



The Nature of Science



What is science?

Lesson Plan

Unit Opener & Lesson 1 What kinds of skills do scientists use?			
	Activity	Pages	Time
Engage	• Unit Opener: Think! <i>What makes this boy a scientist?</i>	SB p. 4	5 min
	• Unit Opener: Identify senses and sense organs.	SB p. 4	10 min
	• Unit Opener: Draw conclusions.	SB p. 4	10 min
	• Think! <i>What is a science question?</i>	TB p. 5	5 min
Explore	• Digital Lab: <i>How can you sort objects?</i> (ActiveTeach)	TB p. 5	15 min
	• Observation	TB p. 5	10 min
Explain	• Ways scientists learn	SB p. 5	20 min
	• Observe and predict	SB p. 6	20 min
	• Classify and compare and contrast	SB p. 7	20 min
	• <i>Got it? 60-Second Video</i> (ActiveTeach)	TB p. 7	5 min
Elaborate	• Classify the Class!	TB p. 5	10 min
	• In the Field	TB p. 5	10 min
	• Science Notebook: Sensing	TB p. 6	10 min
	• If I Were a Scientist...	TB p. 6	10 min
	• Predict Tomorrow's Weather	TB p. 6	10 min
Evaluate	• <i>Lesson 1 Check</i> (ActiveTeach)	TB p. 15a	15 min
	• Assessment for Learning	TB p. 7	10 min
	• Review (Lesson 1)	TB p. 15	20 min
	• <i>Got it? Self Assessment</i> (ActiveTeach)	TB p. 15b	10 min
	• <i>Got it? Quiz</i> (ActiveTeach)	TB p. 15c	10 min

Lesson 2 How do scientists find answers?			
	Activity	Pages	Time
Engage	• Think Again! <i>What is a science question?</i>	TB p. 9	10 min
	• Think! <i>If someone gets a different result, what might you conclude?</i>	SB p. 10	5 min
Explore	• Digital Lab: <i>What conclusion can you draw?</i> (ActiveTeach)	TB p. 8	15 min
Explain	• Steps of investigation	SB p. 8	20 min
	• Scientific methods	SB p. 9	30 min
	• <i>Got it? 60-Second Video</i> (ActiveTeach)	TB p. 10	5 min
Elaborate	• Think! <i>How do you know what the scientist is investigating?</i>	TB p. 8	5 min
	• Science Notebook: Scientific Methods	TB p. 9	30 min
	• Think! <i>Why is it important that scientists communicate?</i>	TB p. 12	5 min
Evaluate	• <i>Lesson 2 Check</i> (ActiveTeach)	TB p. 15a	15 min
	• Assessment for Learning	TB p. 10	10 min
	• Review (Lesson 2)	TB p. 15	20 min
	• <i>Got it? Self Assessment</i> (ActiveTeach)	TB p. 15b	10 min
	• <i>Got it? Quiz</i> (ActiveTeach)	TB p. 15c	10 min

Lesson 3 How do scientists collect and share data?

	Activity	Pages	Time
Engage	• Think! <i>Would the results be the same if you had different pieces of pumice, granite, and basalt? Why or why not?</i>	TB p. 12	5 min
Explore	• Digital Lab: <i>What are some ways you can collect and share data?</i> (ActiveTeach)	TB p. 11	15 min
Explain	<ul style="list-style-type: none"> • Collecting data • Recording data • Tables, charts, and graphs • <i>Got it? 60-Second Video</i> (ActiveTeach) 	SB p. 11 SB p. 12 SB p. 13 TB p. 13	20 min 30 min 10 min 5 min
Elaborate	<ul style="list-style-type: none"> • Favorite Pets • At-Home Lab: Observe and Compare • Real Rocks/Comparing Rocks • Science Notebook: Sock Color 	TB p. 11 SB p. 12 TB p. 12–13 TB p. 13	10 min 10 min 5 min 10 min
Evaluate	<ul style="list-style-type: none"> • <i>Lesson 3 Check</i> (ActiveTeach) • Assessment for Learning • Review (Lesson 3) • <i>Got it? Self Assessment</i> (ActiveTeach) • <i>Got it? Quiz</i> (ActiveTeach) 	TB p. 15a TB p. 13 TB p. 15 TB p. 15b TB p. 15c	15 min 10 min 20 min 10 min 10 min
Lab	• <i>Let's Investigate! What skills do scientists use?</i> (ActiveTeach)	TB p. 14	30 min

Flash Cards

experiment

observe

hypothesis

Lesson 1

Key Words	ELL Support
<i>senses, experiment, results, observe, predict</i>	Prefixes: <i>pre-</i> Comparatives: <i>redder, bigger, tastier, etc.</i> Vocabulary: <i>scientist, skills, discover, sense organs, predict</i>

investigate

record

measure

Lesson 2

Key Words	ELL Support
<i>investigate, conclusion, height, measurement, hypothesis</i>	Nouns from Verbs: Suffix <i>-ion</i> Sequence Words: <i>First, Then, Next, Finally</i>

chart

conclusion

bar graph

Lesson 3

Key Words	ELL Support
<i>data, granite, basalt, pumice</i>	Vocabulary: <i>supporting, tables, charts, graphs, tally</i> Comparatives: <i>wider, taller, etc.</i>

Unit 1

The Nature of Science

Unit Objectives

Lesson 1: Students will identify and apply some skills scientists use to learn about new things.

Lesson 2: Students will understand and apply some of the steps scientists use to ask questions and find answers.

Lesson 3: Students will identify and use some ways scientists share the data they collect.

Vocabulary: *scientist, investigate, observe, discover, senses, sense organs*



Introduce the Big Question

What is science?

Build Background *What do you think scientists do? What do they ask questions about? How do scientists learn about the world?* (Possible answers: They ask questions about plants, animals, Earth, and space. They learn by using their senses.)

Put students in pairs. Have them observe one another for 10 seconds. Then have them turn back to back and describe their partner. *Is your partner's hair long or short? Does your partner have a ribbon in her hair? Does your partner have a pencil or a pen?*

ELL Language Support

Pronounce the lesson vocabulary for students and have them repeat.

Engage

Think!

What makes this boy a scientist?

Point to the photo on the bottom right. *What is the boy doing? What senses do you think he's using? What questions is he asking?* Have students close their eyes and, as a class, say as many details about the picture as they can. *What is the boy looking at? What colors is it? Does he have a hand lens?* (Possible answers: A frog. It's green and red. He does not have a hand lens.)

Unit 1 The Nature of Science

What is science?

I will learn

- how to use science skills.
- why scientists repeat investigations.
- how to record and show data.

- 1** Look and label the five senses. Then name the five sense organs.

smell hearing touch sight taste



smell hearing touch sight taste

- 2** Look at the picture and circle *T* (true) or *F* (false).



1. The trees produce a lot of apples. T / F
2. Many of the apples are ripe. T / F
3. The trees are not healthy. T / F
4. It is winter. T / F

- 3** With the class, say which senses you can use to decide if each statement in activity 2 is true or false.



4 Unit 1

- 1** Look and label the five senses. Then name the five sense organs.

Use the photos to elicit the five senses. Have students label the photos and name the corresponding sense organs.

- 2** Look at the picture and circle *T* (true) or *F* (false).

Have students look at the picture and answer true or false. Correct answers as a class.

- 3** With the class, say which senses you can use to decide if each statement in exercise 2 is true or false.

Have students discuss which senses help them answer the questions in exercise 2. *Which sense did you use to say that the trees produce a lot of apples? If you were standing beside an apple tree, what other senses could you use to answer question 2?* (Possible answers: Sight. I could touch the (apples/trees). I could smell the apples.)

Think! Again!

Revisit the question: *What makes this boy a scientist?* (Possible answer: The boy is using his senses, or observing, to learn things about the world around him.)

Lesson 1

What kinds of skills do scientists use?

Objective: Learn about and use skills scientists use, like classifying.

Vocabulary: *skills, senses, experiment, observe, predict, classify, results*

Digital Resources: Flash Cards (*investigate, experiment, observe*), *Let's Explore!* Digital Lab

Unlock the Big Question



Write the following text on the board: *I will learn some skills scientists use to discover new things.*

Build Background Use the Flash Cards to review *investigate, experiment, and observe.*

ELL Vocabulary Support

Write the words *observe* and *discover* on the board. Read them aloud and have students repeat. Use a hand lens or mime using one to demonstrate observing an object. *I look carefully. I observe. Scientists observe, or carefully study things, by using their senses. They want to find out, or discover, new things.*

Explore

Let's Explore! Lab How can you sort objects?

Objective: Learn ways to classify things.

Digital Resources: *Let's Explore!* Digital Lab, *Let's Explore! Activity Card* (1 per student), Flash Cards (Optional: Do the lab in class; refer to the *Activity Card* for materials and steps.)

- Write *classify* on the board. *Have you ever put things into groups? Classify means to group or sort things.*
- Show the Digital Lab. Check comprehension by eliciting the three ways of classifying shown on the video (*size, shape, and color*).
- Have students complete the *Activity Card* and check their answers in small groups or pairs. Provide support as needed.

Explain

1 Read and complete the statements.

Have students read and complete the statements.

Lesson 1 • What kinds of skills do scientists use?

Key Words

- senses
- experiment
- results
- observe
- predict

1 Read and complete the statements.

Different Ways to Learn

Scientists learn about the world around them. They use their **senses**.

Scientists do **experiments** to learn. They carry out experiments again and again to make sure they get the same **results**.

Scientists learn from each other, too. They ask each other, "How do you know?" and share what they learn. They give answers. They tell how they know.

experiments each other senses



Scientists carry out **experiments**.



Scientists use their **senses**.



Scientists learn from **each other**.

2 Read and match the questions with their answers.

1. Why do scientists repeat their experiments?

To help answer each other's questions.

2. Why do scientists use their senses?

To make sure the results are the same.

3. Why do scientists share what they learn?

To learn about the world around them.

Let's Explore! Lab Unit 1 5

2 Read and match the questions with their answers.

Have students read and match. Then have students check answers for exercises 1 and 2 with a partner.

Elaborate

Classify the Class!

Elicit some ways to classify the people in the classroom, such as by height, age, gender, or first letter of their name. Have students group themselves in two of these classifications.

In the Field

If we had a tree frog in this classroom, how could you use your senses to learn about this animal? (Possible answers: *I could use sight to tell its color, shape, size, and to describe its parts; hearing to describe its sound; and touch to feel its skin.*)

Think!

What is a science question? Have students brainstorm some questions about plants or animals. Then discuss as a class what makes them science questions. (Possible answers: *Does this plant make seeds? Why is this frog green? These questions are about the world around us.*)

Lesson 1

What kinds of skills do scientists use?

Objective: Learn about observing and predicting.

Vocabulary: *observe, predict, classify, compare and contrast*

Digital Resources: Flash Cards (*investigate, observe*), *I Will Know...* Digital Activity

Build Background Explain that scientists observe plants and animals and make predictions so they can test their ideas. For example, scientists can determine why one type of plant or animal can live in a forest and another cannot. Tell students that, as scientists, they will observe, predict, compare, and classify.

ELL Vocabulary Support

Go over the vocabulary words with students and clarify any meanings they're uncertain of. When possible, provide clues about how to figure out meaning. For example, *The prefix pre- helps us know that predict means to say before, or ahead of time.*

Explain

3 Read, look, and mark (✓) the ripe apples. Then answer the questions.

Select two students to read the two paragraphs aloud. Then have students mark the apples and answer the questions. Check answers as a class.

4 How do you know this apple tree is healthy? Read, look, and say with a partner.

Have pairs read and answer the question. *How can scientists test their predictions about how many apples will grow?* (Possible answer: *They can count how many apples did grow.*)

I Will Know...

Have students do the *I Will Know...* Digital Activity.

3 Read, look, and mark (✓) the ripe apples. Then answer the questions.

Observe

Scientists observe to find out about the world. You **observe** when you use your senses to find out about something. We have five senses: smell, hearing, touch, sight, and taste. We use a different part of our body for each sense. We use our nose for smell, our ears for hearing, our hands or fingers for touch, our eyes for sight, and our tongue for taste.

How do you know when an apple is ripe? You might look at the color. Some people tap it to hear how it sounds. You might feel it and smell it, too. You will know if it is ripe when you taste it!



1. Give a reason for your choice.

Possible answer: *These apples are redder than the ones below.*

2. What sense or senses did you use to make your decision?

Possible answer: *I used my sight.*

4 How do you know this apple tree is healthy? Read, look, and say with a partner.

Predict

Scientists use what they observe to predict. You **predict** when you tell what you think will happen.

How might scientists predict how many apples will grow? They can think about how many apples grew the year before.



6 Unit 1 

Elaborate



Science Notebook: Sensing

Pair students. Have them take turns describing an object in detail, telling how it feels or smells, its size, shape, and color. Encourage students to compare it with something else, saying if it is larger, smaller, a different color or texture, and so on. Have them record their observations in their Science Notebooks.

If I Were a Scientist...

Pretend you are a scientist who studies animals. What animal do you want study? Have students write a question about their animal and ideas for finding an answer to their question in their notebooks. Have volunteers share with the class.

Predict Tomorrow's Weather

Put students in small groups. Have them discuss what they think tomorrow's weather will be like and why. Have each group explain to the class why it made the prediction it did. (Possible answers: *what it looks like outside today, what the weather is like at this time of year, etc.*)

Lesson 1

What kinds of skills do scientists use?

Objective: Learn about classifying.

Vocabulary: observe, predict, classify, compare and contrast

Digital Resources: Flash Cards (investigate, observe), Lesson 1 Check (print out 1 per student), Got it? 60-Second Video

Build Background One skill scientists use is classification. They sort things into groups. Scientists also compare and contrast things, or say how things are the same and different.

Explain

5 Read and underline four ways to classify apples.

Have students read and underline four ways to classify, or sort, apples.

6 Are red apples as sweet as green apples? How do you know? Read and say with a partner.

To compare things means to say how they are alike. To contrast things is to say how they are different. Have a volunteer read the instruction aloud. Are the red apples like the green apples? Are they as sweet as the green apples? Have partners answer the questions and discuss their answers.

7 With a partner, select two different types of apples. Draw and label them. Then compare them using your senses and circle the answer.

Have students brainstorm different kinds of apples (Golden Delicious, Fuji, etc.). Have partners select types of apples and draw and label them. Then have them compare and circle the answers.

ELL Content Support

Write the following on the board: Scientists _____ the world around them using their _____. They make _____ and then _____. Scientists sort things, or _____ them. They also observe their similarities and differences, or _____ things. Have students fill in the blanks. (Answers: observe, senses, predictions, investigate, classify, compare and contrast)

5 Read and underline four ways to classify apples.

Classify

Scientists classify, or put things in groups. Scientists might classify kinds of apples by taste, shape, and color. There are many different kinds of apples. How do you know what kinds of apples are the smallest? You might group apples by size.

6 Are red apples as sweet as green apples? How do you know? Read and say with a partner.

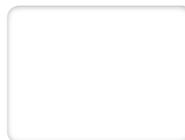


Compare and Contrast

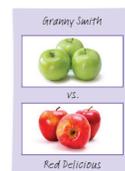
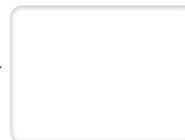
Scientists compare and contrast what they observe, too. They tell what is the same. They tell what is different.

7 With a partner, select two different types of apples. Draw and label them. Then compare them using your senses and circle the answer.

Possible answers:



vs.



Apple A: Granny Smith

Apple B: Fuji

1. Apple A / B is sweeter.

3. Apple A / B is harder.

2. Apple A / B is heavier.

4. Apple A / B has a stronger smell.

> Lesson 1 Check

> Got It?

> 60-Second Video

Unit 1 7

ELL Language Support

Have students review compare and contrast words. On one side of the board, write the comparison words from exercise 7. Elicit their opposites and write them on the other side of the board. Then have students think of other comparison words for the apples and then their opposites. (Possible answers: redder, bigger, tastier, etc.)

Evaluate

Lesson 1 Check Assessment for Learning

Distribute the Lesson 1 Check and allow students sufficient time to complete it. Check answers as a class. Then ask students to grade their progress on the topic of science skills from 1 to 3: 3 = I understand the skills scientists use; 2 = I need to study more; 1 = I need help! Encourage students giving themselves a 2 or 1 to describe what they found difficult and need to study more.

Got It? 60-Second Video

Review Key Words for Lesson 1 (see Student's Book page 5). Play the Got it? 60-Second Video to review the lesson material.

Lesson 2

How do scientists find answers?

Objective: Learn how scientists investigate.

Vocabulary: *investigate, predict, test, conclusion, height, measurement*

Digital Resources: Flash Cards (*investigate, measure, conclusion*), *Let's Explore!* Digital Lab

Materials: meterstick

Unlock the Big Question



Write the following text on the board: *I will learn some ways scientists find answers.*

Build Background *Why do scientists follow particular steps when they investigate? So they can draw conclusions about the questions they ask.*

ELL Vocabulary Support

Mime the word *measure* using a meterstick and measure the height of a volunteer. *To find out how tall someone is, I measure their height.* Next, write the student's height on the board. Write *data* and *conclusion* on the board. *I record the information, or data, I collect. Then I can make a decision, or conclusion, about what I've learned. (John) is 140 cm tall!* Use the Flash Cards for additional support. Show the *conclusion* Flash Card. *These doctors are looking at the data and coming to a conclusion.*

Explore

Let's Explore! Lab **What conclusion can you draw?**

Objective: Students will make a prediction and draw a conclusion.

Digital Resources: *Let's Explore!* Digital Lab, *Let's Explore! Activity Card* (1 per student) (Optional: Do the lab in class; refer to the *Activity Card* for materials and steps.)

- *We will watch a video about predicting and drawing conclusions.*
- Show the Digital Lab. Elicit the steps from students. *Name the steps followed in the lab. (Ask a question. Observe. Predict. Test. Conclude.)*
- Have students complete the *Activity Card* and check their answers in small groups or pairs. Provide support as needed.

Lesson 2 • How do scientists find answers?

Key Words

- investigate
- conclusion
- height
- measurement
- hypothesis

1 Read. Then order the steps for carrying out investigations.

Repeat Investigations

Scientists learn about the world around them. First, they ask questions. Then they investigate. You **investigate** when you look for answers.

Scientists repeat investigations before they draw conclusions. A **conclusion** is what you decide after you think about all you know. You should be able to draw similar conclusions when you repeat an investigation.

For example, one scientist measures the **height** of the tallest tree in a forest. Others repeat the **measurement**. They get similar answers. They draw a conclusion.

- 2 investigate 1 ask questions 4 draw conclusions
3 repeat investigations

2 What do you think the scientist in this picture is studying? Why? Look and talk about the question with the class.
Possible answer: He is studying how clean the water is.



ELL Language Support

Nouns from Verbs

On one side of the board write *predict, investigate, and conclude*. *You can add the suffix -ion to predict to make prediction. You can drop the silent e from investigate and add -ion to make investigation.* Repeat for *conclude* and *conclusion*.

Explain

1 Read. Then order the steps for carrying out investigations.

Have students read and order the steps. Then have them compare with the steps in the Digital Lab. *What step wasn't included in the lab we watched? (Answer: Repeat.)*

2 What do you think the scientist in this picture is studying? Why? Look and talk about the question with the class.

Read the question aloud and have students look at the picture and answer the question. Discuss as a class.

Elaborate

Think!

Ask students *How do you know what the scientist is investigating?* Have groups explain their reasoning to one another. (Possible answers: *I can see he is getting water from the river. He is observing it. I think he is checking if the water is clean.*)

Lesson 2

How do scientists find answers?

Objective: Learn about and apply some scientific methods.

Vocabulary: *scientific methods, hypothesis, experiments, fair test*

Digital Resources: Flash Cards (*conclusion, hypothesis*), *I Will Know...* Digital Activity

ELL Vocabulary Support

Pronounce the vocabulary words for students and have them repeat: *methods, hypothesis, fair test*. Use the Flash Cards to reinforce any meanings students are having difficulty with.

Build Background

What do you think a fair test is? Elicit ideas. *Scientists follow the scientific method. They test their hypothesis with a fair test.*

Explain

3 Read, look, and follow the instructions.

Invite volunteers to read each paragraph aloud. Then have students follow the instructions. Check answers as a class. Ensure students understand that scientists change only one thing in their tests. *Scientists change one thing at a time in their tests. That way they know how that thing affects the results.* Ensure students understand that, if someone else follows the same steps, they should get the same results.

ELL Language & Content Support

Have students sequence the steps in their notebooks using sequence words. (*First, I... Then I..., Next I..., Finally, I...*)

Elaborate

Scientific Methods

Have students use scientific methods to plan an investigation. Brainstorm an investigation as a class and write it on the board. Alternatively, write the following question on the board: *Do plants need sunlight to grow?* Have students form small groups and write a hypothesis in their notebooks. Then have them develop a fair test for the hypothesis. Compare answers. (Possible answers: *Plants need sun to grow. I can put one plant in the sun and another plant in the dark.*)

3 Read, look, and follow the instructions.

1. Circle the question.
2. Underline the hypothesis.
3. Label the pots *water* and *no water*.

Scientific Methods

Scientific methods are ways of finding answers. Scientists use scientific methods when they do experiments. Scientific methods can have these steps. Sometimes scientists do the steps in a different order. Scientists do not always do all of the steps.

Ask a question.

Ask a question that you want answered.



Do seeds need water to grow?

Make a hypothesis.

A **hypothesis** is a possible answer to your question.



The seeds that are watered will grow because seeds need water.

Plan a fair test.

Change only one thing. Keep everything else the same. Record your steps. Someone else should get the same answer if they follow your steps.



I Will Know... Unit 1 9

Think! Again!

Revisit the question *What is a science question?* Write on the board *Do you like cats? Why is this not a science question?* (Possible answers: *You can't make a hypothesis about it. You can't test it or use your senses to find out about it.*)

I Will Know...

Have students do the *I Will Know...* Digital Activity.

Lesson 2

How do scientists find answers?

Objective: Learn about scientific methods.

Vocabulary: *methods, hypothesis, experiments, support, conclude*

Digital Resources: Flash Cards (*hypothesis, conclusion*), *Lesson 2 Check* (print out 1 per student), *Got it? 60-Second Video*

Build Background

Tell students that they often draw conclusions when they read by putting together the clues in what they read with things they already know. Explain that scientists use the information from their investigations and what they already know to draw conclusions. Explain to students that, if the results of a test show the hypothesis was right, the test supports the hypothesis. Then explain that, sometimes when they repeat their tests, scientists get different results. *What does it mean if the results you get are different from what you predicted?* (Possible answers: *My hypothesis was not supported. It might be wrong. I didn't do my experiment well.*)

Explain

4 Read and match the headings with the corresponding information.

Have students read and match. *How can you know if a hypothesis is supported?* (Possible answer: *I got the same results twice.*)

5 Look and draw what you think happened to the seedlings.

Have students draw their pictures and compare them. Ask volunteers to say why they drew what they drew. *What was your conclusion? Why?*

ELL Content Support

On the board, write *methods, hypothesis, experiment, supported, and conclude*. Have students copy the words down and write their own definitions of each term. Review each as a class to check answers.

Think!

If someone else follows the steps of this investigation and gets a different result, what might you conclude?

Ask a volunteer to read the question aloud. Brainstorm answers as a class. (Possible answers: *The hypothesis was wrong. They didn't follow the steps correctly.*)

4 Read and match the headings with the corresponding information.

Do your test.

Collect and record your data.

Tell your conclusion.

Think about the results of your test. Decide if your hypothesis is supported or not supported. Tell what you decide.

Test your hypothesis. Repeat your test. See if your results are the same.

Keep records of what you observe. Use words, numbers, or drawings to help.

5 Look and draw what you think happened to the seedlings.



Think!

If someone else follows the steps of this investigation and gets a different result, what might you conclude?



10 Unit 1 > Lesson 2 Check > Got it? 60-Second Video

ELL Content Support

Most green plants need sunlight, air, nutrients from soil, and water to survive. Unlike animals, most plants do not need to eat; they can make their own food. Photosynthesis is the process by which green plants make food. The green pigment in plants, called chlorophyll, absorbs sunlight. Sunlight provides the energy for the plant to make its own food using water, carbon dioxide, and nutrients. Plants give off oxygen as a byproduct of this process.

Evaluate

Lesson 2 Check Assessment for Learning

Distribute the *Lesson 2 Check* and allow students sufficient time to complete it. Check answers as a class. Then ask students to grade their progress on the topic of scientific methods from 1 to 3: 3 = *I understand scientific methods*; 2 = *I need to study more*; 1 = *I need help!* Encourage students giving themselves a 2 or 1 to describe what they found difficult and need to study more.

Got it? 60-Second Video

Review Key Words for Lesson 2 (see Student's Book page 8). Play the *Got it? 60-Second Video* to review the lesson material.

Lesson 3

How do scientists collect and share data?

Objective: Learn how scientists collect data.

Vocabulary: collect, data, tally marks, picture chart

Digital Resources: Flash Cards (*record, measure*), *Let's Explore!* Digital Lab

Unlock the Big Question



Write the following text on the board. *I will learn how scientists collect, record, and share data.*

Build Background

Why do you think it might be useful for scientists to photograph what they're observing? (Possible answers: to record data, to be able to study details later, etc.) *One way to record data is to use tally marks. I can record the number of girls and boys in the class using tally marks.*

Demonstrate how to make tally marks by counting the girls and then the boys in the class and marking the tallies on the board. (See Favorite Pets.)

Explore

Let's Explore! Lab **What are some ways you can collect and share data?**

Objective: Learn some methods for recording and sharing data.

Digital Resources: *Let's Explore!* Digital Lab, *Let's Explore! Activity Card* (1 per student), Flash Cards (Optional: Do the lab in class; refer to the *Activity Card* for materials and steps.)

- *This video is about recording and sharing data.*
- Show the Digital Lab. *What are some advantages of using tally marks instead of numbers?* (Possible answers: *It can be more correct because you use one mark per cup. It might help you avoid skipping a cup.*)
- *How does recording the number help you compare stacks?* (Possible answer: *It helps because we can see the number of stacks for the whole class.*)
- Have students complete the *Activity Card* and check their answers in small groups or pairs. Provide support as needed.

Explain

- 1 Look and circle the words that describe the rocks.**

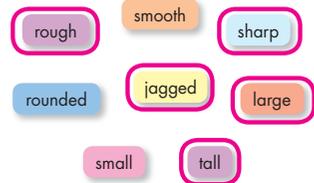
Have students look and circle the words. Check answers as a class. If there is any disagreement,

Lesson 3 • How do scientists collect and share data?

Key Words

- data
- basalt
- granite
- pumice

- 1 Look and circle the words that describe the rocks.**



- 2 Read and circle T (true) or F (false).**

Collect Data

Scientists collect data to learn new things. **Data** is what you observe with your senses. Scientists record what they observe and measure. Scientists make conclusions from data and from what they already know.

1. Scientists collect data using their senses.
2. Scientists use data to make conclusions.
3. Scientists only make conclusions from data.

T / F
T / F
T / F

- 3 Look at the picture and circle one thing you can conclude about the rocks.**

1. The rocks are very light.
2. The rocks are smooth because of the ocean water.
3. Many animals live under the rocks.



Let's Explore! Lab Unit 1 11

have students explain why they chose the description.

- 2 Read and circle T (true) or F (false).**

Have students read and answer the questions. Check answers as a class.

- 3 Look at the picture and circle one thing you can conclude about the rocks.**

Have students circle the answer and ask volunteers to explain. *How did you come to that conclusion?*

Elaborate

Favorite Pets

Draw on the board a chart like the one shown below. Have students copy it in their notebooks. Then take a poll on students' favorite pets. (Each student gets one vote.) Have students enter tallies and total them. *What is the favorite pet in the class?*

Favorite Pets		Total
Cats		5
Dogs		4
Birds		2
Fish		10

Lesson 3

How do scientists collect and share data?

Objective: Learn and use some ways scientists record data.

Vocabulary: record, data, measure, conclusion, granite, basalt, pumice

Digital Resources: Flash Cards (record, conclusion), I Will Know... Digital Activity

Materials: rulers or metersticks (1 per student)

Build Background

What are some ways scientists can record data? (Possible answers: take notes, take photos, make tables, charts, graphs, etc.) *Why do scientists use tables, charts, and graphs instead of writing descriptions?* (Possible answer: So that you can see the data more easily.)

ELL Vocabulary Support

Use the photos in the Student's Book to pre-teach basalt, granite, and pumice.

ELL Content Support

The cooling of molten rock forms igneous rocks, such as granite, basalt, and pumice.

- Granite is hard, and it is often used in construction.
- Basalt is a rock made from lava. It forms most of the ocean floor.
- Pumice forms from lava and is often used as an abrasive, or something scratchy. There are many gas bubbles trapped inside pieces of pumice, which make it very porous. As a result, this rock can sometimes float.

Explain

4 Read and measure the width of the rocks. Write the data in centimeters.

Have students read and measure the rocks. Then have them record the data.

ELL Language Support

Review comparatives. *The piece of basalt is wider than the granite. The piece of pumice is wider than the granite.* Elicit other comparatives from students. (Possible answers: taller, lighter, darker, heavier, etc.)

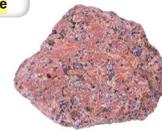
4 Read and measure the width of the rocks. Write the data in centimeters.

Record Data **sample data**

Scientists record what they observe and measure. They look at the data carefully. Scientists can learn new things when they record data.

You can measure how wide each rock is with a ruler. One way to record data is in graphs and charts.

granite



5 centimeters

basalt



6 centimeters

pumice



8 centimeters

At-Home Lab
Observe and Compare
Find three leaves in your neighborhood. Look at them carefully. Compare the shapes and colors. Measure them in inches and centimeters.

12 Unit 1 **I Will Know...**

Elaborate

Real Rocks

If you had real rocks and not just photos, what other ways could you compare and contrast them? Have students write their answers in their notebooks. (This information will be used in a later lesson.)

Think!

Would the results be the same if you had different pieces of pumice, granite, and basalt? Why or why not? (Possible answer: No. Different rocks are different sizes and shapes.)

Think!

Why is it important for scientists to communicate their results to one another? (Possible answers: So that others can repeat the tests to check the results. So that others know you've already done the experiment. So others can build on the knowledge that has been discovered.)

I Will Know...

Have students do the I Will Know... Digital Activity.

Lesson 3

How do scientists collect and share data?

Objective: Learn some ways scientists share results.

Vocabulary: data, record, conclusion, table, chart, graphs, graphically, bar graph, tally, picture chart, survey

Digital Resources: Flash Card (chart), Lesson 3 Check (print out 1 per student), Got it? 60-Second Video

Build Background

Use the Flash Cards to teach vocabulary. Ensure students understand that showing data *graphically* means the data is recorded not just in words or numbers, but in a way they can see. Display the *chart* Flash Card. *This is a pie chart. The data is divided up like slices of pie!* Display the *bar graph* Flash Card. *In this bar graph, you can see the different amounts in bars.* Have students draw a chart, a table, and a graph in their notebooks and label them.

Explain

- 5** Read and fill in the table for each rock. Use your data from page 12.

Have students read and fill in the table.

- 6** Fill in the bar graph for each rock. Then answer the question.

Have students complete the bar graph and answer the question. *Do you think bar graphs are a good way to share data? Why or why not?*

Elaborate

Comparing Rocks

Have volunteers read other ways they could compare the rocks on page 12 from their notebooks. As a class, select one or two ways. Brainstorm possible answers and decide how best to record them as a class.



Science Notebook: Sock Color

Tell students to think about how they can collect and show data about the color of their classmates' socks. Have them write a plan in their Science Notebooks explaining how they would collect and record this data. Tell them to think about what kind of chart or graph would best show the data. If time permits, have students carry out the plan in class.

- 5** Read and fill in the table for each rock. Use your data from page 12.

Tables, Charts, and Graphs

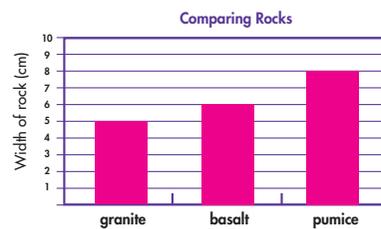
Scientists use tables, charts, and graphs to record data. These help scientists to organize data.

Tables show data in rows and columns, while charts and graphs show data graphically. There are many different types of charts and graphs, but they all help scientists make comparisons and find patterns more easily. Sometimes they learn what is the same. Sometimes they learn what is different.

sample data

Comparing Rocks	
Rock	Width
Granite	5 cm
Basalt	6 cm
Pumice	8 cm

- 6** Fill in the bar graph for each rock. Then answer the question.



Which rock is the widest? pumice

▶ Lesson 3 Check

▶ Got it?

▶ 60-Second Video

Unit 1 13

Evaluate

Lesson 3 Check Assessment for Learning

Distribute the *Lesson 3 Check* and allow students sufficient time to complete it. Check answers as a class. Then ask students to grade their progress on the topic of collecting and sharing data from 1 to 3: 3 = *I understand some ways to collect and share data*; 2 = *I need to study more*; 1 = *I need help!* Encourage students giving themselves a 2 or 1 to describe what they found difficult and need to study more.

Got it?



60-Second Video

Review Key Words for Lesson 3 (see Student's Book page 11). Play the *Got it? 60-Second Video* to review the lesson material.

Let's Investigate!

In this unit, students learn about scientific methods. In this lab, they will apply the concepts of experimenting, measuring, and recording data.

Let's Investigate! Lab What skills do scientists use?

Objective: Measure whether ice melts faster in plain or salt water.

Materials: 2 cups of water, 1 tablespoon of salt, 2 ice cubes, timer, data table

Digital Resources: *Let's Investigate!* Digital Lab, *Let's Investigate!* Activity Card (1 per group), Flash Card (experiment)

Advance Preparation: Prepare the cups and materials.

- Gather students together.
- Have a volunteer measure the salt and stir it in the salt water cup.
- Have another volunteer ready to put the ice cubes in the cups and another ready to start the timer.
- Record the results.
- Have students copy the results into their notebooks.
- Ask students what they can conclude and have them write their conclusions in their notebooks.

Teacher Time-Saving Option: Show the *Let's Investigate!* Digital Lab as an alternative to the hands-on lab activity and have students use the results of the Digital Lab to complete the *Activity Card*.

Unlock the Big Question



Have students refer to the Big Question on the Unit Opener page. In pairs, have them discuss what they know about science skills. Invite student pairs to share their answers to questions 6 and 7 on the *Let's Investigate!* Activity Card.

Materials



Let's Investigate!

What skills do scientists use?

1. Write *salt water* on one plastic cup and *plain water* on the other, using a marker.
2. Stir 1 spoonful of salt into the salt cup.
3. Put 1 ice cube in each cup. Start the timer.
4. Check the timer when the first ice cube melts. Record your data in the table.
5. Check the timer when the second ice cube melts. Record your data.

sample data

Ice Cube Data	
	Time to Melt (minutes)
Plain water	3 minutes
Salt water	5 minutes



14 Unit 1 > Let's Investigate! Lab

Class Experiment: Will sugar have the same effect?

Materials: two cups per group, 1 spoonful of sugar per group, 2 ice cubes per group, 1 timer or watch per group

Preparation: Divide the class into small groups and distribute materials. Alternatively, do the lab as a class.

Instructions: Ask students to predict what will happen. Have each write their hypothesis in their notebooks: (*Sugar will (not) have the same effect as salt.*) Tell students to follow the steps of the *Let's Investigate!* Lab except that they should label one cup *sugar water*. Ask students to perform the experiment and to record their results in their notebooks.

Ask *What conclusions can you draw? Write your conclusions in your notebooks. Did the results support your hypothesis?*

Unit 1 Review



What is science?

Digital Resources: Print out 1 of each per student: *Got it? Self Assessment*, *Got it? Quiz*

Evaluate

Strategies for Targeted Review

The following are strategies for providing targeted review for students if they encounter challenges with the content.

Lesson 1 What kinds of skills do scientists use?

Question 1

If... students are having difficulty understanding that scientists observe, then... remind students how people use their senses to observe. Have students name each sense and point to the body part associated with that sense. Have students say how they use that sense.

Lesson 2 How do scientists find answers?

Question 2

If... students are having difficulty understanding why scientists repeat investigations, then... review scientific methods. Help students make the connection that scientists use methods they think will help them answer their questions.

Lesson 3 How do scientists collect and share data?

Question 3

If... students are having difficulty understanding the differences among tables, charts, and graphs and how to use them, then... use the Flash Cards or drawings to explain them and have students draw and label examples in their notebooks again.

Unit 1 Review

What is science?



Lesson 1

What kinds of skills do scientists use?

1 Circle the correct answer.

You _____ when you use your senses to find out something.
a) record b) repeat c) observe

Lesson 2

How do scientists find answers?

2 Circle why scientists repeat investigations.

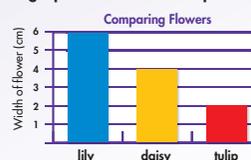
- To use their senses.
- To find different answers.
- To find similar results.



Lesson 3

How do scientists collect and share data?

3 Look at the bar graph and answer the question.



- Which flower is the widest? lily
- Which flower is the least wide? tulip

▶ Got it? Quiz ▶ Got it? Self Assessment Unit 1 15

ELL Language Support

Give students time to review the key words and supporting vocabulary and to ask questions they may have about their meaning.

Got it? Self Assessment

Immediately after students have completed the Review activities, distribute a *Got it? Self Assessment* to each student. Have students complete the *Stop! Wait!* and *Go!* statements for each lesson, allowing them to look back through the lesson material if necessary.

Got it? Quiz

Distribute a Unit 1 *Got it? Quiz* to each student. Quizzes may be used for assessing students' understanding of unit concepts as well as for grading purposes.



Name _____ Date _____

Words to Know

Write the words next to the descriptions they match.

observe predict

- 1. predict to tell what you think will happen next
2. observe to use your senses to find out about something



Explain

Answer the questions on the lines below.

- 3. Name two senses you can use to observe an orange. Possible answers: sight for seeing its color; smell; taste; touch to feel the skin; hearing for the sound of the skin peeling
4. What do scientists do when they compare and contrast? They say how things are the same and different.



Apply Concepts

- 5. Suppose that you are a scientist who studies flowers. Name four different ways that you can classify flowers. Possible answers: number of petals, color, height, where they grow, how much sun/water they need, the shape of the leaves/petals



Name _____ Date _____

Words to Know

Write the words next to the descriptions they match.

investigate conclusion hypothesis

- 1. hypothesis a possible answer to a question
2. investigate to look for answers
3. conclusion what you decide after you think about all you know



Explain

Answer the questions on the lines below.

- 4. Write in the missing steps in the scientific method listed below. Ask a question. Make a hypothesis. Plan a fair test. Do your test. Collect and record. Draw a conclusion.
5. Why do scientists repeat their investigations? They want to make sure their hypothesis is supported/right.



Apply Concepts

- 6. A scientist wants to know if seeds need water to grow. The scientist has seeds, two pots, some soil, and a watering can. Draw and label a picture to show how you can plan a test.

Students' drawings should resemble the test on Student's Book page 9.



Name _____ Date _____

Words to Know

Write the words next to the descriptions they match.

data record

- 1. data information you collect
2. record when scientists write or draw what they learn



Explain

Answer the question on the line below.

- 3. You measure the lengths of three leaves. What are two ways to record your data? Possible answers: I can make a chart or a bar graph. I can make drawings of the three leaves that are the same sizes as the leaves.



Apply Concepts

- 4. You want to investigate what fruit your classmates like to eat. You discover that: 2 people like oranges, 4 people like apples, 5 people like bananas. Draw a chart to show your data.

Answers will vary. Students can make a chart using tally marks or a picture graph.



Name _____ Date _____

Materials

- paper shapes

How can you sort objects?

Think about the skills you use as you do this activity.

- 1. Observe. Work alone. Think of one way to classify the shapes. Sort into groups. I classified the shapes by Possible answers: size, shape, color
2. Work with a group. Classify them in another way. We classified the shapes by Possible answers: size, shape, color

Explain Your Results

- 3. Communicate. What skills did you use to sort the shapes? Possible answer: I observed, classified, and communicated.

What did you learn from this activity?

Possible answer: There are different ways to group the same set of objects.



Name _____ Date _____

Materials

- chips
- plastic cup

What conclusion can you draw?

1. Have a partner pick up the chips one at a time and put them in the cup.
2. Count the number of seconds that pass. Record how long it took to move all the chips.

Explain Your Results

3. Draw a conclusion. If you did this again, would you have the same result? Explain.

Possible answer:
 Yes, I think it would take about the same amount of time.

How could you improve your test?
 Possible answer:
 I could use a timer.



Name _____ Date _____

What are some ways you can collect and share data?

How many boys and girls are in your class? Sample data

1. Use the Tally Chart.

Make 1 mark for each boy.

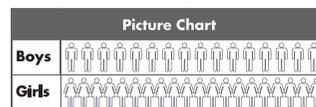
Make 1 mark for each girl.



2. Use the Picture Chart.

Color 1 picture for each boy.

Color 1 picture for each girl.



Explain Your Results

3. Communicate. Share your charts with your family. Which did they like better? Explain.

Possible answer: They liked the picture chart better because it was easier to understand.

Name another way you can record data.
 Possible answer: I can make a bar graph.

Say what some advantages are of recording and sharing data.
 Possible answers: You can tell if you get the same results twice. Other people can know what you found out.



Name _____ Date _____

Analyze and conclude

6. Did the ice cubes melt at the same rate? Explain.
 Possible answer: No. The ice cube in the plain water melted 10 minutes before the ice cube in the salt water did.
7. Name three science skills you used.
 Possible answers: observing, predicting, measuring, testing, comparing and contrasting, recording data, sharing data



Name _____ Date _____

Got it? Self Assessment

Complete the statements for each lesson.

Lesson 1 What kinds of skills do scientists use?

- ☐ Stop! I need help with _____
- ⓘ Wait! I have a question about _____
- ▶ Go! Now I know _____

Lesson 2 How do scientists find answers?

- ☐ Stop! I need help with _____
- ⓘ Wait! I have a question about _____
- ▶ Go! Now I know _____

Lesson 3 How do scientists collect and share data?

- ☐ Stop! I need help with _____
- ⓘ Wait! I have a question about _____
- ▶ Go! Now I know _____



Unit 1 Study Guide

What is science?

Lesson 1

What kinds of skills do scientists use?

- Scientists observe the world around them using their senses.
- Scientists classify and compare and contrast, and they make predictions.

Lesson 2

How do scientists find answers?

- Scientists follow particular steps when they investigate. They repeat their investigations.
- Scientists make a hypothesis, plan a fair test, see if their predictions are right, and draw conclusions.

Lesson 3

How do scientists collect and share data?

- Scientists record their observations and results. They use tables, graphs, charts, and other ways to record their data.
- Recording their data helps scientists communicate and share results with one another.



Review the Big Question

What is science?

Encourage students to answer the following question in their own words:

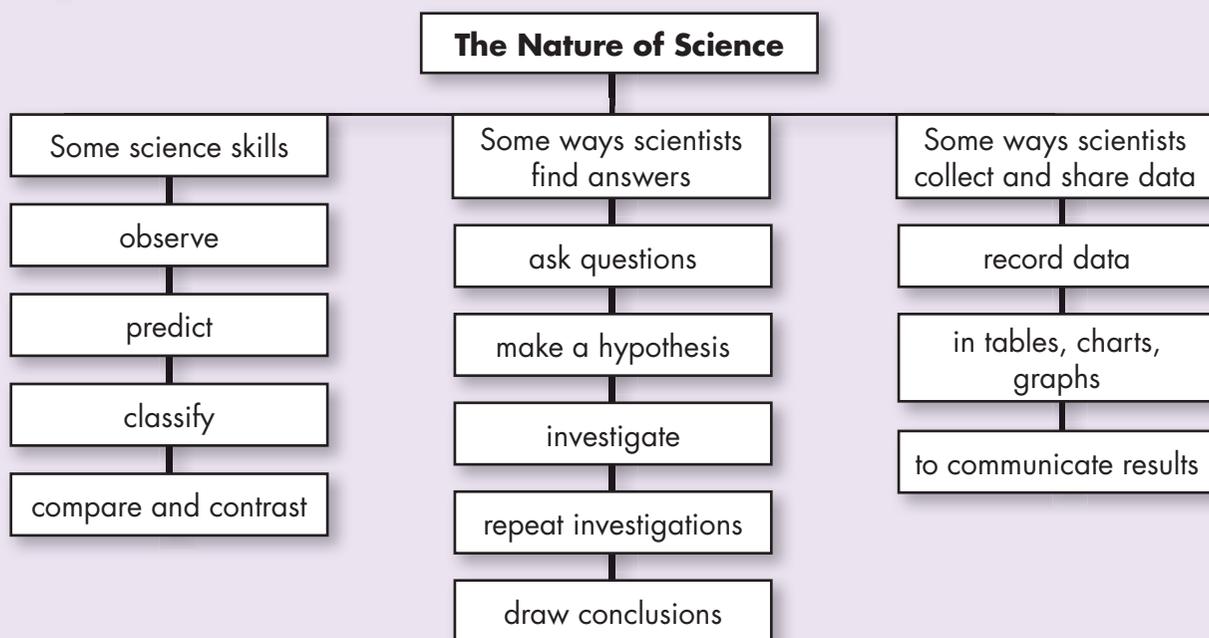
How has your answer to the Big Question changed since the beginning of the unit? What are some things you learned that caused your answer to change?

Make a Concept Map

Have students make a concept map like the one shown on this page to help them organize key concepts.



Unit 1 Concept Map



Students can make a concept map to help review the Big Question.