

# Real World Science: Simple Machines

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## *Congratulations!*

You have chosen a learning program that will actively motivate your students AND provide you with easily accessible and easily manageable instructional guidelines designed to make your teaching role efficient and rewarding.

The AIMS Teaching Module provides you with a video program keyed to your classroom curriculum, instructions and guidelines for use, plus a comprehensive teaching program containing a wide range of activities and ideas for interaction between all content areas. Our authors, educators, and consultants have written and reviewed the AIMS Teaching Modules to align with the Educate America Act: Goals 2000.

This ATM, with its clear definition of manageability, both in the classroom and beyond, allows you to tailor specific activities to meet all of your classroom needs.

## **RATIONALE**

In today's classrooms, educational pedagogy is often founded on Benjamin S. Bloom's "Six Levels of Cognitive Complexity." The practical application of Bloom's Taxonomy is to evaluate students' thinking skills on these levels, from the simple to the complex: Knowledge (rote memory skills), Comprehension (the ability to relate or retell), Application (the ability to apply knowledge outside its origin), Analysis (relating and differentiating parts of a whole), Synthesis (relating parts to a whole), and Evaluation (making a judgment or formulating an opinion).

The AIMS Teaching Module is designed to facilitate these intellectual capabilities, AND to integrate classroom experiences and assimilation of learning with the students' life experiences, realities, and expectations. AIMS' learner verification studies prove that our AIMS Teaching Modules help students to absorb, retain, and to demonstrate ability to use new knowledge in their world. Our educational materials are written and designed for today's classroom, which incorporates a wide range of intellectual, cultural, physical, and emotional diversities.

## **ORGANIZATION AND MANAGEMENT**

To facilitate ease in classroom manageability, the AIMS Teaching Module is organized in four sections. You are reading Section 1, Introduction to the Aims Teaching Module (ATM).

### ***SECTION 2,***

#### **INTRODUCING THIS ATM**

will give you the specific information you need to integrate the program into your classroom curriculum.

### ***SECTION 3,***

#### **PREPARATION FOR VIEWING**

provides suggestions and strategies for motivation, language preparedness, readiness, and focus prior to viewing the program with your students.

### ***SECTION 4,***

#### **AFTER VIEWING THE PROGRAM**

provides suggestions for additional activities plus an assortment of consumable assessment and extended activities, designed to broaden comprehension of the topic and to make connections to other curriculum content areas.

# FEATURES

## INTRODUCING EACH ATM

### *SECTION 2*

Your AIMS Teaching Module is designed to accompany a video program written and produced by some of the world's most credible and creative writers and producers of educational programming. To facilitate diversity and flexibility in your classroom, your AIMS Teaching Module features these components:

#### **Themes**

The Major Theme tells how this AIMS Teaching Module is keyed into the curriculum. Related Themes offer suggestions for interaction with other curriculum content areas, enabling teachers to use the teaching module to incorporate the topic into a variety of learning areas.

#### **Overview**

The Overview provides a synopsis of content covered in the video program. Its purpose is to give you a summary of the subject matter and to enhance your introductory preparation.

#### **Objectives**

The ATM learning objectives provide guidelines for teachers to assess what learners can be expected to gain from each program. After completion of the AIMS Teaching Module, your students will be able to demonstrate dynamic and applied comprehension of the topic.

## **PREPARATION FOR VIEWING**

### **SECTION 3**

In preparation for viewing the video program, the AIMS Teaching Module offers activity and/or discussion ideas that you may use in any order or combination.

#### **Introduction To The Program**

Introduction to the Program is designed to enable students to recall or relate prior knowledge about the topic and to prepare them for what they are about to learn.

#### **Introduction To Vocabulary**

Introduction to Vocabulary is a review of language used in the program: words, phrases, usage. This vocabulary introduction is designed to ensure that all learners, including limited English proficiency learners, will have full understanding of the language usage in the content of the program.

## **Discussion Ideas**

Discussion Ideas are designed to help you assess students' prior knowledge about the topic and to give students a preview of what they will learn. Active discussion stimulates interest in a subject and can motivate even the most reluctant learner. Listening, as well as speaking, is active participation. Encourage your students to participate at the rate they feel comfortable. Model sharing personal experiences when applicable, and model listening to students' ideas and opinions.

#### **Focus**

Help learners set a purpose for watching the program with Focus, designed to give students a focal point for comprehension continuity.

#### **Jump Right In**

Jump Right In provides abbreviated instructions for quick management of the program.

## **AFTER VIEWING THE PROGRAM**

### **SECTION 4**

After your students have viewed the program, you may introduce any or all of these activities to interact with other curriculum content areas, provide reinforcement, assess comprehension skills, or provide hands-on and in-depth extended study of the topic.

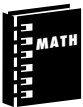
## SUGGESTED ACTIVITIES

The Suggested Activities offer ideas for activities you can direct in the classroom or have your students complete independently, in pairs, or in small work groups after they have viewed the program. To accommodate your range of classroom needs, the activities are organized into skills categories. Their labels will tell you how to identify each activity and help you correlate it into your classroom curriculum. To help you schedule your classroom lesson time, the AIMS hourglass gives you an estimate of the time each activity should require. Some of the activities fall into these categories:



### Meeting Individual Needs

These activities are designed to aid in classroom continuity. Reluctant learners and learners acquiring English will benefit from these activities geared to enhance comprehension of language in order to fully grasp content meaning.



### Curriculum Connections

Many of the suggested activities are intended to integrate the content of the ATM program into other content areas of the classroom curriculum. These cross-connections turn the classroom teaching experience into a whole learning experience.



### Critical Thinking

Critical Thinking activities are designed to stimulate learners' own opinions and ideas. These activities require students to use the thinking process to discern fact from opinion, consider their own problems and formulate possible solutions, draw conclusions, discuss cause and effect, or combine what they already know with what they have learned to make inferences.



### Cultural Diversity

Each AIMS Teaching Module has an activity called Cultural Awareness, Cultural Diversity, or Cultural Exchange that encourages students to share their backgrounds, cultures, heritage, or knowledge of other countries, customs, and language.



### Hands On

These are experimental or tactile activities that relate directly to the material taught in the program. Your students will have opportunities to make discoveries and formulate ideas on their own, based on what they learn in this unit.



### Writing

Every AIMS Teaching Module will contain an activity designed for students to use the writing process to express their ideas about what they have learned. The writing activity may also help them to make the connection between what they are learning in this unit and how it applies to other content areas.



### In The Newsroom

Each AIMS Teaching Module contains a newsroom activity designed to help students make the relationship between what they learn in the classroom and how it applies in their world. The purpose of In The Newsroom is to actively involve each class member in a whole learning experience. Each student will have an opportunity to perform all of the tasks involved in production: writing, researching, producing, directing, and interviewing as they create their own classroom news program.



### Extended Activities

These activities provide opportunities for students to work separately or together to conduct further research, explore answers to their own questions, or apply what they have learned to other media or content areas.



### Link to the World

These activities offer ideas for connecting learners' classroom activities to their community and the rest of the world.



### Culminating Activity

To wrap up the unit, AIMS Teaching Modules offer suggestions for ways to reinforce what students have learned and how they can use their new knowledge to enhance their world view.

## **VOCABULARY**

Every ATM contains an activity that reinforces the meaning and usage of the vocabulary words introduced in the program content. Students will either read or find the definition of each vocabulary word, then use the word in a written sentence.

## **CHECKING COMPREHENSION**

Checking Comprehension is designed to help you evaluate how well your students understand, retain, and recall the information presented in the AIMS Teaching Module. Depending on your students' needs, you may direct this activity to the whole group yourself, or you may want to have students work on the activity page independently, in pairs, or in small groups. Students can verify their written answers through discussion or by viewing the video a second time. If you choose, you can reproduce the answers from your Answer Key or write the answer choices in a Word Bank for students to use. Students can use this completed activity as a study guide to prepare for the test.

## **CONSUMABLE ACTIVITIES**

The AIMS Teaching Module provides a selection of consumable activities, designed to specifically reinforce the content of this learning unit. Whenever applicable, they are arranged in order from low to high difficulty level, to allow a seamless facilitation of the learning process. You may choose to have students take these activities home or to work on them in the classroom independently, in pairs or in small groups.

## **CHECKING VOCABULARY**

The Checking Vocabulary activity provides the opportunity for students to assess their knowledge of new vocabulary with this word game or puzzle. The format of this vocabulary activity allows students to use the related words and phrases in a different context.

## **TEST**

The AIMS Teaching Module Test permits you to assess students' understanding of what they have learned. The test is formatted in one of several standard test formats to give your students a range of experiences in test-taking techniques. Be sure to read, or remind students to read, the directions carefully and to read each answer choice before making a selection. Use the Answer Key to check their answers.

## **ADDITIONAL AIMS MULTIMEDIA PROGRAMS**

After you have completed this AIMS Teaching Module you may be interested in more of the programs that AIMS offers. This list includes several related AIMS programs.

## **ADDITIONAL READING SUGGESTIONS**

AIMS offers a carefully researched list of other resources that you and your students may find rewarding.

## **ANSWER KEY**

Reproduces tests and work pages with answers marked.

# Real World Science: Simple Machines

## THEMES

In *Real World Science: Simple Machines*, students will learn to define and recognize the six basic types of simple machines: the inclined plane, wedge, screw, lever, wheel and axle, and pulley. They will better understand how these machines are used and how they make our lives easier.

## OVERVIEW

A machine is any device that helps us do work. Work is the result of force moving an object. There are six basic types of simple machines. An inclined plane is a sloping surface that makes it easier to move an object to a higher or lower place. A wedge is a type of inclined plane used to raise an object or split an object apart. Another type of simple machine—the screw—is used to apply tremendous force with very little effort. The lever is simply a rigid object that pivots around a fixed point called a fulcrum. There are six different classes of levers. The wheel and axle is a simple machine that helps people lift heavy loads with less effort. A gear is a special kind of wheel that transfers force from one part of a machine to another. Finally, the pulley is a simple machine made of a wheel, a post and a rope. It makes work easier by changing the direction of force.

## OBJECTIVES

- ▶ To identify simple machines within the real world.
- ▶ To explain what each of the six simple machines are used for, including the inclined plane, the wedge, the screw, the lever, the wheel and axle, and the pulley.
- ▶ To use selected vocabulary appropriately when speaking and writing about simple machines.

Use this page for your individual notes about planning and/or effective ways to manage this  
AIMS Teaching Module in your classroom.

Our AIMS Multimedia Educational Department welcomes your observations and comments.  
Please feel free to address your correspondence to:

AIMS Multimedia  
Editorial Department  
9710 DeSoto Avenue  
Chatsworth, California 91311-4409

## INTRODUCTION TO THE PROGRAM

Everyday we depend on some type of machine, whether it is a complex machine, such as a computer, or a simple machine, like a knife. Often times, we don't even realize that a tool we are using is a machine. Simple machines are those that have few or no moving parts. *Real World Science: Simple Machines* presents each of the six types of simple machines. It describes how each type works and offers some examples of how simple machines are used in daily life.

## INTRODUCTION TO VOCABULARY

Before starting the program, write the following words on the board. Ask the class to discuss the meaning of each word, and review the terms that are unfamiliar to students.

**machine** - any device that helps us do work

**work** - the result of a force moving an object

**force** - a push or pull that changes the motion or shape of an object

## FOCUS

Tell students to think for a moment about their daily activities. How often do they use simple machines? How important are the machines? What would life be like without them? Ask students to keep these things in mind as they begin the unit.

## DISCUSSION IDEAS

Ask students to search the classroom for things that might be simple machines. As they list items, record them on the board. Accept all answers without reservation. Which things are used to change the motion of objects? Which things are used to move objects to a higher or lower place? Which things are used to change the shape of objects?

# JUMP RIGHT IN

## HOW TO USE THE *REAL WORLD SCIENCE: SIMPLE MACHINES* AIMS TEACHING MODULE

### Preparation

- ▶ Read *Real World Science: Simple Machines* **Themes**, **Overview**, and **Objectives** to become familiar with program content and expectations.
- ▶ Use **Preparation for Viewing** suggestions to introduce the topic to students.

### Viewing *REAL WORLD SCIENCE: SIMPLE MACHINES*

- ▶ Set up viewing monitor so that all students have a clear view.
- ▶ Depending on your classroom size and learning range, you may choose to have students view *Real World Science: Simple Machines* together or in small groups.
- ▶ Some students may benefit from viewing the video more than one time.

### After Viewing *REAL WORLD SCIENCE: SIMPLE MACHINES*

- ▶ Select **Suggested Activities** that integrate into your classroom curriculum. If applicable, gather materials or resources.
- ▶ Choose the best way for students to work on each activity. Some activities work best for the whole group. Other activities are designed for students to work independently, in pairs, or in small groups. Whenever possible, encourage students to share their work with the rest of the group.
- ▶ Duplicate the appropriate number of **Vocabulary**, **Checking Comprehension**, and consumable activity pages for your students.
- ▶ You may choose to have students take consumable activities home, or complete them in the classroom, independently, or in groups.
- ▶ Administer the Test to assess students' comprehension of what they have learned, and to provide them with practice in test-taking procedures.
- ▶ Use the **Culminating Activity** as a forum for students to display, summarize, extend, or share what they have learned with each other, the rest of the school, or a local community organization.

## SUGGESTED ACTIVITIES

### Writing

Ask students to investigate their homes to find modern complex machines that make our lives easier. Some good examples include electric can openers, washing machines, drills, vacuum cleaners and lawn mowers. Have each student select one modern complex machine and describe it in a written summary. What simple machines make up the larger machine? If possible, have students use instruction manuals to help them understand the internal components of the machine. Remind students not to touch the machines unless an adult is present.



*45 Minutes*

Next, ask students to think about what life was like before the complex machine was invented. Did people use a simple machine instead? How long would a task have taken with the simple machine, compared with the complex machine? Have students summarize their opinions as a continuation of their earlier writings.

### Meeting Individual Needs

Ask students to choose one of the basic simple machines described in the program: the plane, the wedge, the screw, the lever, the wheel and axle, or the pulley. Have students write a brief summary of their chosen simple machine.



*20 Minutes*

Make sure students include a clear definition of the machine, as well as an example from daily life. They should also explain where effort and load are applied when the machine is used.

### Connection to Art

Supply each student with five sheets of drawing paper. Instruct them to draw a typical example of a wedge, inclined plane, screw, wheel and axle, and pulley, with one drawing on each sheet.



*40 Minutes*

(Wedge: common examples include a door stop, knife, saw, and tent stake;

Inclined plane: common examples include a ramp and a slide;

Screw: common examples include a drill bit, and fasteners on vices and clamps;

Wheel and axle: common examples include a wrench, screwdriver, and door knob;

Pulley: common examples include a flag pole, clothesline or ski lift.)

## Link to the World

Ask each student to locate a simple machine in his or her home and bring it to class for a “show and tell” discussion. Encourage students to think carefully about their machines before they present them to classmates. (Students should be reminded to **never** bring a knife, or any object that can be used as a weapon, to school.)



*60 Minutes*

Students should be able to tell the class what type of machine they are presenting, or if applicable, which class of lever. They should also be able to explain how the machine works. Where is force applied when the machine is used? Where is the load? Where is the fulcrum, if any? How does the machine make a job easier?

When all of the presentations are completed, ask students to think about how many simple machines we see and use each day...on the school bus, in the car, in the park, in the kitchen and at school.

## In the Newsroom

Divide students into six cooperative groups. Assign each group a specific category of simple machine: a lever, a wheel and axle, a pulley, an inclined plane, a wedge and a screw. Ask each group to work together to write and present a news story about a specific example of their assigned machine type. For instance, the wedge group may choose to do a story on a door stop.

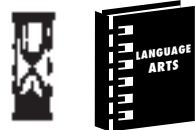


*Extended Time*

Each group should assign its members different tasks: team leader, research and fact gatherer, illustrator or photographer, presenter, and so on. Depending on time and equipment, students may perform live news reports, record radio reports or videotape news segments. Encourage each student to make the most of his or her talents.

## Connection to Language Arts

Complex machines, such as airplanes and automobiles, are made up of many simple machines. Write the following list of machine parts on the board. Ask students to define each part using an encyclopedia or dictionary. In what complex machines might we find the machine parts?



*20 Minutes*

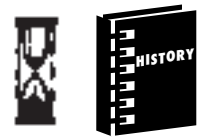
- bearing (reduces the friction of moving or turning parts by providing support; wheels turn inside bearings on their axles)
- gauge (measures pressure in enclosed containers such as pipes)
- governor (instrument that keeps machines running at certain speeds; governors use screws and wheels and axles in order to regulate the flow of fuel or electricity)
- valve (device which opens and closes to control the flow of fluid through pipes and containers)

## Connection to History

Discuss with students the basic facts and events surrounding the dawn of the Industrial Revolution. Describe how the use of simple machines, integrated into large, more complex machines, had tremendous social impact on the United States and other developed nations. Explain how improved production methods made some people very rich, while others, particularly immigrants, were used as slave labor to work in the newly built factories. Discuss how working and living conditions in great cities like New York and London were unbearable. Pollution, disease, heat and cramped living spaces made life hard for people of all ages. With child labor, even children were exploited in the name of profit. As families moved to cities to find work, entire landscapes were changed forever.

Ask students to think carefully about the Industrial Revolution. Was the progress worth the problems it caused? How much easier are our lives now? In what ways might our lives be less fulfilling? How has the Technology Revolution added to these benefits and consequences?

(Like the Technology Revolution, the Industrial Revolution provided people with more free time. However, inventions like the radio and television caused many people to become more isolated, spending less time with neighbors and friends. The conveniences also caused people to become less active, leading to problems like heart disease and obesity. The same situations now threaten to overshadow the exciting possibilities emerging with the Technology Revolution. For instance, some people may come to rely more on the Internet than on social interaction.)



25 Minutes

## Extended Activity

Ask each student to look through old magazines to locate photographs of levers. Furniture, buildings, automobiles, household tools and appliances can include good examples. Ask students to cut out all of the levers they find. Next, have them to glue their lever pictures onto poster board. Below each picture, they should write the name of the object that is being used as a lever. They should also list the class of the lever. Encourage them to find at least one example of a first-class lever, one example of a second-class lever and one example of a third-class lever.

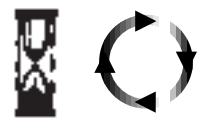
Display the lever collages on a wall entitled, "Levers In Our World."



45 Minutes

## Culminating Activity

Using what they have learned in the unit, ask each student to write a question related to the program. Collect the questions and use them to write a review quiz. After giving the quiz, ask students if they enjoyed designing the test. How would they feel about designing more tests in the future?



60 Minutes

**VOCABULARY**

The following terms are from *Real World Science: Simple Machines*. Fill in the number of each term next to its closest definition.

- |                   |            |
|-------------------|------------|
| 1. fulcrum        | 6. work    |
| 2. screw          | 7. wedge   |
| 3. pulley         | 8. machine |
| 4. inclined plane | 9. gear    |
| 5. lever          | 10. force  |

- \_\_\_ any device that helps us do work
- \_\_\_ the result of force moving an object
- \_\_\_ a push or pull that changes the motion or shape of an object
- \_\_\_ a sloping surface that makes it easier to move objects to a higher or lower place
- \_\_\_ a type of inclined plane used as a tool to raise objects or split objects apart
- \_\_\_ a simple machine, such as a drill bit, used to apply tremendous force with very little effort
- \_\_\_ a rigid object or bar that pivots around a fixed point and reduces the amount of effort needed to lift or move an object
- \_\_\_ fixed point on which a lever rocks back and forth
- \_\_\_ special type of wheel that can transfer force from one part of a machine to another
- \_\_\_ a simple machine that is made up of a wheel on a post, with a rope around the wheel

**CHECKING COMPREHENSION**

Read the following sentences and circle the letter of the word that best fills each blank.

A \_\_\_1\_\_\_ is any device that helps us do work . Work is the result of \_\_\_2\_\_\_ moving an object. There are six basic types of simple machines. An inclined plane is a sloping surface that makes it easier to move an object \_\_\_3\_\_\_ . A \_\_\_4\_\_\_ is a type of inclined plane used to raise an object or split an object apart. Another type of simple machine—the screw—is used to apply tremendous force with very little \_\_\_5\_\_\_ . The lever is simply a rigid object that pivots around a fixed point called a \_\_\_6\_\_\_ . There are \_\_\_7\_\_\_ different classes of levers. The wheel and \_\_\_8\_\_\_ is a simple machine that helps people lift heavy loads with less effort. A \_\_\_9\_\_\_ is a special kind of wheel that transfers force from one part of a machine to another. Finally, the \_\_\_10\_\_\_ is a simple machine made of a wheel, a post and a rope. It makes work easier by changing the direction of force.

- |   |   |
|---|---|
| 1. A. lever<br>B. machine<br>C. gear<br>D. pulley                                       | 6. A. fulcrum<br>B. pole<br>C. gear<br>D. plane         |
| 2. A. load<br>B. fulcrum<br>C. air<br>D. force  | 7. A. four<br>B. six<br>C. three<br>D. five             |
| 3. A. on level ground<br>B. in a circle<br>C. to a higher or lower place<br>D. sideways | 8. A. pulley<br>B. axle<br>C. rope<br>D. lever          |
| 4. A. wedge<br>B. screw<br>C. hammer<br>D. wheel  | 9. A. rake<br>B. jack<br>C. plane<br>D. gear            |
| 5. A. load<br>B. gravity<br>C. stability<br>D. effort                                   | 10. A. barrow<br>B. pivot<br>C. pulley<br>D. flat plane |

### MACHINE MATCH-UP

Match each machine type on the left with the best example on the right.

- |                       |              |
|-----------------------|--------------|
| 1. inclined plane     | see saw      |
| 2. wedge              | ski lift     |
| 3. screw              | axe          |
| 4. first-class lever  | door knob    |
| 5. second-class lever | rake         |
| 6. third-class lever  | highway ramp |
| 7. wheel and axle     | flag pole    |
| 8. fixed pulley       | wheel barrow |
| 9. moveable pulley    | drill bit    |

**TRUE OR FALSE**

Place a T next to statements that are true and an F next to statements that are false.

1. \_\_\_ A rake is a simple type of machine.
2. \_\_\_ Every machine needs force to make it work.
3. \_\_\_ A see saw is an example of an inclined plane.
4. \_\_\_ Almost all cutting machines, like saws and knives, use wedges.
5. \_\_\_ A lever pivots on a point known as a fulcrum.
6. \_\_\_ A good example of a first-class lever is a flag pole.
7. \_\_\_ With a first-class lever, like a see saw, the fulcrum is always between the load and the effort.
8. \_\_\_ The wheel and axle helps people split objects apart.
9. \_\_\_ A ski lift is a good example of a third-class lever.
10. \_\_\_ A gear is a special wheel that transfers force from one part of a machine to another.

**NUMBER CODE**

A = 1	H = 7	R = 13
C = 2	I = 8	S = 14
D = 3	L = 9	T = 15
E = 4	N = 10	U = 16
F = 5	O = 11	V = 17
G = 6	P = 12	Y = 18

- Force is a push or pull that changes the motion or 14-7-1-12-4 of an object.  
\_\_\_\_\_
- Wedges are used to raise objects or 14-12-9-8-15 objects apart.  
\_\_\_\_\_
- The wheel and axle is actually a type of 9-4-17-4-13 that can move things farther with less effort.  
\_\_\_\_\_
- The main advantage of a 12-16-9-9-4-18 is that it can change the direction of force.  
\_\_\_\_\_
- An inclined plane is more efficient when there is less 5-13-8-2-15-8-11-10 between the plane and the object being moved.  
\_\_\_\_\_
- The effectiveness of a wedge depends on the 1-10-6-9-4 of the thin end.  
\_\_\_\_\_
- A screw is actually an inclined plane that 14-12-8-13-1-9-14 around a central shaft.  
\_\_\_\_\_
- The lever was probably one of the earliest simple machines 8-10-17-4-10-15-4-3 by humans.  
\_\_\_\_\_

### MACHINE PUZZLE

Complete the words on the left by using the clues on the right.

M \_\_\_\_\_ A \_\_\_\_\_ is any device that helps us do work.

A \_\_\_\_\_ A door knob is an example of a simple machine known as the "wheel and \_\_\_\_\_."

C \_\_\_\_\_ Levers are divided into three different \_\_\_\_\_ : first, second and third.

H \_\_\_\_\_ A ramp is used to move objects to lower or \_\_\_\_\_ places using less effort.

I \_\_\_\_\_ An \_\_\_\_\_ plane is a sloping surface that makes it easier to move an object to a higher or lower place.

N \_\_\_\_\_ It would take less effort to attach two boards together with a screw and screwdriver than with a \_\_\_\_\_ and hammer.

E \_\_\_\_\_ Scientists often use the formula, "Work \_\_\_\_\_ force times distance."

S \_\_\_\_\_ A \_\_\_\_\_ is a simple machine used in drill bits, vices and clamps.

**WORD SEARCH**

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally or backward.

**plane**  
**wedge**  
**screw**  
**lever**  
**gear**  
**wheel**  
**axle**  
**pulley**  
**machine**  
**fulcrum**

M	T	G	C	T	B	Y	E	L	L	U	P
C	H	E	L	W	C	J	D	U	R	B	N
P	L	A	N	E	M	Z	H	C	A	Z	G
E	O	R	G	D	O	A	S	Y	L	S	Y
B	D	Y	R	G	R	Q	C	W	X	D	E
L	S	C	R	E	W	S	L	H	Q	L	J
Q	T	M	E	P	T	D	S	E	I	W	S
A	Y	C	T	A	B	M	C	E	Y	N	L
V	X	Q	J	O	H	V	G	L	J	Y	E
F	U	L	C	R	U	M	Q	N	C	D	V
R	G	P	E	V	T	N	Z	W	B	C	E
W	P	R	M	A	W	S	P	E	N	Z	R

**TEST**

Circle the phrase which best answers each question.

1. A simple machine is different from a complex machine because it has:

- little or no force.
- few or no moving parts.
- parts that require more effort to be used.
- more gears.

2. A machine helps us get more work done by using less:

- gravity.
- heat.
- fuel.
- effort.

3. In order for work to get done, \_\_\_\_\_ must be applied.

- distance
- friction
- force
- fulcrum

4. The relationship between work and force can be expressed with the formula, "Work equals force times:

- distance."
- effort."
- axle."
- machine."

5. The seesaw, wheelbarrow and rake are all types of:

- axles.
- wedges.
- levers.
- planes.

**TEST (CONTINUED)**

6. A screw is really an adapted:

- wheel.
- pulley.
- lever.
- inclined plane.

7. The simple machine used to a split or raise objects is called a:

- fulcrum.
- screw.
- wedge.
- knob.

8. The distance between two neighboring peaks of an overlapping inclined plane is called:

- force.
- wavelength.
- rigidity.
- pitch.

9. A lever is a simple rigid object or bar that pivots around a fixed point called a:

- ramp.
- shaft
- fulcrum.
- hedge.

10. An example of a wheel and axle is a \_\_\_\_\_ used to turn a bolt.

- wrench
- hammer
- pulley
- gear

## **ADDITIONAL AIMS MULTIMEDIA PROGRAMS**

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## ANSWER KEY for page 18

### VOCABULARY

The following terms are from *Real World Science: Simple Machines*. Fill in the number of each term next to its closest definition.

- |                   |            |
|-------------------|------------|
| 1. fulcrum        | 6. work    |
| 2. screw          | 7. wedge   |
| 3. pulley         | 8. machine |
| 4. inclined plane | 9. gear    |
| 5. lever          | 10. force  |

- 8 any device that helps us do work
- 6 the result of force moving an object
- 10 a push or pull that changes the motion or shape of an object
- 4 a sloping surface that makes it easier to move objects to a higher or lower place
- 7 a type of inclined plane used as a tool to raise objects or split objects apart
- 2 a simple machine, such as a drill bit, used to apply tremendous force with very little effort
- 5 a rigid object or bar that pivots around a fixed point and reduces the amount of effort needed to lift or move an object
- 1 fixed point on which a lever rocks back and forth
- 9 special type of wheel that can transfer force from one part of a machine to another
- 3 a simple machine that is made up of a wheel on a post, with a rope around the wheel

## ANSWER KEY for page 19

### CHECKING COMPREHENSION

Read the following sentences and circle the letter of the word that best fills each blank.

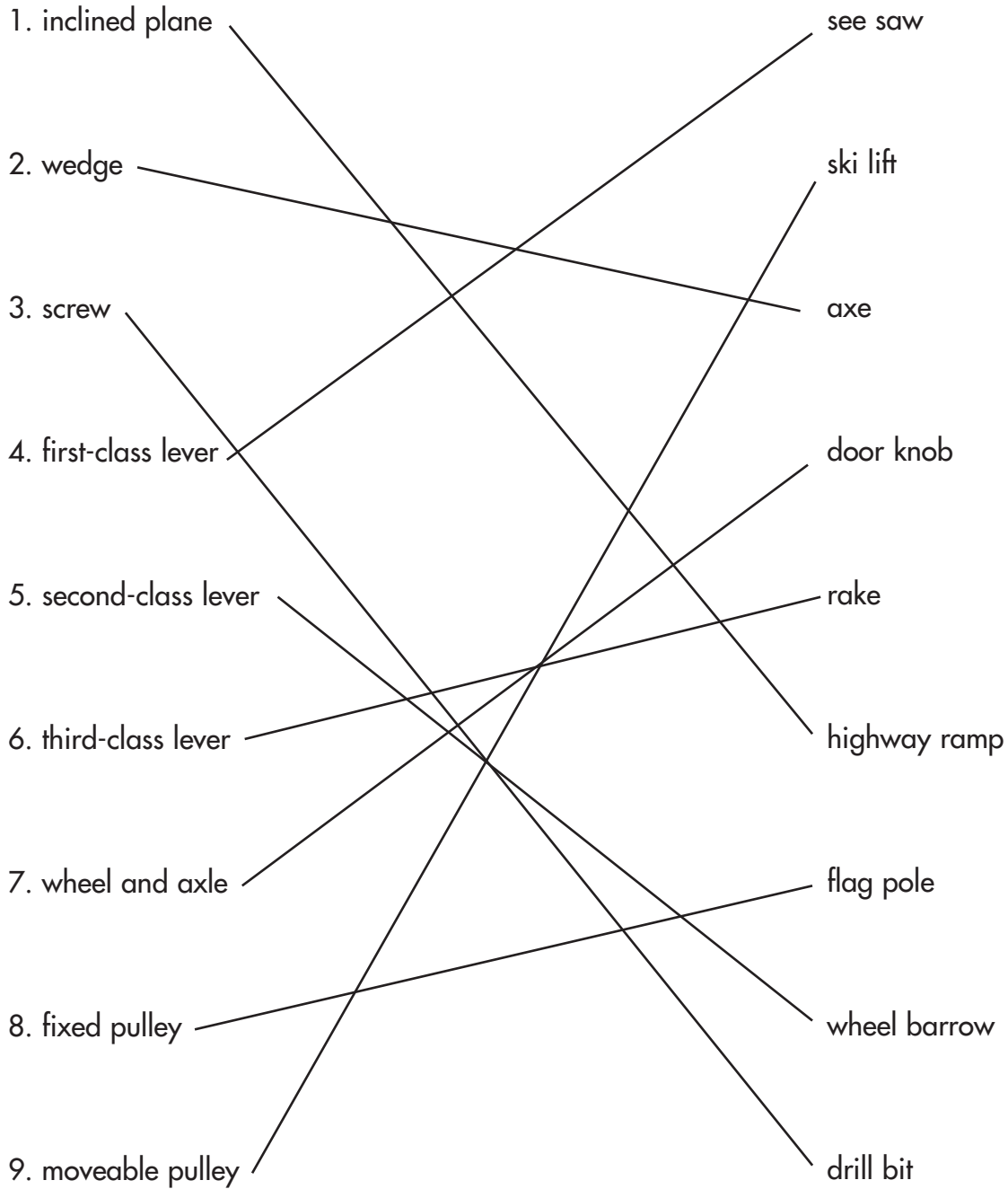
A \_\_\_1\_\_\_ is any device that helps us do work . Work is the result of \_\_\_2\_\_\_ moving an object. There are six basic types of simple machines. An inclined plane is a sloping surface that makes it easier to move an object \_\_\_3\_\_\_ . A \_\_\_4\_\_\_ is a type of inclined plane used to raise an object or split an object apart. Another type of simple machine—the screw—is used to apply tremendous force with very little \_\_\_5\_\_\_ . The lever is simply a rigid object that pivots around a fixed point called a \_\_\_6\_\_\_ . There are \_\_\_7\_\_\_ different classes of levers. The wheel and \_\_\_8\_\_\_ is a simple machine that helps people lift heavy loads with less effort. A \_\_\_9\_\_\_ is a special kind of wheel that transfers force from one part of a machine to another. Finally, the \_\_\_10\_\_\_ is a simple machine made of a wheel, a post and a rope. It makes work easier by changing the direction of force.

1. A. lever  
B. machine  
C. gear  
D. pulley
2. A. load  
B. fulcrum  
C. air  
D. force
3. A. on level ground  
B. in a circle  
C. to a higher or lower place  
D. sideways
4. A. wedge  
B. screw  
C. hammer  
D. wheel
5. A. load  
B. gravity  
C. stability  
D. effort
6. A. fulcrum  
B. pole  
C. gear  
D. plane
7. A. four  
B. six  
C. three  
D. five
8. A. pulley  
B. axle  
C. rope  
D. lever
9. A. rake  
B. jack  
C. plane  
D. gear
10. A. barrow  
B. pivot  
C. pulley  
D. flat plane

# ANSWER KEY for page 20

## MACHINE MATCH-UP

Match each machine type on the left with the best example on the right.



## ANSWER KEY for page 21

### TRUE OR FALSE

Place a T next to statements that are true and an F next to statements that are false.

1.   **T**   A rake is a simple type of machine.
2.   **T**   Every machine needs force to make it work.
3.   **F**   A see saw is an example of an inclined plane.
4.   **T**   Almost all cutting machines, like saws and knives, use wedges.
5.   **T**   A lever pivots on a point known as a fulcrum.
6.   **F**   A good example of a first-class lever is a flag pole.
7.   **T**   With a first-class lever, like a see saw, the fulcrum is always between the load and the effort.
8.   **F**   The wheel and axle helps people split objects apart.
9.   **F**   A ski lift is a good example of a third-class lever.
10.   **T**   A gear is a special wheel that transfers force from one part of a machine to another.

## ANSWER KEY for page 22

### NUMBER CODE

A = 1	H = 7	R = 13
C = 2	I = 8	S = 14
D = 3	L = 9	T = 15
E = 4	N = 10	U = 16
F = 5	O = 11	V = 17
G = 6	P = 12	Y = 18

1. Force is a push or pull that changes the motion or 14-7-1-12-4 of an object.

**shape**

---

2. Wedges are used to raise objects or 14-12-9-8-15 objects apart.

**split**

---

3. The wheel and axle is actually a type of 9-4-17-4-13 that can move things farther with less effort.

**lever**

---

4. The main advantage of a 12-16-9-9-4-18 is that it can change the direction of force.

**pulley**

---

5. An inclined plane is more efficient when there is less 5-13-8-2-15-8-11-10 between the plane and the object being moved.

**friction**

---

6. The effectiveness of a wedge depends on the 1-10-6-9-4 of the thin end.

**angle**

---

7. A screw is actually an inclined plane that 14-12-8-13-1-9-14 around a central shaft.

**spirals**

---

8. The lever was probably one of the earliest simple machines 8-10-17-4-10-15-4-3 by humans.

**invented**

---

## ANSWER KEY for page 23

### MACHINE PUZZLE

Complete the words on the left by using the clues on the right.

**M** achine \_\_\_\_\_ A \_\_\_\_\_ is any device that helps us do work.

**A** xle \_\_\_\_\_ A door knob is an example of a simple machine known as the "wheel and \_\_\_\_\_."

**C** lasses \_\_\_\_\_ Levers are divided into three different \_\_\_\_\_ : first, second and third.

**H** igher \_\_\_\_\_ A ramp is used to move objects to lower or \_\_\_\_\_ places using less effort.

**I** nclined \_\_\_\_\_ An \_\_\_\_\_ plane is a sloping surface that makes it easier to move an object to a higher or lower place.

**N** ail \_\_\_\_\_ It would take less effort to attach two boards together with a screw and screwdriver than with a \_\_\_\_\_ and hammer.

**E** quals \_\_\_\_\_ Scientists often use the formula, "Work \_\_\_\_\_ force times distance."

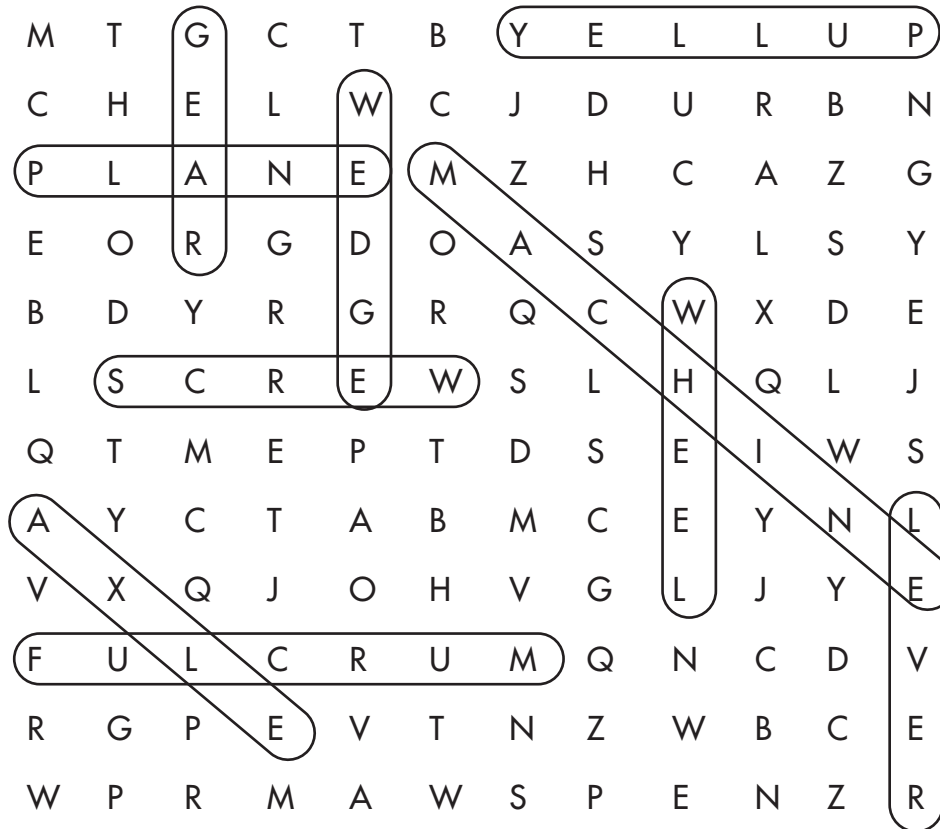
**S** crew \_\_\_\_\_ A \_\_\_\_\_ is a simple machine used in drill bits, vices and clamps.

# ANSWER KEY for page 24

## WORD SEARCH

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally or backward.

- plane
- wedge
- screw
- lever
- gear
- wheel
- axle
- pulley
- machine
- fulcrum



## ANSWER KEY for page 25

### TEST

Circle the phrase which best answers each question.

1. A simple machine is different from a complex machine because it has:

- little or no force.
- few or no moving parts.
- parts that require more effort to be used.
- more gears.

2. A machine helps us get more work done by using less:

- gravity.
- heat.
- fuel.
- effort.

3. In order for work to get done, \_\_\_\_\_ must be applied.

- distance
- friction
- force
- fulcrum

4. The relationship between work and force can be expressed with the formula, "Work equals force times:

- distance."
- effort."
- axle."
- machine."

5. The seesaw, wheelbarrow and rake are all types of:

- axles.
- wedges.
- levers.
- planes.

## ANSWER KEY for page 26

### TEST (CONTINUED)

6. A screw is really an adapted:

- wheel.
- pulley.
- lever.
- inclined plane.

7. The simple machine used to split or raise objects is called a:

- fulcrum.
- screw.
- wedge.
- knob.

8. The distance between two neighboring peaks of an overlapping inclined plane is called:

- force.
- wavelength.
- rigidity.
- pitch.

9. A lever is a simple rigid object or bar that pivots around a fixed point called a:

- ramp.
- shaft
- fulcrum.
- hedge.

10. An example of a wheel and axle is a \_\_\_\_\_ used to turn a bolt.

- wrench
- hammer
- pulley
- gear