

NAME _____

Class: 7

Date _____

Physics BA

Lesson 4.1 – Visible light

1. Determine if the following statements are true or false.

- _____ 1. All plants use visible light to make food by photosynthesis.
- _____ 2. The moon is an example of a luminescent object.
- _____ 3. The filament of an incandescent light bulb glows because it gets extremely hot.
- _____ 4. An LED light produces visible light by fluorescence.
- _____ 5. You can see clearly through an object that is translucent.
- _____ 6. A rainbow occurs because raindrops separate light into its different wavelengths.
- _____ 7. An apple appears red because it absorbs only red light.
- _____ 8. The bluish green colour called cyan is a secondary colour of light.
- _____ 9. Combining red, green, and blue light produces light that appears to be black.
- _____ 10. The primary colours of pigments are the same as the primary colours of light.

Critical Reading

2. Read this passage from the text and answer the questions that follow.

How Visible Light Is Produced

The sun and other stars produce light because they are so hot. They glow with visible light due to their extremely high temperatures. This way of producing light is called incandescence. Some objects produce visible light without becoming very hot. They generate light through chemical reactions or other processes. Producing light without heat is called luminescence. Objects that produce light by luminescence are said to be luminous. Luminescence, in turn, can occur in different ways:

One type of luminescence is called fluorescence. In this process, a substance absorbs ultraviolet light and then gives off the energy as visible light. Certain minerals produce light in this way.

Another type of luminescence is called electroluminescence. In this process, a substance gives off light when an electric current runs through it. Some gases produce light in this way.

A third type of luminescence is called bioluminescence. This is the production of light by living things as a result of chemical reactions. Examples of bioluminescent organisms include jellyfish and fireflies.

Questions

1. Compare and contrast incandescence and luminescence.

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2. List and define three types of luminescence.

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Multiple Choice

3. Circle the letter of the correct choice.

- 1. The sun and other stars produce visible light by
1. Fluorescence. 2. Luminescence. 3. Incandescence. 4. Electroluminescence.
- 2. Jellyfish and fireflies produce light as a result of
1. High temperatures. 2. Chemical reactions. 3. Absorption of ultraviolet light.
4. Reflection of light from other sources.
- 3. Which type of light bulb produces visible light by electroluminescence?
1. Incandescent light bulb 2. Vapour light bulb 3. Neon light bulb 4. two of the above
- 4. An example of opaque matter is a
1. Clear glass window 2. Wooden door. 3. Mirror. 4. two of the above
- 5. Light with the longest wavelength appears
1. Red 2. Blue 3. Green 4. Violet
- 6. A prism separates light into different colours by
1. Reflection 2. Refraction. 3. Scattering 4. Transmission.
- 7. If only green light strikes a blue object, the object appears
1. Green 2. Blue 3. Black 4. White

Matching

4. Match each definition with the correct term.

- _____ 1. referring to matter that allows all visible light to pass through
- _____ 2. production of visible light in a way that does not require high temperatures
- _____ 3. referring to matter that does not allow visible light to pass through it
- _____ 4. production of visible light by an object that is so hot it glows
- _____ 5. passage of light through matter
- _____ 6. referring to matter that transmits but scatters visible light
- _____ 7. substance that colours materials by reflecting light of certain wavelengths and absorbing light of other wavelengths

Terms

- a. incandescence b. translucent c. pigment d. luminescence e. transmission.
- f. transparent g. opaque

5. Fill in the blank with the appropriate term.

1. _____ occurs when a substance absorbs ultraviolet light and gives off visible light.
2. The production of light by living things is called _____.
3. A neon light produces visible light by the process of _____.
4. _____ occurs when transmitted light is spread out by particles of matter.
5. The colour that visible light appears depends on the _____ of the light.
6. The colours red, green, and blue are referred to as the _____ colours of light.
7. The colours cyan, magenta, and yellow are the primary colours of _____.

Critical Writing

6. Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

The human eye can sense only three colours of light: red, green, and blue. Explain how we can see objects of other colours.

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Lesson 4.2 Optics

1. Read this passage from the text and answer the questions that follow.

Lasers

A laser is a device that produces a very focused beam of light of just one wavelength and colour. Laser light is produced in a tube. Electrons in a material such as a ruby crystal are stimulated to radiate photons of light of one wavelength. There are mirrors at the ends of the tube, and the photons of light bounce back and forth off the mirrors. This focuses the light, causing the crests and troughs of the waves to line up. The mirror at one end of the tube is partly transparent. A constant stream of photons passes through the transparent part, forming the laser beam. Laser light has many uses. For example, it is used to scan bar codes and to carry communication signals in optical fibers. Optical fibers are extremely thin glass tubes that are used to guide laser light. Sounds or pictures are encoded in pulses of laser light, which are then sent through an optical fiber. Optical fibers are used to carry telephone, cable TV, and Internet signals.

Questions

1. What is laser light?

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2. Describe how laser light is produced.

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3. What are two uses of laser light?

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2. Fill in the blank with the appropriate term.

1. According to the law of _____, the angle of reflection of light equals the angle of incidence.
2. A mirror with a flat reflective surface is called a(n) _____ mirror.
3. An image that forms where reflected or refracted light rays actually meet is called a(n) _____ image.
4. A(n) _____ mirror forms only virtual images.
5. A(n) _____ lens forms only virtual images.

Lesson 4.3 Vision

1. Determine if the following statements are true or false.

- _____ 1. The eyes and brain work together to enable vision.
- _____ 2. The pupil helps to focus light that enters the eye.
- _____ 3. The lens changes shape to focus images of close or distant objects.
- _____ 4. There are two different types of rods in the retina.
- _____ 5. The brain interprets signals from the retina as shape, colour, and brightness.
- _____ 6. The brain interprets images on the retina as though they were upright.
- _____ 7. Laser surgery corrects vision problems by changing the shape of the lens.
- _____ 8. The role of the iris is to control the size of the pupil.
- _____ 9. The lens normally focuses images on the optic nerve.
- _____ 10. Hyperopia is also called nearsightedness.

2. Read this passage from the text and answer the questions that follow.

How We See

The eyes and brain work together to enable human vision. The eyes collect and focus visible light. The lens and other structures of the eye work together to focus a real image on the retina. The image is upside-down and reduced in size. Rods and cones in the retina send electrical signals about the image to the brain through the optic nerve. The brain interprets the signals as shape, colour, and brightness. It also interprets the image as though it were right-side up. The brain does this automatically, so what we see is always right-side up. The brain also “tells” us what we are seeing.

Questions

1. What is the role of the eyes in vision?

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2. How does information about an image on the retina reach the brain?

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3. What is the role of the brain in vision?

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4. Circle the letter of the correct choice.

1. Structures of the eye that help to focus light include the

- a. iris. 2. cornea. 3. retina. 4. two of the above

2. Which choice shows the correct order in which light passes through structures of the eye?

1. lens, pupil, cornea 2. pupil, cornea, lens
3. cornea, pupil, lens 4. cornea, lens, pupil

3. Why does the pupil of the eye look black?

1. It reflects only black light. 2. It does not reflect any light.
3. It consists of a black membrane. 4. It absorbs all the light that strikes it.

5. Functions of the cornea of the eye include

1. Protecting the eye from injury. 2. Adjusting the position of the lens.
3. Controlling how much light enters the eye. 4. Two of the above

5. The image formed on the retina by the lens of the eye is

1. Virtual 2. Enlarged. 3. Upside-down. 4. two of the above

6. Which statement about myopia is true?

1. It is also called farsightedness. 2. It occurs when the eyeball is longer than normal.
3. It can be corrected with convex lenses.
4. It causes both near and distant objects to appear blurry.

7. What happens when the eyeball is shorter than normal?

- 1. Images are focused in back of the retina.
- 2. Distant objects are seen clearly.
- 3. Nearby objects appear blurry.
- 4. all of the above

4. Match each definition with the correct term.

Terms a. eye b. rod c. cornea d. cone e. iris f. retina g. pupil

- _____ 1. nerve cell in the retina that senses dim light
- _____ 2. coloured part of the eye
- _____ 3. opening at the front of the eye that lets in light
- _____ 4. nerve cell in the retina that senses colors of light
- _____ 5. organ specialized to collect light and focus images
- _____ 6. transparent outer covering of the eye
- _____ 7. membrane lining the back of the eye

6. Fill in the blank with the appropriate term.

- 1. The lens of the eye is a(n) _____ lens.
- 2. Rods and cones change images to _____ signals.
- 3. The shape of the eye’s lens is controlled by tiny _____.
- 4. Electrical signals from the eye travel to the brain through the _____.
- 5. The vision problem in which nearby objects are seen clearly but distant objects appear blurry is _____.
- 6. The vision problem in which distant objects are seen clearly but nearby objects appear blurry is _____.
- 7. The vision problem in question 6 can be corrected with _____ lenses.

7. Thoroughly answer the question below. Use appropriate academic vocabulary and clear and complete sentences.

Explain how the structures of the eye collect and focus light to form images.

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