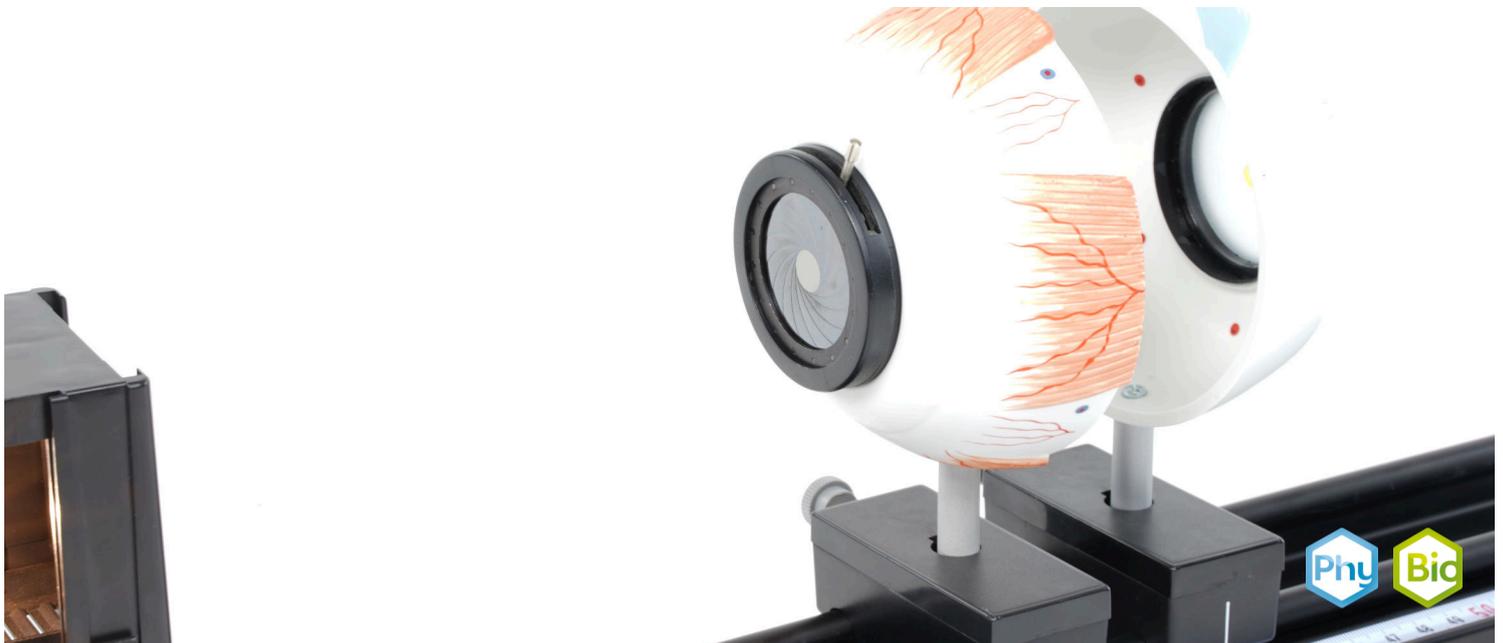


The function of iris and pupil with eye function model



Physics

Light & Optics

Dispersion of light

Biology

Human Physiology

Hearing & Seeing



Difficulty level

easy



Group size

-



Preparation time

10 minutes



Execution time

30 minutes

This content can also be found online at:



<https://www.curriculab.de/c/67178884278770002d59b39>

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Teacher information

Application



Picture of an eye

The iris is a part of tissue coloured by pigmentation and plays an important role in vision. The most important function of the iris is to regulate the incidence of light. Depending on the lighting conditions, there is a dynamic adaptation, as with the iris of a camera.

Other teacher information (1/2)

Prior knowledge



The structure of a human eye should be discussed in class beforehand.

Principle



The iris diaphragm regulates the amount of light entering the eye. If the incidence of light is strong, the iris is almost closed, which leads to an improvement in the depth of field of objects to be imaged. If the incidence of light is weak, the iris diaphragm is wide open.

Other teacher information (2/2)

Learning objective



Pupils should develop an understanding of the function of the iris and pupil.

Tasks



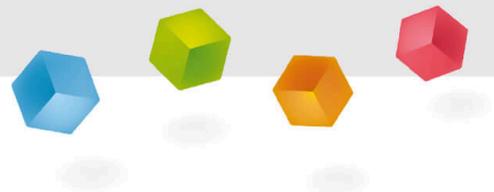
Investigate the effect of the iris diaphragm on the image of objects on the retina.

Safety instructions



The general instructions for safe experimentation in science lessons apply to this experiment.

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Student information

Motivation

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Image of a human eye

The iris is an organ tissue consisting of muscle tissue and pigments. In the centre of the iris is the pupil, the central opening for the incidence of light. The most important function of the iris is to regulate the incidence of light.

Tasks

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- Image the object on the retina and investigate the influence of the opening of the iris diaphragm on the depth of field of the imaged object.



Experimental setup

Material

Position	Equipment	Item no.	Quantity
1	Optical profile bench for student experiments, l = 600 mm	08376-00	1
2	Rider for optical profile bench	09822-00	3
3	Light box, halogen 12 V/20 W	09801-00	1
4	Lenses made of glass for eye function model, set consisting of 4 lenses	64955-00	1
5	Base with stem for light box for optical profile bench	09802-20	1
6	Perl L , mapping object	11609-00	1
7	PHYWE power supply unit, RiSU 2023 DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1
8	Eye function model, consisting of two eye half shells	64960-00	1

Setup (1/3)

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Experimental setup - normal eye

- Set up the experiment as shown on the left.
- The rods of the two eye half shells are each inserted into a rider and placed at the end of the optical profile bench at a distance of 2.5 cm.

Setup (2/3)

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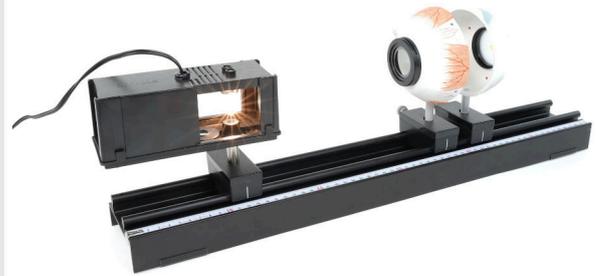


- Place the lens $S1$ ($f = 65 \text{ mm}$) in the lens holder inside the eye shell.
- Place the base with handle under the light box.

Setup (3/3)

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- Place the light box at a distance of approx. 27 cm to the eye lens on the optical bench.
- Pay attention to the orientation of the light box.



Experimental setup - normal eye

Procedure (1/3)

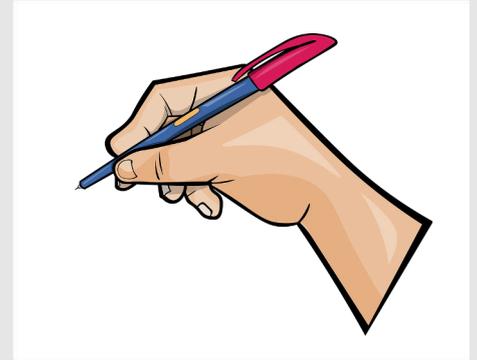
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- Connect the light box to the power supply unit ($\sim 12\text{ V}$) and switch it on.
- Position the object in the slot of the light box.

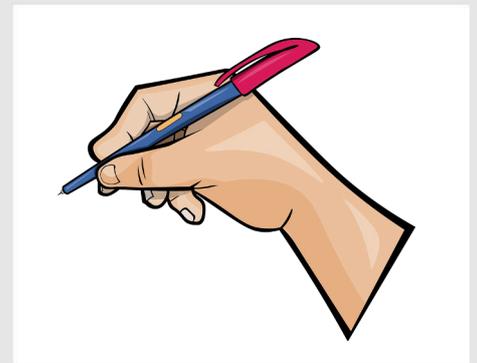
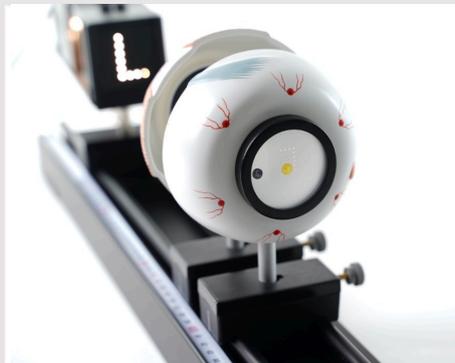
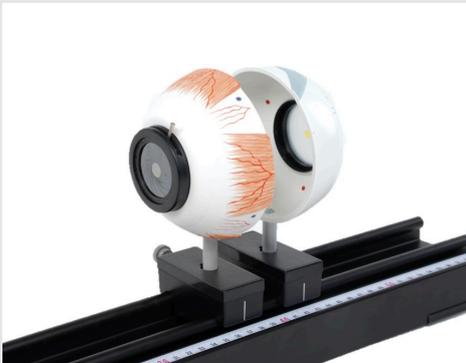
Procedure (2/3)

- Open the iris diaphragm with the lever as far as possible and look at the image on the frosted glass disc.
- Take notes of your observations.

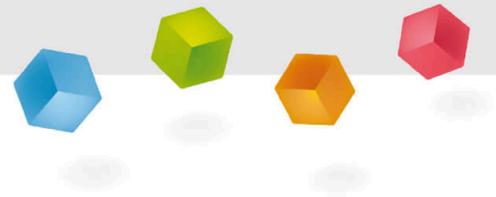


Procedure (3/3)

- Now slowly close the iris diaphragm and observe the image on the frosted glass disc.
- Take notes of your observations.



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Report

Task 1

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Fill in the blanks according to your observations in the first and second part of the experiment.

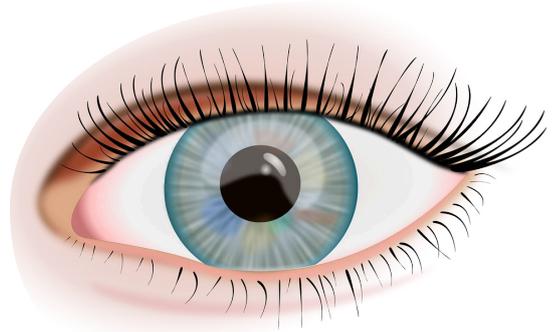
The object is imaged on the frosted glass pane. If the aperture is wide , the image of the object appears very on the frosted glass pane. Objects that are close to the object are imaged . If the aperture is , the image of all objects appears but .

Task 2

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What function do the pupil and iris have in the human eye?

- They regulate the incidence of light.
- They refract the light and act like a converging lens.
- They ensure that the image on the retina is upright.

 Check

Task 3

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Is the following statement true?

The iris can adapt dynamically according to the lighting conditions and works like the iris of a camera.

 True False Check

Slide	Score / Total
Slide 17: Test part 1	0/7
Slide 18: Iris function	0/1
Slide 19: Light adjustment iris diaphragm	0/1

Total amount  0/9

 Solutions

 Repeat