

Grade 1 Science

Unit 4: Simple Machines

10 lessons and a unit quiz. Use this pack with the **Simple Machines 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: A Trip to Old Time Farm	PDF pages 6–9	AP 1.1
☐	Lesson 2: What Is a Ramp?	PDF pages 10–15	AP 2.1
☐	Lesson 3: What Is a Wheel and Axle?	PDF pages 16–21	AP 3.1
☐	Lesson 4: What Is a Pulley?	PDF pages 22–27	AP 4.1
☐	Lesson 5: Exploring Catapults	—	AP 5.1
☐	Lesson 6: What Is a Lever?	PDF pages 28–33	AP 6.1
☐	Lesson 7: What Are a Wedge and a Screw?	PDF pages 34–39	AP 7.1
☐	Lesson 8: Exploring Gears	—	AP 8.1
☐	Lesson 9: Science in Action: Meeting a Toolmaker	PDF pages 40–50	AP 9.1
☐	Lesson 10: Using Simple Machines to Solve Problems	—	AP 10.1
☐	Unit review and assessment	—	—
☐	Words quiz	—	—

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

Lesson 1: A Trip to Old Time Farm

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: What kinds of devices do people use to make tasks easier?

Words to know

- **effort** — exertion required in an attempt to achieve something forward, adj./adv. in the direction that one is facing
- **machine** — a device used to modify motion and force to perform work
- **task** — an action that has to be performed

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 21-25: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 1: "A Trip to Old Time Farm": PDF pages 6-9. Look at the pictures and maps together.

Talk it over

1. Ask students the following: LITERAL—What structures are on Old Time Farm?
2. LESSON 1 | A TRIP TO OLD TIME FARM 17 INFERENTIAL—What tools do many farms have today that they do not have at Old Time Farm?
3. INFERENTIAL—Ask students, Without a tractor to pull a plow, how will farmers on Old Time Farm prepare the soil for planting?
4. INFERENTIAL—Ask, Without a big machine to carry things, how will farmers on Old Time Farm move the corn they pick to the barn to feed the animals?
5. INFERENTIAL—Ask, Without a big machine to cut the hay and form the bales, how will farmers on Old Time Farm make hay bales?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: What kinds of devices do people use to make tasks easier?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 1.1: Things That Make Work Easier — Teacher Guide PDF page 71

Lesson 2: What Is a Ramp?

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: What is a ramp, and how does using a ramp make moving something easier?

Words to know

- **direction** — the course along which something moves
- **lift** — to raise to a higher position
- **raise** — to lift up

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 26–30: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 2: “What Is a Ramp?”: PDF pages 10–15. Look at the pictures and maps together.

Talk it over

1. **motors** Page 8 Ask students to turn to page 8 as you read aloud. **LITERAL**—Ask students, What are the four ways people in the diagram are moving the heavy box?
2. **LITERAL**—Ask students, How does the farmer get the hay to the upstairs rooms of the barn?
3. **INFERENTIAL**—Ask students, How does the person move himself and the wheelchair?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: What is a ramp, and how does using a ramp make moving something easier?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 2.1: Find the Ramp — Teacher Guide PDF page 72

Lesson 3: What Is a Wheel and Axle?

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: What is a wheel and axle, and how does using a wheel and axle make moving something easier?

Words to know

- **axle** — a rod or spindle that passes through the center of a wheel
- **rotate** — to turn about a central axis
- **wheel** — a circular frame capable of turning on an axle

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 31–36: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 3: “What Is a Wheel and Axle?”: PDF pages 16–21. Look at the pictures and maps together.

Talk it over

1. Then ask students, What do all trucks have where they touch the ground?
2. INFERENTIAL—Ask students, How many wheels are there on each object in the pictures?
3. INFERENTIAL—Ask, How many pumpkins are in the wheelbarrows in the pictures?
4. LITERAL—Ask, What makes the wheelbarrow more useful for moving the pumpkins?
5. LITERAL—Ask students, Which parts of the door set are like wheels?
6. How is it different from the trucks on the roads?
7. Ask questions such as • Which object has one wheel and one axle?
8. Ask students, How can the farmers at Old Time Farm use wheels and axles to move a load of hay up the ramp to the upper barn?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: What is a wheel and axle, and how does using a wheel and axle make moving something easier?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 3.1: Find the Wheels and Axles — Teacher Guide PDF page 73

Lesson 4: What Is a Pulley?

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: What is a pulley, and how does using a pulley make moving something easier?

Words to know

- **groove** — a long, narrow dip in a surface
- **pulley** — a wheel with a rope pulled along its grooved edge to reverse the direction of effort needed to raise or lower an object

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 37–41: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 4: “What Is a Pulley?”: PDF pages 22–27. Look at the pictures and maps together.

Talk it over

1. LITERAL—How many parts does a pulley have, and what are they?
2. INFERENTIAL—Point to the picture of the flagpole and ask, How is the pulley on the barn like the pulley on our flagpole?
3. Differentiation LITERAL—Ask, Where are the pulleys in the photos?
4. LITERAL—Ask students, How are the pulley wheels in the photo connected?
5. Ask students, What can you do with a pulley?
6. Ask students, How might the farmers at Old Time Farm use pulleys?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: What is a pulley, and how does using a pulley make moving something easier?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 4.1: Raise the Flag! — Teacher Guide PDF page 74

Lesson 5: Exploring Catapults

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: How does a catapult move heavy objects?

Words to know

- **catapult** — a device that uses an arm to hurl or launch something
 - **distance** — the amount of space between two points
 - **fulcrum** — the point on which a lever pivots
- Words and phrases are unit that you should model for use in isolated drill or memorization

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 42–45: the steps, materials and timing for this lesson.

Talk it over

1. Spark the discussion by asking students the following: • What is the object the teams want to move?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: How does a catapult move heavy objects?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 5.1: Pom-pom Catapult — Teacher Guide PDF page 75

Lesson 6: What Is a Lever?

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: What is a lever, and how does using a lever make moving something easier?

Words to know

- **pry** — to raise or pull apart with a lever

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 46–50: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 5: “What Is a Lever?”: PDF pages 28–33. Look at the pictures and maps together.

Talk it over

1. LITERAL—Ask, What part of the latch does someone push down on to open the gate?
2. INFERENTIAL—Ask, Which takes less effort: using a shovel or just using your hands to dig up dirt?
3. INFERENTIAL—Ask, How can the fulcrum move on a broom?
4. Ask students, What chores do the farmers use levers for at Old Time Farm?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: What is a lever, and how does using a lever make moving something easier?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 6.1: Move That Rock! — Teacher Guide PDF page 76

Lesson 7: What Are a Wedge and a Screw?

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: What are a wedge and a screw, and how does each change the direction of a push or pull?

Words to know

- **screw** — a long wedge spiraled around a central rod, the rotation of which pulls the device into a solid material
- **spiral** — to wind around a central axis while moving away from the point of origin
- **split** — to forcibly push or pull to divide into parts
- **wedge** — a solid piece of material that tapers to a thin edge, used to split a material apart or tightly hold against a surface or material

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 51-55: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 6: "What Are a Wedge and a Screw?": PDF pages 34-39. Look at the pictures and maps together.

Talk it over

1. LITERAL—What is the tool called that is used to split wood on Old Time Farm?
2. How are they different?
3. Ask students, How can we find out whether a wedge is the best tool for keeping a door open?
4. Ask, What does the wedge do as the boat moves forward?
5. Ask students, For what chores do the farmers use wedges at Old Time Farm?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: What are a wedge and a screw, and how does each change the direction of a push or pull?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 7.1: Hold That Door! — Teacher Guide PDF page 77

Lesson 8: Exploring Gears

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: How do gears interact?

Words to know

- **interact** — for two or more factors to affect each other
- **pattern** — a repeating or predictable characteristic or occurrence

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 56–59: the steps, materials and timing for this lesson.

Talk it over

1. Encourage students to use these terms in their discussions. • Ask, How is this change in motion a pattern?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: How do gears interact?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 8.1: Turning Gears — Teacher Guide PDF page 78

Lesson 9: Science in Action: Meeting a Toolmaker

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: What is a compound machine?

Words to know

- **machine** — a device used to modify motion and force to perform work

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 60–64: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 7: “Science in Action”: PDF pages 40–50. Look at the pictures and maps together.

Talk it over

1. LITERAL—What kinds of simple machines does the blacksmith at Old Time Farm make?
2. INFERENTIAL—Ask, How does Ryan know the plow is a compound machine?
3. INFERENTIAL—Ask, Which task is easier, climbing up and down a hill carrying heavy buckets of water or standing in one place and turning a handle around and around?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: What is a compound machine?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 9.1: Parts of a Bike — Teacher Guide PDF page 79

Lesson 10: Using Simple Machines to Solve Problems

THE BIG QUESTION

How do simple machines make farm chores easier? Lesson Question: How can you use simple machines to make squirrels work for their treats?

Words to know

- **design** — a plan or drawing of an invention or solution to a problem (v. to generate ideas for a planned solution)
- **showcase** — an occasion during which multiple people share their ideas, abilities, or offerings on a particular subject

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 65–69: the steps, materials and timing for this lesson.

Check for understanding

- Answer the Big Question in a sentence or two: How do simple machines make farm chores easier? Lesson Question: How can you use simple machines to make squirrels work for their treats?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 10.1: Name That Machine! — Teacher Guide PDF page 80

UNIT REVIEW

Unit review and assessment

- Activity page answer key (for the teacher): Teacher Guide PDF pages 81–81

WORDS QUIZ

Simple Machines

Name: _____ Date: _____

Circle the letter of the best answer.

1. Which word means “a device that uses an arm to hurl or launch something”?
 - a) problem
 - b) machine
 - c) catapult
 - d) pattern
2. Which word means “to forcibly push or pull to divide into parts”?
 - a) effort
 - b) split
 - c) machine
 - d) easier
3. Which word means “to turn about a central axis”?
 - a) easier
 - b) split
 - c) launch
 - d) rotate
4. Which word means “a long, narrow dip in a surface”?
 - a) groove
 - b) lever
 - c) machine
 - d) catapult
5. Which word means “a toothed wheel that interacts with another toothed wheel to rotate it”?
 - a) direction
 - b) raise
 - c) gear
 - d) pattern
6. Which word means “exertion required in an attempt to achieve something forward, adj./adv. in the direction that one is facing”?
 - a) simple machine
 - b) effort
 - c) fulcrum
 - d) pattern

- 7.** Which word means “a repeating or predictable characteristic or occurrence”?
- a) work
 - b) wedge
 - c) machine
 - d) pattern
- 8.** Which word means “to move to a less high position”?
- a) lower
 - b) solution
 - c) launch
 - d) design
- 9.** Which word means “the course along which something moves”?
- a) easier
 - b) direction
 - c) gear
 - d) raise
- 10.** Which word means “the amount of space between two points”?
- a) pry
 - b) screw
 - c) wedge
 - d) distance
- 11.** Which word means “a long wedge spiraled around a central rod, the rotation of which pulls the device into a solid material”?
- a) screw
 - b) work
 - c) raise
 - d) gear
- 12.** Which word means “to raise or pull apart with a lever”?
- a) lower
 - b) solution
 - c) pry
 - d) spiral

Answers

Lesson 1: A Trip to Old Time Farm

1. **Ask students the following: LITERAL—What structures are on Old Time Farm?**
A house, a barn, fences
2. **LESSON 1 | A TRIP TO OLD TIME FARM 17 INFERENTIAL—What tools do many farms have today that they do not have at Old Time Farm?**
Tractors and electricity SUPPORT—For students who are not familiar with modern farming, locate online images using search terms such as “farming equipment today.” Show students some of the complex machines, such as tractor-pulled plows, cultivators, hay balers, and harvesters. Explain that these tools powered by engines were not yet invented when Old Time Farm was built. Page 4
3. **INFERENTIAL—Ask students, Without a tractor to pull a plow, how will farmers on Old Time Farm prepare the soil for planting?**
They may have to push the plow themselves or have horses pull the plow.
4. **INFERENTIAL—Ask, Without a big machine to carry things, how will farmers on Old Time Farm move the corn they pick to the barn to feed the animals?**
They may have to carry it in their arms.
5. **INFERENTIAL—Ask, Without a big machine to cut the hay and form the bales, how will farmers on Old Time Farm make hay bales?**
They may have to cut the hay with a knife.

Lesson 2: What Is a Ramp?

1. **motors Page 8 Ask students to turn to page 8 as you read aloud.**
LITERAL—Ask students, What are the four ways people in the diagram are moving the heavy box?
See Know the Science 2.
2. **LITERAL—Ask students, How does the farmer get the hay to the upstairs rooms of the barn?**
The farmer carries the hay in his arms from the ground up to the high door by climbing the ladder. **INFERENTIAL—Ask, How hard or easy is it to move the hay this way?**
3. **INFERENTIAL—Ask students, How does the person move himself and the wheelchair?**
He both pushes and pulls on the railing.

Lesson 3: What Is a Wheel and Axle?

1. **Then ask students, What do all trucks have where they touch the ground?**
Wheels

2. **INFERENTIAL—Ask students, How many wheels are there on each object in the pictures?**

Two wheels on the bike, but some students may correctly identify the gears as wheels, too

3. **INFERENTIAL—Ask, How many pumpkins are in the wheelbarrows in the pictures?**

About four to six in each one

4. **LITERAL—Ask, What makes the wheelbarrow more useful for moving the pumpkins?**

It has a wheel and axle that allow it to roll. SUPPORT—Use the same small box or crate filled with books that was suggested for Support in Lesson 2. This time, have students push the box over a rug or carpet. Then place a board scooter under the box, and have them try moving the load again. Ask, Why is it easier to move the load with a board scooter?

5. **LITERAL—Ask students, Which parts of the door set are like wheels?**

The knobs INFERENTIAL—Ask, What would it be like to open a door if the knob were lost? Explain.

6. **How is it different from the trucks on the roads?**

The power for pushing or pulling the load comes from your hand instead of a motor CHALLENGE—If you can locate a wheelchair, have students examine its parts and identify the wheel and axle systems. Then challenge students to explain why it is helpful that two of the wheels are very large. Discuss how larger wheels are easier to turn than smaller wheels so that the person using the chair can move forward with less effort.

7. **Ask questions such as • Which object has one wheel and one axle?**

The wheelbarrow

8. **Ask students, How can the farmers at Old Time Farm use wheels and axles to move a load of hay up the ramp to the upper barn?**

They can put the hay on a wagon and roll the wagon up the ramp.

Lesson 4: What Is a Pulley?

1. **LITERAL—How many parts does a pulley have, and what are they?**

Two—a grooved wheel and a rope CORE VOCABULARY—Make sure students understand that the pulley in the diagram allows the user to pull downward on a rope to lift the bucket upward. (See Know the Science.)

2. **INFERENTIAL—Point to the picture of the flagpole and ask, How is the pulley on the barn like the pulley on our flagpole?**

Both are used to lift something up higher than a person standing on the ground can lift it. CORE VOCABULARY—Explain that to raise an object means to move it to a higher position. SUPPORT—Invite students to ask questions about how the sailboat and exercise machines use pulleys. If needed, do a quick online search to view images that show what objects are lifted and how high up the objects are lifted.

3. **Differentiation LITERAL—Ask, Where are the pulleys in the photos?**
On the T-shaped bar near the roof and at the top of the crane arm INFERENTIAL—How does using the pulley make the task of lifting the shingles easier?
4. **LITERAL—Ask students, How are the pulley wheels in the photo connected?**
One rope is wound around all. LITERAL—Ask, How do two or more pulleys affect the effort needed to lift the load?
5. **Ask students, What can you do with a pulley?**
You can pull down to lift something up.
6. **Ask students, How might the farmers at Old Time Farm use pulleys?**
To lift hay into the loft of the hay barn

Lesson 5: Exploring Catapults

1. **Spark the discussion by asking students the following:** • **What is the object the teams want to move?**
A pumpkin

Lesson 6: What Is a Lever?

1. **LITERAL—Ask, What part of the latch does someone push down on to open the gate?**
The arm on the left side INFERENTIAL—Ask students, Where is the fulcrum?
2. **INFERENTIAL—Ask, Which takes less effort: using a shovel or just using your hands to dig up dirt?**
The task is much easier using a shovel.
3. **INFERENTIAL—Ask, How can the fulcrum move on a broom?**
It can move if the person doing the sweeping grabs another part of the handle.
INFERENTIAL—Ask students, How is the balance scale in the picture like a seesaw?
4. **Ask students, What chores do the farmers use levers for at Old Time Farm?**
To open gates, to dig in the dirt, to repair broken fences, to sweep the porch, to weigh foods

Lesson 7: What Are a Wedge and a Screw?

1. **LITERAL—What is the tool called that is used to split wood on Old Time Farm?**
A wedge CORE VOCABULARY—Explain to students that a wedge is a simple machine that makes it easier to spilt or separate things. (See Know the Science.)
INFERENTIAL—When using a wedge, which end touches the object you want to split?
2. **How are they different?**
They have the same long narrow shape with a head on one end and a point on the other end. They differ in that the nail has a smooth part in between the head and the point and the screw has a spiral edge in between.
3. **Ask students, How can we find out whether a wedge is the best tool for keeping a door open?**
We can do a test.

4. **Ask, What does the wedge do as the boat moves forward?**
It pushes the water to the sides of the boat as it moves.
5. **Ask students, For what chores do the farmers use wedges at Old Time Farm?**
To split firewood

Lesson 8: Exploring Gears

1. **Encourage students to use these terms in their discussions. • Ask, How is this change in motion a pattern?**
It happens the same way every time I try it. (See Know the Standards.)

Lesson 9: Science in Action: Meeting a Toolmaker

1. **LITERAL—What kinds of simple machines does the blacksmith at Old Time Farm make?**
Wedges and levers **SUPPORT**—Help students recall the names of the simple machines they have learned about in previous lessons by listing them on chart paper: ramps, wheels and axles, pulleys, levers, wedges, and screws. This list will be a useful reference during the activity in Step 3. **EXTEND**—Show students a garden trowel, and challenge them to use what they read about the shovel to describe the simple machines in a trowel and how they work.
2. **INFERENTIAL—Ask, How does Ryan know the plow is a compound machine?**
Because it is made of two simple machines—a wedge and a wheel and axle
3. **INFERENTIAL—Ask, Which task is easier, climbing up and down a hill carrying heavy buckets of water or standing in one place and turning a handle around and around?**
The task is easier if you can just stand still and turn a handle.

Unit quiz key

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