

The human eye and eye defects

Topic Objectives

Students are expected to learn:

- the various structures of the human eye and their functions
- the roles played by the various structures to help in focusing and adjusting the amount of light entering the eye and in sending messages to the brain
- the sequence of events involved in the detection of light and finally the formation of visual sensation in the brain.

Literacy objectives

Students are expected to develop:

- reading skills that enable them to read effectively, efficiently and critically
- skills in using and designing visual organizers as tools for the conceptualization of science texts.

How to promote active reading

As the functions of many science articles are to inform, explain and discuss rather than to tell a story, they tend to be condensed, technical and abstract, and more complex than other reading materials that F.4 students are accustomed to. So, students need to be taught how to read these texts through guidance and support.

One way of doing so is to encourage them to stop periodically and make sense of it and then reflect on what they have read. Directed Activities Related to Text (DARTs) as well as small reading-sharing group strategies can be used to encourage reflection and presentation of the results of the text reading.

How to develop effective readers of science texts

The class will learn how to effectively use visual organizers such as mapping the scientific knowledge and concepts, comparison tables, and flow-diagrams to improve their understanding of complex written texts.

A. Modelling and Deconstruction

- Show an eye model and briefly revise the formation of optical images in the human eye by using a flask containing fluorescent dye and a glass lens.
- Show a computer animation on the actions of various structures of the human eye in response to changes in light intensity and changes in distance from the observer.

B. Guided Construction

- Work together with students, to briefly revise the explanation of the formation of optical images in the human eye by using a flask containing fluorescent dye and a glass lens.

C. Joint and Independent Construction

- Ask students to read Text 1 about the structure and function of the eye and complete Task 1.

- Ask students to form pairs and complete the first two questions in Task 2 – the process should be that one student will be responsible for answering the question and saying it to his partner and then they swap roles and the other student answers the same question with some refinement.
- Each pair then work together to answer the third and fourth questions and then tell an adjacent pair of students what their answers are.
- Two pairs of students are asked to present to the whole class their answers to the third and fourth questions.

Text 1

The eye

The light from something you look at enters your eye through a small hole called the pupil. The light is made to bend, refracted, by the cornea and the lens. They focus the light onto the back of the eye, called the retina, where it forms an image.

To get the light to focus in the right place on the retina, the lens also has to be the right shape. When you focus on something near you, the lens has to be thick, or more convex, while for something far away from you, it has to be thin, or less convex. The ciliary muscles that hold the lens in place change the lens's shape by changing the tension, by stretching or relaxing.

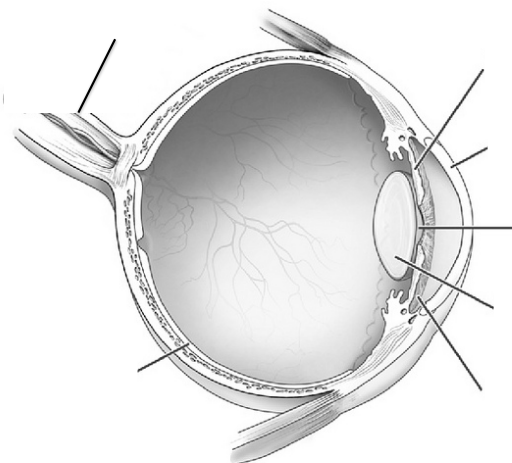
The retina is a kind of black screen that senses light. It is covered with two types of light-sensitive cells called rods and cones. They send a message to the nerve cells which run along the optic nerve to the brain.

If too much light reaches the retina, the cells can be damaged. So, in bright light, the retina sends signals to the coloured ring of muscle around the pupil, called the iris, to relax. This means the pupil becomes smaller and so less light can get through the pupil.

At the place where the optic nerve leaves the eye, there are no light-sensitive cells. This produces a blind spot so, if light from an image falls there, we cannot sense it!

Individual work

Task 1: Use the diagram to label all the seven parts of the human eye that are mentioned in the text above.



Pair work

Task 2: Answer the following questions with your partner.

1. What are the functions of the seven parts of the eye that you have labelled in the diagram?
2. How is the amount of light entering the eye controlled?
3. Some one asks you to explain how we see: write down the events that explain that phenomenon.
4. Write down the order of events that explain what the eye does if there is not enough light to see.

The lessons continue and address the issue of eye defects, specifically long- and short-sightedness. This next section is a lesson that promotes problem-solving and students speaking from a particular perspective.

D. Joint and Independent Construction

With responsibility of varying degrees – in a separate lesson

- Form 4 groups of students (each of 5 students):
 1. a group of novices
 2. a group of opticians
 3. a group of representatives from the mass media
 4. a group of representatives from shops selling spectacles.
- Each group needs to:
 - identify their major areas of interest
 - identify the major causes of shortsighted and long-sightedness.
- Form new groups of students – groups of 4 – with each group consisting of one student from each of the 4 categories as classified in the previous activity.
- Group discussion is conducted to share information, views and values among members
- Each group now shares information, views and values of what they had discussed before:
 - their major areas of interest
 - the major causes of shortsighted and long-sightedness.