Long-sightedness and its correction (hyperopia)

Physics | Light & Optics | Optical devices & lenses

Difficulty level	Group size	Preparation time	Execution time
easy	-	10 minutes	10 minutes

This content can also be found online at:

http://localhost:1337/c/64725077e1994e000281c7b3

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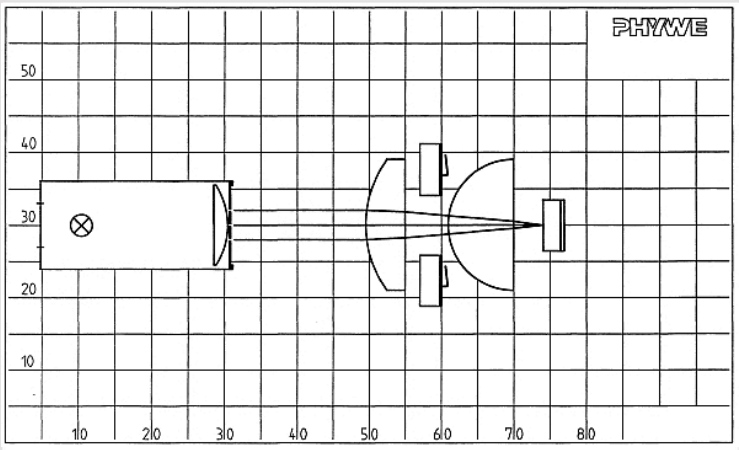
Teacher information

Application



Experimental set-up:

3-slit aperture with diaphragm between two converging lenses

The experiment is intended to simulate and explain the correction of long-sightedness with the help of glasses.

The eye is constructed in such a way that depending on the distance of an object to the eye, the "lens" of the eye curves more or less.

Farsightedness is corrected with the help of a converging lens, which changes the focal length so that objects that are out of focus a short distance away can be seen sharply again.

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Other teacher information (1/2)

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Prior knowledge

Students need prior knowledge of imaging optics, with collecting and diverging lenses and the spectral colours of light. Furthermore, they should have gathered basic knowledge about the function of the human eye.

Principle

To demonstrate what farsightedness is and how it can be corrected with glasses.

Other teacher information (2/2)

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Learning objective

The students should recreate the natural functions of the human eye with the experimental set-ups.

Tasks

The students should make observations and gather knowledge about the experimental set-up.

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Safety instructions

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

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Student information

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Motivation

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Reading glasses sharpen the writing at short distance

Farsightedness is a common side effect of ageing.

Close objects such as a book or smartphone can then no longer be recognised correctly, or fonts can no longer be read.

As in the experiment on myopia, this can be remedied with glasses.

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Equipment

Position	Material	Item No.	Quantity
1	PHYWE Demo Physics board with stand	02150-00	1
2	Halogen lamp for experiments, 12V/50W, with magnetic base	08270-20	1
3	Optical block, semicircular, magnet held	08270-01	1
4	Opt. block,planoconvex, magn.held	08270-02	1
5	Diaphragm w. holder, magnet held	08270-10	2
6	Plane mirror, magnet held	08270-13	1
7	PHYWE Multitap transformer DC: 2/4/6/8/10/12 V, 5 A / AC: 2/4/6/8/10/12/14 V, 5 A	13533-93	1
8	G-clamp	02014-01	2

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Set-up and Procedure (1/2)

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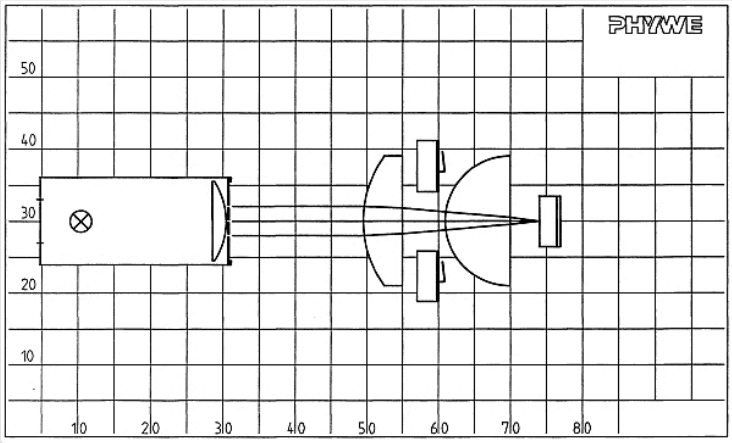

3-slit diaphragm with two converging lenses

- Position the 3-slit bezel luminaire so that the centre beam runs along the optical axis.
- Place and adjust model body semicircle; attach panels; select position of parts according to the illustration.
- Observe the intersection of the rays with the optical axis (image of a very distant object point)
- Place the plane mirror so that the image point appears on its back surface

Set-up and Procedure (2/2)

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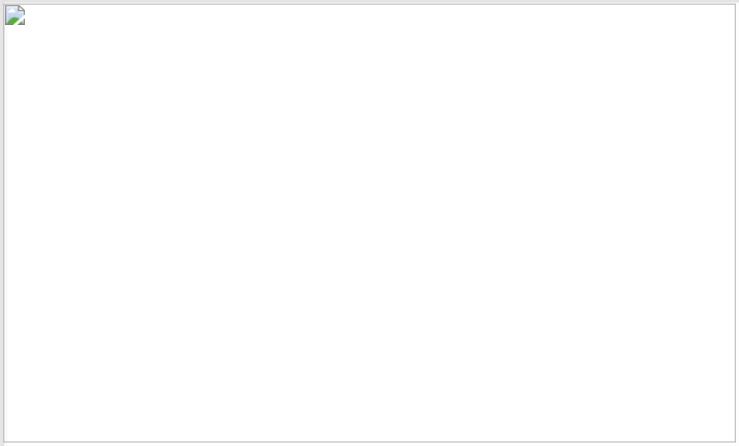

3-slit diaphragm with two converging lenses

- The plane mirror functions as a retina, the semicircular body as an eye lens, the diaphragms function as an iris diaphragm
- Model a farsighted eye from this normal-sighted, relaxed eye by moving the "retina" to the left until it has a distance of approx. 40 mm from the "eye lens".
- Correct farsightedness by attaching a converging lens (glasses)

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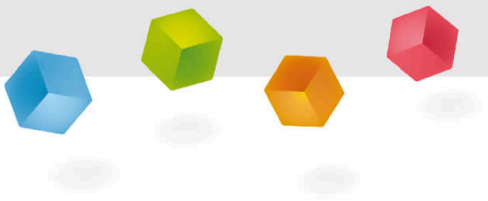

Report

Task 1

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Put the correct words into the gaps!

If the eyeball is too _____, the _____ of objects appear _____ the retina.
They are thus blurred _____ retina.
This eye defect can be corrected by means of a _____.
The focal length is thus _____.

behind
reduced
short
collective lens
on the
images

Check

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Task 2

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The farsighted eye can be shorter than the normal-sighted eye.

○ True ○ False

✓ ✓Review

Farsightedness can be caused by the thickness of the lens of the eye.

○ True ○ False

✓ ✓Review

Task 3

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The images of objects to which the eye is directed,

- appear in front of the retina.
- appear on the cornea.
- appear behind the retina.

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Slide	Score / Total
Slide 12: Task 1	0/6
Slide 13: Multiple tasks	0/2
Slide 14: Task 3	0/3

Total 0 / 11

Solutions Repeat

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