STATISTICS TEACHER
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# Lizards Task Level A

## Teacher Version with Student Version

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**Lesson Overview:** This lesson provides non-traditional data for students to explore with an emphasis on statistical questions utilized at each of the four phases of the Framework for Statistical Reasoning. The use of secondary data on the habitats of lizards combined with posing questions will strengthen the opportunity for students to think and reason statistically.

**Types of Data:**

- Level A: Non-traditional data - using photographs as data

**Learning Objectives:**

| Common Core State Standards Mathematics | Next Generation Science Standards |
|---|---|
| **CCSS.Math.Content.K.MD.B.3**<br>Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.<br>**CCSS.Math.Content.1.MD.C.4**<br>Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.<br>**CCSS.Math.Content.2.MD.D.10**<br>Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. | **1-LS1-1: Information Processing**<br>Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.<br>**1-LS1-2 From Molecules to Organisms: Structures and Processes**<br>Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.<br>**3-LS3-1 Inheritance and Variation of Traits: Life Cycles and Traits**<br>Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.<br>**3-LS3-2 Heredity: Inheritance and Variation of Traits**<br>Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents. |

**Audience:** K-5 students

- This lesson has been tested with early elementary and later elementary students as well as with pre-service and inservice teachers of elementary grades.
- Prerequisites: Prior to this lesson, students should have had experience interpreting statistical investigative questions.

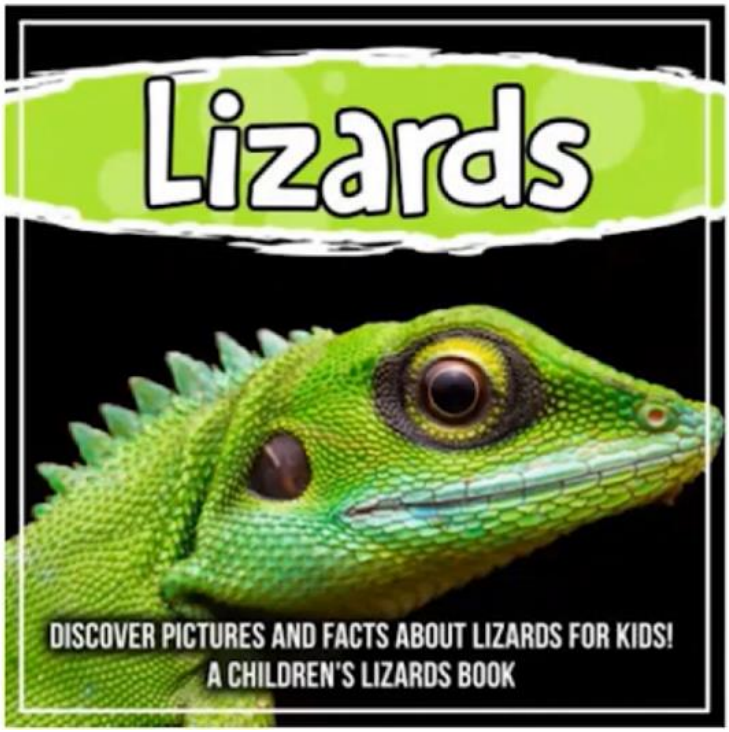
**Time Required:** 2 days (50-60 minute sessions)

Adapted for use from *GAISE II*, American Statistical Association, 2020, pages 97-102

# Lesson Plan

## ENGAGE

*NOTE: Consider reading the book pictured here or another book about lizards with your students prior to this lesson.*

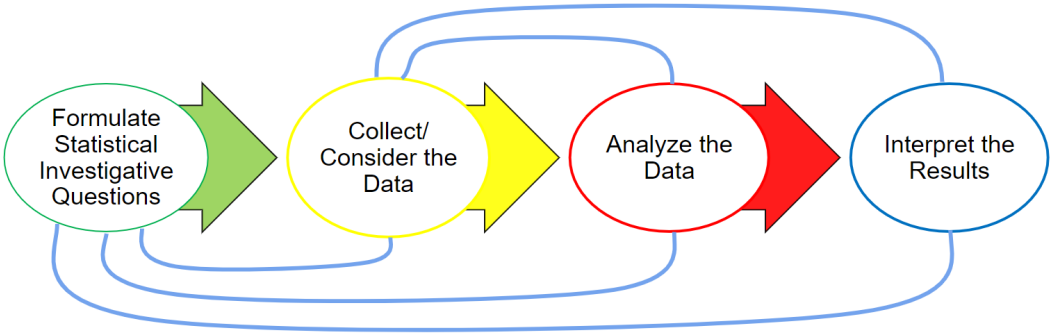



After reading a book about lizards, students became curious about the characteristics of lizards that live in Georgia.
Note: Any state can be used to modify this lesson plan. See extension.

Use the think-pair-share strategy to provide an opportunity for your students to think of questions they may have about lizards after reading the book about lizards. THINK provides 30-60 seconds for students to think about questions they have silently on their own. PAIR provides 2-3 minutes for students to share their questions with a partner, and SHARE provides time for the partner pairs to voice their questions with the whole group. Record their questions on chart paper or the white board. Discuss some of their questions by asking assessing and advancing questions for clarity.

## EXPLORE: Level A

As standard procedure for the tasks used in K-12 classrooms, students will be utilizing the Statistical Problem-Solving Process to guide their thinking and understanding.



## Ask

The teacher posed the statistical investigative question after listening to the students' questions: **What do lizards in Georgia look like?**

*NOTE: Students in the early grades at Level A are not expected to develop and refine statistical investigative questions for all necessary attributes. Teachers at grades K-2 provide the statistical investigative questions while acknowledging the questions students pose from their natural curiosity. At later grades for Level A, students may pose more sophisticated questions, and teachers may be able to utilize such questions from students to bridge to the statistical investigative question posed in this lesson.*

## Collect

Display to the students this set of photographs of lizards indigenous to Georgia. Using the think-pair-share strategy, ask them to answer:

**What do you notice?**
**What do you wonder?**

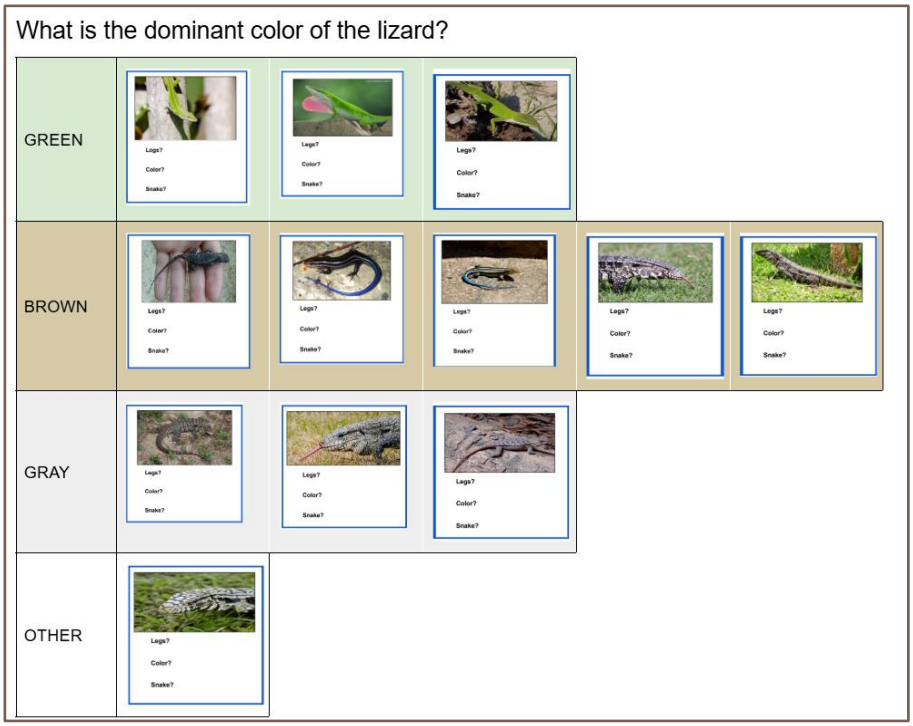
Be sure to record the things students notice and wonder about on chart paper or the board, clarifying with assessing and advancing questions. Next, time will be provided for students to analyze this non-traditional data set for particular characteristics found in each picture.

*NOTE: This data set is made up of photographs, each containing multiple characteristics for students to explore. It is considered non-traditional since each case is a photo instead of categories or numbers found in traditional data sets. Each picture contains various characteristics, the variables, which may be analyzed to help students answer the statistical investigative question.*

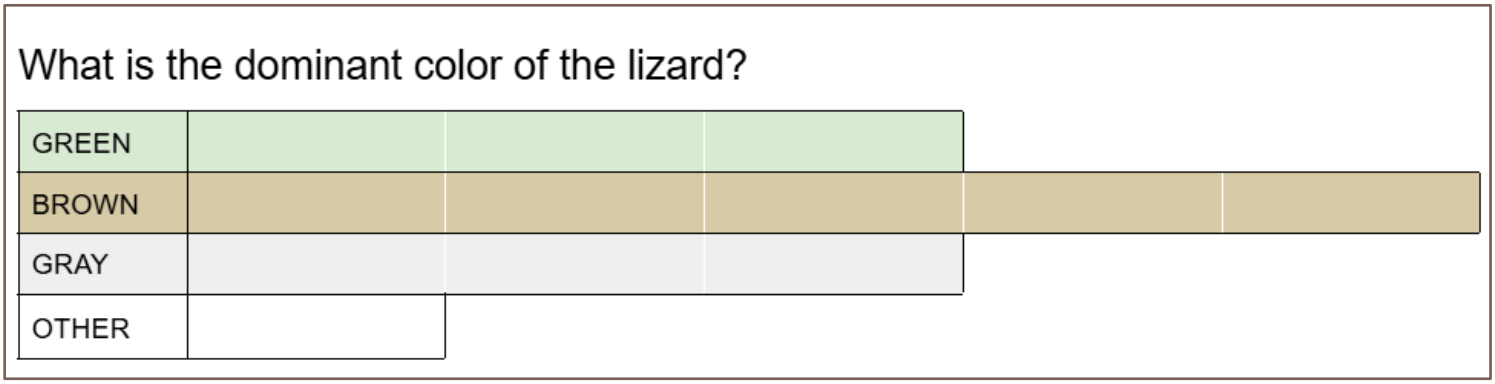
Though students may identify other characteristics of lizards from these photos, ask them to use the following characteristics for this exploration. These questions serve as data collection questions to be used as evidence when interpreting and answering the statistical investigative question at the end of the investigation.

- **Is the lizard legless? Yes or No**
- **What is the dominant color of the lizard? Green, Brown, Gray, or Other**
- **Does the lizard look like a snake? Yes or No**

Data cards are provided at the end of this lesson for copying and distributing to students to make the analysis more accessible for each and every student. Working in partner pairs also provides opportunities for students to create and critique viable arguments with their partners as they discuss each of the characteristics. The data cards can be used to build the bar graphs for each of the data collection questions. The bar graph to represent the dominant color of the lizards is pictured to the right as an example of how bar graphs can be made using the data cards themselves.




This will enable students to build more abstract bar graphs for each characteristic as is pictured below.



## EXPLAIN and ELABORATE

### Analyze

Have students create bar graphs, one for each of the three data collection questions. If bar graphs have not been introduced previously, students can use the data cards themselves to build their bar graphs in either a horizontal or vertical display for each characteristic such as is pictured above. If students have experience with creating bar graphs, they may build more traditional bar graphs with boxes to display frequencies. Have students capture their data displays for each characteristic using iPads or tablets or other technology before moving on to other data displays for the remaining characteristics. They will utilize the three bar graphs as evidence in the interpret phase of the statistical problem-solving process.

Ask students to answer the following analysis questions after completing their bar graphs. The answers to these questions will help them to address the statistical investigative question in the interpret phase of the statistical problem-solving process.

- Which of the dominant colors is most dominant or most popular?
- What is the color that is least likely to be dominant?
- Which is more likely? Legless lizards? Lizards with legs?
- Which is more likely? Lizards that look like snakes? Lizards that do not look like snakes?
- If you were to pick up a data card without seeing the picture of the lizard, what color would you predict would be the dominant color of the lizard on the card? Would it have legs or not? Would it look like a snake or not? Why did you make these choices?

## EVALUATE

### Interpret

Ask the students to answer the statistical investigative question posed and cite evidence from their analysis to provide support for their conclusions. Select and sequence three to five partner pairs of students, as time allows, to present their answers and showcase their three data displays (bar graphs) that serve as evidence for their answers.

Statistical Investigative Question: **What do lizards in Georgia look like?**

Interpretation: **Lizards in Georgia are** _____

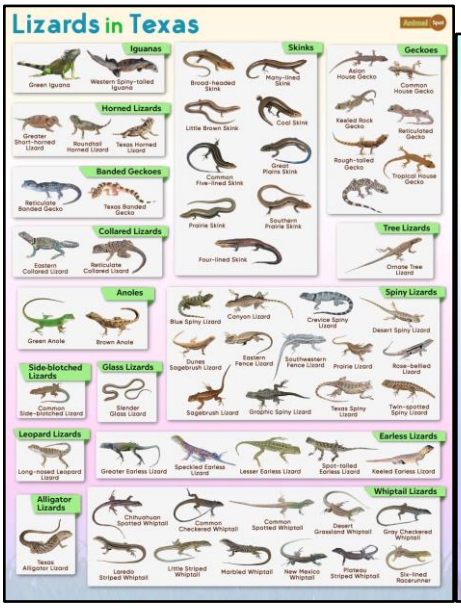
_____

_____

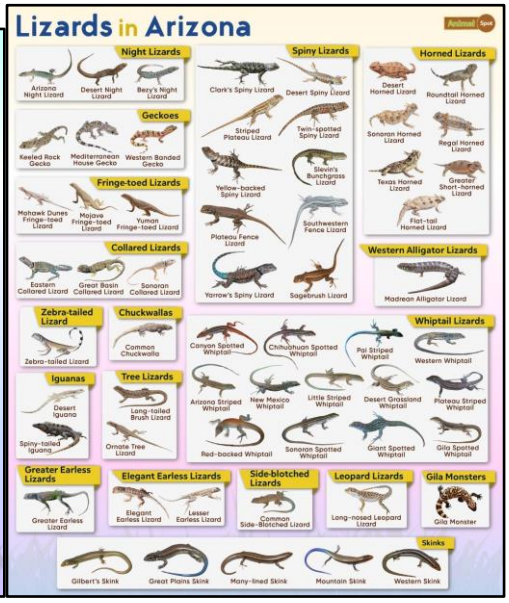
_____

Evidence: (display bar graphs here with explanations)

**EXTENSION:** Provide photographs of lizards from other states, and ask students to answer the statistical investigative question: What do lizards from _____ look like? Ask the students to utilize the Statistical Problem-Solving Process for this new investigation, citing evidence from their analysis to support their answers.







Legs?

Color?

Snake?

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# Lizards Task Level A

Student Version

After reading our book about lizards, what questions do you have about lizards?

1. _____

2. _____

3. _____

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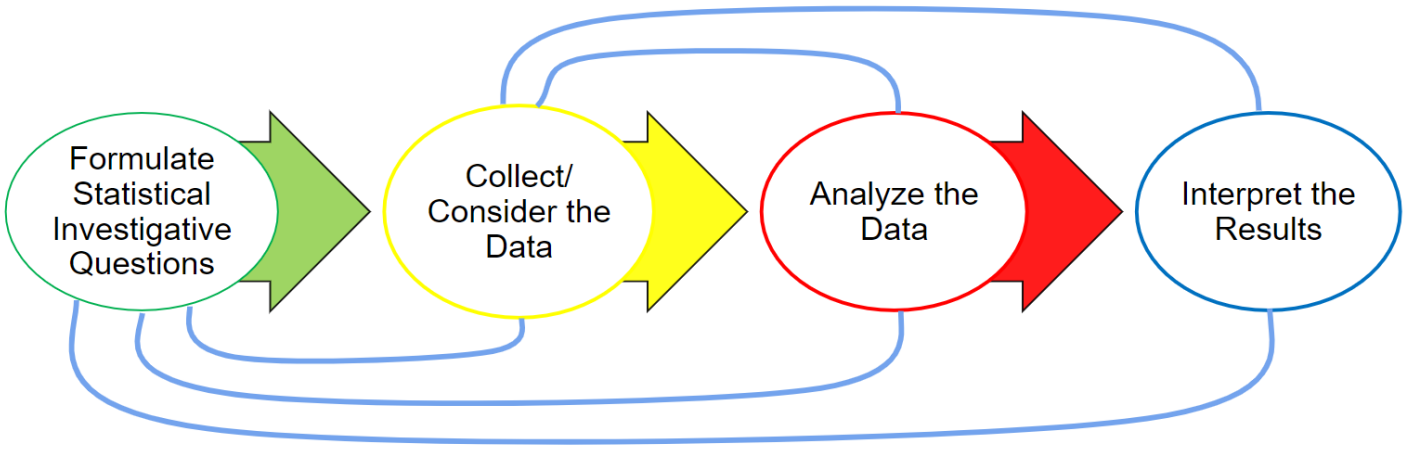


**This is the Statistical Problem-Solving Process we will use for our investigation in today's lesson.**

## Ask

Statistical Investigative Question: **What do lizards in Georgia look like?**

How would you answer this question just from what you may already know about lizards?

## Collect

Here is a set of photographs of lizards that are indigenous to Georgia.

| What do you notice? | What do you wonder? |
| --- | --- |
| | |

Use the following questions found on the data cards of the pictures of lizards from Georgia to analyze the data set:

- **Is the lizard legless? Yes or No**
- **What is the dominant color of the lizard? Green, Brown, Gray, or Other**
- **Does the lizard look like a snake? Yes or No**

## Analyze

Create bar graphs from your data cards for each question, and take pictures of each one using the technology provided. Be prepared to answer the investigative question and provide evidence from your three bar graphs to support your answer.

Answer the following questions to analyze the bar graphs, using the answers to support your answer to the statistical investigative question.

- Which of the dominant colors is most dominant or most popular?
- What is the color that is least likely to be dominant?
- Which is more likely? Legless lizards? Lizards with legs?
- Which is more likely? Lizards that look like snakes? Lizards that do not look like snakes?
- If you were to pick up a data card without seeing the picture of the lizard, what color would you predict would be the dominant color of the lizard on the card? Would it have legs or not? Would it look like a snake or not? Why did you make these choices?

## Interpret

Statistical Investigative Question: **What do lizards in Georgia look like?**

Interpretation: **Lizards in Georgia are** _____

_____

_____

_____

_____

Evidence: (display bar graphs here with explanations)