

Leapfrog Program Week 1

Course Title: Math in the Animal World

Course Description

Does a squirrel move faster than a rabbit? How does an animal's size and shape affect its speed? Animals do amazing things and learning about their fantastic feats is a great way to practice data comparisons, single-digit multiplication, and algebraic equations. Young mathematicians observe animal behavior, conduct simple experiments, and engage in story problems about the fascinating world of animals.

Essential Questions

- How is math part of everything we do?
- How does math help us learn about animals?
- How does an animal's size and shape affect its speed?
- How can numerical data be used to predict animal behavior?

Outcomes

Upon successful completion of this course, students will have:

- a. Researched and observed animal characteristics and behavior and identified how math is used in this process
- b. Collected, recorded, and represented data accurately using graphs and charts
- c. Compared animals using math functions, documenting data to support conclusions
- d. Identified ways math helps scientists study animals
- e. Analyzed how animal characteristics, such as size, affect how the animal moves or behaves
- f. Made predictions about animal behavior using numerical data
- g. Presented, as a final project, findings and conclusions about animal behavior and characteristics using mathematical functions

Instructional Strategies

This course will meet the needs of various learners by grouping students in flexible ways based on skills and interest. Pre-assessment of skills will help the teachers guide students toward appropriately challenging activities. Students will be encouraged to self-assess their abilities and develop their own questions in regard to the topic of the course. Many modes of communication will be encouraged including drawing, writing, and verbal representations. Peer-learning will be central to the course as the students work in teams to study animals in particular habitats. Teachers will differentiate problems offered to students in problem-solving activities. They will also individualize support for students through appropriate scaffolding. For example, students may provide verbal rather than written explanations of problem solving strategies. Technology resources will be integrated into the course as both a source of information and as a support for students.

Resources and Materials

- a. Clement, Rod. *Counting on Frank*. Gareth Stevens Children's Books, 1991. ISBN: 0-8368-0358-2
 - b. Davies, Nocola. *Just the Right Size: Why Big Animals are Big and Little Animals are Little*. Candlewick Press, 2009. ISBN: 9780763639242
 - c. Jenkins, Steve. *Biggest, Strongest, Fastest*. Ticknor and Fields Books for Young Readers, 1995. ISBN: 0395697018
 - d. Jenkins, Steve. *Big and Little*. Houghton Mifflin, 1996. ISBN: 0395726646
 - e. Jenkins, Steve. *Actual Size*. Houghton Mifflin, 2004. ISBN: 0618375945.
 - f. Jenkins, Steve. *I See a Kookaburra!: Discovering Animal Habitats Around the World*. Houghton Mifflin, 2005. ISBN: 9780618507641
 - g. Kroll, Virginia. *Equal Shmequal: A Math Adventure*. Charlesbridge, 2005. ISBN: 1570918910
 - h. Stevens, Janet. *Tortoise and the Hare*. Holiday House, 1985. ISBN: 9780823405640
 - i. Wexo, John Bonnett. *Zoobooks: Animal Champions*. Wildlife Education Ltd., 1998. ISBN: 0937934194.
- **Web sites**
 - a. Seaworld. <http://www.seaworld.org/animal-info/index.htm> This site contains in-depth information about specific animals in the InfoBooks section.
 - b. Sheppard Software. http://www.sheppardsoftware.com/web_games_trivia_animal.htm This site contains articles about individual species as well as animal quizzes.
 - c. National Geographic Kids. <http://kids.nationalgeographic.com/kids/animals/creaturefeature/> This site contains fact files on individual animals organized by habitat.
 - d. Create a Graph <http://nces.ed.gov/nceskids/createagraph/> This is an online graphing program.
 - **Materials**
 - a. Animal Behavior Journal (provided).
 - b. Calculators, measurement tools, chalk, masking tape, crayons, graph paper, various art materials.

Student Assessment

- **Pre-Assessment**
Students will create a "Favorite Animals Graph." The teachers will be able to assess students' graphing skills. Guiding questions and transcription will assess students' prior knowledge about animal needs and habitats.
- **Documentation of Learning**
Individual creation of various types of graphs and charts will document students' research and data representation abilities. Problem-solving, sorting animals by speed, drawing animals to scale, and finding the area of animal homes will assess students' use of math functions in regard to animals and their behavior. Creation of a habitat and Animal Behavior Journals will provide students a space to record their thinking about the usefulness of math in understanding animals.
- **Post-Assessment**
Students will share their Animal Behavior Journals, animals drawn to scale, and habitats at Expo! They will answer questions provided by visitors to the Expo! about the math and animals in their habitat. At the end of the course students will receive a written evaluation based on general class performance, discussion, participation (whole group and small group) evaluations, and written work. Final Student evaluations are written are mailed out by September 15. Please refer to the Leapfrog Family handbook for more information.

Schedule

Date	Topic(s)	In-class Activities	How will you document learning for assessment?
Monday, July 11, 2011	The Length of Animals	<p>Create a whole class Favorite Animals Graph. What do you know about animals' needs and habitats? Become a behaviorists focused on animals of a specific habitat.</p> <p>Practice measuring each other in inches and convert inches into feet and vice versa.</p> <p>Gather data from various sources to compare and contrast the lengths of animals in your chosen habitat. Measure out the lengths of animals to compare their sizes and make a bar graph to organize the results.</p>	<p>Pre-assessment: Favorite Animal Graph, documentation of prior knowledge of animals' needs and habitats.</p> <p>Inches and feet conversion.</p> <p>Animal Lengths Bar graph.</p>
Tuesday, July 12, 2011	The Weight of Animals	<p>Read <i>Equal Shmequal</i> to discuss the concept of comparing animal weights.</p> <p>Research the weights of animals in your chosen habitat and create a pictograph and key to compare and contrast your findings.</p> <p>Using the data you have collected, investigate various questions about the animals in your habitat (e.g., How many lemmings would equal one polar bear?)</p>	<p>Pictograph.</p> <p>Animal comparison problems and solution strategies.</p>
Wednesday, July 13, 2011	The Speed of Animals	<p>Read <i>The Tortoise and the Hare</i> and discuss the speeds of different animals. Focus on how the body of a tortoise is different from the body of a hare.</p> <p>Look at various pictures of animals and try to organize them in order from fastest to slowest. Explain your thinking.</p> <p>Research the speeds of animals in your habitat and create a line graph to represent speed versus length.</p> <p>Act out races between slower and faster animals.</p>	<p>Observations of animal sorting by physical characteristics.</p> <p>Animal Length vs. Speed Line Graph.</p>

Date	Topic(s)	In-class Activities	How will you document learning for assessment?
Thursday, July 14, 2011	What Animals Eat and Where they Live	<p>Discuss food chains and research the food and home requirements of animals in your habitat.</p> <p>Solve problems about how much food animals require in different lengths of time (e.g., in one day, in one year). Predict grazing space animals need based on food consumption.</p> <p>Determine the area of one or more animals' homes (nests, burrow, caves, etc.) Use yard sticks and rulers to measure outlines of the homes. Calculate the area the animal's home and compare it to the animal's size. Make predictions about homes of other animals in your habitat.</p>	<p>Problem solving about food requirements.</p> <p>Replication of animal home and calculation of area.</p> <p>Animal Behavior Journal reflections on size of animal homes.</p>
Friday, July 15, 2011	Animals in their Habitats	<p>Read <i>Actual Size</i> to discuss actual size and scaled drawings. Use graph paper to draw various animals to scale.</p> <p>Design a habitat to display your scaled animals and organize your Animal Behavior Journal for presentation at Expo!</p>	<p>Drawings of animals to scale.</p> <p>Design of territory.</p> <p>Animal Behavior Journals, Habitats and observations of work shared during Expo!</p>

CTD Statement on Third-Party Web Sites

Instructors are required to thoroughly review any third-party web sites they intend to use in their courses for inappropriate content. However, because web content continuously changes, CTD disclaims any responsibility for any of the content contained on third-party web sites used in course materials. If you become aware of anything that may be inappropriate, please notify CTD staff immediately.