

Properties of Light

By Cindy Grigg



¹ Light is one form of energy that travels in electromagnetic waves. This energy is both magnetic and electrical.

² There are many different types of electromagnetic (EM) waves. Most of them cannot be seen by humans. Our eyes see only a small portion of EM waves called visible light. Visible light is made up of different colors. The colors are red, orange, yellow, green, blue, indigo, and violet. The colors are due to the different wavelengths of light. The longer the wavelength, the less energy the wave has. The shorter the wavelength, the more energy it has. The longest wavelength of visible light looks red to us. The shortest wavelength of visible light looks violet to us.



³ Here are some **properties of light**:

⁴ **Light travels out in all directions from its source.** What are some sources of light? The sun is our main source of light on Earth. Some other sources are other stars and fire.

⁵ **Light is made of little particles called photons.** A photon is the smallest possible particle of electromagnetic radiation. These particles travel in waves.

⁶ **Light travels in straight lines called rays.**

⁷ **Light travels "at the speed of light."** This speed is about 186,000 miles per second (670 million miles per hour), or about 300,000 kilometers per second. The speed of light is sort of a galactic "speed limit." So far, nothing has been found that can travel faster than light.

⁸ **Light can travel in a vacuum.** A vacuum is empty space. There are no molecules of air or anything else in a vacuum. Like all forms of electromagnetic waves, light can travel through empty space, as well as through matter.

⁹ **Light can be absorbed.** Absorbed light energy is converted into some other form, such as thermal or heat energy. You can test this by putting a piece of black construction paper and a piece of white construction paper on a sunny windowsill. Place a thermometer for measuring outdoor or room temperature under each piece of paper. Wait a few hours, and then check the two temperatures. The thermometer underneath the black paper should be hotter than the one under the white paper. This is the reason people tend to wear dark colors in the wintertime and white or light colors in the summer. Dark colors absorb light, helping us keep warmer in the winter. In the summer, light colors absorb little of the sun's energy, keeping us cooler.

¹⁰ **Light can be reflected.** If you shine light on a surface, some of that light will bounce off, or be reflected by, the surface. The *law of reflection* tells us that light will always be reflected by a surface at the same angle at which it hits the surface.

¹¹ **Light can be refracted.** Light always travels in straight lines. But when it passes from one medium into another, it changes direction slightly. Refraction occurs because light travels at different speeds through different materials. When light passes through air into water, for example, it slows down. The light rays are bent slightly. You can see this if you put a pencil into a half-glassful of water. The pencil looks bent or broken at the water line. This is due to refraction. Objects that we see get their color from the light they reflect. A green object looks green because it absorbs all other colors but reflects green.

¹² **Light can be transmitted.** Sometimes light passes through matter. This is called transmission. Light is transmitted through some matter more easily than through other kinds of matter. Light is transmitted through water, air, and glass very easily. These materials are said to be transparent. *Transparent* materials allow light to be transmitted through them easily. Some matter transmits some, but not all, of the light that hits it. This material is called *translucent*. Some examples of translucent material are waxed paper or glass blocks. *Opaque* matter does not transmit any light. You cannot see through it because light doesn't pass through it. A book and a brick wall are two examples of opaque materials.

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1. What is the smallest possible piece of electromagnetic radiation? <input type="radio"/> A Waves <input type="radio"/> B Photons <input type="radio"/> C Rays	2. How does light travel? <input type="radio"/> A In straight lines <input type="radio"/> B In rays <input type="radio"/> C In waves <input type="radio"/> D All of the above
3. What is the speed of light? <input type="radio"/> A All of the above are correct <input type="radio"/> B About 670 million miles per hour <input type="radio"/> C About 186,000 miles per second <input type="radio"/> D About 300,000 kilometers per second	4. Light cannot be absorbed. <input type="radio"/> A False <input type="radio"/> B True
5. Light can be reflected. <input type="radio"/> A False <input type="radio"/> B True	6. Light can be transmitted through matter. <input type="radio"/> A False <input type="radio"/> B True
7. These materials allow light to be transmitted through them easily. <input type="radio"/> A Translucent <input type="radio"/> B Transparent <input type="radio"/> C Opaque	8. Something that transmits some, but not all, of the light that hits it is called: <input type="radio"/> A Opaque <input type="radio"/> B Translucent <input type="radio"/> C Transparent

Date _____

Describe in your own words some of the properties of light.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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Properties of Light

Write a paragraph about a time when you observed some of these properties of light. What did you see?

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longest	outdoor	lines	refraction
materials	galactic	helping	portion
waxed	wavelength	wavelengths	allow
possible	longer	magnetic	line
wintertime	material	cooler	

Directions: Fill in each blank with the word that best completes the reading comprehension.

Light is one form of energy that travels in electromagnetic waves. This energy is both (1) _____ and electrical.

There are many different types of electromagnetic (EM) waves. Most of them cannot be seen by humans. Our eyes see only a small (2) _____ of EM waves called visible light. Visible light is made up of different colors. The colors are red, orange, yellow, green, blue, indigo, and violet. The colors are due to the different



(3) _____ of light. The (4) _____ the wavelength, the less energy the wave has. The shorter the wavelength, the more energy it has. The (5) _____ wavelength of visible light looks red to us. The shortest (6) _____ of visible light looks violet to us.

Here are some **properties of light**:

Light travels out in all directions from its source. What are some sources of light? The sun is our main source of light on Earth. Some other sources are other stars and fire.

Light is made of little particles called photons. A photon is the smallest (7) _____ particle of electromagnetic radiation. These particles travel in waves.

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Light can be absorbed. Absorbed light energy is converted into some other form, such as thermal or heat energy. You can test this by putting a piece of black construction paper and a

piece of white construction paper on a sunny windowsill. Place a thermometer for measuring (9) _____ or room temperature under each piece of paper. Wait a few hours, and then check the two temperatures. The thermometer underneath the black paper should be hotter than the one under the white paper. This is the reason people tend to wear dark colors in the (10) _____ and white or light colors in the summer. Dark colors absorb light, (11) _____ us keep warmer in the winter. In the summer, light colors absorb little of the sun's energy, keeping us (12) _____.

Light can be reflected. If you shine light on a surface, some of that light will bounce off, or be reflected by, the surface. The *law of reflection* tells us that light will always be reflected by a surface at the same angle at which it hits the surface.

Light can be refracted. Light always travels in straight (13) _____. But when it passes from one medium into another, it changes direction slightly. Refraction occurs because light travels at different speeds through different materials. When light passes through air into water, for example, it slows down. The light rays are bent slightly. You can see this if you put a pencil into a half-glassful of water. The pencil looks bent or broken at the water (14) _____. This is due to (15) _____. Objects that we see get their color from the light they reflect. A green object looks green because it absorbs all other colors but reflects green.

Light can be transmitted. Sometimes light passes through matter. This is called transmission. Light is transmitted through some matter more easily than through other kinds of matter. Light is transmitted through water, air, and glass very easily. These materials are said to be transparent. *Transparent* materials (16) _____ light to be transmitted through them easily. Some matter transmits some, but not all, of the light that hits it. This (17) _____ is called *translucent*. Some examples of translucent material are (18) _____ paper or glass blocks. *Opaque* matter does not transmit any light. You cannot see through it because light doesn't pass through it. A book and a brick wall are two examples of opaque (19) _____.

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