

Refraction, Lenses, & Prisms (p. 566 - 571)

I. Refraction Of Light

1. Define the term refraction.

Refraction - bending of light as it changes speed in moving from one medium to another.

2. Which way does light bend from the normal if it goes from material with :

High to low speed : Toward the normal (Air → Glass)

Low to high speed : Away from the normal (Glass → Air)

3. The ^{larger} smaller the difference between light speeds, the more light bends between materials.

Circle One : True False

4. Where should a person aim when trying to spear a fish?

Circle One : Above the fish. Right at the fish. Below the fish.

5. Define the term mirage.

Mirage - image of a distant object produced by the refraction of light through air layers of different densities

6. Explain why a mirage forms.

- On a hot day, light is gradually refracted as it moves into layers of hotter air. Refraction causes light to follow curved path to ground. (Light travels faster in hot air than cooler, denser air.)

II. Lenses

1. Define the term lens.

Lens - transparent object that refracts light waves such that they converge or diverge to create an image

2. Differentiate between a converging (convex) lens and diverging (concave) lens and identify the type(s) of images formed by each lens.

Similar to concave mirror →

Converging : Lens that is thicker in the middle than at the edges

Image : Real or Virtual Images (depends on distance)

Similar to convex mirror →

Diverging : Lens that is thicker at the edges than in the middle

Image : Reduced, Upright, Virtual Images

Converging Lens Uses

- ① Human Eye
- ② Camera
- ③ Movie Projector
- ④ Lighthouses

Diverging Lens Uses

- ① Camera Viewfinder
- ② Telescopes
- ③ Eye glasses

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Index of Refraction
- indicates how much the speed of light is reduced
↑(n) = more light is slowed

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Layer = Aim right at fish (refracts too!)

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3. Define the term magnification.

Magnification - increase of an object's apparent size using lenses or mirrors

4. The area where light rays come together and is focused is called the :

focal point

5. What are the two lenses used in a compound light microscope?

1. Objective (varies) 2. Eye piece (10x)

6. Match the eye parts with the correct definitions.

- | | |
|-----------------------|---|
| 1. <u>B.</u> - Pupil | A. Focuses light onto sensor cells at the back of the eye. |
| 2. <u>E.</u> - Retina | B. Opening that allows light to pass through the eye. |
| 3. <u>D.</u> - Cornea | C. Expands & contracts to control amount of light entering the eye. |
| 4. <u>C.</u> - Iris | D. Transparent outer coating of the eye. |
| 5. <u>A.</u> - Lens | E. Inner lining composed of rods and cones. |

7. The following retinal cells are sensitive to which types of light?

Rods = Dim light (night vision → black + white)

Cones = Daytime light (color vision)

III. Dispersion & Prisms

1. Define the term prism.

Prism - system that consists of two or more plane surfaces of a transparent solid at an angle with each other

2. Which type of wavelengths are refracted more?

Circle One : Longer Wavelengths Shorter Wavelengths

3. Which color of light is bent the most and least by a prism?

Bent Most = Violet Bent Least = Red

4. Define the term dispersion.

Dispersion - process of separating white light into the different colors of the spectrum

5. How do raindrops disperse light like prisms?

- Refract light into colors of the spectrum.

6. How do rainbows form?

- Light shines on water droplets in front of a dark background

Magnifying Glass DEMO

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Farsightedness
- Shorter Eye
↳ Image Behind (Convex Lens)

Nearsightedness
- Longer Eye
↳ Image In Front (Concave Lens)

Spectroscopes

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