Indiana

LESSON 1

Science and the Natural World

UNLOCK THE BIG ?

What Skills Do Scientists Use?

7.NS.1, 7.NS.2, 7.NS.3, 7.NS.8, 7.NS.11, 7.DP.9

MY PLANET DIARY

BIOGRAPHY

The Wild Chimpanzees of Gombe

The following words are from the writings of Jane Goodall, a scientist who studied wild chimpanzees in Africa for many years.

"Once, as I walked through thick forest in a downpour, I suddenly saw a chimp hunched in front of me. Quickly I stopped. Then I heard a sound from above. I looked up and there was a big chimp there, too. When he saw me he gave a loud, clear wailing *wraaaaah*—a spine-chilling call that is used to threaten a dangerous animal. To my right I saw a large black hand shaking a branch and bright eyes glaring threateningly through the foliage. Then came another savage *wraaaah* from behind...I was surrounded." Because Jane stood still, the chimps no longer felt threatened, so they went away.

Answer the question.

What is one advantage and one disadvantage of studying wild animals in their natural environment?

PLANET DIARY Go to Planet Diary to learn more about science and the natural world.

Lab zone® Do the Inquiry Warm-Up *Is It Really True?*

Vocabulary

- science
- observing
- quantitative observation
- qualitative observation
- inferring
- predicting
- classifying
- evaluating
- making models

Skills

- Reading: Ask Questions
- Inquiry: Predict

What Skills Do Scientists Use?

Jane Goodall trained herself to become a scientist, or a person who does science. **Science** is a way of learning about the natural world. Science also includes all the knowledge gained by exploring the natural world. **Scientists use skills such as observing, inferring, predicting, classifying, evaluating, and making models to study the world.**

Observing

Observing means using one or more of your senses to gather information. It also means using tools, such as a microscope, to help your senses. By observing chimps like the one in **Figure 1**, Jane Goodall learned what they eat. She also learned what sounds chimps make and even what games they play.

Observations can be either quantitative or qualitative. A **quantitative observation** deals with numbers, or amounts. For example, seeing that you have 11 new e-mails is a quantitative observation. A **qualitative observation** deals with descriptions that cannot be expressed in numbers. Noticing that a bike is blue or that a lemon tastes sour is a qualitative observation.

FIGURE 1

Observing

A chimpanzee uses a rock as a tool to crack open a nut.

Observe Write one quantitative observation and one qualitative observation about this chimp.

7.NS.2, 7.NS.3, 7.NS.8

Academic Standards for Science

7.NS.1 Make predictions and develop testable questions based on research and prior knowledge.

7.NS.2 Plan and carry out investigations.

7.NS.3 Collect quantitative data.

7.NS.8 Analyze data.

7.NS.11 Communicate findings using graphs.

7.DP.9 Present evidence using mathematical representations.

Ask Questions In the graphic organizer ask a *what, how,* or *why* question based on the text under Observing. As you read, write an answer to your question.

Thinking Like a Scientist

Question
Answer

Inferring One day, Jane watched as a chimp peered into a tree hollow. The chimp picked up a handful of leaves and chewed on them. Then, it took the leaves out of its mouth and pushed them into the hollow. When the chimp pulled the leaves out, Jane saw the gleam of water. The chimp then put the wet leaves back into its mouth. Jane reasoned that there was water in the tree. Jane made three observations. She saw the chimp pick up dry leaves, put them in the hollow, and then pull them out wet. But, Jane was not observing when she reasoned that there was water inside the tree. She was inferring. When you explain or interpret the things you observe, you are **inferring,** or making an inference. Inferring is not guessing. Inferences are based on reasoning from what you already know. They could also be based on assumptions you make about your observations. See what inferences you can make about the chimps in **Figure 2.**

FIGURE 2

Inferring

What can you infer about the chimps and the termite mound? 7.NS.8

Complete the activities below.

1. **Observe** In the chart below, write two observations about the chimp on the left.
2. **Infer** Use the observations you wrote to make two related inferences.

Observation	Inference

Predicting Jane's understanding of chimp behavior grew over time. Sometimes, she could predict what a chimp would do next. **Predicting** means making a statement or a claim about what will happen in the future based on past experience or evidence.

By observing, Jane learned that when a chimp was frightened or angry its hairs stood on end. This response was sometimes followed by threatening gestures such as charging, throwing rocks, and shaking trees. Therefore, when Jane saw a chimp with its hair on end, she was able to predict that there was danger.

Predictions and inferences are closely related. While inferences are attempts to explain what is happening or *has* happened, predictions are statements of claims about what *will* happen. If you see a broken egg on the floor by a table, you might infer that the egg had rolled off the table. If, however, you see an egg rolling toward the edge of a table, you can predict that it's about to create a mess.

FIGURE 3

Predicting

Predictions are forecasts of what will happen next.

Predict Write a prediction about what this angry chimp might do next.

7.NS.1

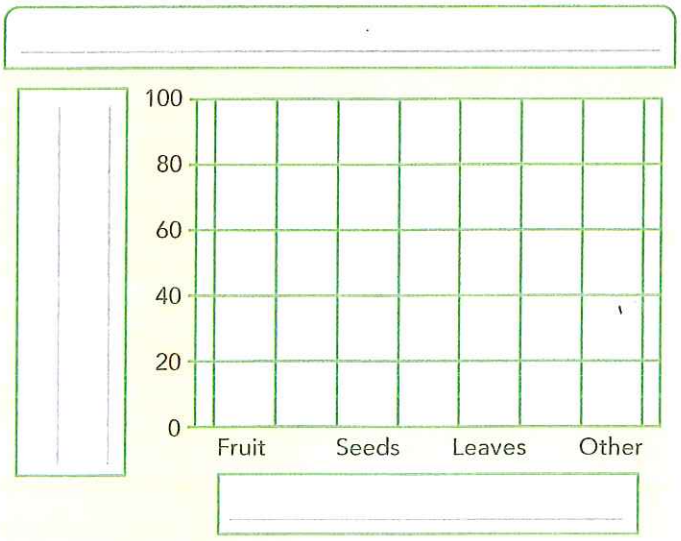
do the math!

Like all animals, chimps prefer to eat certain foods when they are available.

Chimp Diet in May	
Fruits	52%
Seeds	30%
Leaves	12%
Other foods	6%

1. **Graph** Use the information in the table to create a bar graph.

2. Label the *x*-axis and the *y*-axis. Then write a title for the graph.



3. **Interpret Data** Did chimps feed more on seeds or leaves during May?

4. **Infer** What might chimps eat more of if fruits are not available in June?

7.NS.8, 7.DP.9

Classifying What did chimps do all day? To find out, Jane's research team followed the chimps through the forest. They took detailed field notes about the chimps' behaviors. **Figure 4** shows some notes about Jomeo, an adult male chimp.

Suppose Jane had wanted to know how much time Jomeo spent feeding or resting that morning. She could have found out by classifying Jomeo's actions. **Classifying** is the grouping together of items that are alike in some way. Jane could have grouped together all the information about Jomeo's feeding habits or his resting behavior.

Evaluating Suppose Jane had found that Jomeo spent most of his time resting. What would this observation have told her about chimp behavior? Before Jane could have reached a conclusion, she would have needed to evaluate her observations. **Evaluating** involves comparing observations and data to reach a conclusion about them. For example, Jane would have needed to compare all of Jomeo's behaviors with those of other chimps to reach a conclusion. She would also need to have evaluated the resulting behavior data of Jomeo and the other chimps.

FIGURE 4

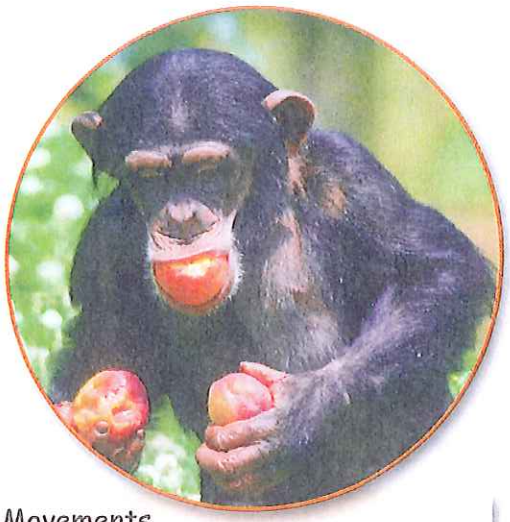
VIRTUAL LAB Classifying

By classifying the information related to a chimp's resting, climbing, or feeding, a scientist can better understand chimp behavior.

Classify Use the chart to classify the details from the field notes.

- 6:45 A.M. Jomeo rests in his nest. He lies on his back.
- 6:50 Jomeo leaves his nest, climbs a tree, and feeds on *viazi pori* fruits and leaves.
- 7:16 He wanders along about 175 m from his nest feeding on *budyankende* fruits.
- 8:08 Jomeo stops feeding, rests in a large tree, feeds on *viazi pori* fruits again.
- 8:35 He travels 50 m further, rests by a small lake.

Feeding	Resting	Changing Location
Jomeo eats *viazi pori* fruits, *budyankende* fruits, and leaves. 7.NS.2, 7.NS.3		

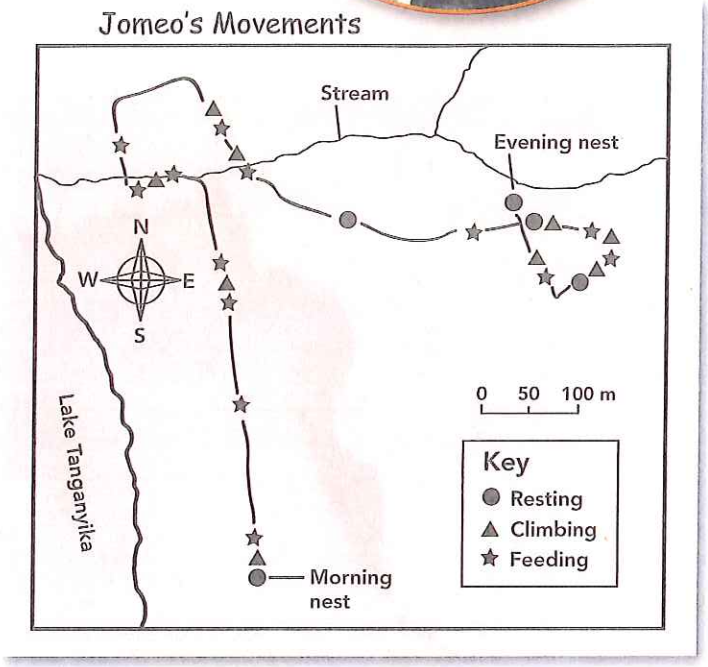


Making Models How far do chimps travel? Where do they go? Sometimes, Jane's research team followed a particular chimp for many days at a time. To show the chimp's movements, they might have made a model like the one shown in **Figure 5**. The model shows Jomeo's movements and behaviors during one day. **Making models** involves creating representations of complex objects or processes. Some models can be touched, such as a map. Others are in the form of mathematical equations or computer programs. Models help people study things that can't be observed directly. By using models, Jane and her team shared information that would otherwise be difficult to explain.

FIGURE 5

INTERACTIVE ART **Making Models**

This model shows Jomeo's movements and behaviors during one day. 7.NS.11



Use the map to answer the questions.

1. **Interpret Maps** How far did Jomeo travel during this day?

2. How many times did Jomeo stop to feed?

3. How many times did Jomeo rest?

Lab zone® Do the Quick Lab *Classifying Objects.*

Assess Your Understanding

1a. Compare and Contrast How do observations differ from inferences?

7.NS.1, 7.NS.2, 7.NS.8

b. Classify Do you think this statement is an observation or an inference? *The cat is ill.* Explain your reasoning.

7.NS.1, 7.NS.2, 7.NS.8

got it?

○ **I get it!** I know that scientists use skills such as

○ I need extra help with

Go to my science coach *online for help with this subject.* 7.NS.1, 7.NS.2, 7.NS.8