

Near and far



Physics

Light & Optics

Dispersion of light

Biology

Human Physiology

Hearing & Seeing

Nature & technology

From senses to measuring



Difficulty level

easy



Group size

1



Preparation time

10 minutes



Execution time

10 minutes

This content can also be found online at:



<https://www.curriculab.de/c/6717a0012787770002d59c05>

PHYWE



Teacher information

Application

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Carrying out the experiment

The lens of the eye is used to visualise objects at different distances on the retina. To do this, the ciliary muscle changes the shape of the lens and therefore its refractive power. If the ciliary muscle is relaxed, the lens becomes flatter and the eye is adjusted to the distance. Contraction of the ciliary muscle leads to increased curvature and thus to greater refractive power, which means that close objects are sharply focused. With age, the elasticity of the lens decreases: it can no longer be curved as much and the near point moves further into the distance. The retina, on which the image is formed, contains photoreceptors that transmit the perceptions to the brain via nerve pathways. The centre of the retina, the fovea centralis, contains a particularly large number of photoreceptors. This is why objects in the centre are seen most clearly.

Other teacher information (1/2)

PHYWE

Prior knowledge



Pupils should know that the eye has the ability to accommodate and can therefore focus on objects at different distances. They should also know how the eye perceives an image.

The prior knowledge should be sufficient for the students to understand the text in the slide "Motivation". Otherwise, the text must be formulated in a way that is easier to understand.

Principle



The eye adjusts to objects at different distances through accommodation.

Other teacher information (2/2)

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Learning objective



Pupils should recognise that the eye is able to focus on objects at different distances. They should notice that an image in the centre of the eye is best seen in focus.

Tasks



The pupils examine the areas in which they can see clearly.

Safety instructions

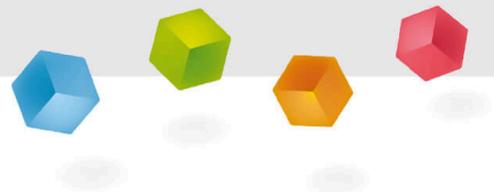
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The general instructions for safe experimentation in science lessons apply to this experiment.

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Student information



Motivation

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Is everything sharp?

The lens of the eye is used to visualise objects at different distances on the retina. To do this, the ciliary muscle changes the shape of the lens and therefore its refractive power. If the ciliary muscle is relaxed, the lens becomes flatter and the eye is adjusted to the distance. Contraction of the ciliary muscle leads to increased curvature and thus to greater refractive power, which means that close objects are sharply focused. With age, the elasticity of the lens decreases: it can no longer be curved as much and the near point moves further into the distance. The retina, on which the image is formed, contains photoreceptors that transmit the perceptions to the brain via nerve pathways. The centre of the retina, the fovea centralis, contains a particularly large number of photoreceptors. This is why objects in the centre are seen most clearly.

Tasks

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- What does the eye see sharply?
- Examine the area in which you can see clearly.

What does the eye see in focus and what is blurred?

The eye sees things sharply outside the near and far point.

The eye sees things sharply between the near and far points.

Material

Position	Equipment	Item no.	Quantity
1	Set for 15 experiments, TESS beginner nature and technology NT-SIN	15241-88	1

Set-up and procedure

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Measure your near point

- Hold the black foil pen in front of your eyes at a distance of 20 cm and the red one on your outstretched arm in the same line of vision. Look at them alternately.
- Now hold the red pen a little next to the black one and look at them alternately.
- Close one eye and bring the black foil pen so close that you can just see the lettering clearly. This is the close-up point.
- Look at the black coloured pencil in front of you without looking away. A classmate selects one of the coloured pens and slowly guides it into your field of vision from the side. Say immediately when you can recognise the colour of the pen.

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Report



Task 1

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Take notes of your observations. What do you notice about the alternating near and far pens? What do you notice about the pens held next to each other?

Task 2

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In which everyday situations is accommodation useful? Write down 5 examples.

Task 3

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Compare your closest point with those of your classmates. Are they all identical?

Task 4

PHYWE

What applies to the near point?

Drag the words into the right place.

With age, the lens is no longer as curved. The near point therefore moves .

Slide	Score / Total
Slide 8: The flavours	0/3
Slide 15: Near point	0/3

Total amount  0/6

 Solutions

 Repeat

 Export text