



Indiana 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.

Indiana Science Standards addressed by this program:

GRADES K-8th

Standard 1: The Nature of Science and Technology

The Scientific View of the World

3rd Grade

3.1.1 Recognize and explain that when a scientific investigation is repeated, a similar result is expected.

4th Grade

4.1.1 Observe and describe that scientific investigations generally work the same way in different places.

5th Grade

5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations.

7th Grade

7.1.1 Recognize and explain that when similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often takes further studies to decide.

8th Grade

8.1.1 Recognize that and describe how scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.

Scientific Inquiry

Kindergarten

K.1.1. Raise questions about the natural world.

1st Grade

1.1.2 Investigate and make observations to seek answers to questions about the world, such as "In what way do animals?"

2nd Grade

2.1.2 Use tools-such as thermometers, magnifiers, rulers, or balances – to gain more

information about objects.

2.1.3 Describe, both in writing and verbally, objects as accurately as possible and compare observations with those of other people.

2.1.4 Make new observations when there is disagreement among individual observations.

3rd Grade

3.1.2 Participate in different types of guided scientific investigations, such as observing objects and events and collecting specimens for analysis.

3.1.3 Keep and report records of investigations and observations using tools, such as journals, charts, graphs, and computers.

3.1.4 Discuss the results of investigations and consider the explanations of others.

4th Grade

4.1.2 Recognize and describe that results of scientific investigations are seldom exactly the same. If differences occur, such as a large variation in the measurement of plant growth, propose reasons for why these differences exist, using recorded information about investigations.

5th Grade

5.1.2 Begin to evaluate the validity of claims based on the amount and quality of the evidence cited.

6th Grade

6.1.3 Recognize and explain that hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.

7th Grade

7.1.2 Explain that what people expect to observe often affects what they actually do observe and provide an example of a solution to this problem.

7.1.3 Explain why it is important in science to keep honest, clear, and accurate records.

7.1.4 Describe that different explanations can be given for the same evidence, and it is not always possible to tell which one is correct without further inquiry.

The Scientific Enterprise

Kindergarten

K.1.2 Begin to demonstrate that everyone can do science.

1st Grade

1.1.3 Recognize that and demonstrate how people can learn much about plants and animals by observing them closely over a period of time. Recognize also that care must be taken to know the needs of living things and how to provide for them.

1.1.4 Use tools, such as rulers and magnifiers, to investigate the world and make observations.

2nd Grade

2.1.5 Demonstrate the ability to work with a team but still reach and communicate one's own conclusions about findings.

3rd Grade

3.1.5 Demonstrate the ability to work with cooperatively while respecting the ideas of others and communicating one's own conclusions about findings.

4th Grade

4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.

5th Grade

5.1.3 Explain that doing science involves many different kinds of work and engages men, women, and children of all ages and backgrounds.

8th Grade

8.1.4 Explain why accurate record keeping, openness, and replication are essential for maintaining an investigator's credibility with other scientists and society.

Technology and Science

1st Grade

1.1.4 Use tools, such as rules and magnifiers, to investigate the world and make observations.

2nd Grade

2.1.6 Use tools to investigate, observe, measure, design, and build things.

Standard 2: Scientific Thinking

Manipulation and Observations

3rd Grade

3.2.4 Appropriately use simple tools, such as clamps, rulers, scissors, hand lenses, and other technology, such as calculators and computers, to help solve problems.

Communication

1st Grade

1.2.6 Describe and compare objects in terms of number, shape, texture, size, weight, color, and motion.

4th Grade

4.2.4 Use numerical data to describe and compare objects and events.

4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.

5th Grade

5.2.7 Read and follow step-by-step instructions when learning new procedures.

6th Grade

- 6.2.5 Organize information in simple tables and graphs and identify relationships they reveal. Use tables and graphs as examples of evidence for explanations when writing essays or writing about lab work, fieldwork, etc.
- 6.2.6 Read simple tables and graphs produced by others and describe in words what they show.

8th Grade

- 8.2.7 Participate in group discussions on scientific topics by restating or summarizing what others have said, asking for clarification or elaboration, and expressing alternative positions.

Critical Response Skills

3rd Grade

- 3.2.7 Ask “How do you know?” in appropriate situations and attempt reasonable answers when others ask the same question.

4th Grade

- 4.2.7 Identify better reasons for believing something than “Everybody know that...” or “I just know,” and discount such reasons when given by others.

5th Grade

- 5.2.8 Recognize when and describe that comparisons might not be accurate because some of the conditions are not kept the same.

8th Grade

- 8.2.9 Explain why arguments are invalid if based on very small samples of data, biased samples, or samples for which there was no control sample.

Standard 4: The Living Environment

Diversity of Life

Kindergarten

- K.4.2 Observe plants and animals, describing how they are alike and how they are different in the way they look and in the things they do.

1st Grade

- 1.4.2 Observe and describe that there can be differences, such as size or markings, among the individuals within one kind of plant or animal group.

2nd Grade

- 2.4.1 Observe and identify different external features of plants and animals and describe how these features help them live in different environments.

3rd Grade

- 3.4.1 Demonstrate that a great variety of living things can be sorted into groups in many ways using various features, such as how they look, where they live, and how they act, to decide which things belong to which group.

6th Grade

- 6.4.3 Describe some of the great variety of body plans and internal structures animals and plants have that contribute to their being able to make or find food and reproduce.

Interdependence of Life

4th Grade

- 4.4.3 Observe and describe that organisms interact with one another in various ways, such as providing food, pollination, and seed dispersal.

Interdependence of Live and Evolution

5th Grade

- 5.4.7 Explain that living things, such as plants and animals, differ in their characteristics, and that sometimes these differences can give members of these groups (plants and animals) an advantage in surviving and reproducing.

8th Grade

- 8.4.7 Recognize and explain that small genetic differences between parents and their offspring can accumulate in successive generations so that descendants are very different from their ancestors.

Standard-5: The Mathematical World

Shapes and Symbolic Relationships

3rd Grade

- 3.5.3 Construct tables and graphs to show how values of one quantity are related to values of another.

4th Grade

- 4.5.4 Demonstrate how graphical displays of numbers may make it possible to spot patterns that are not otherwise obvious, such as comparative size and trends.

6th Grade

- 6.5.2 Demonstrate how graphs may help to show patterns – such as trends, varying rates of change, gaps, or clusters – which can be used to make predictions.

Reasoning and Uncertainty

2nd Grade

- 2.5.3 Begin to recognize and explain that people are more likely to believe ideas if good reasons are given for them.
- 2.5.4 Explain that sometimes a person can find out a lot (but not everything) about a group of things, such as insects, plants, or rocks, by studying just a few of them.

3rd Grade

- 3.5.5 Explain that one way to make sense of something is to think of how it relates to something more familiar.

4th Grade

- 4.5.5 Explain how reasoning can be distorted by strong feelings.

5th Grade

- 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar.
- 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events.

5.5.10 Explain the danger in using only a portion of the data collected to describe the whole.

6th Grade

6.5.6 Predict the frequency of the occurrence of future events based on data.

7th Grade

7.5.4 Describe that the larger the sample, the more accurately it represent the whole. Understand, however, that any sample can be poorly chosen and this will make it unrepresentative of the whole

8th Grade

8.5.6 Explain that a single example can never prove that something is always true, but it could prove that something is not always true.

8.5.7 Recognize and describe the danger of making over-generalizations when inventing a general rule based on a few observations.