting	people plant flowers
budding	squirrels find food	people go swimming
trees full of green leaves	trees with no leaves	people rake leaves
birds build nests and lay eggs	birds raise their young	
squirrels have babies	bluebirds live in the south	

SOL 1.7 – Appendix B

Spring vs. Autumn Changes

Did you include:

- animal changes
- plant changes
- people changes



SOL 1.7 – Appendix C

New Seasons

Create a new land that has different seasons than we do. What happens during the winter in the new land? What happens during the summer? Write down things that people, animals, and plants do during each season. Also explain what the temperature and weather is like during each season.

Name of land: _____

Season: _____	**Season: _____**
Temperature: _____	**Temperature: _____**
Weather: _____	**Weather: _____**
Animals _____	**Animals _____**
Plants _____	**Plants _____**
People _____	**People _____**

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