NAME: _____

Before You Read

Light Energy

1. Put a check mark (✓) next to the answer that is most correct. Use a dictionary to help you.

a) What does "ultraviolet" mean?

- ○ A pale violet
- ○ B very violet
- ○ C before violet
- ○ D beyond violet

b) If light can pass through something, we say the thing is _____

- ○ A absorbent
- ○ B conductive
- ○ C reflective
- ○ D transparent

c) What does "refracted" mean?

- ○ A absorbed
- ○ B bent
- ○ C bounced
- ○ D transferred

2. Circle (T) if the statement is TRUE or (F) if it is FALSE.

T F a) Reflected means bounced.

T F b) Each color of light is a different wavelength.

T F c) Green objects absorb green light.

T F d) Rainbows are caused by refraction.

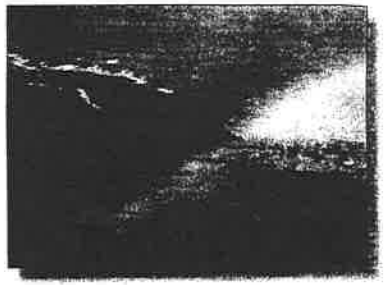
T F e) Light can travel across empty space.

Reading Passage

NAME: _____

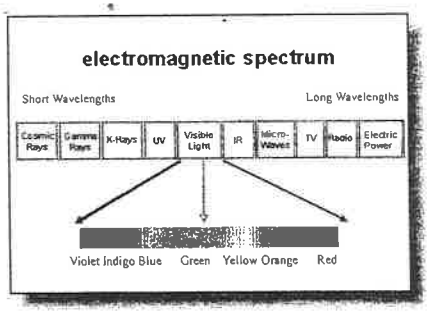
Light Energy

Light energy also travels in the form of waves. Like the other kinds of waves you learned about, light waves have wavelengths, frequencies, and amplitudes. But there is one big difference between light waves and other waves; light can travel across completely empty space. Scientists call light **electromagnetic radiation**.



Light has many wavelengths, from very short to very long. All the wavelengths together are called the **electromagnetic spectrum**. The picture of the spectrum shows that we only see a small part of the spectrum. This part is called **visible light**.

Look at some of the other parts of the spectrum. **Ultraviolet** light has shorter wavelengths than visible light. These are the wavelengths that can burn our skin. **Infrared** light has longer wavelengths than visible light. These are heat waves. Some wavelengths are useful. At the long end are radio waves that carry radio and TV signals. **Microwave** radiation is used to cook food. **X-ray** radiation is used by doctors and dentists to look inside our bodies.



Light travels much faster than sound. That is why we see lightning before we hear the thunder. Light travels at a speed of 671 million miles per hour. Light travels 93 million miles from the sun to Earth in just 8 seconds.

Several things can happen when light hits matter. If light passes straight through something, we say the material is **transparent**. Glass, air, and water are transparent.

A space ship is traveling through *empty space*. A person on the crew of the space ship sees a large meteor pass a few feet from the window. Why could the crew member see the meteor but not *hear* it?

_____

_____

NAME: _____

Reading Passage

Light Energy

Light can also be **absorbed** or **reflected** by matter. Absorb means to soak up or take in. Reflect means to bounce off. Black things absorb almost all light that hits them. White things and mirrors reflect almost all light. Mirrors reflect clear **images** because they are smooth. White cloth or paper have tiny bumps that reflect light in all directions and break up the image.

The **law of reflection** tells us that light bounces off an object at a very specific angle. The angle that light bounces off something is the *same* as the angle at which it hit the object; it just bounces off in the other direction. Another way to say this is "the **angle of incidence** equals the **angle of reflection**."

Did you know that each color we see has its own wavelength? Most things absorb some wavelengths of light and reflect others. This is why things have different colors. A green leaf reflects green light and absorbs colors of all the other wavelengths.

When light passes from one transparent material to another, it often changes direction. This is called **refraction**. Light bends when it moves from air to water. This makes things under water look like they are in the wrong place or are the wrong shape. Try this: Put a pencil in a glass of water. It will look bent at the surface of the water. This is caused by refraction.

Rainbows are also caused by refraction. Water droplets refract sunlight, but they refract each wavelength of visible light at a different angle. This separates visible light into the spectrum of colors we call a rainbow.

After You Read

NAME: _____

Light Energy

1. Fill in each blank with a word or group of words from the list.

ultraviolet **infrared** **x-ray** **microwave** **radio** **visible**

a) _____ waves are longer than microwaves.

b) _____ wavelengths are between ultraviolet and infrared wavelengths.

c) _____s are used to look at broken bones.

d) _____ radiation can cook food quickly.

2. List the wavelengths of light from the shortest wavelength to longest wavelength. Use the terms below.

infrared **microwaves** **radiowaves** **ultraviolet** **visible** **x-rays**

Shortest

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Longest

NAME: _____

Light Energy

Answer the questions in complete sentences.

3.

a) Which colors are reflected by a white shirt?

_____

b) Which colors are absorbed by a black shirt?

_____

c) Which colors are reflected by a red shirt?

_____

4. What is the law of reflection?

_____

_____

Extension & Application

5. It takes approximately *1 second* for light to travel from the moon to Earth. Suppose there was a large mirror on the moon. Now, a bright light flashes on Earth. How long would it take for you to *see* the light reflected by the mirror? Explain how you got your answer.

_____

_____

6. Sound travels one mile in 5 seconds. Light travels much, much faster. When there is a lightning strike, we see the flash and then hear the thunder later. Explain how you could tell how far away you were from a lightning strike.

_____

_____

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