

Work and Machines ▪ *Adapted Reading and Study*

Simple Machines (pages 124–135)

Inclined Plane (page 125)

Key Concept: You can determine the ideal mechanical advantage of an inclined plane by dividing the length of the incline by its height.

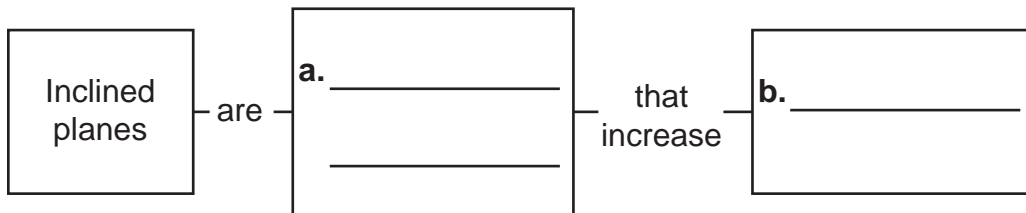
- An inclined plane is one kind of simple machine. An **inclined plane** is a flat, sloped surface. A ramp used to load a moving truck is an example of an inclined plane.
- An inclined plane makes work easier by increasing the distance over which a force is exerted.
- The output force of an inclined plane is greater than the input force.

Answer the following questions. Use your textbook and the ideas above.

1. Circle the letter of an example of an inclined plane.
 - a. truck
 - b. ramp
 - c. airplane

2. Read the words in the box. Use the correct words to fill in the blanks in the concept map about inclined planes.

Simple machines Force Work



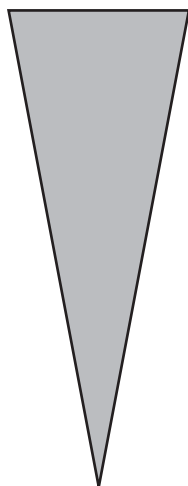
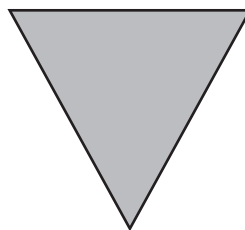
Work and Machines ▪ *Adapted Reading and Study***Wedge** (page 126)

Key Concept: The ideal mechanical advantage of a wedge is determined by dividing the length of the wedge by its width.

- A wedge is one kind of simple machine. A **wedge** is an inclined plane that can move.
- A wedge is thick at one end and thin at the other end. A knife is an example of a wedge.
- A wedge makes work easier by changing the direction and amount of a force.
- The longer and thinner a wedge is, the greater its mechanical advantage.

Answer the following questions. Use your textbook and the ideas above.

3. Is this sentence true or false? A wedge is an inclined plane that can move. _____
4. Circle the letter of the wedge with the greater mechanical advantage.

**a.****b.**

Work and Machines ▪ *Adapted Reading and Study***Screws** (page 127)

Key Concept: The ideal mechanical advantage of a screw is the length around the threads divided by the length of the screw.

- A screw is one kind of simple machine. A **screw** is an inclined plane wrapped in a circle. A jar lid is an example of a screw.
- A screw makes work easier by increasing the distance over which a force is exerted.
- A screw's output force is greater than the input force.

Answer the following questions. Use your textbook and the ideas above.

5. An inclined plane wrapped in a circle is a(an)

_____.

6. Read each word in the box. In the sentence below, fill in the correct words.

greater than	less than	equal to
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- a. The output force of a screw is _____ the input force.

7. An example of a screw is

- a ramp.
- a knife.
- a jar lid.

Work and Machines ▪ *Adapted Reading and Study***Levers** (pages 128–129)

Key Concept: The ideal mechanical advantage of a lever is determined by dividing the distance from the fulcrum to the input force by the distance from the fulcrum to the output force.

- A lever is one kind of simple machine. A **lever** is a bar that moves around a fixed point called a **fulcrum**. There are three kinds, or classes, of levers.
- In a first-class lever, the fulcrum is between the input force and output force. First-class levers change the direction of a force. A seesaw is a first-class lever.
- In a second-class lever, the output force is between the fulcrum and the input force. Second-class levers increase a force. A wheelbarrow is a second-class lever.
- In a third-class lever, the input force is between the fulcrum and the output force. Third-class levers increase the distance over which a force is exerted. A hockey stick is a third-class lever.

Answer the following questions. Use your textbook and the ideas above.

8. Draw a line from each term to its meaning.

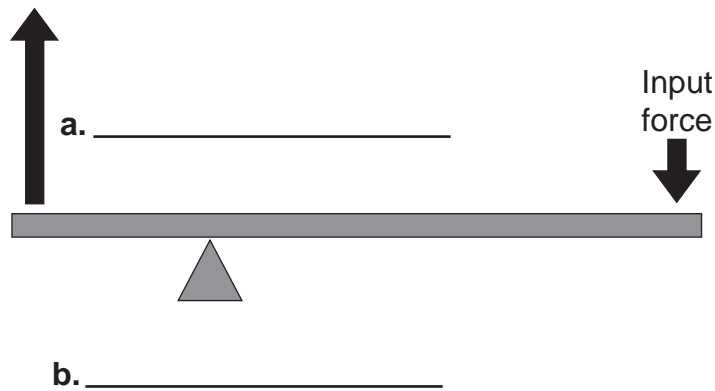
Term	Meaning
fulcrum	a. a bar that moves
lever	b. a fixed point

9. Circle the letter of each example of a lever.
- a.** hockey stick
 - b.** screw
 - c.** wheelbarrow

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10. Read the words in the box. Use the correct words to label the diagram.

Output force	Input force	Fulcrum
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Wheel and Axle (pages 130–132)

Key Concept: You can find the mechanical advantage of a wheel and axle by dividing the radius of the wheel by the radius of the axle.

- A wheel and axle is one kind of simple machine. A **wheel and axle** is two circular objects that are joined together. A screwdriver and a doorknob are examples of wheel and axles.
- Some wheel and axles increase force. Other wheel and axles increase the distance over which a force is exerted.

Answer the following questions. Use your textbook and the ideas above.

11. Circle the letter of each example of a wheel and axle.

- a. doorknob
- b. screwdriver
- c. screw

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12. Circle each way a wheel and axel can help you do work.
- reduce the work
 - increase the force
 - increase the distance over which a force is exerted

Pulley (pages 132–133)

Key Concept: The ideal mechanical advantage of a pulley is equal to the number of sections of rope that support the object.

- A pulley is one kind of simple machine. A **pulley** is a wheel with a rope or cable wrapped around it. A pulley is used to raise a flag on a flagpole.
- Pulleys can change the amount or direction of the input force.

Answer the following questions. Use your textbook and the ideas above.

13. Is this sentence true or false? A pulley changes the amount of work needed to raise a flag. _____
14. You can use a(an) _____ to raise a flag up a flagpole.

Simple Machines in the Body (page 134)

Key Concept: Most of the machines in your body are levers that consist of bones and muscles.

- Levers are found in your body. Your arm works as a lever when you bend your elbow. Your foot acts as a lever when you take a step.
- Wedges are found in your body, too. Your front teeth are wedges that help you bite through food.

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Answer the following questions. Use your textbook and the ideas on page 57.

15. When you bend your knee, your leg acts as a
- wedge.
 - lever.
 - pulley.
16. When you bite into an apple, your front teeth act as
- wedges.
 - levers.
 - pulleys.

Compound Machines (page 135)

Key Concept: The ideal mechanical advantage of a compound machine is the product of the individual ideal mechanical advantages of the simple machines that make it up.

- A **compound machine** is made of two or more simple machines.
- Most machines you use are compound machines. A bicycle is one example of a compound machine.

Answer the following questions. Use your textbook and the ideas above.

17. A machine that is made of two or more simple machines is called a(an) _____.
18. Is the following sentence true or false? A bicycle is an example of a simple machine. _____