

4th Grade Science at Home

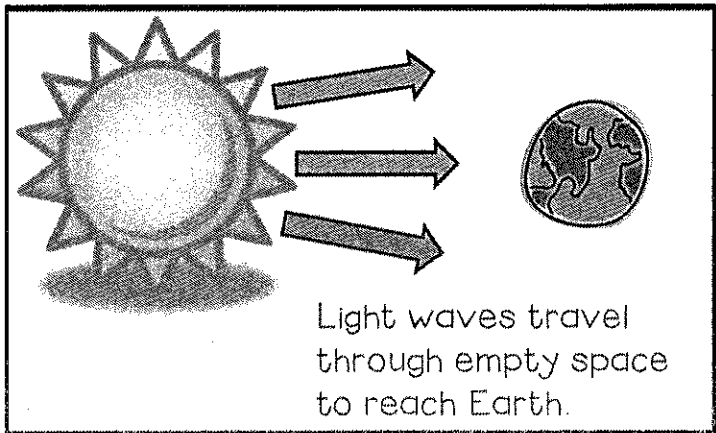
Listed below you will find the dates of the science activities:

Date	Activity
3/17	What is light
3/18	How does light Travel through Matter?
3/19	What is a Shadow?
3/20	How is light Reflected?
3/23	How is light Refracted?
3/24	Light and Color?
3/25	What is Sound?
3/26	Sound Waves and Frequency
3/27	Sound Waves Travel Through Solids, Liquids, and Gases
3/30	Sound and Pitch
3/31	Sound and Volume

What is Light?

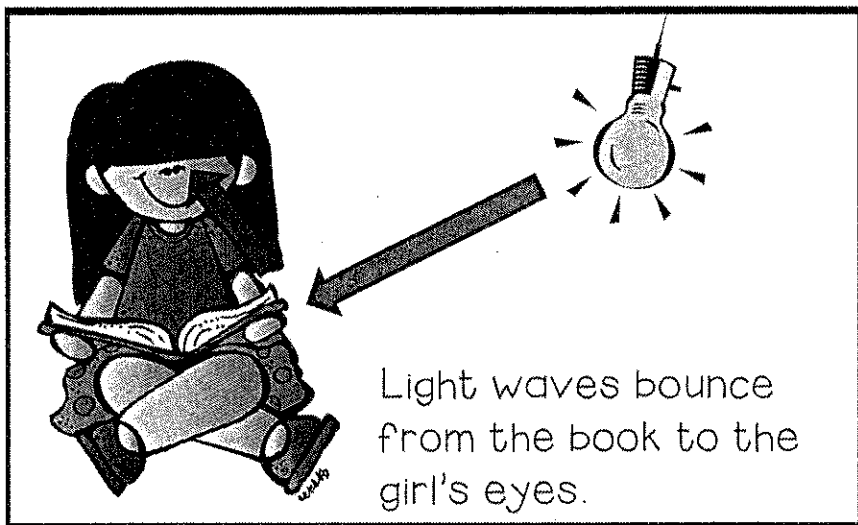
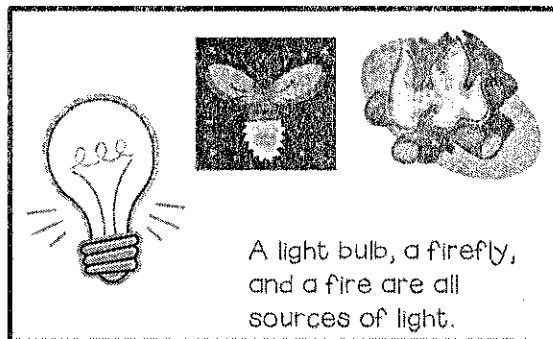
Can you imagine a world without light? Everything and everyone would be in complete darkness! Scary!!! **Light** is a form of energy that we can see.

Light energy travels in waves just like sound energy. These light waves travel in straight lines away from the source of light. The waves go in all directions!



Light can come from many different sources. Our greatest source of light is the sun. The sun's light waves travel through empty space to reach the Earth. Light bulbs, fire, and some organisms such as fireflies give off light as well.

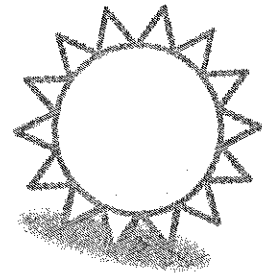
But, most objects do not create their own light. Light is simply bounced off of them from a light source such as a lamp. When light hits an object, it bounces off that object and to our eyes. This allows us to see the object with our eyes.



Key Word

Light- a form of energy that you can see

Name _____ Date _____



What is Light?

Fill in the blank with the correct word from the box.

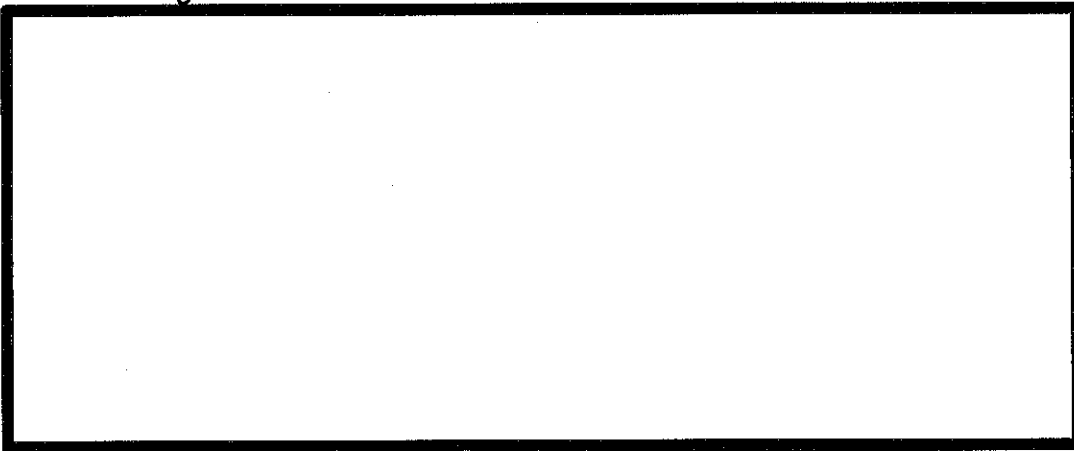
bounces
straight

space
firefly

directions
sun

1. Light travels in _____ lines.
2. A _____ produces its own light.
3. Light can travel through empty _____.
4. Our greatest source of light is the _____.
5. Light waves travel in all _____.
6. Light _____ off objects and reaches our eye.

Draw and label a picture to show how light travels and how we see light. Include a light source, an object, and a person. Draw arrows to show how light travels.



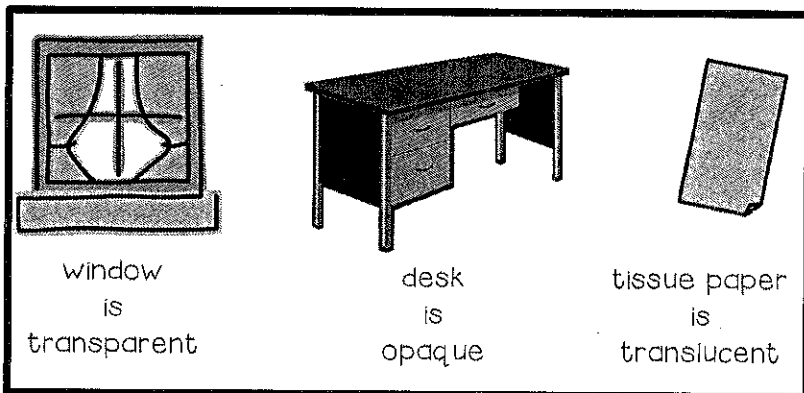
How does Light Travel through Matter?

When light hits an object, it can be reflected, absorbed, or completely passed through the object. What the light does, depends on the type of matter it strikes. You know that all objects are made of matter. The window, your desk, and even a piece of tissue paper are made of matter. So, what happens when I shine a light on them?

If I were to shine my flashlight on the window, the light would pass through it. That's because the window is made of glass, which is a transparent material. A **transparent** material is a material that light can pass through. Clear plastic and water are also transparent materials.

What happens when I shine my flashlight on my desk? Does the light shine through my desk? Nope! The light is absorbed by the desk because the desk is opaque. An **opaque** material is a material that no light passes through. A book, a tree, and an apple are all opaque materials.

So, how about the tissue paper? Is it transparent or opaque? The answer is neither! Tissue paper is a translucent material. That means that when I shine my flashlight on it, only some of the light will pass through it. A **translucent** material scatters light waves in all directions. Things appear blurry when I look through a translucent material.



Key Word

Transparent- a material that allows light to pass through it

Opaque- a material that does not allow light to pass through it

Translucent- a material that allows some light to pass through it

Name _____ Date _____

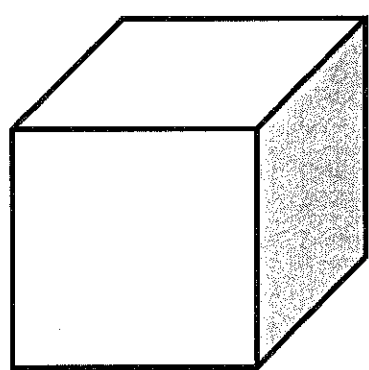
How Does Light Travel Through Matter?

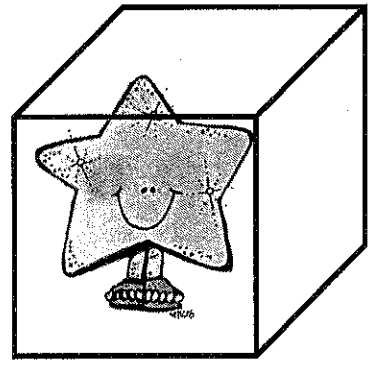
Fill in the blank with the correct word from the box.

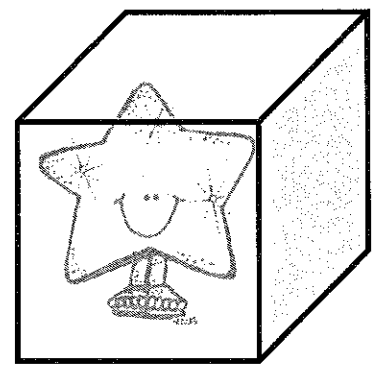
transparent	tissue paper	opaque
glass	translucent	apple

1. Some light passes through _____
2. A transparent material _____
3. An opaque material _____
4. All light passes through _____
5. No light passes through _____
6. A translucent material _____

Label each picture as transparent, opaque, or translucent.







What is a Shadow?

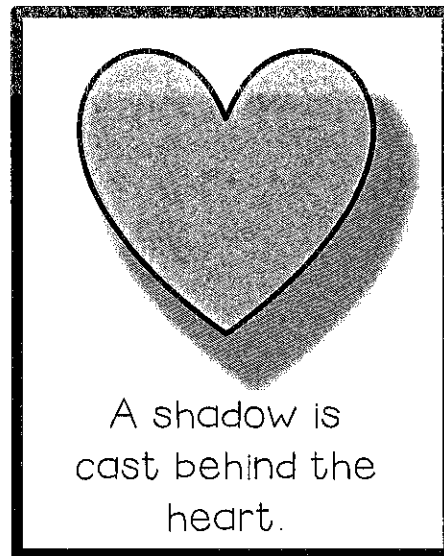
Key Word

Shadow- a dark area on a surface created by an object blocking the path of light

What is a shadow? When do we see shadows? Sometimes it seems like our shadow is following us around! A **shadow** occurs when light waves are blocked. When light hits an opaque object, such as you, the light waves are blocked by your body. The rest of the light waves travel around your body and hit the ground. This creates a shadow in the shape of your body.

Have you ever made shadow puppets on the wall? Shadows appear on the wall when you shine a light on an opaque object. For example, if I shine my flashlight on my hand, some light waves will hit my hand and be absorbed, and other light waves will go around my hand and hit the wall. A shadow of the shape of your hand forms on the wall. Shadows take the shape of the object they strike.

Why do some shadows look blurry and some look sharp? Pretend that you are standing in a dark room by the wall. Get very close to the wall and hold your hand up. Have your friend shine the flashlight at your hand. A sharp shadow about the size of your hand will appear on the wall because you are so close to the wall where the shadow is cast. Now take a few steps away from the wall and hold up your hand. This time the shadow will appear blurry and larger because you are farther away from the wall. The farther away you are from the wall, the bigger and blurrier the shadow will be. The closer you are to the surface where the shadow is cast, the clearer or sharper it will be.



A shadow is cast behind the heart.

Name _____ Date _____



What is a Shadow?

Answer each question carefully.

1. What is a shadow? _____

2. Shadows appear when you shine a light on a(n) _____ object.

A) transparent B) translucent C) opaque

3. What does a shadow take the shape of? _____

4. How does a sharp shadow form? _____

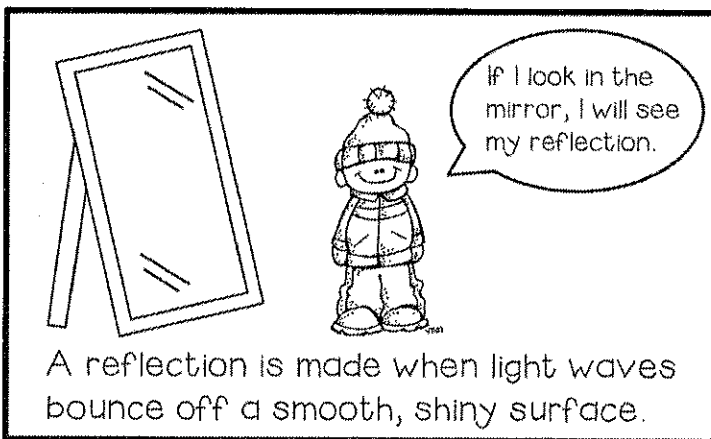
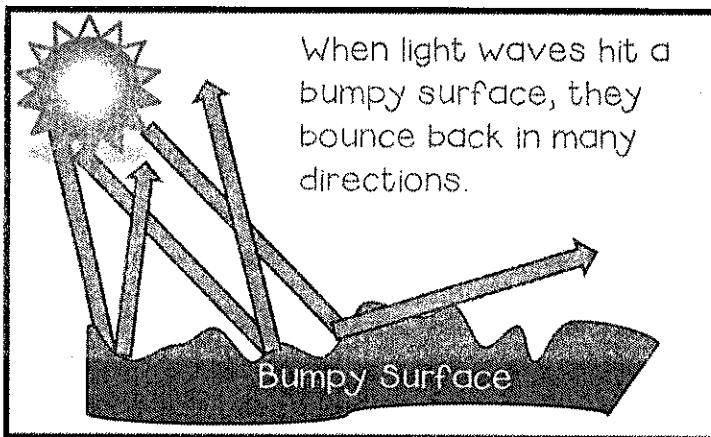
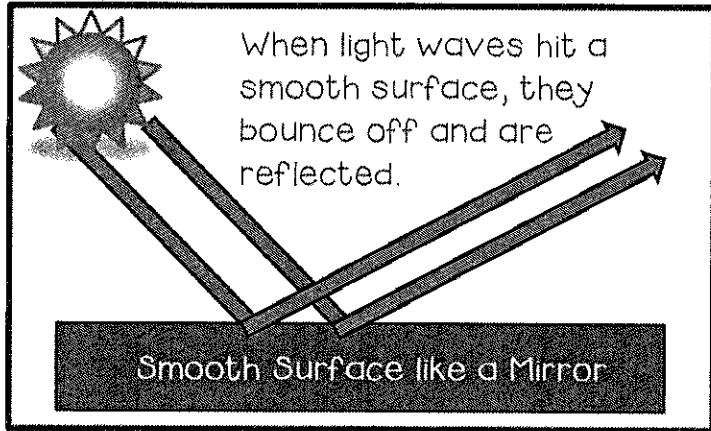
5. How does a blurry shadow form? _____

6. The farther you are away from the wall, the _____

and _____ the shadow will be.

How is Light Reflected?

What happens when you look in a mirror? What do you see? You see your reflection! Why does that happen?



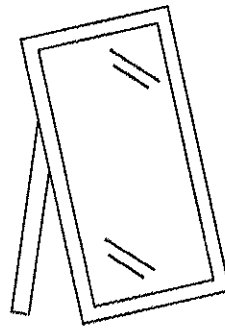
We learned that light waves travel in straight lines, and we also learned that they bounce off an object they strike. When light waves strike an object with a smooth and shiny surface, the light waves bounce directly back to your eyes at an equal angle causing you to see your reflection. This can also happen on a smooth and shiny surface like a pond or lake.

To **reflect** means to bounce off a surface. But what if the surface is not smooth and shiny? When light waves hit an object with a bumpy surface, they bounce back in many directions. The light waves bounce back at various angles. This causes you to see that object rather than your reflection.

Key Word

Reflect- to bounce off a surface

Name _____ Date _____



How is Light Reflected?

Answer each question carefully.

1. What does reflect mean? _____
2. What do you see when you look at a smooth and shiny surface like a mirror?

3. What happens when light waves hit a smooth and shiny surface?

4. What happens when light waves hit a bumpy surface?

Write True or False on the line.

5. Light waves bounce off a rough surface at equal angles. _____
6. If I look at a mirror-like surface, I will probably see my reflection.

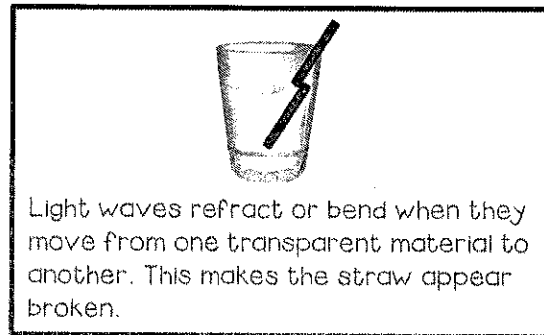
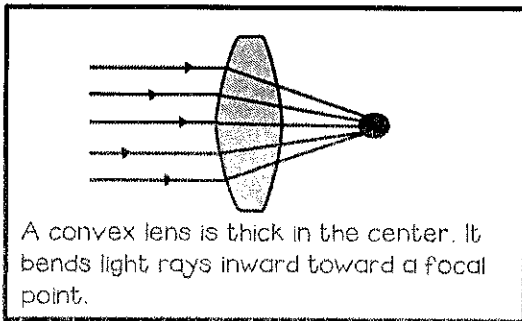
7. To reflect means to absorb light waves. _____
8. When light bounces off a bumpy surface, I will see the object that the light is striking, rather than my reflection. _____

How is Light Refracted?

What happens when light waves move from one transparent material to another? They **refract** or bend!

Refraction happens when light bends as it passes from one transparent material to another. These transparent materials could include water, air, glass, etc. Refraction can cause an object to look bent or broken. Think about a straw in a glass of water. If you look through the glass, the straw will appear to be broken. Is it really broken? No. The light is just bent as it moves through the glass, the water, and the air.

A **lens** is an object that refracts light. A lens can make objects appear larger or clearer. Do you know of any lenses? I bet you do! A microscope, eyeglasses, and telescopes all use lenses. A lens is usually made of plastic or glass. It is curved in some way so that it refracts light.



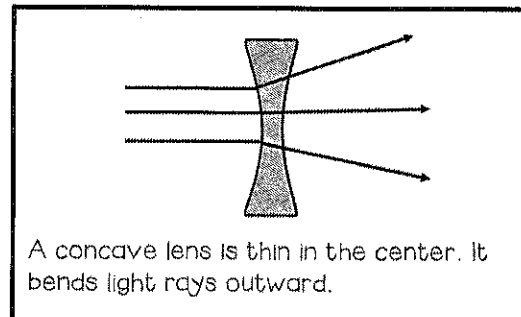
A convex lens is thick in the center. It bends light rays inward to a focal point. This lens makes objects appear larger. Examples of convex lenses include magnifying glasses and microscopes.

A concave lens is thin in the center. It bends light rays outward. This lens makes objects appear smaller. People who are near-sighted wear eyeglasses with concave lenses. A peephole in a door is another example of a concave lens.

Key Word

Refract- to bend light waves

Lens- an object that refracts light



Name _____ Date _____



How is Light Refracted?

Answer each question carefully.

1. What does refract mean? _____

2. What are 3 materials that refract light?

3. A concave lens is _____ in the center.

4. A convex lens is _____ in the center.

5. What are 2 examples of a concave lens?

6. What are 2 examples of a convex lens?

Write True or False on the line.

7. A lens is an object that refracts light. _____

8. All opaque materials refract light.. _____

9. Refraction can cause objects to look bent or broken. _____

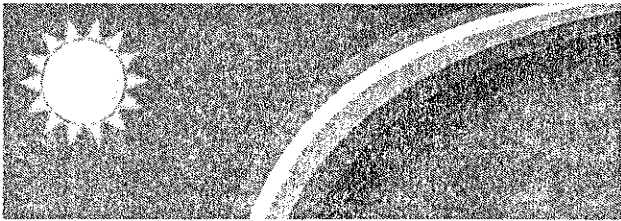
Light and Color

I'm sure that you have seen a rainbow before, but do you know how a rainbow is produced? Do you ever wonder why we see certain colors? Why does an apple look red or a banana look yellow? It's all because of light!

Key Word

Absorb- to take in or soak up

Prism- a piece of glass or other transparent material shaped like a triangle that separates white light into the colors of a rainbow



ROY G. BIV

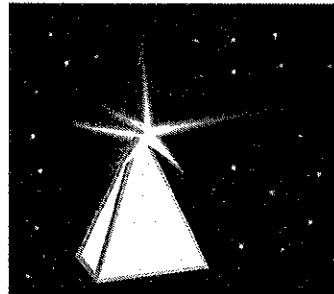
Red Orange Yellow Green Blue Indigo Violet

When light hits an object, some of the light can be **absorbed** or soaked up by the object. The other colors that are not absorbed are reflected off the object. Our eyes see these reflected colors. For example, when light strikes a lemon, the lemon absorbs all the colors except yellow. The yellow light is reflected back to our eyes. What if an object reflects all the colors that hit it? Then, that object will appear white. If an object absorbs all the colors that hit it, that object will appear black.

A **prism** is a piece of transparent material that is shaped like a triangle. When light shines on a prism at a slant, the light rays bend as they move through the prism. Each ray bends a different amount causing a band of colors, or spectrum, to exit the prism. It breaks light up into the colors of the rainbow. Tiny droplets of water in the air are prisms too. That's why we can see a rainbow after a rainstorm!

Sunlight or white light is made up of all the seven colors of the visible spectrum. The seven colors include red, orange, yellow, green, blue, indigo, and violet. These colors are always in the same order on the spectrum.

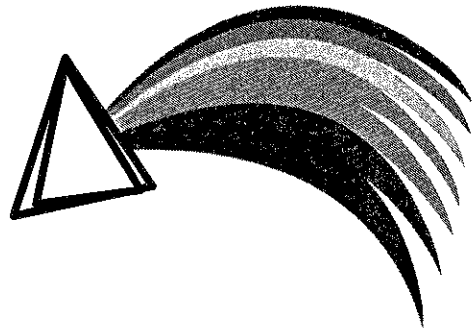
Prism



A prism separates white light into colors.

Name _____ Date _____

Light and Color



Answer each question carefully.

1. What is a prism? _____

2. What are the seven colors that make up the visible spectrum?

3. Why are we able to see a rainbow after it rains?

4. When light hits an object, some of the light can be _____
or soaked up by the object.

5. Explain how we are able to see a red apple. What happens when
light strikes the apple?

6. Why do some objects appear black?

What is Sound?

"Agghhhhh!" "Bzzzzzzzzzz!" "Booooooom!" Sounds are everywhere! Some are really loud, and others are so soft we can barely hear them. But what is a sound? A sound is a form of energy that travels as waves through matter. Remember that matter is anything that has mass and takes up space, so it is all around us (solids, liquids, and gases)! The waves that sound travels in are not the waves you see on the ocean. These waves are invisible. They carry energy from one place to another.

All sounds are caused by vibrations. When something vibrates, it means that it moves back and forth very quickly. Think about plucking the strings on a guitar. When you pluck the strings, they vibrate the air around it and cause your ear to hear a sound. When we talk, our vocal cords vibrate. You can actually feel it! Try it and see!

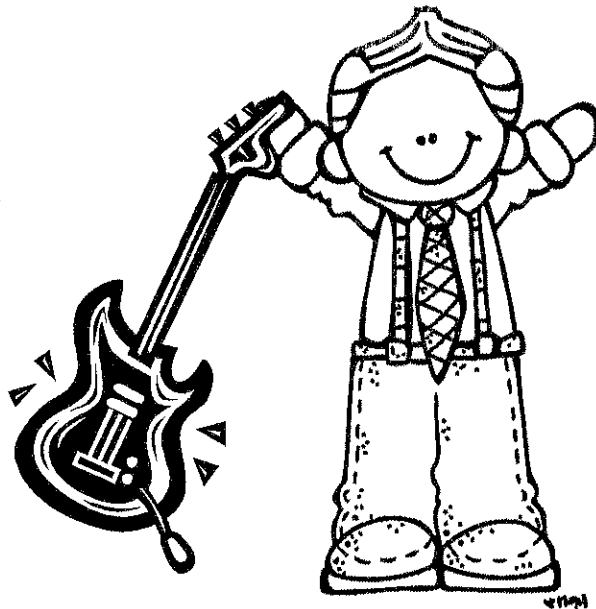
Vocabulary

sound- form of energy that travels as waves through matter

energy- the ability to cause matter to change or move

wave- a change that carries energy from one place to another

vibrate- move back and forth very quickly



Name _____

What is Sound?

1. What are all sounds caused by? _____

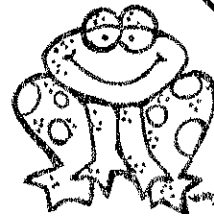
2. What is energy? _____

3. Sound waves carry _____ from one place to another.

4. To move back and forth quickly is to _____.

5. A frog's ribbit sound

travels as _____ through the air.

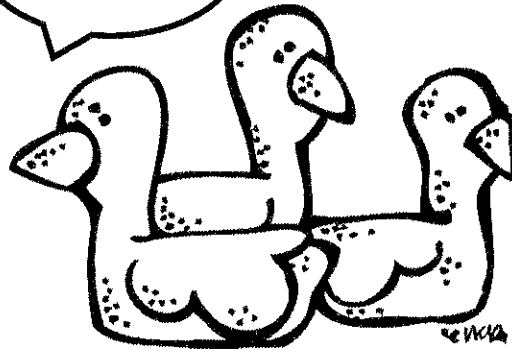


6. What is matter? _____

7. My _____

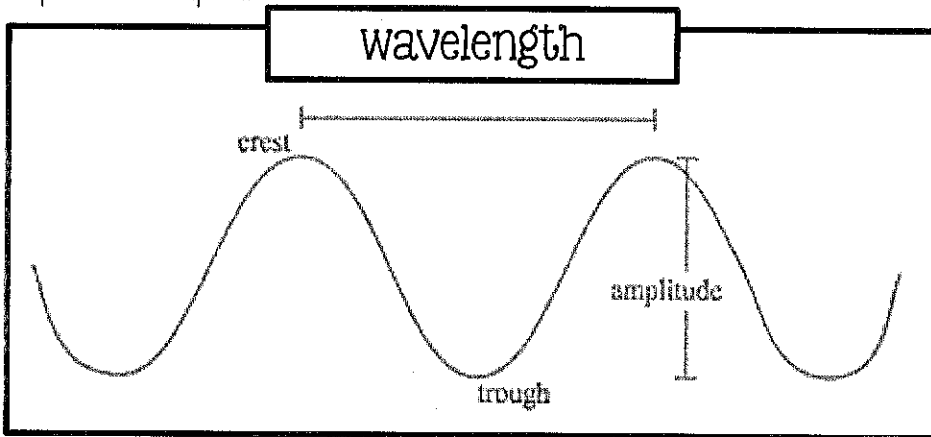
vibrate when I speak.

8. What is a sound wave?



Sounds Waves and Frequency

Sound is a form of energy that travels as waves. A wave is a change that carries energy from one place to another. A wave has points that are high and points that are low. A high point of a wave is called a crest. A low point is called a trough. The distance between one crest to the next crest or one trough to the next trough is called the wavelength. Short wavelengths are created when the crests and troughs are near each other. Long wavelengths are created when the crests and troughs are spread apart.



The number of crests or troughs that pass by over a certain amount of time is called the wave's frequency. So,

crests and troughs that are close together have high frequencies. Crests and troughs that are spread apart have low frequencies.

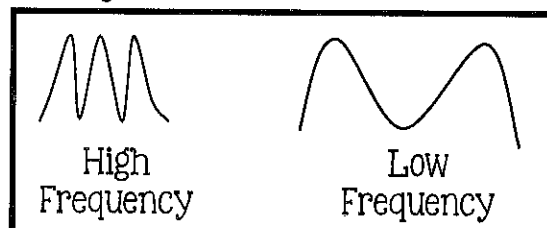
Vocabulary

crest- a high point of a wave

trough- a low point of a wave

wavelength- the distance between one crest or trough to the next

frequency- the number of crests or troughs of a wave that pass by over a certain amount of time



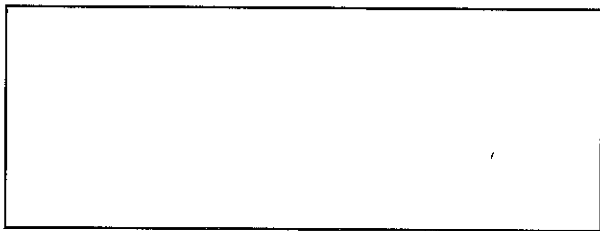
Name _____

Sound Waves and Frequency

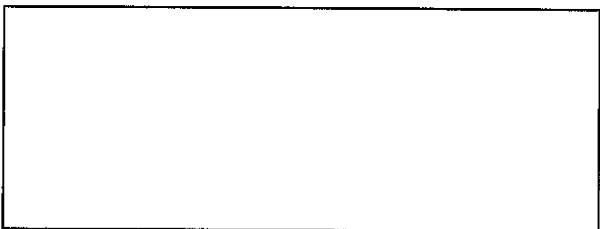
Use the word box to fill in the blanks below.

frequency crest trough wavelength wave

1. A short _____ is created when the crests and troughs are close together.
2. A _____ is the high point of a wave.
3. A _____ is the low point of a wave.
4. A change that carries energy from one place to another is a _____.
5. _____ is the number of crests or troughs of a wave that pass by over a certain amount of time.
6. Draw a high frequency wave.



7. Draw a low frequency wave.



Sound Waves Travel Through Solids, Liquids, and Gases

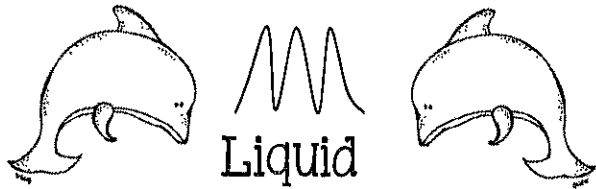
You can hear sounds all around you. Sound waves travel through different mediums. A medium is the matter through which a wave travels. So, sound waves can travel through solids, liquids, and gases.

Just like light waves, sound waves travel at various speeds. The speed they travel at depends on the medium they are traveling through. Do you think sound waves move faster through solids, liquids, or gases?

Well, let's think about it. You hear sounds traveling through the air, a gas, all the time. But, animals in the ocean communicate with each other, so sounds travel through a liquid. And, I can hear my baby sister screaming through my door, a solid, even when it's closed. So, you know sound travels through all three—solids, liquids, and gases, but I'll bet you will be surprised to hear that sound travels fastest through solids! Sound waves move slowest through gases. Sound waves also travel at different speeds depending on the temperature of the medium. Sound waves travel faster in warm mediums and slower in cold mediums.

Vocabulary

medium- the matter through which a wave travels



Liquid



Gas

Sound Waves Travel Through Solids, Liquids, and Gases

Name _____

Write True or False on the Line.

1. Sound waves travel through different mediums. _____
2. Sound waves travel slowest through solids. _____
3. Sound waves cannot travel through liquid. _____
4. The speed of a sound wave depends on the medium it travels through. _____
5. Sound waves travel faster in cold mediums than warm mediums. _____

Answer each question below.

6. What is a medium?

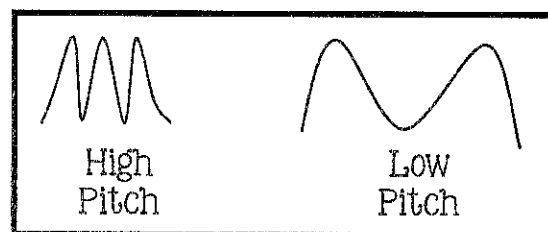
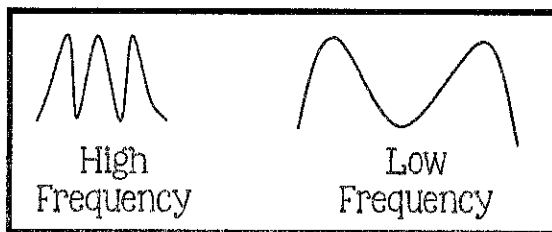
7. Will sound travel faster through warm water or cold water?



Sound and Pitch

Think about the sound a tuba makes. Now think about the sound a flute makes. What is different about those sounds? I bet you realized that one sound is low and one sound is high. All sounds can be high or low. **Pitch** is how high or low a sound is.

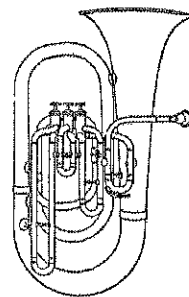
The pitch of a sound is determined by the sound wave's frequency. Frequency is the number of crests or troughs of a wave that pass by over a certain amount of time. If a sound wave has a high frequency, it will have a high pitch. If a sound wave has a low frequency, it will have a low pitch.



Flutes vibrate at a high frequency and have a high-pitched sound. Tubas vibrate at a low frequency and have a low-pitched sound. A piano is an instrument that can produce both high and low-pitched sounds. When a short, thin string inside a piano is pressed down, you will hear a high-pitched sound. When a long, thick string is pressed down, you will hear a low-pitched sound.

Vocabulary

pitch- how high or low a sound is



A tuba vibrates at a low frequency and produces a low-pitched sound.

Sound and Pitch

Name _____

Fill in the blank with the correct word from the box.

Low	High	Pitch	Tuba	Flute	Frequency
-----	------	-------	------	-------	-----------

1. A _____ produces a low-pitched sound.
2. _____ is the number of waves that pass a point in a given time.
3. Low-pitched sounds vibrate at a _____ frequency.
4. High-pitched sounds vibrate at a _____ frequency.
5. _____ is how high or low a sound wave is.
6. A _____ produces a high-pitched sound.

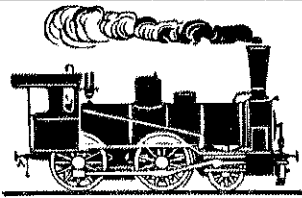
Answer each question below.

7. What happens when a short, thin piano string is pressed down?

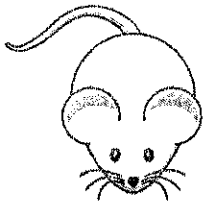
8. What happens when a long, thick piano string is pressed down?

Sound and Volume

Listen. Do you hear that? It may be the soft sound of a whisper or the fluttering of an insect's wings. Or maybe you are outside in a large city, and you can hear the loud honking of cars and the hammering of the construction workers' tools. Sounds can be loud and soft depending on how much energy the sound wave carries.



The waves of louder sounds have more energy, so they travel farther.



The waves of softer sounds have less energy, so they don't travel as far.

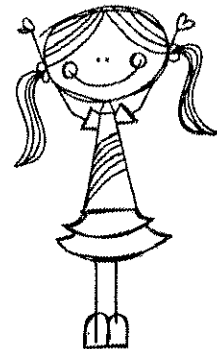
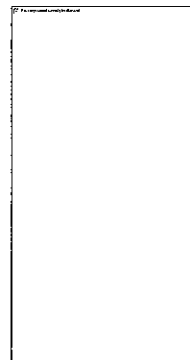
Volume is how loud or soft a sound is. The volume of a sound depends on the sound wave's amplitude.

Amplitude is the size or intensity of the sound wave's vibration. It is the distance between the resting point and the crest or trough of a wave. Louder sounds have more amplitude and higher waves. Softer sounds have less amplitude and shorter waves.

Vocabulary

volume- how loud or soft a sound is

amplitude- size or intensity of the sound wave's vibration; distance between the resting point and the crest or trough of a wave



Sound and Volume

Name _____

Fill in the blank with the correct word from the box.

Volume	Amplitude	Louder	Softer
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1. _____ sounds have more energy and travel farther.
2. _____ is how loud or soft a sound is.
3. The waves of _____ sounds have less energy, so they don't travel as far.
4. _____ is the size or intensity of the sound wave's vibration.

Write True or False on the line.

5. Sounds can be loud or soft depending on how much energy the sound wave is carrying. _____
6. A train's horn has less volume than a mouse's squeak.

7. Softer sounds have more energy and higher waves.

