Science Curriculum Matrix

Kindergarten

August 1, 2009

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

Finally, please note that Science SOL K.1 (Science Investigation, Reasoning, and Logic) is incorporated into the content-based Science Standards of Learning (i.e. Science SOL K.2 through K.10).

Thanks,

The Science Vertical Team

Scientific Investigation, Reasoning, and Logic

GRADE: Kindergarten
CONCEPT: SCALE: Properties
ENDURING UNDERSTANDING: Properties characterize objects, organisms, and substances.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
Students should understand: • A particular sensing organ is associated with each of the five senses (eyes, ears, nose, tongue, and skin). • Using the senses we can make careful observations about the world and communicate those observations through descriptors.	**Knowledge/Comprehension Level** • Smell an unknown odor and find its match. This activity also incorporates SOL K.1 a, b, and e. • Have students draw the sensory organ that helps them find out more about each of the following: o The sound of a bird singing o The taste of a strange vegetable o The smell of spoiled milk o The feel of a fuzzy kitten o The sound of your parent calling you o The smell of mom's new perfume • Make a tape of common community sounds (e.g., cars honking, people cheering, dogs barking, and rain falling) and make picture cards to match. Play the tape and have students match the sound to the object. This activity also incorporates SOL K.1 a and e. **Application/Analysis Level** • Research how nocturnal animals (bats or owls, for example) use their sense of hearing and compare/contrast this knowledge with how daytime animals (rabbits, for example) use their sense of hearing for hunting and self-defense. **Synthesis/Evaluation Level** • Have students create a new product or food. They can then use describing words to tell you how it feels, what it tastes like, whether it is rough or smooth, bright or dull, etc.	**sensing organs** **sight** **sound** **smell** **taste** **touch** **sweet** **sour** **bitter** **salty** **rough** **smooth** **bright** **dull** **loud** **soft** **hard** **sort** **cold** **warm** **hot**

SOL: K.2 Students will investigate and understand that humans have senses that allow one to seek, find, take in, and react or respond to information in order to learn about one's surroundings.

(a) Five senses and corresponding sensing organs (taste – tongue, touch – skin, smell – nose, hearing – ears, and sight – eyes); and
(b) Sensory descriptors (sweet, sour, bitter, salty, rough/smooth, hard/soft, cold, warm, hot, loud/soft, high/low, bright/dull).

Physical Science: Force, Motion, and Energy

GRADE: Kindergarten
CONCEPT: CHANGE and CONSTANCY: Cause and 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: • Magnets will attract certain metals (iron-bearing, nickel, and cobalt). • Magnets have an effect on some items, causing them to move. Some items are not affected by magnets and remain stationary. • Because some metals are attracted to magnets, they have many simple useful applications in the home. • The force of a magnet can move something without actually touching it. • Repulsion is the force that pushes like poles of magnets apart.	**Knowledge/Comprehension Level** • Students will explore with magnets and label if the item attracts or repels to the magnet. (See Appendix A.) This activity also incorporates SOL K.1 e. • Students will compare and contrast the difference between the vocabulary words: push, pull, attract, and repel. (See Appendix B.) This activity also incorporates SOL K.1 c. **Application/Analysis Level** • Compare objects that attract to objects that do not attract. What do you notice? Why? This activity also incorporates SOL K.1 g. **Synthesis/Evaluation Level** • Using all the information that students know about magnets, they will observe and make predictions to decide whether a piece of aluminum can attract or repel a magnet. Students will then use a variety of magnets to test out their hypothesis. (See Appendix C.) This activity also incorporates SOL K.1 a, b, e, and g. • Create a list of rules to explain how magnets attract to some things but not to others. This activity also incorporates SOL K.1 c.	**attraction** **non attraction** **repel** **push** **pull** **metal** **non-metal**

SOL: K.3 The student will investigate and understand that magnets have an effect on some materials, make some things move without touching them, and have useful applications.

(a) Attraction/no attraction, push/pull, attract/repel, and metal/nonmetal; and
(b) Useful applications (refrigerator magnet, can opener, magnetized screwdriver, and magnetic games).

SOL K.3 – Appendix A

Name: _____

Think about your work with magnets. Complete the chart by drawing some objects.

Things that a magnet CAN pick up (does attract):	Things that a magnet CANNOT pick up (does not attract):

SOL K.3 – Appendix B

Name: _____

Magnet Vocabulary

Use pictures and words to tell what you know about each idea.

Attract	**Repel**
Push	**Pull**

Is this aluminum can magnetic?

Predictions: _____

_____

Observations: _____

_____

Were you correct? _____

_____

Image: Clipart.com. 19 September 2006. <www.clipart.com>

Physical Science: Matter

GRADE: Kindergarten
CONCEPT: Scale: Properties
ENDURING UNDERSTANDING: Properties characterize objects, organisms, and substances.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
Students should understand: • An object may have many properties that can be observed and described. • Objects can be described readily in terms of color, shape, and texture. • An object can be described according to its position relative to another object and its motion. • Two different objects can have some of the same physical properties and some different physical properties.	**Knowledge/Comprehension Level** • Show students colored cards; students should be able to name each color. • Have students sort objects into property categories. **Application/Analysis Level** • Give students two objects. Have them name or list differences between those two items. (Differences should include texture, weight, and position.) **Synthesis/Evaluation Level** • Create a way to measure the perimeter of the classroom. How would you measure it if you could not use a yardstick?	**color** **triangle** **square** **rectangle** **flexible** **stiff** **straight** **curved** **big** **little** **heavy** **light** **over** **under** **in** **out** **left** **right**

SOL: K.4 The student will investigate and understand that the position, motion, and physical properties of an object can be described.

(a) Colors (red, orange, yellow, green, blue, purple), white, and black;
(b) Shapes (circle, triangle, square, and rectangle) and forms (flexible/stiff, straight/curved);
(c) Textures (rough/smooth) and feel (hard/soft);
(d) Relative size and weight (big/little, large/small, heavy/light, wide/thin, long/short); and
(e) Position (over/under, in/out, above/below, left/right) and speed (fast/slow).

Physical Science: Matter

GRADE: Kindergarten
CONCEPT: SCALE: Properties
ENDURING UNDERSTANDING: Properties characterize objects, organisms, and substances.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
Students should understand: • Water can be a solid, liquid, or a gas. • The state of water can be changed by heating or cooling it. • The natural flow of water is from a higher to a lower level. • Some objects float in water while others do not.	**Knowledge/Comprehension Level** • Sort items into sink or float categories. This activity also incorporates SOL K.1 e and f. **Application/Analysis Level** • Give the students two objects. Have students predict whether the items will sink or float and justify their answers. Then test. Were they correct? This activity also incorporates SOL K.1 a, g, and i. • Compare water as a solid and a liquid. **Synthesis/Evaluation Level** • Create a list of rules to explain why some things float and some sink. This activity also incorporates SOL K.1 c.	**solid** **liquid** **gas** **stream** **sink** **float**

SOL: K.5 The student will investigate and understand that water flows and has properties that can be observed and tested.

(a) Water occurs in different states (solid, liquid, gas);
(b) The natural flow of water is downhill; and
(c) Some materials float in water, while others sink.

Life Science: Life Processes

GRADE: Kindergarten
CONCEPT: CHANGE and CONSTANCY: Cause and 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 and animals change as they grow. • Plants and animals need food, water, and air (oxygen) to live. (Many animals and plants that live in water use the oxygen that is dissolved in the water.) • Plants and animals live and die. This is part of the life cycle. • Many offspring of plants and animals are like their parents but not identical to them.	**Knowledge/Comprehension Level** • Give students a picture of an animal and then have them draw a line to the things that the animal would need to survive. (See Appendix A.) This activity also incorporates SOL K.1 c. • Have students build a model of a life cycle with given pictures. This activity also incorporates SOL K.1 h. **Application/Analysis Level** • Give students a picture of an animal and a person. Have them compare and contrast the different needs of an animal and a person in a Venn diagram. This activity also incorporates SOL K.1 h. • Have students find pictures of plants and build a model of the plant life cycle (flower, root, stem, leaves) and label. **Synthesis/Evaluation Level** • Have students explain the importance of basic needs and then explain what would happen at the beginning or end of an animal's life cycle. • Have students illustrate the life cycle of a butterfly and then explain what would happen if the caterpillar did not get enough food.	Life cycles Survival Food Water Air Root Stem Leaves flower

SOL: K.6 The student will investigate and understand basic needs and life processes of plants and animals. Key concepts include:

(a) Living things change as they grow, and they need food, water, and air to survive;
(b) Plants and animals live and die (go through a life cycle); and
(c) Offspring of plants and animals are similar, but not identical to their parents or to one another.

SOL K.6 – Appendix A

What does the dog NEED to live?

Draw a line from the dog to everything he needs.

A. 

B. 

C. 

D. Air 

Earth Science: Interrelationships in Earth/Space Systems

GRADE: Kindergarten
CONCEPT: SCALE: Properties
ENDURING UNDERSTANDING: Properties characterize objects, organisms, and substances.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
Students should understand: • A shadow is an image of an object created when light is blocked by that object. • Shadows can occur whenever light is present. • People can make shadows. • Living and nonliving things can make shadows.	**Knowledge/Comprehension Level** • Have students complete the *Me and My Shadow!* worksheet to show how a shadow is made. (See Appendix A.) Have them include the light, object, and shadow. See that they have each item in the correct alignment. **Application/Analysis Level** • Show two shadows. Have students analyze shadows and guess what the objects are. This activity also incorporates SOL K.1 e. **Synthesis/Evaluation Level** • Which will create a darker shadow: a can of soda or a transparent bottle of soda? Why? Defend your answer.	**shadow** **light**

SOL: K.7 The student will investigate and understand that shadows occur when light is blocked by an object.

(a) Shadows occur in nature when sunlight is blocked by an object; and
(b) Shadows can be produced by blocking artificial light sources.

SOL K.7 – Appendix A

Me and My Shadow!

Draw a picture of you and your shadow on a bright sunny day. Think about where to draw the sun and what your shadow might look like.

Earth Science: Patterns, Cycles, and Change: Meteorology

GRADE: Kindergarten
CONCEPT: CHANGE and CONSTANCY: Cycles
ENDURING UNDERSTANDING: Cycles organize change, which can lead to predictable outcomes.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
Students should understand: • One can make simple predictions in weather patterns. On a cloudy, warm day, it may rain. On a cloudy day that is very cold, it may snow. On a clear day there most likely will be no rain or snow. • As animals and plants grow, they get larger according to a pattern. • Natural objects such as leaves, seeds, and cones have patterns we can see. • Home and school routines frequently follow a pattern.	**Knowledge/Comprehension Level** • Draw and label a tree according to each season. This activity also incorporates SOL K.1 b and c. • Cut out magazine pictures that might show what individual people look like as children, as young adults, and as older people. Have students tell about these changes. This activity also incorporates SOL K.1 a. **Application/Analysis Level** • Using a Venn diagram, have students compare and contrast between what they looked like as a baby, including their size, and what they look like now. This activity also incorporates SOL K.1 c. • Have a student use the day's weather and a weather map to predict what the weather might be tomorrow. Record his/her ideas and ask for reasoning for the predictions. This activity also incorporates SOL K.1 i. • Compare the weather in two different places of the world. List similarities and differences. **Synthesis/Evaluation Level** • Have students create their own type of animal and describe how the animal will grow and change over time. This activity also incorporates SOL K.1 b and i.	**season** **change** **fall** **winter** **spring** **summer**

SOL: K.8 The student will investigate and understand simple patterns in his/her daily life. Key concepts include:

(a) Weather observations;
(b) Shapes and forms of many common natural objects, including seeds, cones, and leaves;
(c) Animal and plant growth; and
(d) Home and school routines.

Earth Science: Earth Patterns, Cycles, and Change

GRADE: Kindergarten
CONCEPT: CHANGE and CONSTANCY: Cycles
ENDURING UNDERSTANDING: Cycles organize change, which can lead to predictable outcomes.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
Students should understand: • Change occurs over time. • Change can be fast or slow depending upon the object and conditions. • As people grow they change. • Not all things change at a rate that can be observed easily. • Many changes can be measured.	**Knowledge/Comprehension Level** • Student should be able to explain or draw the basic life process of butterfly (other examples could be a fish, plant, frog, etc). This activity also incorporates SOL K.1 c. **Application/Analysis Level** • Look at a bean seed and a human picture. Compare and contrast each life cycle. Is it fast or slow? What changes did you notice? This activity also incorporates SOL K.1 a and c. **Synthesis/Evaluation Level** • Pose the questions: o What might happen if our plants did not grow? o What would happen if nothing changed? o Defend your answer.	**natural** **human-made** **rate**

SOL: K.9 The student will investigate and understand that change occurs over time and rates may be fast or slow.

(a) Natural and human-made things may change over time; and
(b) Changes can be noted and measured.

Earth Science: Resources

GRADE: Kindergarten
CONCEPT: CHANGE and CONSTANCY: Equilibrium
ENDURING UNDERSTANDING: Stability occurs when changes are counterbalanced.

Essential Understandings	Assessment Samples – SOL/Blooms	Vocabulary
The students should understand: • Natural resources such as water and energy should be conserved. • Recycling helps to save our natural resources. • Recycling recovers used materials. Many materials can be recycled and used again, sometimes in different forms. Examples include newspapers that are turned into writing tablets. • Reusing materials means using them more than once. Examples include dishes and utensils that are washed after use rather than using paper plates and plastic utensils and putting them in the trash. • Recycling, reusing, and conserving helps preserve resources for future use. • Resources will last longer if we recycle, reuse, or reduce consumption.	**Knowledge/Comprehension Level** • What do reduce, reuse, and recycle mean? **Application/Analysis Level** • Concept sort between things that are good and bad for the environment. This activity also incorporates SOL K.1 e. • Discuss with a tape recorder about what they have learned or what they know. **Synthesis/Evaluation Level** • Predict what would happen if we trash our room and fail to conserve our resources. Then extend and argue what would happen if we continue to trash our world. This activity also incorporates SOL K.1 b, c, and i. • Our earth may be dying because of pollution. Create a plan that would help save our earth.	conserve reuse recycle conservation resources

SOL: K.10 The student will investigate and understand that materials can be reused, recycled, and conserved. Key concepts include:

(a) Materials and objects can be used over and over again;
(b) Everyday materials can be recycled; and
(c) Water and energy conservation at home and in school helps preserve resources for future use.