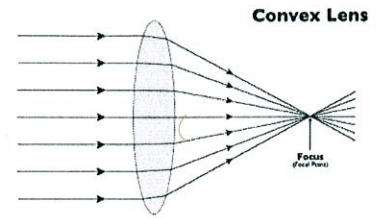


Chapter 19 --Section 3- Refraction and Light

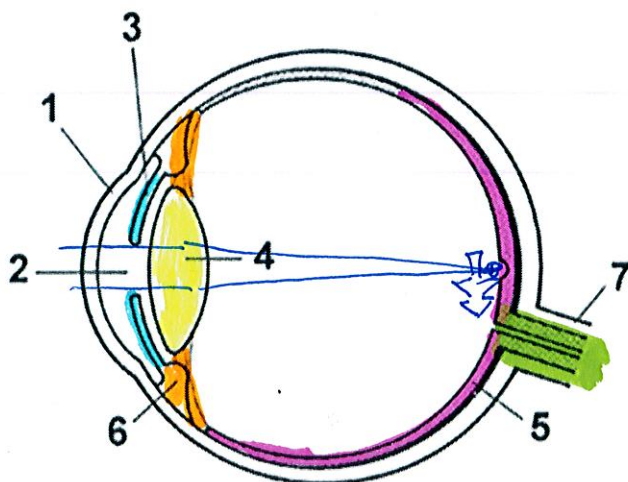
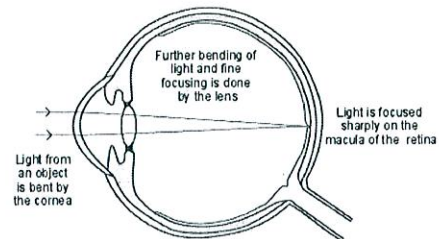
Read pages 691-695 in the red textbook. Answer the questions in complete sentences.



1. What causes light to bend (refract) when it enters a new medium at an angle?
2. What does "Index of Refraction" mean?
3. Look at the chart (Index of Refraction) and the "Analyzing Data" at the top of page 692. Answer all three questions in that section.
4. Explain why rainbows appear in the sky occasionally and why we see ROYGBIV in that order in the rainbow.
5. What is a mirage and why do they appear at times? Have you ever seen a mirage?
6. What is a lens and what is the purpose of a lens?
7. Do you wear contact lenses or eyeglasses with lenses? If so, what does the lens do for you?
8. Do you have a lens in your eye that refracts light when the light passes through the lens?
9. Draw, color and label figure 17. Under your drawing, explain what happens to light rays when they pass through each type of lens.

SECTION 4 SEEING LIGHT Pages 697-700 Use complete sentences!

1. What two major organs are involved with seeing light?
2. Provide the names of the seven eye parts below and color each part a different color.
3. Name two functions of the cornea.
4. Explain the function of the pupil.
5. Explain the function of the iris.
6. What is the function of the lens in your eye?
7. What do the ciliary muscles do?
8. Where does the upside down image form?
9. Why are the rods important? What do they do?
10. Why are the cones important? What do they do?
11. What is the function of the optic nerve?
12. Draw and label figure 21 on page 700. Include a caption to explain the diagram.
13. Describe the difference between a nearsighted person and a far sighted person and the type of corrective lens they would need.



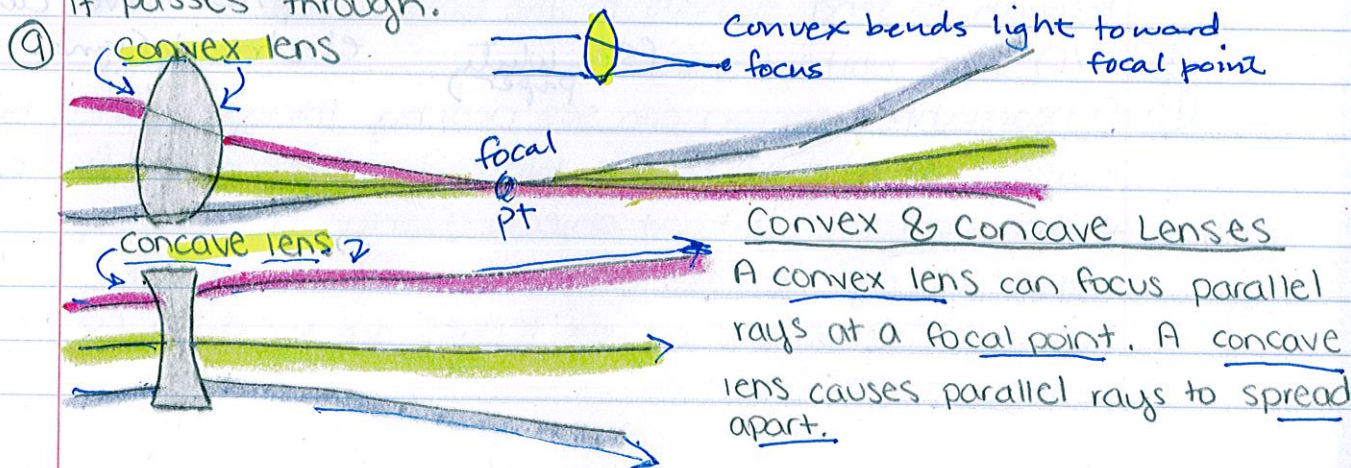
upside down
image forms
on retina

- 1- Cornea
- 2- Pupil
- 3- iris
- 4- Lens
- 5- Retina
- 6- Ciliary Muscle
- 7- optic nerve

Refraction & Light

SECTION 3 / CHAPTER 19 / 691-695

- ① When light rays enter a ^{new} medium at an angle, the change in speed causes the rays to bend, or change direction.
- ② A material's index of refraction is a measure of how much a ray of light bends when it enters that material. (Page 692)
- ③ Diamonds (solid) causes the greatest change in the direction of a light ray. According to the table, solids tend to bend light more. A light ^{ray} would ~~not~~ bend if it entered corn oil at an angle after traveling through glycerol, because corn oil and glycerol have the same index of refraction (1.47).
- ④ When white light from the sun shines through the droplets, a rainbow may appear. The water droplets act like tiny prisms, refracting and ~~reflecting~~ the light and separating the colors. We see ROYGBIV in that order in rainbows because each color bends according to its wavelength.
- ⑤ A mirage is an image of a distant object caused by refraction of light. I have seen a mirage. See page 693.
- ⑥ A lens is a curved piece of glass or other transparent material that is used to refract light. A lens forms an image by refracting light rays that pass through it to help you see.
- ⑦ I wear eyeglasses with lenses. The lense helps me to see more clearly by refracting light that passes through it.
- ⑧ Yes, I have a lens in my eye that refracts light when it passes through.



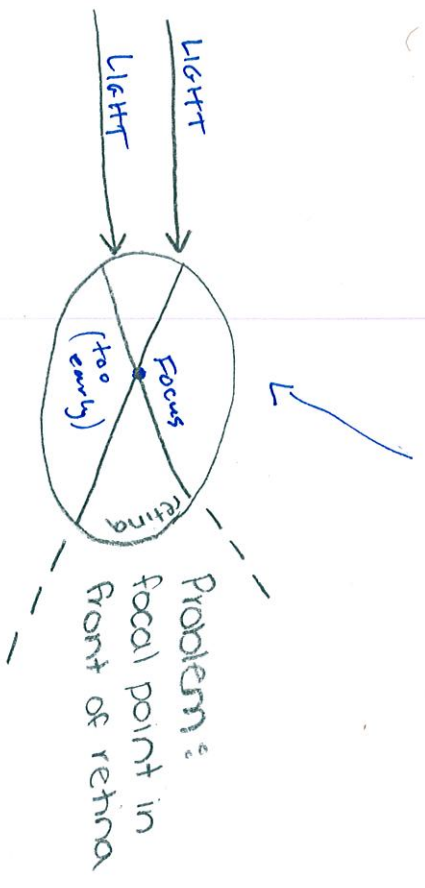


Seeing Light

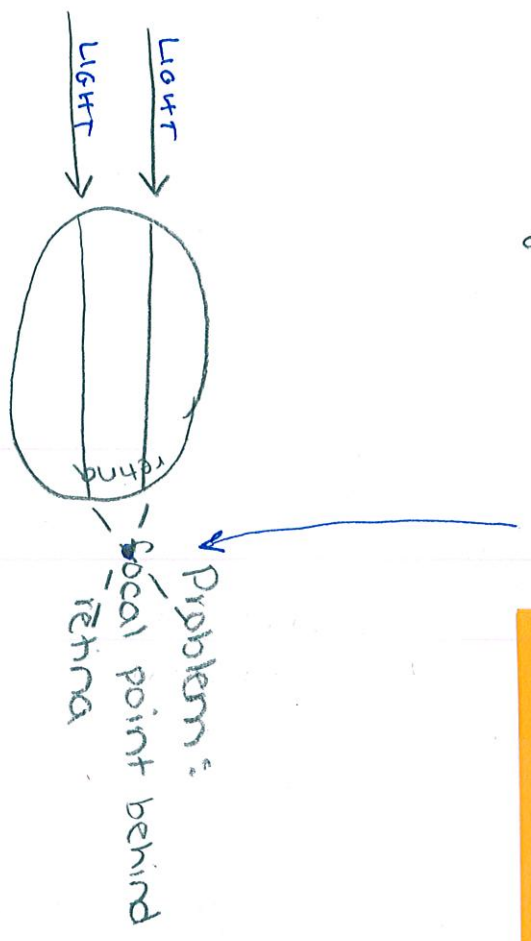
SECTION 4/697-700

- ① Your eyes and brain are 2 major organs involved with seeing light.
- ② N/A (See colored diagram on Question page.)
- ③ The cornea protects the eye. It also acts as a lens to help focus light rays. Cornea is convex so it bends light.
- ④ The pupil is the opening through which light enters the inside of the eye. In dim light, the pupil becomes larger to allow in more light, whereas in bright light, the pupil becomes smaller to allow in less light.
- ⑤ The iris is a ring of muscle that contracts and expands to change the size of the pupil. The iris gives the eye its color.
- ⑥ The lens is a convex lens that refracts light to form an image on the lining of your eyeball. (Image forms on retina.)
- ⑦ Muscles, called ciliary muscles, hold the lens in place behind the pupil. Ciliary muscles also change the shape of the lens for focusing.
- ⑧ The upside down image forms on the retina.
- ⑨ Rods are cells that contain a pigment that responds to small amounts of light. The rods allow you to see in dim light.
- ⑩ Cones are cells that respond to color. They may detect red, green, or blue light. They respond best in bright light.
- * Both rods and cones help change images on the retina into signals that then travel to the brain.
- ⑪ The optic nerve is the ^{short} thick nerve ^{that} the rods and cones travel through to send signals to the brain. Optic nerve carries electrical signal to brain.
- ⑫ N/A → on white paper (See white paper)
- ⑬ A nearsighted person can see nearby things clearly, but objects at a distance are blurred, whereas a farsighted person can see distant objects clearly, but nearby objects appear blurry. Concave lenses are used to correct nearsightedness and convex lenses are used to correct farsightedness.

Nearsightedness
(eyeball too long)



Farsightedness
(eyeball too short)

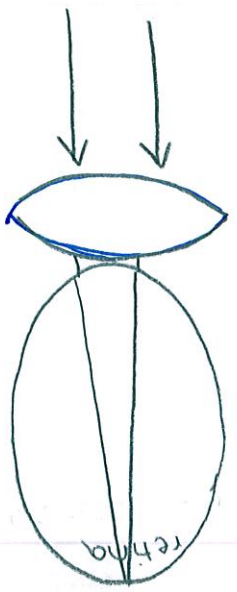


Concave Lens



Correction:
focal point on retina

Convex Lens



Correction:
focal point on retina

CAPTION

Vision correction

Nearsightedness and farsightedness are caused when the eyeball is too long or too short. Both can be corrected with lenses (concave or convex).