



## Indiana Academic Standards Addressed By Zoo Program

### ARE PRIMATES RIGHT HANDED OR LEFT HANDED?

(HANDEDNESS)

Program description:

Students will think about their hand preference. Using inquiry and a variety of tools, they will discover whether the Zoo's primates are right handed or left handed.

Indiana Science Standards addressed by this program:

#### GRADES K-8<sup>th</sup>

#### **Standard 1:** The Nature of Science and Technology

##### *The Scientific View of the World*

##### 3<sup>rd</sup> Grade

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

##### 4<sup>th</sup> Grade

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

##### 5<sup>th</sup> 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.

##### 7<sup>th</sup> 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.

##### 8<sup>th</sup> 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.

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

##### 1<sup>st</sup> Grade

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

##### 2<sup>nd</sup> Grade

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.

### 3<sup>rd</sup> 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.

### 4<sup>th</sup> 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.

### 6<sup>th</sup> 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.

### 7<sup>th</sup> 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.

### 1<sup>st</sup> 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.

### 2<sup>nd</sup> Grade

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

### 3<sup>rd</sup> Grade

- 3.1.5 Demonstrate the ability to work cooperatively while respecting the ideas of others

and communicating one's own conclusions about findings.

4<sup>th</sup> 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.

5<sup>th</sup> 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.

8<sup>th</sup> 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*

1<sup>st</sup> Grade

1.1.4

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

2<sup>nd</sup> Grade

2.1.6

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

**Standard 2: Scientific Thinking**

*Manipulation and Observations*

3<sup>rd</sup> 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.

3.2.7

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

*Communication*

4<sup>th</sup> Grade

4.2.5

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

5<sup>th</sup> Grade

5.2.7

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

6<sup>th</sup> 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.

6.2.7

Analyze and interpret a given set of findings, demonstrate that there may be more than one good way to do so.

7<sup>th</sup> Grade

7.2.7

Incorporate circle charts, bar and line graphs, diagrams, scatter plots, and symbols into writing, such as lab or research reports, to serve as evidence for claims and/or conclusions be expressed based on the units of the inputs to the calculation.

*Critical Response Skills*

3<sup>rd</sup> Grade

3.2.7

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

4<sup>th</sup> 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.

5<sup>th</sup> Grade

5.2.8

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

8<sup>th</sup> 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.

1<sup>st</sup> 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.

2<sup>nd</sup> 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.

3<sup>rd</sup> 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.

6<sup>th</sup> 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 Live and Evolution*

5<sup>th</sup> 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.

8<sup>th</sup> 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*

1<sup>st</sup> Grade

1.5.2

Make and use simple picture graphs to tell about observations.

*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.

4<sup>th</sup> 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.

6<sup>th</sup> 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*

2<sup>nd</sup> 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.

3<sup>rd</sup> Grade

3.5.5

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

4<sup>th</sup> Grade

4.5.5

Explain how reasoning can be distorted by strong feelings.

5<sup>th</sup> 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.

7<sup>th</sup> 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.

8<sup>th</sup> 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.