Science 8

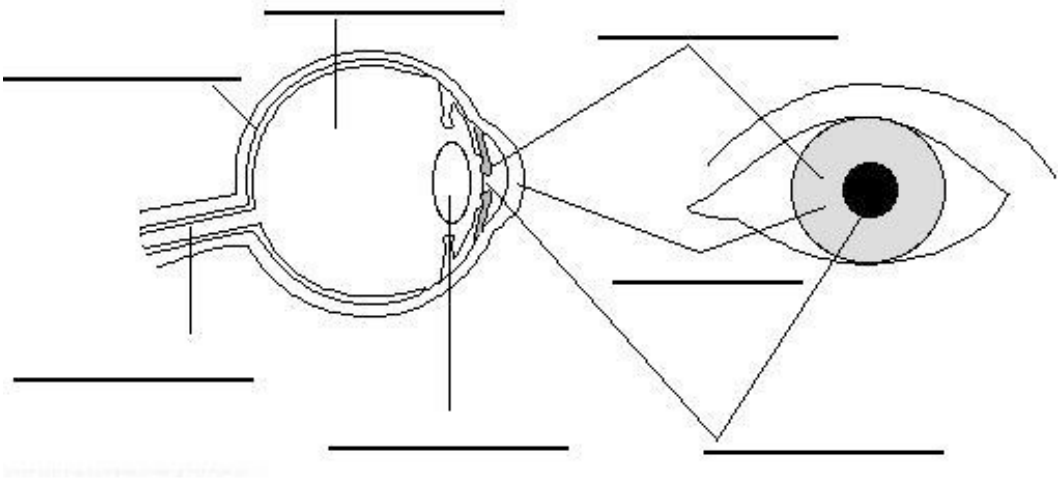
Optics VIII

Name:
Date:
Block:

1. **Black and White Vision and Colour Vision**
2. **Correcting Focus Problems**
3. **Blindness**

Label the following diagram:

- Cornea
- Lens
- Iris
- Optic Nerve
- Pupil
- Retina
- Watery Fluid



Black and White Vision and Colour Vision

There are specialized cells in your retina that absorb and detect light.

1. Rod Cells
    - Our brain uses rod cells to detect light and dark.
    - This is called our black and white vision system.

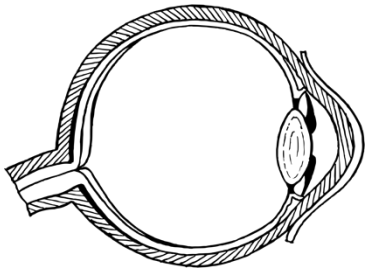
2. Cone Cells
    - Cone cells are used to detect colour.
    - There are three types of cone cells that detect the colours red, green, and blue.
    - These three colours are important because they are the primary colours of light.

Correcting Focus Problems

1. Normal Vision
    - Most of the fine-focusing takes place in the lens.
    - The lens is able to fine-tune the image by changing its shape.
    - The lens is convex in shape and the light rays converge at the retina.

2. Near-Sighted Vision
    - People who are near-sighted can see nearby objects but cannot see far.
    - The eye has a longer shape than the normal eye.
    - The lens converges the light rays to form an image in front of the retina causing a fuzzy image.

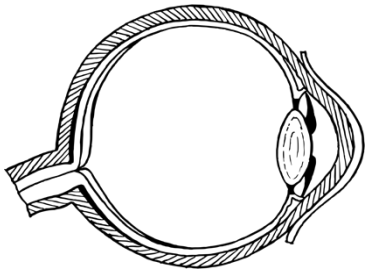
Draw a diagram of an eye of an individual who has near-sighted vision.



- Vision is corrected with a concave lens.

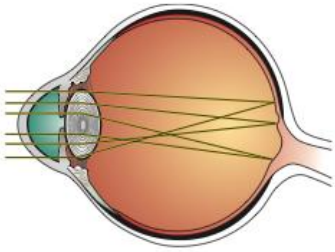
3. Far-Sighted Vision
    - People who are far-sighted can see distant objects but cannot see near.
    - The eye has a shorter shape than the normal eye.
    - The lens converges the light rays to form an image behind the retina causing a fuzzy image.

Draw a diagram of an eye of an individual who has far-sighted vision.



- Vision is corrected with a convex lens.

4. Astigmatism
    - Astigmatism is caused when the cornea has a distorted shape.
    - The image focuses on more than one point on the retina.
    - Astigmatism can be corrected using eyeglasses or contact lenses.
    - An individual can also undergo laser surgery to reshape the cornea.



Blindness

- Blindness is any vision impairment that keeps an individual from taking part in life's activities.
- It can range from not being able to detect any light to being able to perceive some light.
- Blindness can often be a result of disease or malnutrition.

Snow blindness:

- Painful condition of temporary, partial or complete blindness caused by overexposure to the glare of sunlight.
- Can be prevented by wearing snow goggles.
- Treatment for snow blindness is: resting the eyes in the dark.

Night blindness:

- Difficult or impossible to see in dim light.
- The most common cause is the rod cells losing their ability to respond to light.

Colour blindness:

- The ability to see only in shades of grey.
- It occurs in about one person in every 40 000.
- An advantage of a person who is colour-blind is that it limits distractions.
- The most common kind of colour vision deficiency is the inability to tell red and green apart.

Questions:

1. Why are children in developing countries at a greater risk of becoming blind?

Blindness can often be a result of disease or malnutrition.

2. How does an irregularly-shaped cornea cause astigmatism?

The image focuses on more than one point on the retina

3. How can snow blindness be prevented?

By wearing snow goggles

↳ Resting eyes in the dark.

4. If a person had damage to their cones, how would their vision be affected?

Cone cells are used to detect colours

↳ Person may be colourblind

5. What are the two parts of the eye involved in focusing?

lens and cornea

   a. Which does the majority of the focusing?

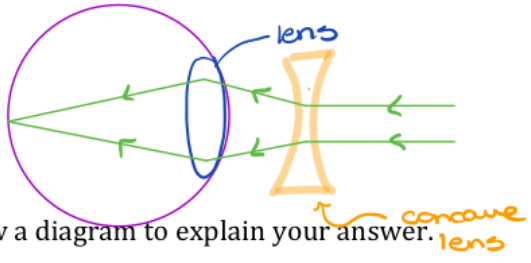
Cornea

   b. Which does the fine-focusing?

Lens

6. What kind of lens corrects near-sightedness? Draw a diagram to explain your answer.

Concave lens



7. What kind of lens corrects far-sightedness? Draw a diagram to explain your answer.

Convex lens