

Grade 5

Teacher Manual



Oak Meadow

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Introduction

This teacher manual is intended to help you support your student's learning in English, United States History, and Science. In addition to factual answers to assignment questions, you will find suggestions for ways to guide your student's learning, and tips on how to assess their responses. Along with the learning assessments found in each lesson of the coursebook (which highlight learning goals for each lesson), these tools will help you evaluate, track, and document your student's progress.

You are encouraged to use a weekly planner and the assignment checklist in each lesson. Help your child learn to use these organizational tools as well. Time management is an essential skill for students to learn, and one that will be useful for their entire lives.

In this teacher manual, you will find the full text for all assignments. The activities and experiments are listed without the text. Teacher manual answers are seen in color. If more information is needed about any assignment, you can refer to the full text and reading material in the student's coursebook.

For obvious reasons, it is best not to share this teacher manual with your student. Each student should be encouraged to come up with their own answers, and sometimes a student might go beyond what is required for the assignment. This is to be encouraged! When a student gets a factual answer wrong, you can share the correct answer. The focus should always be on the learning process rather than on a sense of judgment. Several incorrect answers related to a particular topic point to an area the student will benefit from revisiting.

If you notice a student's answers matching those of the teacher manual word for word, you will probably want to have a discussion about plagiarism and the importance of doing original work. Students in fifth grade are just beginning to learn about this concept, and any discussion about it should be approached as a learning opportunity. The issue of plagiarism and properly attributing sources is addressed in the English course.

We encourage you and your student to explore the topics introduced this year in active, experiential ways. We believe a real understanding and appreciation of the wonder of the world and the joy of learning only comes about when you and your student are fully participating in it.

Oak Meadow

Grade 5

English

English Lesson

Grammar Instruction

Subjects and Predicates

Reading

Find a book about Christopher Columbus in the library, if possible, and begin reading it. Recommended titles include

Columbus by Ingri and Edgar d'Aulaire

I Sailed With Columbus by Miriam Schlein

Christopher Columbus by Ann McGovern

Christopher Columbus, Sailor & Dreamer by Bernadette Bailey

Pedro's Journal by Pam Conrad

Columbus; The Voyage of Imagination from the *Value Tales* series

You have two weeks to read this book. (You will find additional book suggestions in the Further Study section of lesson 2.)

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.

ASSIGNMENT SUMMARY

- Begin reading a book of your choice about 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.

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.

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 their own words, but understand that this is difficult (try it 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 they have 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 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 proofread 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. They will rewrite the report, incorporating all the changes made. Point out the difference between the first and second drafts.

English Lesson

Grammar Instruction

Independent and Dependent Clauses

Reading

Finish reading your Christopher Columbus book.

Assignments

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

dowel convert stern bow
parallel rectangle dimension savage (noun)

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
- Write spelling/vocabulary words using alphabet refrigerator magnets

ASSIGNMENT SUMMARY

- Finish reading your Christopher Columbus book.
- 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.

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 4" × 10".*
 - **dowel *n***: cylindrical peg for holding a structure together. *A $\frac{1}{4}$ " 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 pole 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 4" × 10" 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 toward 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.

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.

English Lesson

Grammar Instruction

Sentence Fragments

Run-On Sentences

Using a Dictionary

Reading

Continue reading *The Witch of Blackbird Pond*. Each day, look up words you don't understand in your reading. Be sure you don't miss the meaning of the story you are reading. Become comfortable with using a dictionary because you will need it frequently in years to come.

Many students are reluctant to stop reading to look up words in the dictionary. Encourage your child to circle the unknown words or mark them somehow, and then when the chapter is finished, you and your child can discuss the meanings of the words and/or look them up together. Encourage your child to guess at the word's meaning based on the context of the sentence. This will help your student when they are writing original sentences that put vocabulary words into context.

Assignments

1. Write definitions for the following vocabulary words. Alphabetize them and use each one in a sentence. Remember to add a few additional spelling words to your list.

kettle skillet trundle indigo frontier apprentice

Look for new ways to practice your vocabulary/spelling list throughout the week so that you are very comfortable with the words before your spelling quiz. Here are a few more ideas:

- Make a crossword puzzle using the words (graph paper makes this easier).

ASSIGNMENT SUMMARY

- Begin reading *The Witch of Blackbird Pond*.
- Look up unknown words in the dictionary.
- Alphabetize and define vocabulary words, and use them in sentences.
- Take a spelling quiz.
- Transform sentence fragments into complete sentences.
- Repair run-on sentences.
- Revise previous writing to fix run-on sentences.

- Spell the words aloud with a partner, each one saying one letter at a time.
- Spell words using pipe cleaners, alphabet noodles, dough, etc.
- Recite spelling words in rhythm as you jump rope, skip, bounce a ball, etc.
- Print the word on a piece of paper and then cut it into letters; scramble the letters up and see how fast you can recreate the word; do this with several words at once for a real challenge.

Note the new ideas for ways to work with spelling/vocabulary words. It may help your child immensely if you also participate in these playful ways to explore words.

- **apprentice** *n*: person learning a trade by working for an agreed period of time. *At age 13, young girls were hired out to be servants in wealthier households, or apprenticed as cooks or seamstresses.*
 - **frontier** *n*: border between settled and unsettled countryside. *Immigrants ventured into the frontier hoping for a better life.*
 - **indigo** *n*: dye of a violet blue made from the indigo plant. *Early crops that did well here were rice, cotton, and indigo.*
 - **kettle** *n*: container for boiling water in. *Huge kettles were hung over the fire for cooking.*
 - **skillet** *n*: long-handled metal cooking pot; frying pan. *The women often cooked in skillets on grates over a fire.*
 - **trundle** *v*: roll or move, especially noisily or heavily. *A heavy cart drawn by four oxen trundled down Main Street.*
2. Correct these sentence fragments so each one is a complete sentence. You may add to either the beginning or the end of the fragment. Make sure to punctuate your complete sentence properly.
- a. **Johnny, who loved to play baseball, was thrilled to be in Little League.**
 - b. **The children were so happy that they went running and jumping all the way across the field.**
 - c. **Throughout the colony of Virginia, tobacco, rice, cotton, and indigo were thriving crops.**
 - d. **Paul Revere was more than a legendary figure.**
 - e. **All those who believed in freedom from England worked hard to achieve it.**
 - f. **Reading *Where the Wild Things Are* is highly recommended.**

3. Identify the following sentences as correct or run-on sentences. Repair any run-on sentences.

There is often more than one way to repair a run-on sentence. Examples are below but your child may suggest another solution.

- a. **I've had a cold for a week and I'm feeling very tired.**
 - b. **The sun shone brightly. It was a hot day.**
 - c. **It might rain tonight, so wear your raincoat. (Correct)**
 - d. **The British were guarding the roads, so Paul Revere had a hard time getting through.**
 - e. **The colonists needed a new flag, but they had trouble deciding on one.**
 - f. **A new flag was finally chosen. It had 13 stars and 13 stripes.**
 - g. **When the cat played with yarn, it got all tangled up. (Correct)**
 - h. **The kettle was pushed into the fire and got very hot. It was too hot to handle so I had to use a rag to pull it out.**
4. Read through your written work this week and repair any run-on sentences you find by breaking them into separate sentences or using conjunctions and punctuation to separate the complete thoughts. (You might want to review the section called "Conjunctions" in the English manual.)

Ask your child to point out run-on sentences that could use revision, and then check to see if adequate repairs are made. If they can't find any run-on sentences, you might point out one or two. Of course, not every child will use run-on sentences, but many do.

Alternately, if your child tends to write lots of very short, simple sentences, you can encourage the use of conjunctions and punctuation to create compound and complex sentences to provide more variety and interest in their writing.

English Lesson

Grammar Instruction

Verb Forms

Reading

Finish your reading book.

Assignments

- Write definitions and sentences for the following words. Make sure to work with this list in a variety of ways throughout the week before you take the spelling quiz.

treaty	whilst	tyrant	foment
emancipation	unified	arbitrary	maxim
subdue	compromise		

- **arbitrary** *adj*: coming about seemingly at random. *A tyrant exercises arbitrary power.*
- **compromise** *v*: concede; negotiate; conciliate; agree through concession. *The Loyalists would not compromise their allegiance to Britain.*
- **emancipation** *n*: freedom from social, political, or moral constraints. *She wrote that although nations were being emancipated, men insisted upon retaining absolute power over their wives.*
- **foment** *v*: instigate, stir up trouble. “. . . We are determined to foment a rebellion, and will not hold ourselves bound by any laws in which we have no voice or representation.”
- **maxim** *n*: truth or rule of conduct expressed briefly. *A famous maxim in the Declaration of Independence states, “All men are created equal.”*

ASSIGNMENT SUMMARY

- Alphabetize and define vocabulary words, and use them in sentences.
- Take a spelling quiz.
- Write a book report.
- Compose sentences using present tense, past tense, past participle verb forms.
- Form plural nouns.
- Differentiate between different sentence types.

- **subdue v: conquer, suppress.** *The Loyalists were subdued after the American Revolution.*
- **treaty n: agreement between people, especially for use or purchase of property.** *Despite treaties, some American Indian villages were burned or destroyed and their land given away in punishment for their support of the British.*
- **tyrant n: cruel leader.** *Abigail Adams wrote her husband saying that men would be tyrants if they could, probably because she had seen so many men act in domineering ways.*
- **unified adj: caused to be one; combined; cohesive.** *In order for a new country to succeed, it needed a strong, unified government.*
- **whilst conj: at the time.** *In a letter, Abigail Adams wrote, “. . . For, whilst you are proclaiming peace and good will to men, emancipating all nations, you insist upon retaining an absolute power over wives.”*

2. You should be finished with your chosen reading book. Write a book report using the notes you wrote last week.

Your book report should include a title page with the name of the book and the author, your name, and the date. The body of the report should briefly summarize the action of the story, introducing the main characters and telling something about how they were changed during the course of the book. It should also include comments on whether or not you recommend this book to others and why. Be sure to back up any comments with specific examples.

Revise and edit your book report for clarity and accuracy. Check to make sure your paragraphs have topic sentences and present one clear topic. Check to make sure your sentences are varied, of different lengths, and use descriptive words. Check spelling, punctuation, and other details. Read your report aloud. Do you think it sounds interesting? How could you make it more interesting?

After you have made all your corrections, copy the report in your best handwriting, and then proofread it to make sure you have done your best work. Feel free to illustrate the cover of your book report with a picture related to the story.

The student should finish writing a report on their book of choice. Attention should be paid to sentence and paragraph structure, with an emphasis on including specific details about the book as well as opinion. The report should be interesting enough to motivate the reader of the report to read the book. The student should follow the steps of the writing process (particularly revise, edit, and proofread). In the final report, look for the information to be organized in a logical way, and for a clear delineation of opinion and fact.

3. Choose two words from each of the verb tense columns in the grid above (present tense, past tense, past participle) and write a sentence for each one. You will be writing six sentences. Remember, you may need a helping verb when using the past participle form of the verb.

Examples of present tense: I go to the park and sit on the swing.

Examples of past tense: I went to the park and sat on the swing.

Examples of part participle: I had gone to the park and had sat on the swing.

4. Form the plurals of the following nouns. (Refer to the section called “Nouns” in your English manual if you need a refresher about the spelling rules.)

city **cities** mouse **mice** gypsy **gypsies** woman **women**

daisy **daisies** monkey **monkeys** turkey **turkeys** berry **berries**

5. In the following sentences, identify the **nouns**, **verbs**, **adjectives** and **adverbs**. Also identify each sentence as declarative (DEC), interrogatory (INT), exclamatory (EX), or imperative (IMP).

As you can see from the colorful sentences below, these four parts of speech make up the majority of words in a sentence. However, it may be challenging for your fifth grader to identify all of them. The most important element of this exercise is that your student correctly categorizes the words they highlight. That is, it is more important that your student labels the words correctly than that they identify each and every example of these parts of speech.

- a. **Have you seen** my **little black dog**? (INT)
- b. **I saw him running happily through** the **big meadow**. (DEC)
- c. **Harvey, you naughty little dog, come here right now!** (IMP)
- d. What a **good dog you are!** (EX)
- e. **Boris**, the **colorful African butterfly**, **flew slowly toward** the **huge yellow sunflower**. (DEC)
- f. **Along came** a **big black hungry crow**. (DEC)
- g. **When** the **cranky, black crow saw** the **brilliantly colored butterfly** float **by** on the **warm air, it cried raucously**. (DEC)
- h. **Does anyone know** if the **black crow hungrily gulped Boris down**? (INT)

English Lesson

Reading

Continue reading *Children of the Wild West* and *Buffalo Bird Girl: A Hidatsa Story*. Continue to look up any words you do not understand, and take notes. Remember to put notes into your own words.

Assignments

1. Add several words to the list below and then define each word and use it in a sentence. Work with the words throughout the week and then take a spelling quiz.

lucrative volatile captor duel humble

- **captor *n*: one who catches, wins or takes control, or imprisons another.** *Andrew Jackson refused to shine the boots of his British captor.*
 - **duel *n*: armed contest between two people, usually to the death.** *He often challenged people to duels to solve simple disagreements and arguments.*
 - **humble *adj*: modest.** *Andrew Jackson was the first president to have come from a very humble beginning.*
 - **lucrative *adj*: profitable.** *Through his lucrative private law practice and by buying and selling land, Andrew Jackson became wealthy.*
 - **volatile *adj*: changeable in mood; flighty, unstable.** *He had a fierce and volatile temper.*
2. You already know that every sentence must have a capital letter at the beginning and a period, exclamation point, or question mark at the end. You know also that every sentence must have a subject (which includes a noun) and a predicate (which includes a verb). You may want to review “Subjects and predicates” in the English manual.

Use colored pencils to shade the subject of each of the following sentences in blue and the predicate of each sentence in red (or circle them in the designated color), like the following examples:

ASSIGNMENT SUMMARY

- Alphabetize and define vocabulary words, and use them in sentences.
- Take a spelling quiz.
- Identify subjects and predicates in sentences.
- Compose simple, compound, and complex sentences.
- Identify words with prefixes and suffixes.

The red-haired girl with the ponytail **was playing soccer.**

Soccer season **is usually extremely hot.**

Remember, the subject includes the noun and all the words related to it, and the predicate include the verb and all the words related to it.

- a. **The kitten raced up the tree.**
 - b. **The huge, old tree was tall and stately.**
 - c. **The tiny cat’s cries could be heard coming from the beautiful canopy of green leaves.**
 - d. **Peter, the neighborhood’s best tree climber, decided to climb up and rescue the kitten.**
 - e. **The terrified cat’s sharp claws dug into Peter’s shoulder as he made his way down the tree.**
3. Compose two simple sentences, two compound sentences, and two complex sentences (refer to “Sentence Structures” in the English manual). In each of your sentences, shade or circle the **subject in blue** and the **predicate in red**. Use proper capitalization and ending punctuation.
4. Put together the following phrases to make sentences. Your sentences might be very silly, but you must include at least one subject and one predicate in each sentence. You can combine more than one phrase into a single sentence. Identify the **subjects** and **predicates**.
- **ran down the hill**
 - **sailed out to sea**
 - **the gardener, John**
 - **was a huge giant**
 - **sobbed inconsolably**
 - **the magic green fish**
 - **Pip, the purple frog**
 - **the moon**
 - **rose majestically**
 - **the king of France**

Sentence examples:

The king of France was a huge giant.

The magic green fish rose majestically.

Oak Meadow

Grade 5

United States History

U.S. History Lesson

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 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 traveled to China to trade soon after he was born, and his mother died. He was raised

ASSIGNMENT SUMMARY

- 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.

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 returned 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 that went up and down over the surface of the water. The student is expected to use their 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 with a local observatory or stargazer 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.

U.S. History Lesson

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 their own. Here are some possible reasons that may be cited for Columbus’s behavior:

- **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.**

ASSIGNMENT SUMMARY

- 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

- **Europeans were already using 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, and 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 that are still being treated with disrespect, such as the Chiapas in Mexico, the Aborigines 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 near our home and claimed our property? 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 toward 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 that is unknown is often 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 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 on 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 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 Isabela. What kinds of things might they have said to each other? See the guidelines for punctuating dialogue in the section called "Direct 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, a.m. or p.m., 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.

U.S. History Lesson

Reading

Read “Colonial Living” (see Reading Selections).

Assignments

1. Look at the map you drew last week. Shade the New England colonies orange, the middle colonies green, and the southern colonies pink. Color the water blue. Label the Atlantic Ocean and the Pacific Ocean. If you have included the Great Lakes on your map, label those as well.

Your student is asked to color in the map made in the last lesson. The New England colonies are Connecticut, Massachusetts, Rhode Island, and New Hampshire. The middle colonies are New York, New Jersey, Pennsylvania, and Delaware. The southern colonies are Maryland, Virginia, North and South Carolina, Georgia, Louisiana, and Florida. (Actually, Florida was not an English colony, but a Spanish territory, Louisiana was a French territory, and New Hampshire and New Jersey were not colonies until later, but go ahead and have your student add them to the map.)

The original 13 British colonies were New Hampshire, which included parts of Maine and Vermont; New York, which did not yet stretch out to the Great Lakes; Massachusetts, which also included part of Maine; Rhode Island and Connecticut, pretty much as they are today; New Jersey and Pennsylvania, which did not stretch as far west as they do now; Virginia, including West Virginia; and North Carolina, South Carolina, and Georgia. Everything west of these, as far as the Mississippi River, was pretty much Louisiana (held by France), or “Indian territory.” Unless your student has done additional research, they are not likely to know many of these details. Feel free to share them with your student to help them create a more accurate map.

ASSIGNMENT SUMMARY

- Read “Colonial Living.”
- Draw and label areas on the map of North America.
- Consider the reason for the placement of the early colonies.
- Create a study chant.
- Draw a family tree.
- Record final data and interpret it.
- Activity: Johnny Cake

2. Which area had the most colonies? Why do you think this was? Give more than one possible reason. Write your answer in complete sentences.

The areas with the most colonies are along the northeastern seaboard in the areas where the earliest colonists settled. Possible reasons are below:

- **Early colonists were more interested in establishing settlements than in exploration, so tended not to travel very far from where they first landed.**
 - **Many different countries were sending settlers at about the same time to about the same place, so the land got divided up into smaller pieces to accommodate numerous peoples.**
 - **Harsh conditions and disagreements between people meant that people had to move away quickly and found colonies elsewhere.**
 - **People did not claim big chunks of land at first because they did not have enough people to work a large area of land; this meant land was divided into fairly small colonies at first.**
3. After reading “Colonial Living,” make up your own chant or verse to learn something you are studying in school. This might relate to math, spelling, or any other area. It might be fun to record your chant on audio or video. Otherwise, just write it down.

This can be a lot of fun. Possibilities are chanting the names of all the states and state capitals, or multiplication tables. Some students might also want to make up movements or rhymes to go with their verse.

4. It was common in colonial days for families to record important family events on a family tree, which was added to with each marriage and birth. A family tree was a record of all the relatives on both sides of the family.

On a piece of poster board or sturdy art paper, create your own family tree (if your ancestors are unknown, you may want to create a family tree for a friend or other loved one). Go back as far in your family’s history as you want. Perhaps there is a record of your great-grandparents, or even further back!

You might like to design your family tree like an actual tree with branches, and make it a real work of art, instead of the more traditional example shown. Use colored pencils, and decorate the edges of the paper with artistic designs. Consider making it on large poster board, so it’s big enough to decorate beautifully.

Your student should feel free to present this material as they wish. Sometimes a family tree is shown with oneself at the bottom, like a trunk, and the ancestors stretching out along the branches above. Siblings, aunts, uncles, and cousins may be added, although it may take more planning to accommodate them all. If a student or family prefers to follow a family tree other than the student’s, that is fine as well.

5. Record your final measurements with your shadow stick. Has there been any change in the placement of the sun in the sky during the six weeks you have been measuring the shadow cast by your stick? Write one or two sentences describing what your data shows.

The data chart should include accurate measurements and indicate consistent data collection. Hopefully the student will notice a pattern to the data and be able to make a connection between the movement of the sun and the passage of time or season.

Activity

Johnny Cake

The recipe included in the coursebook can be baked like a cake or you can thin the batter with a little extra milk and fry the Johnny cakes like pancakes.

U.S. History Lesson

Reading

Read “After the War” (found in Reading Selections).

Assignments

1. Write a letter to a friend as if you were a colonial woman whose husband was fighting in the revolution. Tell about some of the hardships you face, and the extra work you have to do each day. Be specific; don't just say, “I have to do all my husband's work.” Describe your day as you imagine it might have been.

The student is asked to think about taking on the work of two people in terms of survival; remember that even though people helped each other out, everyone had to work hard at physical labor in order to have enough to eat and stay warm and dry. A husband's work might include clearing and plowing fields, sowing seeds, watering, harvesting and storing crops, chopping and stacking firewood, building and fixing fences, caring for and feeding animals, building and repairing homes and barns, digging wells, hunting for food, and protecting family and livestock from wild animals.

2. Why do you think it was so important for the United States to have a Constitution? What do you think might have happened if there hadn't been one? What kinds of rules do you think are the most important ones for a country to have? Answer the first two questions with a few sentences, and then make a list of important rules.

When the United States gained its independence, it needed to create a government under which the people were willing to be governed, and to decide the limits of that government; what kinds of laws could be made, and what kinds of laws were not allowed to be made by it.

ASSIGNMENT SUMMARY

- Read “After the War.”
- Write from the perspective of a woman during the Revolutionary War.
- Consider what to include in a Constitution.
- Plan how to furnish a house on a budget.
- Write a conversation between George and Martha Washington.
- Add to your map.

Here are a few examples of what might happen without a Constitution:

- **The most forceful or powerful people might take over, create whatever laws they wanted, and make people obey them**
- **Each state might decide to make up its own government completely independent of the other states, and the different kinds of governments might fight each other, with the more physically powerful states taking over other states**
- **There might be a lot of disagreement over the laws and what they mean, causing further conflict**

The rules the student might identify as important for a country will vary, but may address issues of how people can live in harmony together and what to do in case of conflicts.

3. Go to a furniture store or scan through magazines, newspaper, or online ads and see how much elegant furniture you can buy for \$3,000. Imagine if you had to furnish the president's mansion on \$3,000 today! In those days it was quite a lot of money. How much do you think it would cost today to furnish just one room elegantly?

The student may not be able to furnish even a simple, ordinary living room today with \$3,000. In estimating the cost of furnishing one elegant room today, the student may consider wallpaper, paint, draperies, lamps, vases, bookends, mirrors, pictures, flooring, rugs, and fixtures such as curtain rods, light switch plates, chandeliers, etc., as well as the furniture itself.

4. Imagine how George Washington might have felt as he rode home after his last day as the first American president. What do you think he would have done with his time during those first few weeks home at Mount Vernon? Write a conversation George and Martha Washington might have had on this journey as they look ahead to their lives as common citizens. Use proper punctuation for dialogue (refer to the English manual if necessary).

George Washington was lucky to have the opportunity to actually put into practice the ideals for which he fought. One of these ideals was that all men (people) are created equal. This is an opportunity for the student to think about the transition from war hero to ordinary citizen, an experience that some people today have, and how one remains an ordinary citizen despite one's heroism. Putting the conversation into dialogue form allows the student to practice dialogue punctuation and to show how George and Martha may have had different points of view about the situation.

5. Add New York City and Washington, D.C. to your map.

U.S. History Lesson

Reading

Read “Andrew Jackson” (see Reading Selections).

Assignments

1. After completing the reading selection, choose one of these assignments:
 - a. What options do you think Andrew Jackson should have considered, other than taking over the Indians’ land and sending them west? Use your creative problem solving to design a plan under which the Indians and the white settlers might have lived side-by-side, each getting what they needed to thrive. Take into account their differing ways of life, sources of food, community organization, etc. Give specific examples of how your plan satisfies the needs of both groups. Write at least two pages.

The student is asked to combine both imagination and pragmatism to recognize the problems of the Native Americans who had white settlers push them out of their land, and come up with solutions for white people and Indians living together. The student has a choice of a story or a play in which to do this. Alternative options to Andrew Jackson’s plan may include buying the Indian’s land at a fair price, but only if they are willing to sell; dividing up the land between Native Americans and white settlers according to population; or asking the Indians for their opinions on how to solve the issue and share the land.

- b. Compose a short play which includes dialogue between one or more white settlers and one or more Indians who are being forced to move. Show the ideas and points of view of each person. Set the scene by telling a little about the characters, the location of the play, and anything else you consider important. Use correct punctuation for dialogue. Write at least two pages. Feel free to act out your play afterwards. (You might want to record it.)

This exercise allows students to consider both sides of the issue from a personal point of view. The characters in the play should clearly express their feelings about what is

ASSIGNMENT SUMMARY

- Read “Andrew Jackson.”
- Reflect and write about the forced relocation of Native Americans.
- Activity: Making a Bead Loom

happening. Although the conversation is written in play form, the student is asked to use correct punctuation for dialogue.

Activity

Making a Bead Loom

The student will be making a small loom this week and stringing it in preparation for next week's weaving project. There are many good videos online if more instruction is needed.

Oak Meadow

Grade 5

Science

Lesson

1

Scientific Inquiry

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 backyard 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

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.

Lesson

2

Scientific Ways of Knowing

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 acidic, 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 their knowledge to make an informed speculation. Students will be expected to support their findings with specific evidence throughout this course.

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.

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

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 ongoing, 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 that 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 that depend on these areas decline.**
3. Complete the science test (found after the experiment).
- 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 of 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.

Experiment: The experiment follows a step-by-step procedure that 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 be taken into account in a controlled experiment.

A controlled experiment is one that 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.

Lesson

6

The Web of Life

Reading

Read “Energy in Ecosystems” (see Reading Selections).

Assignments

1. After completing the reading assignment, make a list of eight different things that you eat. Describe the food chain for each food.

The student’s challenge will be to identify the connections between food (the end product) and the sun, which is at the beginning of each food chain. A food chain shows how energy moves through an ecosystem. This may require some research or assistance from you. If a student has listed cereal and chicken on the list of foods, for instance, the food chains might look like this:

Cereal: sun → oats → me

Chicken: sun → seeds → insects → chicken → me

Technically, every food chain goes from the sun to producers (plants) to consumers to scavengers to decomposers. In this exercise, however, students are asked to focus on the links of the chain before the food gets to their plate.

2. Using the eight food chains you identified above, draw a food web that shows how all these things are connected. Take your time to draw your food web carefully, in color, and label each segment of it. Make it clear how things are related.

The food web should start with the sun (as all food webs do!), then move to plants, and then animals, finishing with the human. Using the cereal and chicken food chains above, for instance, the food web would show how the two chains are connected. The student’s drawing may contain scavengers and decomposers, as these are important elements of any food web.

ASSIGNMENT SUMMARY

- Read “Energy in Ecosystems.”
- List the food chain for different types of food.
- Draw a food web.
- List plants and animals you would raise on a farm.
- Complete the science test.
- Write the results of your mold experiment.

3. Make a list of the plants and animals you would raise if you were a farmer. Explain why you chose each of them.

Make sure your student gives reasons for their choices. Here is a sample response:

If I were a farmer, I would raise crops that were good to eat and easy to store. Since I live in New England, this means apples, squash, tomatoes, and broccoli. I would have a small, diverse organic farm and sell directly to my customers at a farmers' market. Organic produce is better for the consumer, and better for the environment. I would also raise chickens for collecting and selling eggs, and a few goats for milk and making cheese. In this way, I could meet the needs of my family and know that the foods that we were eating are as healthy as possible.

4. Complete your mold growth experiment. Did different types of molds grow on different foods? Describe the changes as carefully and accurately as you can. Perhaps you will measure the mold growth in terms of length and width, or perhaps you will estimate how much of the item is covered with mold (10%, 50%, etc.). Try to be as exact as you can. In addition, make drawings of the different kinds of molds that you grew.

When you are finished with your experiment, be sure to put your sealed bags into the garbage. Don't open them because some kinds of mold are dangerous to breathe. Remember, safety first!

Conclusions: Did the placement (warm + light, warm + dark, cold + dark) have any effect? Why do you think that the food needed to be dipped in water? For each step of the scientific process, write one or two sentences about what you did, what you observed, and why you think it happened.

Mold growth can be measured in inches/centimeters, or it can be recorded with an estimated percentage (e.g., 25% of the bread was covered with mold). Drawings should accompany the data, and students should write one or two sentences for each step of the scientific process.

Results: Students will find that different molds grow on different types of food. They should note color and appearance of mold in their drawings. In general, the "cold and dark" specimen will have the least growth.

Conclusions: Molds are fungi, and so they are neither plants nor animals. They need moisture and heat to grow. They do not need light, so the students may notice good growth in the warm and dark specimen. The food needed to be dipped in water because molds need moisture for growth. Some mold spores are also water borne (others are spread in the air, others by insects and animals).

Science Test

1. Describe two different environments.

The student might mention any number of environments, such as a forest, a desert, the bottom of the ocean, or your backyard.

2. Explain the difference between a food chain and a food web.

A food chain shows how energy moves through an ecosystem, from the sun, through plants (producers) and animals (consumers, scavengers, and decomposers). When a lot of food chains are linked together, it is called a food web. Like the strands in a spider web, all the linked food chains are interdependent.

3. How does each and every food chain begin?

Each and every food chain begins with the sun! The sun is the source of the energy for every living thing on Earth.

4. How does each and every food chain end? Why is this such an important step in the food chain?

Every food chain ends with the decomposers. They take dead things and turn them into soil, which in turn supports the plants in beginning another food chain. This forms the final link in the full circle of the food chain.

5. Define producers, consumers, scavengers, and decomposers. Explain the role of each in the environment.

Green plants are called producers; they are the only link in the chain that can use the sunlight to create their own food. Animals that get their energy by eating other living things are called consumers; consumers can eat plants and/or animals. Scavengers eat only other animals that have already died, and in this way act as the clean-up crew for the planet, eating dead animals before they spread disease. Decomposers break down any remaining dead matter (plants and animals), releasing rich nutrients back into the soil.

6. Why are plants so important to Earth?

Green plants (producers) are significant because they use the energy from the sun directly to produce their own food. Only plants can make their own food. In this way, plants capture the energy from the sun and transform it into a food/energy source for every animal on Earth.

7. What happens to energy in each step of the food chain?

About 90% of the energy is lost in each step of the food chain. The energy that is lost in each link of the food chain is given off in the form of heat energy.

8. Why do some people want to keep the human food chain short by eating grains instead of meat?

Eating lower on the food chain means we benefit from a greater amount of food energy since so much energy is lost in every step of the food chain. Also many people believe that using land to grow crops to feed people (rather than using those crops to feed animals that people will eat) is a more sensible use of land and may eventually help eliminate world hunger.

9. Explain diversity in an ecosystem and why it is important.

Diversity in an ecosystem refers to having many different types of plants and animals in one area. This makes an ecosystem stronger because it is less likely to be thrown out of balance and unable to recover if one type of species is altered (increases or decreases).

Lesson

17

Conserving Earth's Resources

Reading

Read “Recycling” and “Food and Hunger.”

Assignments

1. Keep a record for one week of everything you eat. Each day, check to see if you had food from each of the food groups (carbohydrates, proteins, vitamins and minerals). If you did not, eat a more balanced assortment of foods the next day. At the end of the week, assess your diet. Do you think you have a healthy diet? Why or why not? What areas do you think you could change? Would these changes have a positive effect on the environment? How?

Your student is keeping a detailed record of what they eat. This is harder than it sounds—it may help if your student keeps a notebook or chart in the kitchen. You can also help your child remember what was eaten at the end of each day and check to make sure the list is being kept up to date.

Most adults have some opinions about diet, especially their own and their children's. In this exercise, it's recommended that parents allow students to explore their own feelings about food, free from parental influence.

The student is asked if they think their diet is healthy and why, and what areas of diet might be changed. Students are also asked to make the connection between diet and the environment. This may lead to interesting questions and conversations.

2. Choose one of the following projects to complete:
 - a. Do service stations recycle motor oil in your community? Visit or call three service stations to find out. Where do they take it, and what is done with it there? Report your findings.

ASSIGNMENT SUMMARY

- Read “Recycling” and “Food and Hunger.”
- Keep track of what you eat, and assess your diet.
- Complete an assignment related to the reading.
- List recycled and plastic materials in the home.
- Reflect on how to take care of Earth.

Motor oil is harmful to the environment because many of its hydrocarbon components are poisonous and do not easily break down. Your student may be surprised to find out how carefully the disposal of motor oil is regulated.

- b. Learn about the use of hemp as an alternative to cutting down trees for paper.

Until the mid-19th century, paper was made from cotton, straw, hemp, and other fibers, not trees. Both hemp and kenaf are bushes that are easier to cultivate than trees because they are disease-resistant, are nitrogen fixers, and work well in crop rotation. Both grow much more quickly than most softwood trees that are often grown for paper pulp, maturing from seed in five to six months. That means that crops of hemp or kenaf can be grown and harvested several times before a stand of coniferous trees has grown sufficiently for harvest and making pulp.

Producing paper from hemp is better for the future health of all of us because the toxic chemicals needed to make quality paper from wood, the worst of which is dioxin, are not used in hemp production. Hemp cultivation does not deplete the soil of minerals the way harvesting trees does.

- c. Compare a piece of recycled paper and a regular piece of paper and compare the two. Do you see any difference? If so, what is it?

The difference between recycled and new paper is often insignificant unless you're dealing with heavyweight paper.

3. Make a list of items in your home that are made of recycled material. Make a list of items that are made of plastic, and write down ideas for alternate materials that could be used for these items.

This assignment may be challenging as sometimes it is hard to tell if something is made of recycled material. The process of looking closely at the materials in your home and trying to determine their origin will be a worthwhile experience.

4. You have learned many ways to be a good caretaker of Earth so that our planet remains a healthy, safe place in which to live. Reflect on what you have learned and which things feel most important to you. Write your thoughts in a paragraph, or express them in an artistic form (a drawing or painting, a poster, a poem, etc.)

This exercise is another opportunity for your student to appreciate their contribution to caring for the home and the planet.

Lesson

23

Body Tissues

Reading

Read “Body Tissues” (found in Reading Selections).

Assignments

1. Do some research to learn what a neuron looks like. Draw a picture of a neuron, and label all of the organelles within.

Students will need to do research in the library or online to complete this assignment. The neuron drawing should include the following organelles: endoplasmic reticulum, mitochondria, Golgi apparatus, Nissl bodies, and nucleus. It may also include the neuronal membrane, dendrites, and axons. The drawing should be clearly labeled and neatly drawn.

2. Choose one of the following fingerprint projects:

These experiments are fun and easy to do. Students should be able to categorize their fingerprints according to the three categories (arches, whorls, and loops). It may be interesting to take the fingerprints of others as well and compare them.

- a. “Lift” your prints! Using a pencil, rub a *very* black square on a white piece of paper. Make sure the square is shiny black. Rub your thumb, print-side down, onto the square. Take a piece of tape, and put the sticky side onto the black part of your thumb. Press the tape down. Now remove the tape from your thumb, and tape it onto a piece of white paper. Wash your hands with soap and water. Use a magnifying glass to study your fingerprint. Describe your fingerprint. Does it have arches, loops, and/or whorls?
- b. Another fun way to look at your fingerprints is to *blow them up!* Press your thumb onto an ink-pad, and then press your thumb onto an uninflated balloon. Now, blow up the balloon, and see your fingerprint magnified. Write a description of your fingerprint.
- c. Take the fingerprints of your friends and family members. See if you can put them into their respective categories; arches, whorls, or loops. Which category do most of your fingerprints fall into? Which category do the fewest fall into?

ASSIGNMENT SUMMARY

- Read “Body Tissues.”
- Draw and label a neuron.
- Choose a fingerprint project.
- Make a list of family blood types.
- Describe the purpose of five different organs.
- Activity: Muscle Model

3. Make a list of all of the blood types in your family. Try to find out your own blood type, if you can. See who could donate blood to you, if you needed it.

Some family members may not know their blood types but it will be educational for the student to learn what they can.

4. Make a list of five organs in your body. Describe the job of each one.

Answers will vary and may include eyes, tongue, lungs, heart, kidney, liver, and stomach.

Activity

Muscle Model

Students should compare the muscles in their arms to the model, flexing and extending their own muscles as they move the balloon model.