

Grade 5

Oak Meadow

Teacher Manual

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Grade 5



Lesson

Grammar Instruction

Subjects and Predicates

Reading

Begin reading *Where Do You Think You're Going, Christopher Columbus?* by Jean Fritz. You have two weeks to read this book.

Assignments

1. Write the following vocabulary words in alphabetical order:

sphere migrate exotic magnetic
hazard artifact technology

To this list, you will add three to five additional spelling words. Spelling words can be taken from your reading or can be any word that you have trouble spelling.

For each vocabulary word, write a definition. If there is more than one definition, use the one that matches the context of the lesson material where it appears. Finally, use each word on the list (both vocabulary words and spelling words) in a sentence that shows you understand the meaning of the word.

When writing definitions for vocabulary words, use your own words, but do not use the root word or any other form of the vocabulary word in the definition. For example, to define *magnetic* as *having to do with magnets* does not really explain what *magnetic* means. The definition needs to include information on what a magnet is, or what magnetism is and does.

ASSIGNMENT SUMMARY

English

- ☐ Begin reading *Where Do You Think You're Going, Christopher Columbus?*
- ☐ Alphabetize and define vocabulary words, and use them in sentences.
- ☐ Take a spelling quiz.
- ☐ Identify subjects and predicates in sentences.
- ☐ List subjects and predicates and compose original sentences.
- ☐ Edit and proofread writing assignment.



English

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When writing vocabulary sentences, try to use the word in the form in which it appears in the list (for instance, *magnetic* instead of *magnet* or *magnetized*), and make sure that the sentence clarifies what the word means.

It may take you a while to learn how to write good definitions without using the word you are defining, and it may take a while to learn how to write sentences that use the word in a way that shows its meaning. You might want to ask your parent to help you at first by going over what you've written and pointing out whether or not it follows these guidelines.

Each week, your student will be alphabetizing and defining vocabulary words, and creating original sentences. Encourage your student to write definitions in his or her own words, but understand that this is difficult (try if yourself, if you'd like!). The main goal is for your child to learn to look up words in the dictionary or online, and then write a definition based on what he or she has learned, rather than copying a definition word for word.

When writing original sentences, encourage your child to add enough detail to provide a relevant context for the word.

- **artifact:** n. man-made object of historical interest. *The archeologist found a carved wooden bowl, an artifact that showed a human settlement had once been there.*
- **exotic:** adj. strange, unusual. *Traders traveling to the Far East brought home exotic artifacts, gems, silks, spices, and other wonderful things.*
- **hazard:** n. danger, risk. *There were no monsters in the seas, but there were strong currents, rocks, and other hazards, just as there are today.*
- **magnetic:** adj. having properties of attracting iron and of pointing approximately north when suspended. *The magnetic properties of a compass make it a reliable indicator of direction.*
- **migrate:** v. move from one place, especially from one country in order to settle in another. *Ancient people migrated from Asia thousands of years ago, traveling throughout North and South America.*

- **sphere:** n. ball, globe. *Ancient people believed the world was flat, not shaped like a sphere.*
 - **technology:** n. application of knowledge for practical purposes. *Early advances in technology led to the development of important navigational tools.*
2. Identify the **subject** and **predicate** in each of the following sentences (identify the subject by underlining it once, and the predicate by underlining it twice):
- a. The Vikings sailed across the sea.
 - b. They visited the coast of America.
 - c. The nighttime stars helped them to find their way.
 - d. Marco Polo and other explorers worried about monsters in the ocean.
 - e. Many explorers thought they would fall off the edge of the world.
3. List five different subjects and five different predicates. Make them interesting! Then use them to make five to ten different complete sentences. Some of your sentences might come out pretty silly, but they should still make sense.

This exercise is designed to help students clarify the role of subjects and predicates in sentences. Have fun reading your child's sentences. If necessary, help your child differentiate between the subject ("Who or what is the sentence about?") and the predicate ("What is happening?").

4. After writing your social studies essay (see below), review it carefully to look for mistakes or ways to make it better. Begin by reading it aloud. Listen to each sentence and see if it says what you intended it to say. If not, make a note about what you can add or rearrange to improve it. This is called *editing* and is something you will be expected to do for each essay and report you write. Check for capital letters and correct ending punctuation. Make all the necessary corrections and write your final draft in your best penmanship.

Once you have written your final version, read it one more time to check for any final mistakes—this is called *proofreading*. Proofreading is done

English

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English

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after all the editing changes have been made, and usually only requires a few tiny little corrections. By taking the time to review, edit, and proof-read your work, your writing will be more clear and expressive.

Corrections should be made by the child to clarify the main points in the essay. He or she will rewrite the report, incorporating all the changes made. Point out the difference between the first and second drafts.



Grammar Instruction

Independent and Dependent Clauses

Reading

Finish reading *Where Do You Think You're Going, Christopher Columbus?* In the social studies section, you will find assignments related to the book.

Assignments

1. Alphabetize the following list of vocabulary words and add 3–5 more spelling words:

dowel convert stern bow parallel savage (noun)
rectangle dimension

Write definitions for each vocabulary word and use it in a sentence that shows you understand the meaning of the word. (You do not have to define your additional spelling words but please use each one in a sentence.) Put your definitions into your own words. Do not use the root word or any other form of the vocabulary word in the definition. If there is more than one meaning of the word, use the one that matches the context of your social studies material.

When practicing how to spell words, always look for a variety of ways to work with the words throughout the week. Here are some ideas:

- Practice writing them down
- Spell them aloud
- Play a fill-in-the-blank spelling game (have a parent write blanks for the letters, including two or three letters and letting you fill in the rest)
- Use Scrabble letters to spell the words and then trying to hook them together into a Scrabble grid

ASSIGNMENT SUMMARY

English

- ☐ Finish reading *Where Do You Think You're Going, Christopher Columbus?*
- ☐ Alphabetize and define vocabulary words, and use them in sentences.
- ☐ Take a spelling quiz.
- ☐ Identify dependent and independent clauses.
- ☐ Compose sentences and indicate subjects and predicates.
- ☐ Edit and proofread writing assignment.

English

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- Write spelling/vocabulary words using alphabet refrigerator magnets

Try to come up with new ways to work with your list of words each week. At the end of the week, take a spelling quiz (the quiz will include vocabulary words and spelling words).

Note the variety of ways suggested for your child to work with the vocabulary words each week. More suggestions will be made throughout the year. Encourage your child to try new ways to work with the words.

- **bow:** n. front end of a boat or ship. *A drawn line to the center of the narrowest end of the boat will form the bow.*
- **convert:** v. to change belief. *Christopher Columbus believed he was meant to take the Christian religion across the ocean and convert the people there.*
- **dimension:** n. any measurable extent. *The dimensions for the bottom of the model boat are 4x 10".*
- **dowel:** n. cylinder shaped peg for holding a structure together. *A 1/4" dowel is used for a model boat.*
- **file:** n. tool with rough surface for smoothing wood, fingernails, etc.. *A half-round file is helpful when building a model sailboat.*
- **mast:** n. upright to which a ship's sails are attached. *A sail is placed over a mast.*
- **parallel:** adj. extending in the same direction, but never meeting. *The slit cut into the paper has to be parallel to the 6" sides.*
- **rectangle:** n. plane figure with four straight sides and four right angles. *A first step in constructing the model boat bottom is to draw a 4x10" rectangle on a piece of wood.*
- **savage:** adj. wild; member of a primitive tribe. *Because he arrived from what he thought was a superior country, Columbus saw the native people as little more than savages.*
- **stern:** n. rear part of a ship or a boat. *The sail curves towards the stern of a boat.*

2. Decide whether each of the following groups of words is a complete sentence (an independent clause) or an incomplete sentence (a dependent clause). If the sentence is complete, capitalize the first word and add the appropriate ending punctuation. If the sentence is incomplete, add or subtract a word or phrase to make it complete, and then add beginning capitalization and ending punctuation.
 - a. Three ships went with Columbus. (IC)
 - b. *They tried, but* found no gold in that country. (DC)
 - c. *They* went running through (DC) *the bushes.*
 - d. He wants to visit the moon. (IC)
 - e. *Look for* the boy who has lots of freckles. (DC)
 - f. She turned a page in her book. (IC)
 - g. If they hurry, (DC) *they may succeed.*
 - h. *I found the information in* a book I read. (DC)
 - i. *We met* before the race began. (DC)
3. Compose three complete sentences and identify the subject and predicate of each. Identify the subject by underlining it once, and the predicate by underlining it twice. (Refer to “Subjects and Predicates” in the English manual.)

If your student has difficulty distinguishing between the subject and the predicate, it may help to focus first on the predicate by asking “What is going on in this sentence? What is happening?” Once the action is determined, you can point out that anything left over (i.e. who or what is doing the action) is the subject.

4. When you do your written social studies assignment, carefully review and edit your first draft to correct errors in spelling, grammar, and punctuation and to make sure your ideas are coming across clearly. Check to be sure all of your sentences are complete. When you are sure your report is the way you want it, write your final draft neatly. Proofread this final draft to catch and fix any little mistakes.

You will be expected to review, edit, and proofread all your essays and reports this year so you'll want to get into the habit and make it a regular part of your writing process.

English

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English

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It is important that students get into the habit of reviewing their written work to make corrections, clarify ideas, and produce a final draft that is their best work. While students are only expected to copy neatly into final form longer assignments, such as essays, stories, or reports, they are encouraged to read over short answer responses as well to make sure each answer expresses ideas in a clear way and is free of errors in spelling, punctuation, capitalization, and grammar. Corrections can be made to short answers without the student having to copy it over into a polished final form.

Learning to revise, edit, and proofread work is a process that will continue to be developed throughout middle school, so while you'll want to encourage your child in the development of these habits, keep in mind that fifth graders are just beginning to engage in these important elements of the writing process. Notice and acknowledge your child's efforts in this area, no matter how small, and don't expect too much at once.

Grade 5



Lesson

Social Studies

Reading

Read “Early Settlers in North America” (found in Reading Selections at the end of this lesson).

Assignments

1. After reading “Early Settlers in North America,” look up the Bering Strait on a globe or world map to get an idea of the area being discussed. It is between Asia and North America, from Siberia to Alaska. Find Norway, Iceland, and Greenland on the globe.

Draw a picture of a globe and divide it into the four hemispheres. Mark each hemisphere. In which hemisphere do you live?

Your student may notice that it is challenging to draw the four hemispheres on a globe since the spherical shape means you will only be showing one side at a time. The main objective is to clarify the dividing lines (equator and prime meridian), and show where they are located on the globe. Make sure each hemisphere is labeled.

2. Choose one of these writing assignments:
 - a. Read about Marco Polo’s adventures in an encyclopedia, library book, or online source. Afterward, write a page or two about what you learned. If you enjoy creative writing, you might prefer composing a scene that could have occurred between Marco Polo and the great ruler Kublai Khan in China.

Look for your student to include specific details based on research, and to write in complete sentences, using paragraphs to organize information

ASSIGNMENT SUMMARY

Social Studies

- ☐ Read “Early Settlers in North America.”
- ☐ Choose a writing assignment about early explorers.
- ☐ Make a shadow stick and data chart.
- ☐ Find the North Star.
- ☐ Write a poem about the night sky.

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into topics. If a story is written, the factual research should be evident in the story.

Below is an overview of Marco Polo's life.

Marco Polo (1254–1324) was born in Venice to a merchant family. His father and uncle took off to China to trade soon after he was born, and his mother died. He was raised by an uncle and aunt and educated to be a merchant. When his father and uncle came home, they took Marco (age 17) with them to meet the great Mongolian emperor of China, Kublai Khan, who they had befriended. They sailed to Palestine, then rode camels across Asia; it took three years to get to China.

Marco was valued by the Khan for knowing languages, and he was sent on many official missions throughout the Chinese empire. It became evident the Khan did not want the Polos to leave. However, the Polos were able to leave when they offered to accompany the Chinese bride being sent to Persia to marry the Khan's great nephew, who was the emperor of Persia.

Marco got back to Venice, bringing back ivory, jade, porcelain, silk, and jewels. However, Venice was being conquered by the city-state of Genoa, and Marco was jailed. While in jail, Marco decided to pass the time by writing *Description of the World*, describing China as advanced and prosperous in comparison with Europe. The book had a great influence, and is credited with having inspired the trade and culture of the late Middle Ages and the Renaissance. Nobody knows how much of Marco Polo's story was true; some of it was quite fanciful so it seems likely that he liberally embellished his travels.

- b. Compose a short story or newspaper article about what terrible monsters and other hazards might await anyone who tries to sail around the world. Illustrate your story with vivid and colorful drawings.

Old maps can be a source of how the people of the time envisioned the monsters that they believed lurked in the sea. A common image was the sea serpent, with a dragon's head and a long snake-like body which went up and down over the surface of the water. The student is expected to use imagination when describing sea monsters in text and illustrations. In addition to sea monsters, other ideas may include monsters that lived in

the wind and caused storms, or those that caused heavy darkness to fall. Look for a creative and descriptive project.

3. Make a shadow stick. Find a flat, sunny spot and put a stick straight into the ground. Have someone help you measure the length of its shadow at 10 AM, 12 noon, and again at 2 PM. Write down each measurement, carefully noting the time. How does the shadow differ in length between these two-hour increments? In which direction does the shadow point at noon?

Create a chart to record the changes in the length of your stick's shadow once a week for six weeks. Measure the shadow at 12 noon on the same day each week. If this time is not convenient, choose another time, but stay consistent from week to week, always measuring at the same time of day.

At the end of six weeks, look at your shadow data. You will be able to tell whether the sun is higher or lower in the sky now than it was six weeks ago according to how the length of the shadow has changed over time. When the sun is lowest in the sky, the shadow will be longer. In the Northern Hemisphere, the sun is at its lowest point in the sky on December 21. When the sun is highest in the sky, the shadow will be very short. In the Northern Hemisphere, the sun is highest in the sky on June 21 (reverse these dates for the Southern Hemisphere).

The results of this experiment will vary, depending on the location of the student's home. The main goal of this exercise is for the student to become aware of the movement of the sun across the sky, and experience firsthand an ancient way of measuring time. In addition, your student is expected to record data over time, accurately keeping track of measurements in an organized form. You may want to help your student create a chart and devise a system for taking regular measurements.

4. On a clear night this week, go outdoors and look for the North Star. Did you find it? If your skies are cloudy this week, try again when they're clear.

The North Star is often one of the first stars to be seen at night. Those living close to the equator or in the southern hemisphere will have a harder time finding it, if they can at all. The Southern Cross is the constellation used by navigators as a benchmark in the southern hemisphere. Check

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with a local observatory or star gazer if there is difficulty in determining where the North Star is.

5. The next day after you look at the night sky, close your eyes and imagine what it looks like. Were the stars twinkling? Was the moon shining? How does the air feel? Was it chilly? Warm and moist? How did you feel when you looked into this huge expanse? Did you think about how quiet or how big the sky is? What do you think might lie a million miles away in space?

Jot down a few key words that contain strong visual images or intense feelings, and use these ideas to write a poem about the night sky.

After composing your poem, write it neatly on an unlined piece of paper and illustrate it with pictures or an artistic border, or paint your page lightly with a watercolor wash.

The intent of this assignment is to provide students with an opportunity to recognize and express their own feelings about the night sky. It may be that they will be able to connect the wonder of the night sky with the daring of those who mapped and used it to guide them into the complete unknown. The poem should relate to the stars somehow and be presented in thoughtful, artistic form.



Social Studies

Reading

Read “European Explorers” (in Reading Selections at the end of this lesson).

Assignments

1. Look at a globe or world map and trace the way from Portugal and Spain around the tip of Africa to India. This is where Días and da Gama went.

Now look west from Europe. This is where Columbus went. Look at a map and identify the area where Columbus traveled and explored. What islands do you see in the Caribbean?

An important concept is to understand the two different directions the early explorers took. Encourage your student to discuss the different experiences these travelers had, based on where they went.

2. Choose two of the following questions and write at least a full page in response to each of them. If, as one option, you would like to draw a series of relevant cartoon pictures that tell a story, you may do so.
 - a. Christopher Columbus claimed land that was already inhabited by the Indians. What do you think about this? Do you think you would have handled the situation this way? What would you have done differently? What do you think made Columbus treat the Indians the way he did?

This asks for the student to view historical events from varying perspectives, including his or her own. Here are some possible reasons that may be cited for Columbus’s behavior:

ASSIGNMENT SUMMARY

Social Studies

- ☐ Read “European Explorers.”
- ☐ Trace travel routes on globe or world map.
- ☐ Write about the travels of Columbus.
- ☐ Continue to record data on the sun’s movement.
- ☐ Activity: Build a Sailboat

Social Studies

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- Columbus was expecting to find the rich, great culture of China and Asia that Europeans had located before, and instead found more “primitive” societies, so considered them inferior.
- Europeans were already using black African slaves, and felt their cultures were inferior, so considered the Native Americans to be of the same cultural level.
- Native Americans were not Christian, were considered “heathens,” an inferior ranking in the minds of Europeans.
- Frustrated at not being able to find the riches he expected, Columbus took whatever wealth seemed available, including people and their belongings.

It may be useful for the student to be reminded that although we are sometimes more respectful of other cultures these days, there are still instances where indigenous people are treated as inferior. Today there are cultures which are still being treated with disrespect, such as the Chiapas in Mexico, the Aborigine in Australia, and the Kaiapo, Guarani, Guajajara and Kaiwa of the Amazon rain forest.

- b. Imagine you were an early inhabitant of the Caribbean who saw Columbus and his ships arriving off the coast of your home. How would these people have appeared to you? How might you have felt? Would you feel welcoming or would you be frightened? How might you and your family prepare to meet these strangers?

There are any number of possible feelings one might have, such as thinking these people were gods, and worshipping them; to thinking they were wonderful new friends, and welcoming them; thinking they were frightening, alien creatures, and being afraid; or believing they posed a threat and should be treated as enemies. It is possible to have a mixture of feelings.

- c. What do you think we would do today if someone from another planet landed ~~in the United States and claimed it as his territory because he had discovered it.~~ How would you feel about this?

This assignment is designed to challenge students to put themselves in the place of the Native Americans when white people arrived and claimed the land for themselves. The difference, however, may be in attitudes towards ownership of land. Many Native Americans felt that land was meant to be

shared by all, and not “owned” as in our cultural concept. As such, they may have been less concerned about this action than we might be today if aliens were to arrive and claim ownership of what we feel is “ours.”

- d. What if you had to convince someone to fund a long, expensive, and dangerous journey? Where would your expedition go? Why? Who would you try to get to support you? How would you convince them?

There was very little knowledge about what Columbus was proposing to explore, and something the unknown is the most feared. The student is encouraged to imagine the challenges of trying to convince someone to support a journey that seems impossible. A combination of convincing facts, the ability to persuade, imagination, and a passion for the adventure are all strategies that would be effective.

- e. Visit a ship the size of the *Niña*, the *Pinta*, or the *Santa Maria*. Write about what the experience of traveling so far in a ship that size might have been like. You might like to compose this as a story or diary.

Each of the ships was just about 100 feet long and there were 100 men total in the three ships. If a ship the size of the *Nina*, *Pinta* or *Santa Maria* is not available, it may be possible to draw out a life size outline of the ship using sidewalk chalk on a large empty parking lot, or by setting up stakes in a field or large lawn. Hopefully the student will be able to recognize the challenges of making a dangerous, uncertain journey while living in such cramped, uncomfortable living quarters.

- f. Imagine being a crew member with Columbus. Compose a diary or ship's log for five days of the journey, citing any birds or sea creatures seen, weather, fears and concerns of the crew, and anything else you think might be relevant. You are welcome to include some drawings of what you might have seen and experienced.

Columbus made four voyages to the Indies; each was quite different in nature. The attitudes and fears of the crew may vary by voyage and by what the student feels are important concerns. In your student's response, look for both emotion and realistic historical detail.

- g. Compose a conversation between Columbus, Ferdinand, and Isabella. What kinds of things might they have said to each other? See the guidelines for punctuating dialogue in the section called “Di-

Social Studies

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rect Quotations” in your English manual at the back of this book. We will work more on punctuating dialogue later.

This exercise is designed to bring awareness to the people involved in history, and to how, in any situation, each person might express different concerns, ideas, and goals. Here are some ways each person might have acted differently:

- **Columbus:** Very confident, very certain in tone.
- **Ferdinand:** Uncertain, doubtful, and fearful.
- **Isabella:** Curious, excited, and interested in the possibilities.

One interesting conversation would be between Isabella and Ferdinand. How would she persuade Ferdinand to release the necessary funds? Would she use ridicule, anger, and threats? Would she use pleading and arguing, or perhaps be loving and positive?

3. Check your shadow stick this week and make a note of the length of the shadow. Write down the measurement on your data chart. Make sure to note the date and time of the measurement.

You might want to check your student’s chart to make sure data is being recorded accurately and consistently. Are the unit labels included in the measurement (inches, AM or PM, etc.)?

Activity

Build a Sailboat

Directions for this project are in the coursebook. Students who have other ideas or skills for making a sailboat should feel free to use them.

Grade 5



Scientific Inquiry

Science

Assignments

1. After reading about bird beaks, collect as many pictures of birds as you can. Arrange your bird pictures according to beak type, and group the different beak types together.

Paste the pictures on a piece of paper, grouped according to beak types, and then draw pictures of the food that each bird eats, using the information in “Bird Beaks as Tools” as a reference. Alternately, you might like to make up a game that matches each bird with its food.

This exercise is designed to help students become aware of how the form of a bird’s beak relates to its function, namely what a bird eats. Games that students may want to play are card games with bird cards, or a bird board game that has each bird trying to make its way to the food it prefers.

2. Observe the birds in your back yard or a local park. Ask yourself what type of food each bird might eat based on the shape of its beak. Make a list of at least three different types of birds you observe (if you don’t know the type of bird, just describe it as well as you can, particularly its beak shape). If you can’t observe birds directly, find three different pictures to use. Create a hypothesis for each that predicts which types of food the bird will prefer.

Students should make a list of birds and a sketch of the birds’ beaks, and then form a hypothesis about what type of food they eat. Students are encouraged to use a bird guide as a reference and to check their work.

ASSIGNMENT SUMMARY

- ☐ Read “The Scientific Method” and “Bird Beaks as Tools.”
- ☐ Collect pictures of birds and group them according to beak type.
- ☐ Make a guess about the bird’s diet based on its beak.
- ☐ Observe birds and make predictions about their diets.
- ☐ Experiment: Bird Beaks

Scientific Inquiry

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Experiment

Bird Beaks

Design a simple experiment to determine which types of food the birds actually eat. One way to do this is to purchase different types of birdseed and set up “feeding stations.” For instance, you might wonder, “Will only birds with triangle shaped beaks eat sunflower seeds?” Or you might ask, “If I put out two different types of bird seed, one with shells and one without, will the birds that eat from each pile of seed have different types of beaks?” You can pose whatever question you like! Once you decide on your question and make a prediction about what will happen, brainstorm ways to test your hypothesis.

List the steps of the scientific method and follow them one by one as you carry out your experiment. Try to remove as many variables as you can. For instance, in this experiment, a variable might be the location of the bird seed. If one pile of bird seed is raised off the ground (where birds feel safe) and one is on the ground near the dog’s resting spot, how might this variable (location) affect your experiment results? You want to make everything the same except for the one thing you are testing.

After conducting your experiment, write a few sentences about what happened during each step of the scientific method. What are your conclusions? How could your experiment be improved?

Students should follow these steps of the scientific method (each step should have at least one or two sentences written about it):

Observation/question: Students write a question that the experiment will try to answer.

Hypothesis: A prediction or hypothesis is made, based on what the student already knows.

Experiment: The procedure for the experiment should be described step by step, taking into account (and controlling) as many variables as possible.

Results: Observations should be recorded as accurately and objectively as possible, and organized in a logical way (table, chart, list, etc.).

Conclusion: Students draw conclusions based on the results, and reflect on additional ways to expand on or follow up the experiment.



Scientific Ways of Knowing

Science

Reading

Read “Scientific Ways of Knowing” and “Frogs” (found in Reading Selections).

Assignments

1. After completing the frog experiment in this lesson, make a prediction about the frog population based on what you observed. What did you discover? Are frogs in your pond in trouble? Can you think of any other explanations for what you found? Can you think of ways to help the frogs in your area to keep a healthy population?

Support your findings with evidence. That means you will give specific examples of why you believe what you say, and what led you to have this opinion.

Note: if your experiment lasts longer than two weeks, just complete this assignment when your experiment ends.

If there has been a recent change in land use (new housing development or shopping mall) this may mean that frog habitat has been destroyed, leading to fewer frogs. If students check the pH of the pond and find it to be very acid, they might speculate on why this is so—are there factories in the area, or pulp mills? Where does runoff to the pond come from? Another factor that may influence the frog population is weather. If it is a drought year, there may not be as many frogs or tadpoles. Students are asked to “support their findings with evidence,” so look for the student to use his or her knowledge to make an informed speculation. Students will be expected to support their findings with specific evidence throughout this course.

ASSIGNMENT SUMMARY

- ☐ Read “Scientific Ways of Knowing” and “Frogs.”
- ☐ Make a prediction about the local frog population.
- ☐ Consider how humans affect the environment.
- ☐ Complete a science test.
- ☐ Experiment: Frog Population

Scientific Ways
of Knowing

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Students may want to present their results to their local Conservation Commission, or write letters to their state representatives. These results can be very useful as a basis to measure long term changes in their area!

2. Write a paragraph about the ways humans have affected the environment, both for good and bad. Do some research on this topic so you can back up your thoughts with facts (support your opinion). Include any ideas you might have for ways that people could change their behavior to help the environment.

Students are asked to research the specific impact of human activities. What happens to animals and plants when humans are involved? How is the forest affected? Foresters, scientists, businesses, and conservationists all have opinions and can be used for research. Since field research is on-going, magazines can also be an excellent source. Here are a few aspects students may consider regarding the long term results of human activity:

- Some birds and large carnivores cannot survive without substantial square mileage of wilderness.
- Mining and development create pollutants which poison parts of the ecosystem or slowly damage an animal's ability to reproduce.
- When a specific habitat is disturbed or disappears (such as a type of tree or wetlands), animal populations which depend on these areas decline.

3. Complete the science test below.

Test and answers are found after the experiment.

Experiment

Frog Population

Design an experiment to determine if the frog population in your neighborhood is healthy and growing or having any problems. Find a pond in your neighborhood where you can observe frogs. You may want to record data from your pond site for several weeks so it should be a place you can visit frequently. The spring is the mating and egg-laying season, but frogs may be found throughout the summer and fall. They may be hibernating in your area in the winter.

Choose a “clue” from the following list to research and use as the basis for your hypothesis.

- **Habitat destruction.** This can include roads that were built where frogs have to cross to reach their breeding ponds. You may need to talk to older adults to learn about how the landscape used to look.
- **Pollution, pesticides, acid rain.** You may want to talk to farmers or landowners around your pond. You could test the pond water's acidity.
- **Ultraviolet (UV) radiation.** Since this affects mainly the egg production and viability, you might conduct a frog count to see how many are hatching and making it to adulthood.
- **Competition and predators.** After doing a frog survey, can you identify any non-native frogs?

Brainstorm ways to design an experiment that will answer your question.
Collect your data (pieces of information) and record your observations.

Report the results of your investigation by listing the five steps of the scientific method (question, hypothesis, experiment, results, and conclusion) and writing a couple sentences about what you did for each step.

For each scientific experiment in this course, students are expected to follow the steps of the scientific process, writing one or more sentences for each step. Look for an experiment design that takes into account variables and tries to control them. Also, look for students to write a conclusion that not only refers to the original intent of the experiment but also specifies ways in which the experiment might have been improved (or compromised).

Science Test

Complete the following test to show what you have learned. Answer any questions in complete sentences.

1. List the five steps of the scientific method and explain each one.

Observation/question: A question (often based on an initial observation) is posed that the experiment will try to answer.

Hypothesis: A prediction or hypothesis is made about what might happen.

Scientific Ways of Knowing

(continued)

Scientific Ways of Knowing

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Experiment: The experiment follows a step by step procedure which takes into account (and tries to control) as many variables as possible.

Results: The results of the experiment are observed and recorded in an organized way.

Conclusion: Based on the results, a conclusion is drawn about what the experiment showed; usually the conclusion also takes into account flaws in the experimental design.

2. Explain why variables must taken into account in a controlled experiment.

A controlled experiment is one which can be repeated exactly with the same results. A single variable, such as temperature or location, can easily alter the results of an experiment, so all variables except the one being studied are controlled as much as possible to achieve the most accurate results.

3. List three different types of bird beaks and describe how they are related to the bird's diet.

Birds have different shaped beaks to enable them to eat their favorite foods. Their beaks are like tools for them. Here are some types of beaks that students might describe.

- Duck: wide bill with sieve-like edge strains out water while capturing plants and small organisms.
- Toucan: large beak plucks whole fruits off trees.
- Pelican: long beak with large lower pouch scoops up fish.
- Hummingbirds: long, thin beak reaches deep into flowers to gather nectar.
- Cardinal: cone-shaped beak cracks open seeds and nuts.
- Herons: spear-shaped beak spears fish.
- Raptors: curved, hook-shaped beaks for tearing meat.

4. Describe a frog's life cycle.

The three phases of a frog's life cycle are adult frog, egg or spawn, and tadpole.

5. What is an indicator species? Why are frogs an indicator species?

An indicator species is sensitive to changes in the environment, and can show the first signs of an imbalance in nature. Because they take in both air and water through their skin, frogs are very sensitive to pollution.

6. List four things that can cause problems for frogs, and explain why each is a problem.

Habitat destruction: Frogs need both dry land and a pond environment for their survival; if one of these habitats is disturbed, the frog life cycle can be interrupted.

Depletion of the ozone: Changes in temperature due to ozone depletion can interfere with the development of frogs' eggs.

Pollution, pesticides and acid rain: Frogs will take into their bodies any pollutants in the air or water, and can easily become sick or die.

Competition and predators: Non-native species or animals who have been dislocated due to habitat destruction can quickly alter a frog population.

Scientific Ways of Knowing

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