

Eighth Grade “Electromagnetic Radiation and Light” Assessment

- 1a. Light waves are the only waves that can travel through _____.
- space
 - solids
- 1b. Electromagnetic waves, such as light, are the only kind of wave that can travel through _____.
- 1c. Electromagnetic waves (light) are unique in that they can transfer energy through _____.
- 2a. The electromagnetic spectrum contains _____ kind of wave.
- one
 - more than one
- 2b. List two types of waves in the electromagnetic spectrum:
- _____
 - _____
- 2c. Rank these electromagnetic waves from smallest to largest: radio waves, microwaves, visible light, gamma waves:
- Smallest: _____

- Largest: _____

- 3a. Electromagnetic energy is called “electromagnetic” because the waves have both an electric field and a _____ field.
- static
 - magnetic
- 3b. Electromagnetic waves are made up of two fields. What are they?
- _____
 - _____
- 3c. Why are electromagnetic waves named “electromagnetic”?
- _____

- 4a. The electric field and the magnetic field in an electromagnetic wave are at what angle to each other?
- 180°
 - 90°

- 4b. The electric field and magnetic field in an electromagnetic wave are at _____ angles to each other and traveling in the same direction.
- 4c. How are the electric and magnetic fields in an electromagnetic wave situated in relation to each other?

- 5a. What acronym can we use to remember the order of colors in the visible spectrum?
 a. GROBVY
 b. ROYGBV
- 5b. Write the six colors of the visible spectrum in order:
 1. _____
 2. _____
 3. _____
 4. _____
 5. _____
 6. _____
- 5c. Put the six colors of the visible spectrum in order from smallest to largest wavelength, then add the two “invisible” colors in the correct places.

- 6a. Light travels at 300,000 km/s and 186,000 miles per second in a _____.
 a. liquid
 b. vacuum
- 6b. How fast does light travel in a vacuum?
 a. 3 miles/s
 b. 300,000 km/s or 186,000 miles/s
 c. 3 million m/hr
 d. 3 billion km/s
- 6c. What is the speed of light in a vacuum in km/s and in miles/s?

- 7a. When we use the speed of light in formulas and equations, we usually replace the number with the letter ____.
- a. "c"
 - b. "m"
- 7b. What letter do we use to represent the speed of light when writing formulas?

- 7c. The speed of light is a constant represented by the letter _____.
- 8a. Refraction is when light _____ as it goes from one medium to another.
- a. bends
 - b. stops
- 8b. As a result of _____, light will bend when it passes from one medium to another.
- a. reflection
 - b. refraction
- 8c. Why does light refract when it passes from one medium into another at an angle?

- 9a. Eyeglasses, magnifying glasses, and all kinds of other lenses work because light _____ when it passes through a lens.
- a. breaks
 - b. refracts
- 9b. Light refraction causes the _____ in devices like cameras and microscopes to focus light.
- a. shutters
 - b. lenses
- 9c. What property of light allows devices like cameras, microscopes and eyeglasses to focus light? _____
- 10a. White light turns into a _____ when it passes through a prism.
- a. rainbow
 - b. dark spot
- 10b. White light passing through a _____ separates into rainbow colors because of refraction.

10c. How does refraction work with prisms?

11a. Who discovered the prism effect on light?

- a. Curie
- b. Newton

11b. Who discovered the effect of prisms on white light? _____

11c. What did Newton discover about prisms?

12a. Light waves _____ when they bounce off of surfaces like mirrors.

- a. diffract
- b. reflect

12b. Light bounces off of surfaces. This property is called _____.

12c. What is reflection of electromagnetic waves?

13a. What shape is a concave mirror?

- a. puffed out
- b. caved in

13b. Draw a concave mirror and show which side is the reflective surface.

13c. Draw a concave mirror and show an object's orientation and comparative size when reflected in it.

- 14a. A _____ mirror is puffed out in the middle.
a. convex
b. plane

14b. What shape is a convex mirror?

14c. Draw a convex mirror and show what light waves that reflect off of it will do:

- 15a. The point where light waves come together and focus is called the _____ point.
a. divergence
b. focal

- 15b. The focal point of a mirror or lens is the place where the light rays
a. converge or come together
b. diverge or spread apart

15c. What happens to light rays at a focal point?

The following Colorado Model Content Standards are addressed in this assessment by the questions indicated:

Questions 8a, 8b, 8c, 10a, 10b, 10c, 12a, 12b, 12c, 13a, 13b, 13c, 14a, 14b, 14c, 15a, 15b, 15c: Standard 1. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

All questions: Standard 2. Physical Science: Students know and understand common properties, forms, and changes in matter and energy.

Questions 1a, 1b, 1c, 2a, 2b, 2c: Standard 4. Earth and Space Science: Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space.

Questions 9a, 9b, 9c: Standard 5. Students know and understand interrelationships among science, technology, and human activity and how they can affect the world.

Questions 4a, 4b, 4c, 9a, 9b, 9c: Standard 6. Students understand that science involves a particular way of knowing and understand common connections among scientific disciplines.

Answer Key

- 1a. a. space
1b. space
1c. space (a vacuum)
- 2a. b. more than one
2b. Acceptable answers could include any two of the following:
-radio
-infrared
-visible
-ultraviolet
-x-rays
-gamma rays
-microwaves
2c. Smallest: radio
micro
visible
Largest: gamma
- 3a. b. magnetic
3b. electric field and magnetic field
3c. Acceptable answers could include:
-They are composed of both an electric field and a magnetic field.
- 4a. b. 90°
4b. right (90° , etc)
4c. Acceptable answers could include:
-The electric field and the magnetic field are at right angles to each other.
- 5a. b. ROYGBV
5b. Red, orange, yellow, green, blue, violet
5c. infrared, red, orange, yellow, green, blue, violet, ultraviolet
- 6a. b. vacuum
6b. b. 300,000 km/s or 186,000 miles/s
6c. 300,000 and 186,000
- 7a. a. "c"
7b. "c"
7c. "c"
- 8a. a. bends
8b. b. refraction

- 8c. Acceptable answers could include:
-Light travels at different speeds in different mediums, so when it enters a new medium at an angle, one edge of the light ray speeds up or slows down before the rest, so the whole thing bends.
- 9a. b. refracts
9b. b. lenses
9c. refraction
- 10a. a. rainbow
10b. prism
10c. Acceptable answers could include:
-When light enters a prism, the different wavelengths of light bend at different angles depending on the amount of energy they carry. The different wavelengths spread out and show all the component colors of the white light.
- 11a. b. Newton
11b. Newton
11c. Acceptable answers could include:
-He discovered that a prism breaks white light up into its component colors by bending each one differently than the others.
- 12a. b. reflect
12b. reflection
12c. Acceptable answers could include:
-when electromagnetic waves bounce off of a surface
- 13a. b. caved in
13b. Diagrams should show the light rays coming in to the sunken in side of the mirror.
13c. Acceptable answers could include:
-The mirror's reflective side should be sunken in, and the reflection should be upside down and smaller.
- 14a. a. convex
14b. bulged out in the center
14c. Acceptable answers could include:
-The mirror's reflective surface should curve outwards, and the reflected light rays should diverge.
- 15a. b. focal
15b. b. diverge or spread apart
15c. Acceptable answers could include:
-The light rays come together (converge) and focus, forming a clear image.