

# Simple and Complex Machines

We hear the word “work” all the time. But, what is work actually? Simply put, work is done when a force is exerted on another object causing it to move! It’s that simple! Work is the energy used when a force causes an object to move. Some things are easy to move, requiring only a small amount of energy or work. Other things are almost impossible to move, requiring huge amounts of energy and work to move them. There are some objects that would be impossible for people to move without help. This is where machines come in. A machine is anything that helps to alleviate or reduce the the amount of force needed to do the work. Simple machines are just that, simple. They only have a few parts.

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The first type of simple machine is a wheel and axle. This type of simple machine is made of a cylinder or a shaft and a circular object like a tire, doorknob, or a rolling pin. A wheel and axle reduce the amount of force necessary to do the work. Imagine how much harder it would be to move a huge pile of rock from one location to another without the use of a wheel barrow! That wheel on the wheel barrow is, you guessed it, a wheel and axle!

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Another type of simple machine that we use all the time is called a lever. A lever is a simple machine in which a stiff bar or beam rotates on a fulcrum, or fixed point. Levers help to reduce the work needed to move an object. Think about how hard it would be for you to lift your classmate. If you and your classmate sat on a see-saw, however, it would be much easier for you to lift him or her off the ground. A see-saw is a type of lever. When you lift your friend on a see-saw, they are the “load” and you are acting as the “force.”

(15)

Yet another type of simple machine is an inclined plane. Imagine trying to lift a very heavy box into the back of a truck! It likely would be quite difficult and require a large amount of force to do the work. It sure would be easier with an inclined plane, or ramp! An inclined plane is a flat surface with one end raised higher than the other. You can push objects up the inclined plane or slide them down.

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Other types of simple machines are pulleys, screws, and wedges. Each functioning in their own way to make work easier by requiring less force to move an object! Often times two or more simple machines will work together. When this happens a complex machine is formed. Thank goodness for machines. They sure do make our life a lot easier.

(25)

Name \_\_\_\_\_

**After closely reading the passage, answer the following questions. Be sure to look for details in the text to support your answer.**

1. What are two sentences best help to convey the main idea of this passage?

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2. According to paragraph 3, what is a fulcrum?

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3. Line 7 of the text says “A machine is anything that helps to alleviate or reduce the the amount of force needed to do the work.” What is one detail from the text that supports this claim.

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4. How does the author feel about machines? What sentences best convey this feeling?

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Name \_\_\_\_\_

Date \_\_\_\_\_

Using details and examples from the text, explain the purpose of a simple machine. Give examples of some ways they may accomplish that purpose.

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Name \_\_\_\_\_

Date \_\_\_\_\_

A friend says people we can get by just fine without machines. Do you agree? Why or why not? Support your opinion with evidence from the text.

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# Light Energy

The light that we see, visible light, is only a small part of the electromagnetic spectrum. This light travels in waves that have certain wavelengths. Different wavelengths of visible light have different beautiful colors. As light travels, it travels in a straight line at a constant speed, however, that speed can change depending on what material the light is passing through. In addition, visible light can reflect off of objects as well as be bent and made to travel in a new direction.

(5)

As mentioned above, visible light with different wavelengths have different colors. All these colors together make up white light. When the traveling light comes into contact with an object some or all of the light may be reflected. Look around you. Do you see all the beautiful color? The color you see is actually light being reflected back to your eyes. Take a blue shirt, for example. When light hit that shirt, all of the light except the blue light is absorbed into the shirt. The blue light, on the other hand, is reflected from the shirt back to your eyes. This is why, amazingly, the shirt appears blue to you. It the blue light being reflected to your eyes.

(10)

In addition to light reflecting, light can also refract or bend. Light normally travels in a straight line at a constant speed. When the light enters a new material, however, the speed that the light is traveling can change ever so slightly. When this happens the direction the light is traveling in can also change. When white light enters a prism, the prism will actually bend the light of different wavelengths in different amounts. This causes all the colors of the light to be separated out as they exit the prism. Have you ever wondered how a rainbow is formed? When light enters the tiny droplets of water that are in the atmosphere. The drops of water act as prisms, bending the light and separating out all the beautiful colors for you to see on display.

(20)

When light comes into contact with an object, if that object lets all of the light pass through we call the object transparent. If only some of the light is able to pass through the object that object is called translucent. If, on the other hand, the object does not allow any of the light to pass through it is called an opaque object.

(25)

Visible light travels in straight lines. When it comes into contact with other objects the light can be reflected or refracted giving us the beautiful colors that enrich and beautify our lives each day. Thank goodness for the miracle of light!

Name \_\_\_\_\_

**After closely reading the passage, answer the following questions. Be sure to look for details in the text to support your answer.**

1. What two sentences best give the main idea of this passage?

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2. Considering the information in paragraph 2 and 3, what is one thing both the reflection and refraction of light can do for us?

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3. What is the meaning of the word "refract" as it is used in line 15 of the text?

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4. What organizational structure does the author use in paragraph 2 (chronological, cause/effect, compare/contrast, problem/solution, etc.).

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Name \_\_\_\_\_

Date \_\_\_\_\_

The passage says when light comes into contact with other objects it “can be reflected or refracted.” Using details and examples from the text, explain why each of these is important.

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Name \_\_\_\_\_

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*When it comes to light, refraction is more important than reflection. Do you agree? Why or why not? Support your opinion with evidence from the text.*

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# Potential & Kinetic Energy

Energy is simply the ability to do work or cause something to change. Although energy can not be created or destroyed, it is able to change from one form to another. One thing energy can do is change an object's motion.

- (5) Kinetic energy is energy that is due to an object's motion. The amount of kinetic energy an object in motion possesses is dependent upon the objects speed and mass. When an object is moving at a slower speed, it has less kinetic energy. When it is moving at a faster speed, it has a greater kinetic energy. The faster it moves the greater the energy. Think about a demolition crew tearing down an old building. They may use a giant wrecking ball. If they gently tapped the building with the wrecking ball, probably nothing would happen. If, (10) on the other hand, they let the wreacking ball swing picking up great speed the amount of kinetic energy will be much greater and the building will not stand much of a chance. Kinetic energy, the energy of motion, is energy that is causing change.

- (15) In contrast to kinetic energy, potential energy is energy that is not causing any change, yet has the *potential* to cause change in the future. Some people think of potential energy as stored up energy. One of the primary types of potential energy is what is known as gravitational potential energy. This is potential energy that exists because of the objects position. Think about a rock sitting on the ground. We would say that that rock had little to no potential energy. However, what if that rock was **teetering** on the edge of a high cliff, about to fall? Because of the rock's position and the potential of gravity to cause change in the rock's position, we say the rock has (20) potential, or stored energy. The higher and/or heavier an object is, the more gravitation potential energy the object has.

- (25) Energy can change from potential to kinetic energy. Think about the rock on the edge of the cliff again. What would happen if the rock fell from the cliff? As the rock was falling, or moving, the rock would also possess kinetic energy. Some of the stored potential energy has changed into kinetic energy. As the rock gathers speed and moves closer to the ground, its potential energy decreases and its kinetic energy increases.

Kinetic energy, the energy of motion, and potential or stored energy, are two important forms of energy.

Name \_\_\_\_\_

**After closely reading the passage, answer the following questions. Be sure to look for details in the text to support your answer.**

1. What sentence best represents the main idea in this passage?

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2. Considering the information from the passage, what do potential and kinetic energy have in common?

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3. Which sentence form the text best supports the fact that a pine box derby car at the top of a track has potential energy?

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4. What words from the passage best help you understand the meaning of the word "teetering" in line 18?

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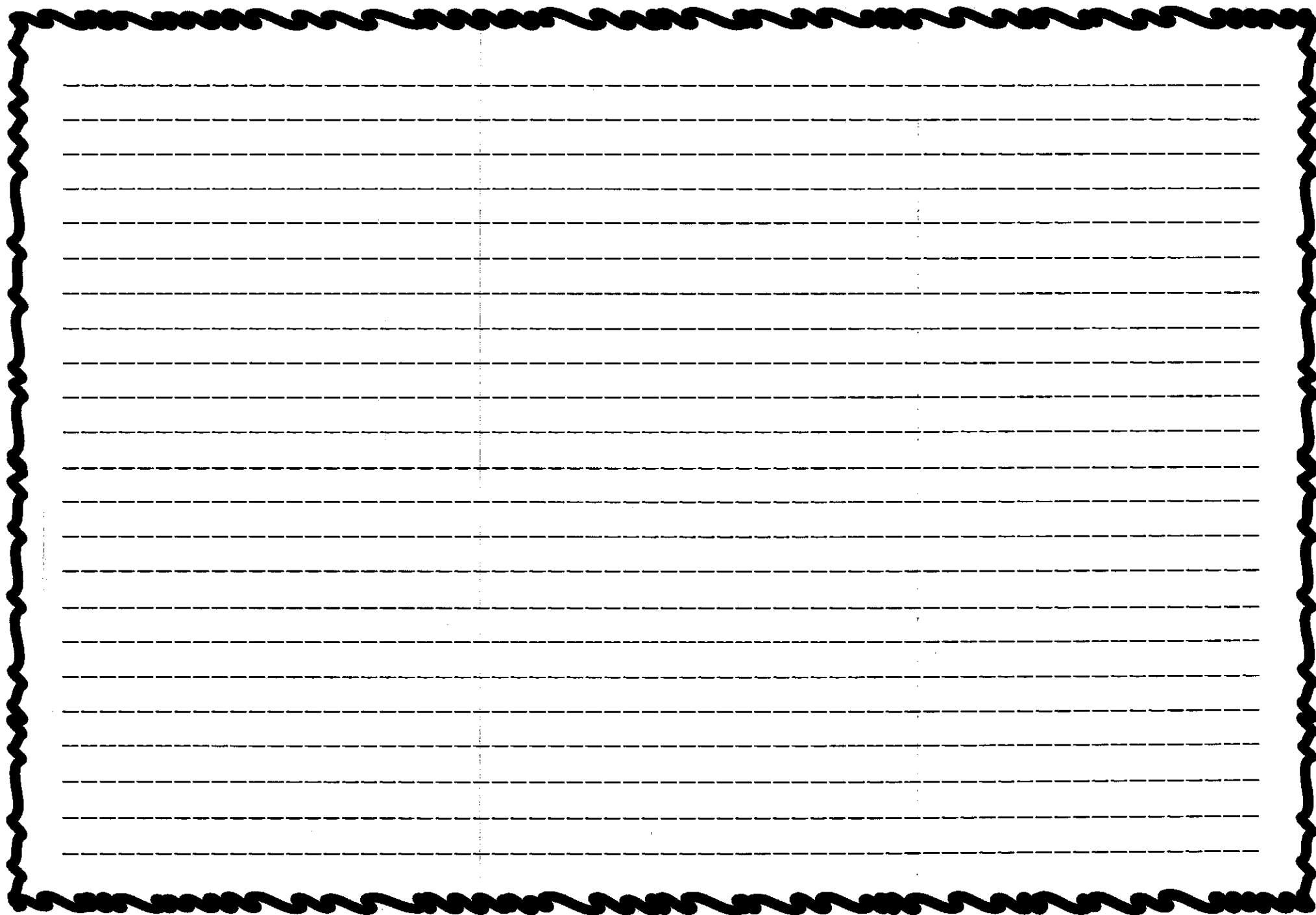
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Pretend you are explaining to a friend an object's energy can change depending on the position of that object. Use details from the text to help you write your conversation below.

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Name \_\_\_\_\_

Date \_\_\_\_\_

*An object falling to the ground has decreasing kinetic energy and increasing potential energy. Do you agree? Why or why not? Support your opinion with evidence from the text.*

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# Force

When a push or a pull acts upon an object, this is called force. When one object pushes or pulls another object the first object is exerting a force upon the second. Forces can vary in strength or magnitude. They can make an object move, stop moving, speed up, slow down or even change direction. Every force has both a magnitude, how strong the force is, and a direction. The magnitude of a force is measured in a special unit called the newton.

(5)

One type of force that every object in the world is subjected to is gravity. Every single object exerts a gravitational pull on every other object. Wow! Did you know that your very body is exerting a gravitational pull on the objects around it? Fortunately, it is only the gravitational pull exerted by a large object, such as a planet, that can actually be felt. The Earth's gravitational pull is constantly pulling everything in the world towards its center. In fact, how much you weigh is the measure of the gravitational force of the Earth pulling on your body! The force of gravity is what causes things to fall and is also responsible for keeping our satellites in orbit by pulling them toward the earth. Without gravity, our satellites would fly off into space.

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Another type of force is the force of magnetism. The force of magnetism pushes and pulls objects. Every magnet has two poles referred to as the north pole and the south pole. The north pole of one magnet is attracted to the south pole of another magnet. On the other hand, the north pole of a magnet will repel, or push away the north pole of another magnet.

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In addition to the force of gravity and the force of magnetism, electrical forces can also act upon objects around us, even if the objects do not touch. These forces will act between objects that have an electrical charge. Whenever an object gains or loses an electron, it can become electrically charged. If the object gains additional electrons, it will become gain a negative charge. If the object loses electrons it can become positively charged. Every object that is electrically charged will exert force on other objects. Opposite charges attract!

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Gravity, magnetism, and electricity are all key forces we encounter each and every day. One key difference between these forces is that unlike magnetism and electricity, the force of gravity can not be blocked! Gravity is an ever present force acting upon you and me and everything else in the universe at all times!

Name \_\_\_\_\_

**After closely reading the passage, answer the following questions. Be sure to look for details in the text to support your answer.**

1. What sentence best describes the main idea in this passage?

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2. What statement in the text best helps the reader understand the meaning of the word "repel" in line 17?

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3. What sentence from the text describes a key difference between the different forces discussed?

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4. What can you feel from paragraph two are the author's feelings about the force of gravity?

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Name \_\_\_\_\_

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Use information and evidence from the text to compare and contrast the differences and similarities between the forces of gravity, magnetism, and electricity.

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*There is no gravity on the moon.* Do you agree or disagree with this statement? Use evidence from the text to support your opinion.

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DATE: \_\_\_\_\_

## Personal Text Response

Directions: Record your personal thoughts and feelings about the text you just read.

	Personal Response
I was surprised about ...	
I didn't like ...	
I didn't understand ...	