



Indiana Academic Standards Addressed By Zoo Program

WINGED WONDERS: SEED DROP!

Program description:

Discover how whether all seeds fall at the same rate. Do small or big seeds fall more slowly? Students will use inquiry to discover answers to these and other questions about plants and their adaptations.

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

1.1.1 Observe, describe, draw, and sort objects carefully to learn about them.

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

2nd Grade

2.1.1 Manipulate an object to gain additional information about it.

2.1.3 Describe, both in writing and verbally, objects as accurately as possible and

- 2.1.4 compare observations with those of other people.
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.

6th Grade

- 6.1.2 Give examples of different ways scientists investigate natural phenomena and identify processes all scientists use, such as collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations, in order to make sense of the evidence.
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.

8th Grade

- 8.1.3 Recognize and describe that if more than one variable changes at the same time in an experiment, the outcome of the experiment may not be attributable to any one of the variables.

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 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.

Technology and Science

2nd Grade

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

2.1.7 Recognize and describe ways that some materials – such as recycled paper, cans and plastic jugs, can be used over again.

4th Grade

4.1.9 Explain how some products and materials are easier to recycle than others.

Standard 2: Scientific Thinking

Computation and Estimation

Kindergarten

K.2.1 Use whole numbers, up to 10, in counting, identifying, sorting, and describing objects and experiences.

1st Grade

1.2.1 Use whole numbers, up to 100, in counting, identifying, measuring, and describing objects and experiences.

3rd Grade

3.2.1 Add and subtract whole numbers mentally, on paper, and with a calculator.

4th Grade

4.2.1 Judge whether measurements and computations of quantities, such as length, area, volume, weight, or time, are reasonable.

8th Grade

8.2.2 Determine in what units, such as seconds, meters, grams, etc., an answer should be expressed based on the units of the inputs to the calculation.

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.

3.2.5 Construct something used for performing a task out of paper, cardboard, wood, plastic, metal or existing objects.

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.

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.

8th Grade

8.2.2

Determine in what units, such as seconds, meters, grams, etc., an answer should be expressed based on the units of the inputs to the calculation.

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 knows 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 3: The Physical Setting

Matter and Energy

Kindergarten

K.3.1

Describe objects in terms of the materials they are made of, such as clay, cloth, paper, etc.

2nd Grade

2.3.5

Investigate that things can be done to materials – such as freezing, mixing, cutting, heating, or wetting – to change some of their properties. Observe that not all materials respond in the same way.

Forces of Nature

Kindergarten

K.3.2

Investigate that things move in different ways, such as fast, slow, etc

1st Grade

1.3.4

Investigate by observing and then describe how things move in many different ways, such as straight, zigzag, round-and-round, and back-and forth.

- 1.3.5. Recognize that and demonstrate how things near Earth fall to the ground unless something holds them up.

5th Grade

- 5.3.11 Investigate and describe that changes in speed or direction of motion of an object are caused by forces. Understand that the greater the force, the greater the change in motion and the more massive an object, the less effect a given force will have.
- 5.3.12 Explain that objects move at different rates, with some moving very slowly and some moving too quickly for people to see them.
- 5.3.13 Demonstrate that Earth's gravity pulls any object toward it without touching it.

Standard 4: The Living Environment

Diversity of Life

Kindergarten

- K.4.1 Give examples of plants and animals.
- 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

1st Grade

- 1.4.3 Observe and explain that animals eat plants, or other animals for food.

2nd Grade

- 2.4.3 Observe and explain that plants and animals both need to take in water, animals need to take in food, and plants need light.

Interdependence of Live and Evolution

3rd Grade

- 3.4.4 Describe that almost all kinds of animals' food can be traced back to plants.

4th Grade

- 4.4.5 Observe and explain that most plants produce far more seeds than those that actually grow into new plants.

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 group (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

Numbers

1st Grade

1.5.1

Use numbers, up to 10, in order, such as first, second, and third, and to name them, such as bus numbers or phone numbers.

3rd Grade

3.5.2

Observe that and describe how some measurements are likely to be slightly different, even if what is being measured stays the same.

5th Grade

5.5.1

Make precise and varied measurements and specify the appropriate units.

6th Grade

6.5.2

Evaluate the precision and usefulness of data based on measurements taken.

Shapes and Symbolic Relationships

2nd Grade

2.5.3

Observe that and describe how changing one thing can cause changes in something else, such as exercise and its effect on heart rate.

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

6.5.3

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

2.5.4

Begin to recognize and explain that people are more likely to believe ideas if good reasons are given for them.

2.5.6

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 observation.

Standard 6: Common Themes

Models and Scale

Kindergarten

K.6.1 Describe an object by saying how it is similar or different from another object.

1st Grade

1.6.1 Observe and describe that models, such as toys, are like the real things in some ways but different in others.

2nd Grade

2.6.2 Observe and explain that models may not be the same size, may be missing some details, or may not be able to do all of the same things as the real things.

3rd Grade

3.6.3 Explain how a model of something is different from the real thing but can be used to learn something about the real thing.

4th Grade

4.6.3 Recognize that and describe how changes made to a model can help predict how the real thing can be altered.

Constancy and Change

1st Grade

1.6.2

Observe that and describe how certain things change in some ways and stay the same in others, such as in their color, size, and weight.

2nd Grade

2.6.3

Describe that things can change in different ways, such as in size, weight, color, age, and movement. Investigate that some small changes can be detected by taking measurements.

4th Grade

4.6.4

Observe and describe that some features of things may stay the same even when other features change.