

SPLASH, FLASH, CRANK, SLIDE, ALIVE!

This is a general science tour with plenty of hands-on action in the areas of life cycles, adaptation, fossils, energy, water cycle, friction, and gravity. Your class will explore Discovery Center animals, water table, shadow room, and super slide.

4th GRADE

Standards:

Science

Language Arts

Social Studies

Life Science

Standard 2. INTERDEPENDENCE:

Conceptual Strand 2: All life is interdependent and interacts with the environment.

GLE 0407.2.1. Analyze the effects of changes in the environment on the stability of an ecosystem.

Teacher Questions, Pre-Tour

Q: Describe a wetland ecosystem (amount of water, type of plants, animal species, food chains and food webs). This is the type of ecosystem you will visit at the Discovery Center. To understand and apply the answers to this and the subsequent post-tour question, the students should walk the boardwalk loop with their chaperones before leaving the Discovery Center.]

Teacher Questions, Post-Tour

Q: Recall your visit to the Discovery Center and your walk on the boardwalk? Suppose that Murfreesboro had several years of very dry weather (little rainfall). How might that affect the wetland ecosystem? What might happen if there was a lot of rainfall?

What effect on the wetland ecosystem might there have been if the city had decided to drain the wetland (that was considered as a plan long ago!)

Standard 3. FLOW OF MATTER AND ENERGY:

Conceptual Strand 3: Matter and energy flow through the biosphere.

GLE 0407.3.1. Demonstrate that plants require light energy to grow and survive.

Teacher Questions, Pre-Tour

Q: Do we make our own food? (No).

Q: What organism CAN make its own food? (Only green plants)

Teacher Questions, Post-Tour

Q: Divide the class into small groups of 3-4 students. Give each group 4 cups (labeled with group number or name) filled with potting soil, and have them plant seeds --- radish or marigold. Keep the pots on a window sill or other place where they get sunlight/daylight. When the sprouts are

about 1-2” tall, take 2 pots from each group and place these in a closet or under a box in a dark part of the classroom. Continue to water all plants, but keep the ‘dark’ plants away from light. Compare the plants exposed to sunlight/daylight to the plants kept in the dark. Which plants grew better? (For a more dramatic comparison, this experiment may be continued until the plants kept in light flower or otherwise mature.)

GLE 0407.3.2. Investigate different ways that organisms meet their energy needs.

Teacher Questions, Pre-Tour

Q: How do plants get energy? How do animals get energy? How do humans get energy?

Teacher Questions, Post-Tour

Q: At the Discovery Center, you saw some of the animals that are used for programs. How do these animals meet their energy needs? How might this be different from the animals that live in the wetlands adjacent to the Discovery Center?

Standard 4. HEREDITY:

Conceptual Strand 4: Plants and animals reproduce and transmit hereditary information between generations.

GLE 0407.4.1. Recognize the relationship between reproduction and the continuation of a species.

Teacher Questions, Pre-Tour

Q: Were there cats and dogs when your grandparents were little? How about wild animals, like raccoons or opossums? (may have to show a picture for some students who have never seen wild animals). Since dogs or cats or wild animals don’t live as long as humans, explain why there are still cats, dogs, raccoons, and opossums today? (They reproduce, or have babies, which mature and reproduce in turn).

Teacher Questions, Post-Tour

Q: You saw some animals on your Discovery Center tour that normally live in the wild, like the box turtle or milk snake. In order for their species to not die out, what must happen? (Most individuals in the species must be able to reproduce). What can affect reproduction in the wild? (good habitat, ability to avoid predators, number of young, etc.)

[For advanced students, a discussion of the dangers to wild habitats by feral animals (domestic animals who are ‘wild’ and hunt for their food), such as cats, might be appropriate. This discussion could lead to what might happen if there is unchecked reproduction of pet animals.]

Standard 5. BIODIVERSITY AND CHANGE:

Conceptual Strand 5: A rich variety of complex organisms have developed in response to a continually changing environment.

GLE 0407.5.1. Analyze physical and behavioral adaptations that enable organisms to survive in their environment.

Teacher Questions, Pre-Tour

Q: Name a plant and an animal that live in a desert habitat. How does each meet its needs for food, water, and shelter, and space? Is this a physical adaptation (color & shape, body system like blood

circulation or nutrition, etc.) or a behavioral adaptation (something the plant or animal does)? [This exercise may be done with some research in the library or at home. Note: Being active at night when it is cooler is a physical adaptation to the desert heat. Also, some animals aestivate during the summer in order to conserve energy and stay cool. Some desert animals, like the sidewinder (rattlesnake) are lighter colored, like the desert sand, in comparison with their woodland cousins, which are much darker in color. This physical adaptation has taken place over time.]

Teacher Questions, Post-Tour

Q: Name some plants and animals that live in a wetland habitat like that at the Discovery Center. How does each meet its needs for food, water, and shelter, and space? Is this a physical adaptation (color & shape, body system like blood circulation or nutrition, etc.) or a behavioral adaptation (something the plant or animal does)? [This exercise may be done with some research in the library or at home.]

GLE 0405.5.2. Describe how environmental changes caused the extinction of various plant and animals species.

Teacher Questions, Pre-Tour

Q: What is one LARGE group of animals that have gone extinct that we know about? (Dinosaurs). What environmental changes might have been the cause of this? [Note: This website <http://www.answers.com/topic/why-did-dinosaurs-become-extinct> has a short discussion; scientists are not certain of the cause of dinosaur extinction, and there are several theories.]

Teacher Questions, Post-Tour

Q: Besides environmental changes, what changes that humans cause affect native plants and wildlife? [Habitat loss/reduction due to urbanization; pesticides that kill plants which birds need for food; water pollution that affects species (like mussels) upon which other animals depend.]

Standard 9. MATTER:

Conceptual Strand: The composition and structure of matter is known, and it behaves according to principles that are generally understood.

GLE 0407.9.2. Explore different types of physical changes in matter.

Teacher Questions, Pre-Tour

Q: What are the three states of matter? (Solid, liquid, gas). Using the states of matter, how could you change water from a liquid to a solid? From a solid to a liquid? From a liquid to a gas?

Teacher Questions, Post-Tour

Q: At the Discovery Center, you discussed the water cycle. List all the ways water exists in the world (lakes, rivers, puddles, ocean, snow, glaciers, rain, etc.). What conditions cause the changes water goes through as it becomes ice, rain, snow, or a cloud?

Standard 10. ENERGY:

Conceptual Strand: Various forms of energy are constantly being transformed into other types without any net loss of energy from the system.

GLE 0407.10.2. Investigate how light travels and is influenced by different types of materials and surfaces.

Teacher Questions, Pre-Tour

Q: [Suggestion: Go outside with your class on a sunny day, and take an umbrella of light fabric, an umbrella of dark fabric, a poster board or large piece of cardboard, a square piece of waxed paper (@ 12" x 12"), a pane of glass (careful with sharp edges), and/or other opaque or translucent or transparent items.

Working in pairs, students take turns holding these items over their heads. Ask their partner to write down which items block sunlight better than others.

Next, have students observe their own shadows on the ground, and the shadows produced by the items listed above.

Ask: Which items blocked the sun better? Which items let a little light through? Which items let a lot of light through? Why?

Which item(s) had the darkest shadow?

(Try this activity at different times of the school day and ask students to record the position of the sun when you do the activity. Ask: How does the position of the sun affect your shadow and the shadows of the items?)

Teacher Questions, Post-Tour

Q: At the Discovery Center, you experienced the "Shadow Room." Where did the light come from in that room? Why were you able to make shadows on the wall? (interaction of light and 'special paint' on the wall). Was your shadow clear and sharp, or were some of the edges 'fuzzy'? If sharp, why do you think that happened? If fuzzy, why do you think that happened?

Standard 11. MOTION:

Conceptual Strand 11. Objects move in ways that can be observed, described, predicted and measured.

GLE 0407.11.1. Recognize that the position of an object can be described relative to other objects or a background.

Teacher Questions, Pre-Tour

Q: [Suggestion: Outside is a great place to do this!] Print the following "positions" on strips of paper, divide students into groups of 3, and have each group demonstrate and describe one of the following:

Next to

In front of

Behind

Beside

To the left of

To the right of

Above

Below

Across from

Diagonally across from

Teacher Questions, Post-Tour

Q: Describe several exhibits or objects at the Discovery Center in relation to other objects or places there.

The second floor is (above) the first floor.

The fire truck is (across from) the Tennessee Live porch.

The parking lot is (in front of) the museum.

The wetlands are (could say 'next to' or 'behind') the museum.

The turtle tank is (next to) the gravel pit.

GLE 0407.11.2. Design a simple investigation to demonstrate how friction affects the movement of an object.

Teacher Questions, Pre-Tour

Q: What is friction? How can it be helpful? How can it cause problems?

Teacher Questions, Post-Tour

Q: At the Discovery Center, you were able to go down the big slide. Were you able to speed up, or slow down? What caused friction for you? How is your speed related to friction?

GLE 0407.11.3. Investigate the relationship between the speed of an object and the distance traveled during a certain time period.

Teacher Questions, Pre-Tour

Q: A commercial jet will travel around 600 miles per hour, while the traveling speed of an automobile (based on legal limits!) is about 70 miles an hour. In one hour, how far has each vehicle traveled? In two? Could the car ever travel faster than the jet? (students may discuss how much fuel each carries, rate of fuel use, size of tanks, friction of road vs. air, etc.)

Teacher Questions, Post-Tour

Q: At the Discovery Center, you experienced traveling down the slide. Was there any way you were able to increase your speed? (slide down first with your feet out in front of you, then slide down while picking up your feet) Since you traveled the same distance both times, what was affected by your increased speed? (It took less time to get to the bottom.) Can you think of any other ways to go even faster? (Think about the type of material your pants are made of, and how constructed. No pockets on sweat pants or gym shorts...).

Language Arts

Recommended Reading:

Nonfiction:

A Drop Around the World by Barbara McKinney. (1998). Ages 5 and up. **Lexile measure: 820L.**

City Animals (Zoobooks Series) by John Bonnett Wexo.

Come to Your Senses (All Eleven of Them) by Milan Tytla. (1993).

Cool Gravity Activities: Fun Science Projects about Balance (Cool Science) by James Hopwood.

DK Eyewitness Books: Fossil by Paul Taylor (2004). Ages 8 and up.

Ducks, Geese, & Swans (Zoobook Series) by John Bonnett Wexo
Hamsters, Gerbils, Guinea Pigs, Rabbits, Ferrets, Mice, and Rats: How to Choose and Care for a Small Mammal (American Humane Pet Care Library) by Laura S. Jeffrey. (Ages 5 and up, 48 pages).
Janice VanCleave's Energy for Every Kid: Easy Activities That Make Learning Science Fun by Janice VanCleave (2005). Ages 9 and up.
Learning to Care for Small Mammals (Beginning Pet Care with American Humane) by Felicia Lowenstein Niven. (Grades 3 and up)
Nocturnal Animals (Zoobooks Series) by John Bonnett Wexo. (Grades 4 and up)
Owls (Zoobooks Series) by Timothy L. Biel. (Grades 4 and up)
Salamander Rain: A Lake & Pond Journal by Kristin Joy Pratt-Serafini. (Grades 3 and 4).
Skunks and Their Relatives (Zoobooks) by John Bonnett Wexo. (Grades 4 and up)
Turtles (Zoobooks Series) by Timothy L. Biel. (Grades 4 and up)
Understanding Your Senses by Rebecca Treayes (1997) Upper elementary.
Snakes! (Zoobook Series) by John Bonnett Wexo. (2001).
Snakes! Strange and Wonderful by Laurence Pringle. (2009). Elementary.

Fiction:

(Hybrid: fiction and nonfiction) Near One Cattail: Turtles, Logs And Leaping Frogs by Anthony D. Fredericks. (Ages 4 and up)
The Magic School Bus Explores the Senses by Joanna Cole. (2001). Grades 1-4.
The Magic School Bus Gets Eaten: A Book About Food Chains by Pat Relf. (ages 4 and up, 32 pages)
The Magic School Bus Inside the Human Body by Joanna Cole. (2011). Grades 2-5
The Magic School Bus Wet All Over: A Book About the Water Cycle by Pat Relf (1996). Grades 3-5.

For teachers:

Ranger Rick's NatureScope series titles:

Amazing Mammals, Part I (1998, National Wildlife Federation, McGraw-Hill)
Amazing Mammals, Part II (1998, National Wildlife Federation, McGraw-Hill)
Endangered Animals: Wild and Rare (1997, National Wildlife Federation, McGraw-Hill)
Let's Hear It for Herps (1997, National Wildlife Federation, McGraw-Hill)
Wading Into Wetlands (1997, National Wildlife Federation, McGraw-Hill)

Social Studies

Standard 3. GEOGRAPHY:

Content Standard: Geography enables the students to see, understand and appreciate the web of relationships between people, places, and environments. Students will use the knowledge, skills, and understanding of concepts within the six essential elements of geography: world in spatial form, places and regions, physical systems, human systems, environment and society, and the issues of geography.

GLE 4.3.02 Recognize the interaction between human and physical systems around the world.

Teacher Questions, Pre-Tour

Q: How do we heat our homes? (Electric heat pump, electric heater, wood fire place, etc.)

Q: Where does the energy come from to heat our homes? If electric, how is it generated and carried to our homes?

Teacher Questions, Post-Tour

Q: How are we—as a community, city, county, state, country—able to provide ‘heat and light’ on demand for our citizens?

Q: Is this true for all people in all countries?

Q: How might our (as a country) use of resources affect other people around the world? Is there anything we can do to use less energy? (turn lights off when you leave a room, don’t let water run, etc.)

Standard 6. INDIVIDUALS, GROUPS, and INTERACTIONS:

Content Standard: Personal development and identity are shaped by factors including culture, groups, and institutions. Central to this development are exploration, identification, and analysis of how individuals and groups work independently and cooperatively.

GLE 4.6.01. Recognize the impact of individual and group decisions on citizens and communities.

Teacher Questions, Pre-Tour

Q: Whether you live in the city or the county, you need services that can be provided to a group of citizens. Can you name some of these services? (light/electricity, water, heat, fire protection, crime prevention and protection, waster removal services, etc.)

Teacher Questions, Post-Tour

Q: Does each family buy its electric power individually from the source? (No, we usually buy it as a group, sometimes call a “coop” or cooperative, which helps save money for the individual family or consumer.) This is an example of citizens working as a group (cooperating) to provide something all of them need and use.