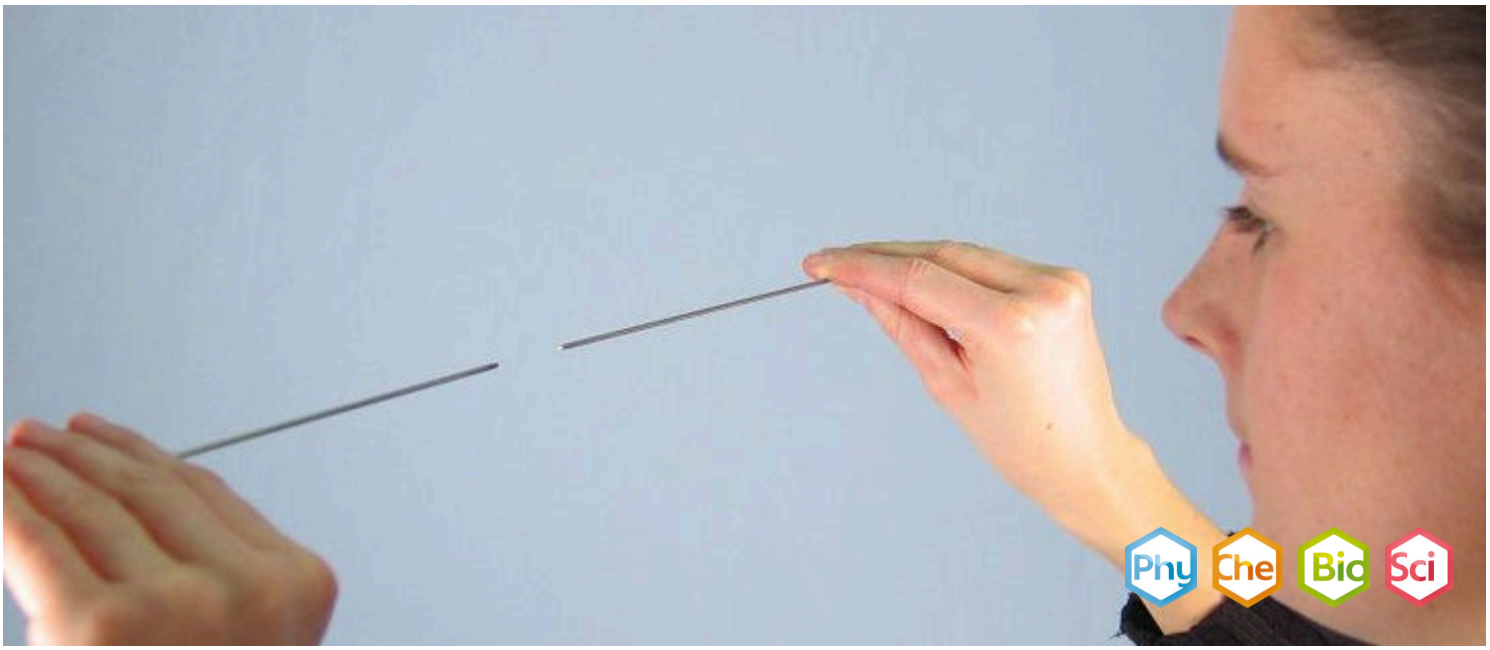
Two eyes see more than one



Physics > Light & Optics > Dispersion of light

Biology > Human Physiology > Hearing & Seeing

Nature & technology > From senses to measuring

Difficulty level	Group size	Preparation time	Execution time
easy	1	10 minutes	10 minutes

This content can also be found online at:

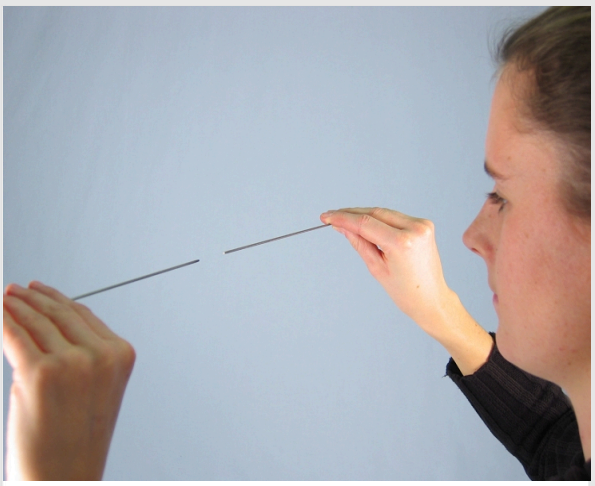
https://www.curriculab.de/c/6717a02b2787770002d59c0f

PHYWE

Teacher information

Application

PHYWE



Carrying out the experiment

When looking at an object with both eyes, an image is created on each retina. However, the images are not perceived separately, as they fall on corresponding retinal areas, but merge into one impression. As each eye sees the object from a slightly different angle, the images are different and a spatial impression is created.

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Other teacher information (1/2)

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Prior knowledge

Pupils should know how the eye is constructed and how the interaction between the two eyes works, including the transmission of information.

Principle

With one eye closed, spatial vision is difficult or even impossible.

Other teacher information (2/2)

PHYWE

Learning objective

Pupils should recognise that both eyes are needed to enable spatial vision.

Tasks

Students investigate how seeing with both eyes differs from seeing with only one eye.

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Safety instructions

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- There are visual impairments that prevent spatial vision. Pupils should be informed of this in advance in order to eliminate any uncertainties.
- The general instructions for safe experimentation in science lessons apply to this experiment.

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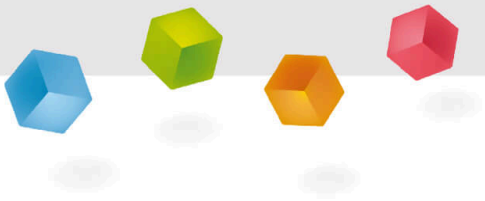

Student information

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Motivation

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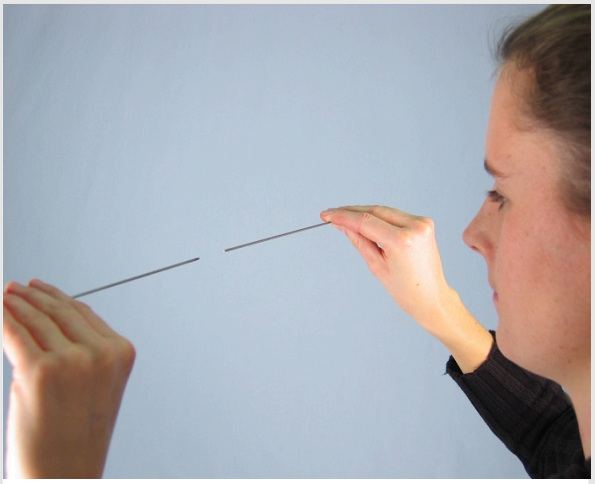

Carrying out the experiment

When looking at an object with both eyes, an image is created on each retina. However, the images are not perceived separately, as they fall on corresponding retinal areas, but merge into one impression. As each eye sees the object from a slightly different angle, the images are different and a spatial impression is created.

Tasks

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- Why do you need both eyes to see well?
- Investigate how seeing with both eyes differs from seeing with only one eye.

We need both eyes to be able to judge distances correctly.

right

false

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Material

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

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Set-up and procedure (1/2)

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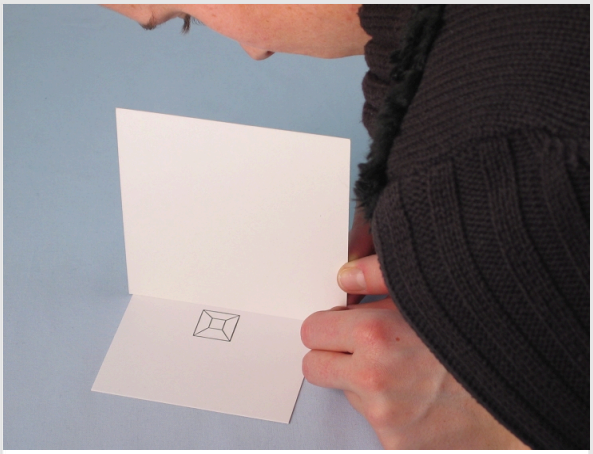

The map "spatial vision" is your tool

- Hold the two knitting needles horizontally in front of your eyes at a distance of about $30\ \mathrm{cm}$ so that their tips are pointing towards each other. They should be $20 - 30\ \mathrm{cm}$ apart.
- Close one eye and move the knitting needles quickly towards each other until the tips touch. Can you manage that?
- Repeat the experiment when you see with both eyes. What do you notice?
- Place the card "Spatial vision" on the table in front of you and place the white card between the two figures.

Execution (2/2)

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How does the depth effect come about?

- First look at the figures with one eye only, then with the other. Hold the white card so that you can only see one of the figures with one eye.
- Now look at the figures with both eyes. Try to adjust your eyes to the distance. To do this, adjust your gaze as if you were looking at a distant object. You can also imagine that you are looking through the figures. What do you perceive?
- Then alternate between closing one eye and the other. How does the image change?

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Report

Task 1

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What do you notice when you try to hit the tips of the knitting needles? What do you notice when you look at the figures on the card first with one eye and then with both eyes? Take notes of your observations!

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Task 2

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Name four everyday activities that require spatial vision.

Task 3

PHYWE

Did your classmates make different observations to you? Take notes of them and discuss the reasons in class.

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Task 4

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Why is it so difficult to touch the tips of the knitting needles when you can only see with one eye?

- Because one eye only sees half of it.
- It is not. You can easily touch the knitting needle with one sighted eye.
- Because you need both eyes to be able to see in space. If you can only see with one eye, it is very difficult to judge distances.
- Because the hands can only be controlled using both eyes.

Slide	Score / Total
Slide 8: The two eyes	0/2
Slide 16: Point of the knitting needle	0/1

Total amount 0 / 3

Solutions | Repeat | Export text

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