

Grade 4 Science

Unit 3: Structures and Functions of Living Things

15 lessons and a unit quiz. Use this pack with the **Structures and Functions of Living Things Student Reader** (print it, or download it once from the course) to teach the whole unit without the internet.

What is in this pack

- A lesson plan for each chapter: the Big Question, words to know, which pages to read, questions to talk over and the activity pages.
- The unit quiz, ready to print.
- Answers for the teacher at the back: every discussion question and the quiz key.

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Lesson schedule

Two or three lessons a week, about 30 minutes each. Tick each one off as you go.

	Lesson	Reader pages	Activity pages
☐	Lesson 1: Structure and Function of a Plant	—	AP 1.1, AP 1.2
☐	Lesson 2: Biological Organization	PDF pages 7–10	AP 2.1, AP 2.2
☐	Lesson 3: Organs and Organ Systems	PDF pages 11–16	AP 3.1, AP 3.2
☐	Lesson 4: Functions for Survival	—	AP 4.1, AP 4.2
☐	Lesson 5: Functions in Animals	PDF pages 17–20	AP 5.1, AP 5.2, AP 5.3
☐	Lesson 6: Functions in Plants	PDF pages 21–26	AP 6.1, AP 6.2
☐	Lesson 7: Structure and Function Report	—	AP 7.1, AP 7.2, AP 7.3, AP 7.4
☐	Lesson 8: Hearing and Vision	—	AP 8.1, AP 8.2
☐	Lesson 9: Human Vision and Hearing	PDF pages 27–32	AP 9.1
☐	Lesson 10: Modeling the Detection of Sound and Light	—	AP 10.1, AP 10.2
☐	Lesson 11: Sensing the Environment	—	AP 11.1
☐	Lesson 12: Animal Senses	PDF pages 33–38	AP 12.1
☐	Lesson 13: Plant Responses	PDF pages 39–42	AP 13.1
☐	Lesson 14: Stimulus and Response for Survival	—	AP 14.1
☐	Lesson 15: Helen Keller and Louis Braille	PDF pages 43–46	—
☐	Unit review and assessment	—	AP UR.1, AP UR.2, AP UR.3
☐	Words quiz	—	—

Page numbers are the PDF page numbers of the Student Reader file, so they match what your PDF reader shows.

Lesson 1: Structure and Function of a Plant

THE BIG QUESTION

How are structure and function related in a plant process?

Words to know

- **function** — the way that something works to achieve a task or serve a purpose
- **structure** — the arrangement of parts that make up something
- **leaf** — the part of a plant that is at the end of a stem and is often flat and green
- **organism** — an individual plant, animal, or single-cell life form
- **root** — the part of the plant that grows downward to seek water, usually underground
- **stalk** — the main support, or stem, of a plant
- **stem** — the main stalk of a plant or a shrub

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 25–29: the steps, materials and timing for this lesson.

Talk it over

1. What direction does water move through plants?
2. How can we investigate how water moves through plants?
3. What happens if the seed or plant is not watered?
4. What happens when a wilted plant is watered?
5. Why does the plant respond this way?
6. How does water move in your house?
7. What happens when you wet one edge of a piece of cloth or paper?
8. What happens to water as you drink it through a straw?
9. What do you predict will happen to the colored water by the end of the lesson?
10. What do you predict will happen to the colored water by the following day?
11. What difference would you observe if you cut the leaves off before starting?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How are structure and function related in a plant process?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 1.1: Structure of a Celery Stalk — Teacher Guide PDF page 123

- Activity Page 1.2: Celery Investigation — Teacher Guide PDF pages 124-125

Lesson 2: Biological Organization

THE BIG QUESTION

How are cells and tissues related in living things?

Words to know

- **cell** — the smallest unit of life
- **biological organization** — the pattern of how an organism is structured

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 30–37: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 1: “Biological Organization”: PDF pages 7–10. Look at the pictures and maps together.

Talk it over

1. What is a cell?
2. Are there different types of cells? What are some examples of different cells in your body?
3. If we're made of cells, why can't we see them?
4. How many cells are plants and animals made of?
5. Do you think there is a structure to how plants and animals are formed?
6. What are some examples of structures of plants and animals?
7. Why do you think it is important to study structures in science?
8. What do the plastic blocks represent?
9. What do the structures you built represent?
10. What is the smallest unit in a living thing?
11. What do those cells come together to make?
12. Did you read about any of these examples in the article?
13. What are some other examples of cells that make up animals or plants?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How are cells and tissues related in living things?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 2.1: Cells and Tissues Model — Teacher Guide PDF page 126

- Activity Page 2.2: Check — Teacher Guide PDF page 127

Lesson 3: Organs and Organ Systems

THE BIG QUESTION

How do organs work together in systems to perform specific functions?

Words to know

- **function** — the way that something works to achieve a task or serve a purpose
- **structure** — the arrangement of parts that make up something
- **organ** — a body part made up of related tissues that perform a specific function
- **organ system** — a group of organs that work together to carry out certain functions
- **nerve** — a bundle of cells that send and receive messages between the brain and other body parts
- **oxygen** — a gas that allows an animal to breathe

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 38–44: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 2: “Organs and Organ Systems”: PDF pages 11–16. Look at the pictures and maps together.

Talk it over

1. What is the structure of organs?
2. What do organs do?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do organs work together in systems to perform specific functions?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 3.1: Make a Lung Model — Teacher Guide PDF pages 128–129
- Activity Page 3.2: Check — Teacher Guide PDF pages 130–131

Lesson 4: Functions for Survival

THE BIG QUESTION

What functions of living things enable them to survive and grow?

Words to know

- **survival** — the state of continuing to live
- **survive** — to stay alive
- **growth** — the life process of becoming bigger and stronger
- **behavior** — the ways in which an organism acts
- **reproduce** — to make new, young individuals of the same type

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 45–50: the steps, materials and timing for this lesson.

Talk it over

1. What organism will you choose?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: What functions of living things enable them to survive and grow?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 4.1: Organism Research and Concept Map — Teacher Guide PDF pages 132–133
- Activity Page 4.2: Check — Teacher Guide PDF page 134

Lesson 5: Functions in Animals

THE BIG QUESTION

How do some animal structures function?

Words to know

- **function** — the way that something works to achieve a task or serve a purpose
- **survival** — the state of continuing to live
- **survive** — to stay alive
- **growth** — the life process of becoming bigger and stronger
- **behavior** — the ways in which an organism acts
- **reproduce** — to make new, young individuals of the same type
- **involuntary** — describing any action or movement done automatically, such as the pumping of a heart
- **voluntary** — describing any behavior done by choice, such as walking

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 51–58: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 3: “Functions in Animals”: PDF pages 17–20. Look at the pictures and maps together.

Talk it over

1. What structures do animals that live on land and in water use to take in air?
2. What structures do animals have to move blood to parts of the body?
3. What structures do animals use to take in energy?
4. Can you think of other activities (functions) that animals do to survive and grow?
5. What are the most important things a pet owner has to do?
6. What are the main functions of an animal such as a cat or a dog?
7. What structures enable an animal to carry out these functions?
8. What does an animal need to grow?
9. What are the main functions of systems that support growth in animals' bodies?
10. How do legs enable behavior?
11. How do the legs work as part of a system?
12. What structures of that organism can you identify?
13. How do structures you identify relate to the functions of your organism?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do some animal structures function?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 5.1: Functions in Animals — Teacher Guide PDF page 135
- Activity Page 5.2: Classifying Structures — Teacher Guide PDF page 136
- Activity Page 5.3: Check — Teacher Guide PDF page 137

Lesson 6: Functions in Plants

THE BIG QUESTION

How do some plant structures function?

Words to know

- **response** — a reaction to some factor or condition
- **bark** — the outer covering of the trunk, branches, and roots of a woody plant

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 59–65: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 4: “Functions in Plants”: PDF pages 21–26. Look at the pictures and maps together.

Talk it over

1. What is the function of roots?
2. What is the function of stems?
3. What is the function of leaves?
4. Can you think of other things plants need to survive and grow?
5. What needs of plants are like those of animals?
6. What are the most important things that a houseplant needs to grow?
7. What happens if you forget to water the plant?
8. What are the main functions of systems of structures in a plant?
9. How does the plant use energy from light?
10. How does the plant use gases that enter the leaves?
11. What is produced as waste by the leaves?
12. How does a plant grow if you place it by a window?
13. What is the evidence that roots and shoots respond to gravity?
14. In what situation would you expect roots to not grow down?
15. How does a vine plant (e.g., pea, pumpkin) “know” to grow its tendrils around a bean pole?
16. Why does a redwood tree have very thick bark?
17. How does the structure of your plant object support its survival, growth, behavior, or reproduction?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do some plant structures function?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 6.1: Functions of Plant Structures — Teacher Guide PDF page 138
- Activity Page 6.2: Check — Teacher Guide PDF page 139

Lesson 7: Structure and Function Report

THE BIG QUESTION

How are structure and function related in any one plant or animal?

Words to know

- **cell** — the smallest unit of life
- **tissue** — a group of similar cells joined together
- **function** — the way that something works to achieve a task or serve a purpose
- **structure** — the arrangement of parts that make up something
- **organ** — a body part made up of related tissues that perform a specific function
- **organ system** — a group of organs that work together to carry out certain functions
- **nerve** — a bundle of cells that send and receive messages between the brain and other body parts
- **survival** — the state of continuing to live
- **survive** — to stay alive
- **growth** — the life process of becoming bigger and stronger
- **behavior** — the ways in which an organism acts
- **reproduce** — to make new, young individuals of the same type
- **response** — a reaction to some factor or condition

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 66–73: the steps, materials and timing for this lesson.

Talk it over

1. How does the plant or animal move?
2. How does the plant or animal get the sources of energy it needs to survive?
3. What is the most important structure of a plant or animal, and why?
4. How is the structure of your plant or animal related to its function?
5. How does that function support growth, survival, and/or reproduction?
6. What evidence can you find that the function is essential to growth, survival, and/or reproduction?
7. How is that structure and function part of a system?
8. How is that system related to other systems?
9. What is the plant or animal that you chose?
10. What structure and function of that plant or animal are you focusing on?

11. What kind of evidence did you find?
12. What evidence showed your plant's or animal's structure and function were part of a system?
13. What evidence showed this system is essential to your plant's or animal's growth, survival, and/or reproduction?
14. If time allows, ask a challenging extension question, such as the following: Can you think of a benefit of studying this structure and function in your plant or animal?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How are structure and function related in any one plant or animal?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 7.1: Research and Writing Discussion — Teacher Guide PDF page 140
- Activity Page 7.2: Research and Writing Outline — Teacher Guide PDF pages 141-142
- Activity Page 7.3: Report Scoring Guide — Teacher Guide PDF page 143
- Activity Page 7.4: Take-Home Guide — Teacher Guide PDF pages 144-145

Lesson 8: Hearing and Vision

THE BIG QUESTION

How does the eye gather light and use it to see?

Words to know

- **visual system** — the set of cells, tissues, and organs in the eyes and brain that make vision possible
- **sense** — to detect a stimulus
- **pupil** — the dark middle part of the eye
- **reflect** — to bounce light off of some objects, like a mirror, and cast back the light
- **vision** — the ability to see

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 75–79: the steps, materials and timing for this lesson.

Talk it over

1. What is necessary so that the eye can function to see objects?
2. How does light get to the eye?
3. What happens to the light once it enters the eye?
4. What happened to your pupils when the lights went off?
5. Why do you think they got larger?
6. What other parts of the body work with the visual system to help you see?
7. What other senses work with vision to get information about the world around you?
8. Why can't you see when you close your eyes?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How does the eye gather light and use it to see?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 8.1: The Pupil — Teacher Guide PDF page 146
- Activity Page 8.2: Reflection — Teacher Guide PDF page 147

Lesson 9: Human Vision and Hearing

THE BIG QUESTION

How do humans see and hear?

Words to know

- **visual system** — the set of cells, tissues, and organs in the eyes and brain that make vision possible
- **auditory system** — the set of cells, tissues, and organs in the ears and brain that enable hearing
- **sense** — to detect a stimulus

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 80–84: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 5: “Human Vision and Hearing”: PDF pages 27–32. Look at the pictures and maps together.

Talk it over

1. Why did you look at me?
2. What do we mean when we say that seeing and hearing are involuntary?
3. What are some other organs that help you sense the world around you?
4. How can technology help people who cannot hear well?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do humans see and hear?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 9.1: Sending Signals — Teacher Guide PDF page 148

Lesson 10: Modeling the Detection of Sound and Light

THE BIG QUESTION

How can I model structures that function to detect sound and light?

Words to know

- **sense** — to detect a stimulus
- **vision** — the ability to see

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 85–88: the steps, materials and timing for this lesson.

Talk it over

1. How did you know that the door to the classroom is closed?
2. What parts of the body helped me close the door?
3. How was your investigation similar when I closed the door at the beginning of the lesson?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How can I model structures that function to detect sound and light?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 10.1: Ruler Drop Investigation — Teacher Guide PDF page 149
- Activity Page 10.2: Make a Model — Teacher Guide PDF page 150

Lesson 11: Sensing the Environment

THE BIG QUESTION

Why must plants and animals sense their environments?

Words to know

- **sense** — to detect a stimulus
- **sensory** — relating to the senses

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 91–95: the steps, materials and timing for this lesson.

Talk it over

1. What happens when you touch something that is too hot?
2. What do you do when you smell something yummy?
3. What happens when you step on something sharp?
4. What happens when you hear something that is too loud?
5. What happens when a bright light shines in your face?
6. Why do you think it is important to sense things in your surroundings?
7. What is an example of a stimulus that you saw in the video?
8. What is an example of a response that you saw in the video?
9. How did it feel when the feather was touching your hand?
10. What did you do when the feather touched your hand?
11. Based on the activity you just did with the feather, what do you think was the stimulus, and what do you think was the response?
12. How do you know plants respond to the stimuli in their environments?
13. What is an example of a behavior that a plant has in response to stimuli?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: Why must plants and animals sense their environments?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 11.1: Plant Stimulus and Response — Teacher Guide PDF page 151

Lesson 12: Animal Senses

THE BIG QUESTION

How do animals sense and respond to their environments?

Words to know

- **sense** — to detect a stimulus
- **stimulus** — a factor or condition that causes a response (plural stimuli)

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 96–103: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 6: “Animal Senses”: PDF pages 33–38. Look at the pictures and maps together.

Talk it over

1. What do snakes detect when they snap their tongues?
2. Is this something that animals can normally smell?
3. How does this sense influence the snake's behavior?
4. What senses does the shark use?
5. How do the senses influence the shark's behavior?
6. Did you read about any of these examples in the chapter?
7. What are some other examples of ways that animals sense their environments?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do animals sense and respond to their environments?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 12.1: What Senses Do Animals Have? — Teacher Guide PDF page 152

Lesson 13: Plant Responses

THE BIG QUESTION

How do plants sense and respond to their environments?

Words to know

- **behavior** — the ways in which an organism acts
- **response** — a reaction to some factor or condition
- **stimulus** — a factor or condition that causes a response (plural stimuli)
- **tropism** — a plant's growth or movement in response to a stimulus

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 104–109: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 7: “Plant Responses”: PDF pages 39–42. Look at the pictures and maps together.

Talk it over

1. What do you think behavior means when talking about plants?
2. What kinds of behaviors do you think plants engage in?
3. What do you think influences plant behaviors?
4. Why do you think scientists study plant behaviors?
5. What did the scientists do in the video to see how temperatures influence plant behaviors?
6. What kinds of plant behaviors were the scientists interested in studying?
7. What kind of stimulus is this plant responding to?
8. How did the plant react to the sense that it was being harmed?
9. What does this video tell us about plants?
10. Which plant did the vine choose to attach to?
11. Why did the vine choose this plant?
12. How did the vine know to choose this plant?
13. What is smell?
14. Did you read about any of these examples in the Student Reader?
15. What are some other examples of ways that plants sense and respond to their environments?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do plants sense and respond to their environments?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 13.1: Plant Response Concept Map — Teacher Guide PDF page 153

Lesson 14: Stimulus and Response for Survival

THE BIG QUESTION

How do a(n)

Words to know

- **input** — any data, idea, or object that is put into any process or system
- **output** — the amount of something that is produced

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 110–113: the steps, materials and timing for this lesson.

Check for understanding

- Answer the Big Question in a sentence or two: How do a(n)
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 14.1: Stimulus and Response Diagram — Teacher Guide PDF page 154

Lesson 15: Helen Keller and Louis Braille

THE BIG QUESTION

What have I learned about structures and functions?

Words to know

- **cell** — the smallest unit of life
- **tissue** — a group of similar cells joined together
- **function** — the way that something works to achieve a task or serve a purpose
- **structure** — the arrangement of parts that make up something
- **organ** — a body part made up of related tissues that perform a specific function
- **organ system** — a group of organs that work together to carry out certain functions
- **nerve** — a bundle of cells that send and receive messages between the brain and other body parts
- **survival** — the state of continuing to live
- **survive** — to stay alive
- **growth** — the life process of becoming bigger and stronger
- **behavior** — the ways in which an organism acts
- **reproduce** — to make new, young individuals of the same type
- **response** — a reaction to some factor or condition
- **visual system** — the set of cells, tissues, and organs in the eyes and brain that make vision possible
- **auditory system** — the set of cells, tissues, and organs in the ears and brain that enable hearing
- **sense** — to detect a stimulus
- **stimulus** — a factor or condition that causes a response (plural stimuli)
- **tropism** — a plant's growth or movement in response to a stimulus

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 114–120: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 8: “Helen Keller and Louis Braille”: PDF pages 43–46. Look at the pictures and maps together.

Talk it over

1. What do you think it would be like to not be able to see/hear/smell/taste/ touch?
2. Would you need to rely on other senses in order to get around?

3. How did Helen Keller need to adapt her behavior to communicate?
4. How has braille influenced the behavior of those who cannot see?
5. Why are these hands and arms considered adaptive devices?
6. What is life like for these people without the adaptive devices?
7. What is sign language allowing Koko the gorilla do?
8. How was Helen Keller able to live a full life?
9. How did Helen Keller's disabilities influence her behavior?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: What have I learned about structures and functions?
- Use one of today's words in a sentence of your own.

UNIT REVIEW

Unit review and assessment

- Unit Assessment (print for your student): Teacher Guide PDF pages 159-164
- How to mark it (for the teacher): Teacher Guide PDF pages 170-171
- Activity page answer key (for the teacher): Teacher Guide PDF pages 165-169
- Activity Page UR.1: Reading Braille — Teacher Guide PDF page 155
- Activity Page UR.2: Vocabulary Crossword Puzzle — Teacher Guide PDF page 156
- Activity Page UR.3: Vocabulary Review — Teacher Guide PDF page 158

WORDS QUIZ

Structures and Functions of Living Things

Name: _____ Date: _____

Circle the letter of the best answer.

1. Which word means “a body part made up of related tissues that perform a specific function”?

- a) nerve
- b) organ
- c) stimulus
- d) tissue

2. Which word means “a factor or condition that causes a response (plural stimuli)”?

- a) stimulus
- b) survive
- c) structure
- d) tropism

3. Which word means “the set of cells, tissues, and organs in the eyes and brain that make vision possible”?

- a) sense
- b) response
- c) survive
- d) visual system

4. Which word means “a group of organs that work together to carry out certain functions”?

- a) organ
- b) stimulus
- c) auditory system
- d) organ system

5. Which word means “a bundle of cells that send and receive messages between the brain and other body parts”?

- a) sense
- b) nerve
- c) tropism
- d) organ system

6. Which word means “the smallest unit of life”?

- a) organ system
- b) function
- c) cell
- d) growth

- 7.** Which word means “the life process of becoming bigger and stronger”?
- a) behavior
 - b) stimulus
 - c) nerve
 - d) growth
- 8.** Which word means “a group of similar cells joined together”?
- a) cell
 - b) auditory system
 - c) tissue
 - d) organ
- 9.** Which word means “a plant’s growth or movement in response to a stimulus”?
- a) auditory system
 - b) tropism
 - c) survival
 - d) visual system
- 10.** Which word means “the set of cells, tissues, and organs in the ears and brain that enable hearing”?
- a) reproduce
 - b) visual system
 - c) sense
 - d) auditory system
- 11.** Which word means “to stay alive”?
- a) auditory system
 - b) survive
 - c) growth
 - d) survival
- 12.** Which word means “a reaction to some factor or condition”?
- a) response
 - b) survive
 - c) sense
 - d) survival

Answers

Lesson 1: Structure and Function of a Plant

1. **What direction does water move through plants?**
Upward, from roots to stems/ stalks to leaves
2. **How can we investigate how water moves through plants?**
Put a plant in some water, and see what happens.
3. **What happens if the seed or plant is not watered?**
It will wilt and/or die.
4. **What happens when a wilted plant is watered?**
If conditions are right, it will likely become healthy again.
5. **Why does the plant respond this way?**
It receives a need for its survival: water.
6. **How does water move in your house?**
Through pipes
7. **What happens when you wet one edge of a piece of cloth or paper?**
The water moves through the material.
8. **What happens to water as you drink it through a straw?**
The water rises in the straw.
9. **What do you predict will happen to the colored water by the end of the lesson?**
It will rise and get soaked up by the plant.
10. **What do you predict will happen to the colored water by the following day?**
It will start rising into the bottom of the stalk.
11. **What difference would you observe if you cut the leaves off before starting?**
The water may rise more slowly.

Lesson 2: Biological Organization

1. **What is a cell?**
The basic structure of life
2. **Are there different types of cells? What are some examples of different cells in your body?**
Yes; skin cells, muscle cells, blood cells
3. **If we're made of cells, why can't we see them?**
They are very small.
4. **How many cells are plants and animals made of?**
Larger plants and animals are made of trillions of cells.
5. **Do you think there is a structure to how plants and animals are formed?**
Yes

6. **What are some examples of structures of plants and animals?**
A plant has roots, a stem, and leaves. Some animals have bones and muscles.
7. **Why do you think it is important to study structures in science?**
Structures help us figure out how things work.
8. **What do the plastic blocks represent?**
Cells
9. **What do the structures you built represent?**
A tissue
10. **What is the smallest unit in a living thing?**
Cell
11. **What do those cells come together to make?**
Tissues
12. **Did you read about any of these examples in the article?**
We have skin cells, hair cells, and many other types of cells.
13. **What are some other examples of cells that make up animals or plants?**
We have cells that make our eyes and ears work.

Lesson 3: Organs and Organ Systems

1. **What is the structure of organs?**
They are made of tissues working together.
2. **What do organs do?**
Carry out specific functions

Lesson 4: Functions for Survival

1. **What organism will you choose?**
If students struggle to choose an organism, provide a suggestion, or ask the second question first. Students may find that it helps to start with an animal or plant that they already know about.

Lesson 5: Functions in Animals

1. **What structures do animals that live on land and in water use to take in air?**
Lungs, gills
2. **What structures do animals have to move blood to parts of the body?**
Heart
3. **What structures do animals use to take in energy?**
Mouth, digestive system
4. **Can you think of other activities (functions) that animals do to survive and grow?**
Hunt for food, avoid predators
5. **What are the most important things a pet owner has to do?**
Provide food, clean up waste

6. **What are the main functions of an animal such as a cat or a dog?**
Eat, move, produce waste
7. **What structures enable an animal to carry out these functions?**
Jaws, legs, tail
8. **What does an animal need to grow?**
Food, water, and air
9. **What are the main functions of systems that support growth in animals' bodies?**
Chewing and digesting food for energy, breathing, ridding the body of waste
10. **How do legs enable behavior?**
Legs enable an animal to move voluntarily, which is a behavior.
11. **How do the legs work as part of a system?**
Muscles and the nervous system work together to move the animal's body, including the bones, to carry out a behavior such as walking.
12. **What structures of that organism can you identify?**
Student responses may include number of legs, size, shells, backbones, gills, etc.
13. **How do structures you identify relate to the functions of your organism?**
The structures help the organism swim, walk, crawl, breathe, and get food.

Lesson 6: Functions in Plants

1. **What is the function of roots?**
Take in water
2. **What is the function of stems?**
Help the plant reach for light
3. **What is the function of leaves?**
Use the sun's energy to make food
4. **Can you think of other things plants need to survive and grow?**
Good soil, no predators
5. **What needs of plants are like those of animals?**
They need water, energy, and to avoid being eaten.
6. **What are the most important things that a houseplant needs to grow?**
Water, soil, enough light
7. **What happens if you forget to water the plant?**
It wilts; it dies.
8. **What are the main functions of systems of structures in a plant?**
Absorb sunlight and use its energy, take in water, move water, exchange gases with the air around it
9. **How does the plant use energy from light?**
To make food
10. **How does the plant use gases that enter the leaves?**
The plant uses light energy to combine water with the gases to make sugar.

11. **What is produced as waste by the leaves?**
Oxygen and water vapor that escape through holes in the leaves
12. **How does a plant grow if you place it by a window?**
It bends toward the light.
13. **What is the evidence that roots and shoots respond to gravity?**
Roots grow down, and shoots grow up.
14. **In what situation would you expect roots to not grow down?**
If water is close to the surface
15. **How does a vine plant (e.g., pea, pumpkin) “know” to grow its tendrils around a bean pole?**
Its tendrils respond to the touch of the bean pole.
16. **Why does a redwood tree have very thick bark?**
To resist insects, disease, and fire
17. **How does the structure of your plant object support its survival, growth, behavior, or reproduction?**
It allows the plant to get the food and nutrients it needs to grow and mature.

Lesson 7: Structure and Function Report

1. **How does the plant or animal move?**
Animals: legs, wings, muscles; plants: tropisms
2. **How does the plant or animal get the sources of energy it needs to survive?**
Animals: eating plants or other animals; plants: make their own food from sunlight and exchanging gases
3. **What is the most important structure of a plant or animal, and why?**
There is no single “most important structure.” Structures are parts of interrelated essential systems with structures and functions that work together to support the plant’s or animal’s survival, growth, and reproduction. However, each structure is important because without it, the other structures would not work or most organisms could not survive in their environment.
4. **How is the structure of your plant or animal related to its function?**
Sample response: Fish have gills so they can breathe in water.
5. **How does that function support growth, survival, and/or reproduction?**
Fish use their gills to get oxygen from the water.
6. **What evidence can you find that the function is essential to growth, survival, and/or reproduction?**
Without the ability to breathe, fish will die.
7. **How is that structure and function part of a system?**
The respiratory system includes gills for fish and lungs for people for breathing.
8. **How is that system related to other systems?**
The respiratory system takes air to the circulatory system, brain, and organs.

9. **What is the plant or animal that you chose?**
Sample response: a grapevine
10. **What structure and function of that plant or animal are you focusing on?**
Sample response: how the structure results in making grapes
11. **What kind of evidence did you find?**
The grapes grow when the amount of water is just right. The vines will not produce grapes if they do not get the water they need.
12. **What evidence showed your plant's or animal's structure and function were part of a system?**
Sample response: The grapevine has roots and shoots.
13. **What evidence showed this system is essential to your plant's or animal's growth, survival, and/or reproduction?**
If the water is cut off or the roots are pulled up, no fruit will grow.
14. **If time allows, ask a challenging extension question, such as the following: Can you think of a benefit of studying this structure and function in your plant or animal?**
Yes. I like to eat grapes.

Lesson 8: Hearing and Vision

1. **What is necessary so that the eye can function to see objects?**
Light
2. **How does light get to the eye?**
By reflecting from objects
3. **What happens to the light once it enters the eye?**
It is bent, or refracted, and ultimately travels to the optic nerve. The signal is then sent along the nerve to the brain.
4. **What happened to your pupils when the lights went off?**
They grew larger.
5. **Why do you think they got larger?**
They were trying to let more light into the eye because the eye needs light to see.
6. **What other parts of the body work with the visual system to help you see?**
Nerves, brain
7. **What other senses work with vision to get information about the world around you?**
Touch, hearing, smell, and taste
8. **Why can't you see when you close your eyes?**
Because your eyelids keep light from entering your pupils

Lesson 9: Human Vision and Hearing

1. **Why did you look at me?**
Because you made noise/clapped your hands

2. **What do we mean when we say that seeing and hearing are involuntary?**
You cannot help seeing and hearing things around you.
3. **What are some other organs that help you sense the world around you?**
Hands, nose
4. **How can technology help people who cannot hear well?**
With hearing aids and implants

Lesson 10: Modeling the Detection of Sound and Light

1. **How did you know that the door to the classroom is closed?**
I heard it; I saw you close it.
2. **What parts of the body helped me close the door?**
Brain, muscles, bones, eyes
3. **How was your investigation similar when I closed the door at the beginning of the lesson?**
Information was taken in by the senses, sent to the brain, and interpreted, and then the brain sent a signal to the body to react.

Lesson 11: Sensing the Environment

1. **What happens when you touch something that is too hot?**
You pull your hand away.
2. **What do you do when you smell something yummy?**
You get hungry; you start salivating.
3. **What happens when you step on something sharp?**
You jump away from it.
4. **What happens when you hear something that is too loud?**
You cover your ears.
5. **What happens when a bright light shines in your face?**
You close your eyes.
6. **Why do you think it is important to sense things in your surroundings?**
So you can know how to react; so you can stay safe
7. **What is an example of a stimulus that you saw in the video?**
One example: the thorn pricking the foot
8. **What is an example of a response that you saw in the video?**
One example: the foot being lifted off the thorn
9. **How did it feel when the feather was touching your hand?**
It tickled.
10. **What did you do when the feather touched your hand?**
I pulled my hand away; I started laughing; I curled my fingers.
11. **Based on the activity you just did with the feather, what do you think was the stimulus, and what do you think was the response?**
Stimulus: feather; response: laughing

12. **How do you know plants respond to the stimuli in their environments?**
Based on plant behaviors, like how they grow
13. **What is an example of a behavior that a plant has in response to stimuli?**
Sample: growing toward light; growing around an object

Lesson 12: Animal Senses

1. **What do snakes detect when they snap their tongues?**
Chemicals
2. **Is this something that animals can normally smell?**
Some may smell it, and others can't.
3. **How does this sense influence the snake's behavior?**
It tells the snake where to look for food or how to avoid danger.
4. **What senses does the shark use?**
Sight, sound, touch, smell
5. **How do the senses influence the shark's behavior?**
They tell the shark where to hunt for food and what to eat.
6. **Did you read about any of these examples in the chapter?**
The animals in the chapter used sight, sound, and touch to hunt for food and stay safe from predators.
7. **What are some other examples of ways that animals sense their environments?**
Some animals can smell danger, such as sensing fire or nearby predators.

Lesson 13: Plant Responses

1. **What do you think behavior means when talking about plants?**
How they respond to the conditions around them
2. **What kinds of behaviors do you think plants engage in?**
Growing toward the light, roots growing toward water
3. **What do you think influences plant behaviors?**
Water, sunlight
4. **Why do you think scientists study plant behaviors?**
To see how they grow and learn how to make them better
5. **What did the scientists do in the video to see how temperatures influence plant behaviors?**
The scientists planted seeds in different areas and tracked how they grew.
6. **What kinds of plant behaviors were the scientists interested in studying?**
How the plants grew, how they flowered, whether they would survive in new climates
7. **What kind of stimulus is this plant responding to?**
Touch
8. **How did the plant react to the sense that it was being harmed?**
It sent an alert throughout the plant.

9. **What does this video tell us about plants?**
Different parts of plants can communicate with each other.
10. **Which plant did the vine choose to attach to?**
Tomato
11. **Why did the vine choose this plant?**
It is easier to attach to.
12. **How did the vine know to choose this plant?**
It smelled the tomato scent.
13. **What is smell?**
Recognizing the presence of some chemical in the environment
14. **Did you read about any of these examples in the Student Reader?**
Yes, plants respond to temperature and touch.
15. **What are some other examples of ways that plants sense and respond to their environments?**
Growing toward light and reacting to smells

Lesson 15: Helen Keller and Louis Braille

1. **What do you think it would be like to not be able to see/hear/smell/taste/touch?**
Accept all responses.
2. **Would you need to rely on other senses in order to get around?**
Yes
3. **How did Helen Keller need to adapt her behavior to communicate?**
She learned to read using her fingers. She learned to use sign language to communicate, and she touched the hands of others who spoke to her in sign language.
4. **How has braille influenced the behavior of those who cannot see?**
It provides a way to read and write.
5. **Why are these hands and arms considered adaptive devices?**
They allow people with missing fingers, hands, or arms to be able to pick things up, hold things, etc.
6. **What is life like for these people without the adaptive devices?**
Without the adaptive devices, these people are limited in what they can do physically.
7. **What is sign language allowing Koko the gorilla do?**
Talk to humans
8. **How was Helen Keller able to live a full life?**
By finding ways to adapt to her disabilities
9. **How did Helen Keller's disabilities influence her behavior?**
She had to rely on other senses to communicate.

Unit quiz key

1. b 2. a 3. d 4. d 5. b 6. c 7. d 8. c 9. b 10. d 11. b 12. a