



Ohio Academic Standards Addressed By Zoo Program

WILD PACK: FASTEST CUTTERS

Program description:

Using inquiry skills, students will observe the leaf cutter ant colony in the Zoo's Insect World to determine whether big ants or small ants can cut leaves the fastest. Results from this inquiry can be taken to the classroom and groups can share findings and graph the information.

Ohio Science Standards addressed by this program, organized by grade band and then standard:

Grades K-2

STANDARD: Life Sciences

Benchmark A: Discover that there are living things, non-living things, and pretend things, and describe the basic needs of living things (organisms).

Indicators:

Kindergarten

1. Explore differences between living and non-living things (e.g., plant-rock)

Grade One

1. Explore that organisms, including people have basic needs which include air, water, food, living space and shelter.
2. Investigate that animals eat plants and/or other animals for food and may also use plants or other animals for shelter and nesting.

Grade Two

1. Explain that animals, including people, need air, water, food, living space and shelter; plants need air, water, nutrients (e.g., minerals), living space and light to survive.
5. Explain that animals, including people, have basic needs which include air, water, food, living space and shelter.

Benchmark: Explain how organisms function and interact with their physical environment.

Indicators:

Kindergarten

5. Investigate observable features of plants and animals that help them live in different kinds of places

Grade Two

6. Investigate the different structures of plants and animals that help them live in different environments (e.g., lungs, gills, leaves and roots).

Benchmark: Describe similarities and differences that exist among individuals of the same kind of plants and animals.

Indicators

Kindergarten

4. Investigate variations that exist among individuals of the same kind of plant or animal.

Grade Two

4. Compare similarities and differences among individuals of the same kind of plants and animals, including people.

Standard: Scientific Inquiry

Benchmark A: Ask a testable question.

Indicators:

Kindergarten

1. Ask “what if” questions.
2. Explore and pursue student-generated “what if: questions.

Grade One

1. Ask “What happens when” questions.
2. Explore and pursue student-generated “what happens when” questions.

Grade Two

1. Ask “how can I/we” questions.
2. Ask “how do you know” questions (not “why” questions) in appropriate situations and attempt to give reasonable answer when others ask questions.

Benchmark B: Design and conduct a simple investigation to explore a question.

Indicators:

Kindergarten

7. Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers and other appropriate tools).

Grade One

5. Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers, timers and simple balances and other appropriate tools.)

Grade Two

6. Use appropriate tools and simple equipment/instruments to safely gather scientific data (e.g., magnifiers, non-breakable thermometers, times, rulers, balances and calculators and other appropriate tools).

Benchmark C: Gather and communicate information from careful observations and simple investigation through a variety of methods.

Indicators

Kindergarten

7. Recognize that numbers can be used to count a collection of things.

Grade One

3. Work in a small group to complete an investigation and then share findings with others.
8. Describe things as accurately as possible and compare with the observations of others.

Grade Two

4. Use evidence to develop explanations of scientific investigations. (What do you think? How do you know?)
5. Recognize that explanations are generated in response to observations, events and phenomena.
9. Use whole numbers to order, count, identify, measure and describe things and experiences.
10. Share explanations with others to provide opportunities to ask questions, examine evidence and suggest alternative explanations.

Standard: Scientific Ways of Knowing

Benchmark A: Recognize that there are different ways to carry out scientific investigations. Realize that investigations can be repeated under the same conditions with similar results and may have different explanations.

Indicators

Kindergarten

1. Recognize that scientific investigations involve asking open-ended question. (How? What if?)
2. Recognize that people are more likely to accept your ideas if you can give good reasons for them.

Grade One

1. Discover that when a science investigation is done the same way multiple

times, one can expect to get very similar results each time it is performed.

2. Demonstrate good explanations based on evidence from investigations and observations.

Grade Two

1. Describe that scientific investigations generally work the same way under the same conditions.

Benchmark B: Recognize the importance of respect for all living things.

Indicators

Kindergarten

3. Interact with living things and the environment in ways that promote respect.

Benchmark C: Recognize that diverse groups of people contribute to our understanding of the natural world.

Indicators

Kindergarten

4. Demonstrate ways science is practiced by people everyday (children and adults).

Grade One

3. Explain that everybody can do science, invent things and have scientific ideas no matter where they live.

Grade Two

4. Demonstrate that in science it is helpful to work with a team and share findings with others.

Grades 3-5

Standard: Life Sciences

Benchmark A: Differentiate between the life cycles of different plants and animals.

Indicators

Grade Four

5. Describe how organisms interact with one another in various ways (e.g., many plants depend on animals for carrying pollen or dispersing seeds.)

Benchmark B: analyze plant and animal structures and functions needed for survival and describe the flow of energy through a system that all organisms use to survive.

Indicators

Grade Three

2. Relate animal structures to their specific survival functions (e.g., obtaining food, escaping or hiding from enemies).

Benchmark C: Compare changes in an organism's ecosystem/habitat that affect its survival.

Indicators

Grade 5

6. Support how an organism's patterns of behavior are related to the nature of that organism's ecosystem, including the kinds and numbers of other organisms present, the availability of food and resources, and the changing physical characteristics of the ecosystem.

Standard: Scientific Inquiry

Benchmark A: Use appropriate instruments safely to observe, measure and collect data when conducting a scientific investigation.

Indicators

Grade Five

1. Select and safely use the appropriate tools to collect data when conducting investigations and communicating findings to others (e.g., thermometers, timers, balances, spring scales, magnifies, microscopes and other appropriate tools).

Benchmark B: Organize and evaluate observations, measurements and other data to formulate inferences and conclusions.

Indicators

Grade Three

2. Discuss observations and measurements made by other people.
3. Read and interpret simple tables and graphs produced by self/others
5. Record and organize observations (e.g., journals, charts and tables).

Grade Five

2. Evaluate observations and measurements made by other people and identify reasons for any discrepancies.
3. Use evidence and observations to explain and communicate the results of investigations.

Benchmark C: Develop, design and safely conduct scientific investigations and communicate the results.

Indicators

Grade Three

6. Communicate scientific findings to others through a variety of methods (e.g., pictures, written, oral and recorded observations).

Grade Four

4. Explain the importance of keeping conditions the same in an experiment.
5. Describe how comparisons may not be fair when some conditions are not kept the same between experiments.

6. Formulate instructions and communicate data in a manner that allows others to understand and repeat an investigation or experiment.

Grade Five

6. Explain why results of an experiment are sometimes different (e.g., because of unexpected difference in what is being investigated, unrealized differences in the methods used or in the circumstances in which the investigation was carried out, and because of errors in observations).

Standard: Scientific Ways of Knowing

Benchmark A: Distinguish between fact and opinion and explain how ideas and conclusions change as new knowledge is gained.

Indicators

Grade Four

1. Differentiate fact from opinion and explain that scientists do not rely on claims or conclusions unless they are backed by observations that can be confirmed.

Grade Five

1. Summarize how conclusions and ideas change as new knowledge is gained.

Benchmark B: Describe different types of investigations and use results and data from investigations to provide the evidence to support explanations and conclusions.

Indicators

Grade Five

2. Explain why an experiment must be repeated by different people or at different times or places and yield consistent results before the results are accepted.

Benchmark C: Explain the importance of keeping records of observations and investigations that are accurate and understandable

Indicators

Grade Three

3. Keep records of investigations and observations and do not change the records that are different from someone else's work.

Grade Four

2. Record the results and data from an investigation and make a reasonable explanation.
4. Explain why keeping records of observations and investigations is important.

Grade Five

5. Keep records of investigations and observations that are understandable weeks or months later.

Grades 6-8

Standards: Life Sciences

Benchmark B: Describe the characteristics of an organism in terms of a Combination of inherited traits and recognize reproduction as a characteristic of living organisms essential to the continuation of the species.

Indicators;

Grade Seven

7. Investigate the great diversity among organisms.

Benchmark C: Explain how energy entering the ecosystems as sunlight supports the life of organisms through photosynthesis and the transfer of energy through the interactions of organisms and the environment.

Indicators

Grade Six

8. Describe how organisms may interact with one another.

Grade Seven

3. Investigate how organisms or populations may interact with one another through symbiotic relationships and how some species have become so adapted to each other that neither could survive without the other (e.g., predator-prey, parasitism, mutualism and commensalism.)

Standard: Scientific Inquiry

Benchmark A: Explain that there are differing sets of procedures for guiding scientific investigations and procedures are determined by the nature of the investigation, safety considerations and appropriate tools.

Indicators

Grade Six

1. Explain that there are not fixed procedure for guiding scientific investigations; however, the nature of an investigation determines the procedures needed.

Benchmark B: Analyze and interpret data from scientific investigations using appropriate mathematical skills in order to draw valid conclusions.

Indicators

Grade Six

3. Distinguish between observation and inference.
4. Explain that a single example can never prove that something is always correct, but sometimes a single example can disprove something.

Grade Eight

2. Read, construct and interpret data in various forms produced by self and others in both written and oral form (e.g., tables, charts, maps,

graphs, diagrams and symbols).

Standard: Scientific Ways of Knowing

Benchmark A: Use skills of scientific inquiry processes (e.g., hypothesis, record keeping, description and explanation).

Indicators

Grade Six

2. Describe why it is important to keep clear, thorough and accurate records.

Grade Eight

1. Identify the difference between description (e.g., observation and summary) and explanation (e.g., inference, prediction, significance and importance).

Benchmark B: Explain the importance of reproducibility and reduction of bias in scientific Methods

Indicators

Grade Seven

1. Show that the reproducibility of results is essential to reduce bias in scientific investigations.
2. Describe how repetition of an experiment may reduce bias.

Grade Eight

2. Explain why it is important to examine data objectively and not let bias affect observations.