Optical illusions

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:

http://localhost:1337/c/5f0d64441c41060003916ab5

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Teacher information

Application

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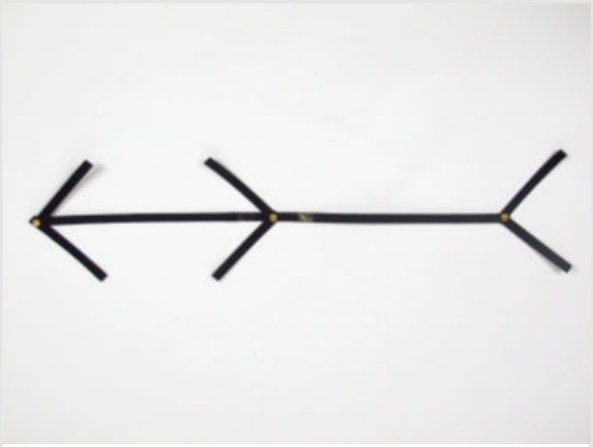

Experimental setup

We are all doubtless familiar with so-called optical illusions and have perhaps been deceived by them. Even if you know, you are looking at an optical illusion, you cannot let it disappear.

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Other teacher information (1/2)

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Prior knowledge

In the optical perception we can observe certain regularities, so particular figures are perceived more consciously than others, similar elements get perceived as a group and structures get simplified. In optical illusions these regularities are used to achieve a perceptual illusion.

Scientific principle

The perception of objects and the conscious sensation produced in the brain as a result of a physiological process, which begins when a stimulus in a sensory organ is triggered. The perception consists of sensation and experience.

Other teacher information (2/2)

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Learning objective

Students should experience how optical illusions come about and understand how they are created.

Tasks

The students should explain by means of an example what a typical optical illusion is based on.

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Safety instructions

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The common rules for safe experimentation in scientific education apply to this experiment.

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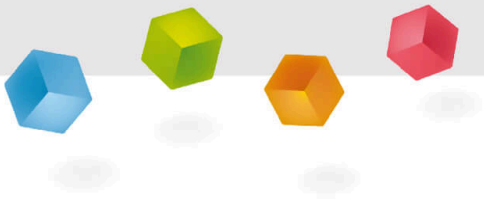

Student information

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Motivation

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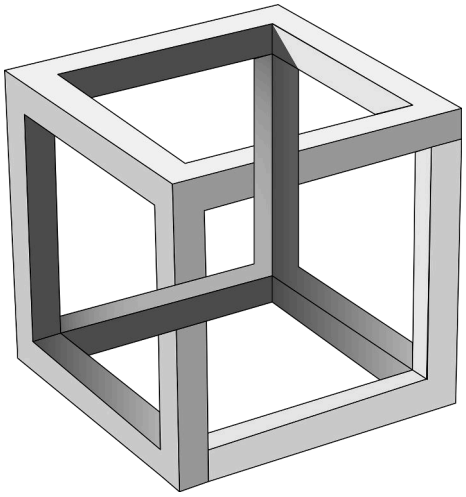

Impossible cube

Anyone looking at a painting by Dutch artist M. C. Escher will notice that a three-dimensional representation on a two-dimensional object, such as paper, confuses the brain. But it is not even necessary to go that far. Our perception is easier to confuse than we think.

That is what this experiment in optical illusions is all about.

Tasks

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Penrose triangle

Try to explain the cause of the optical illusion in this example.

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Equipment

Position	Material	Item No.	Quantity
1	Optical illusion figures	64948-00	1

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Setup (1/2)

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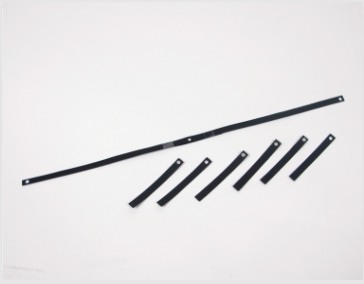

Cut out from a sheet of black cardboard one strip approx. 50 cm long and 1 cm wide and six strips 10 cm long and 1 cm wide (upper image). If necessary, stick two strips together to make the longer one.

Using a hole punch, make a hole at each end of the six short strips, and at both ends and in the centre of the long strip (lower image).

Setup (2/2)

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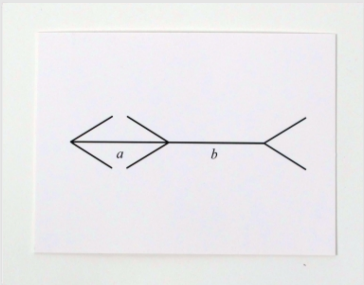

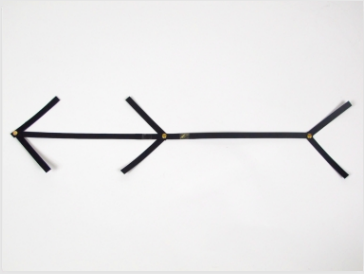

With the aid of three brass fasteners assemble the strips to make the same shape as shown in the upper picture, but now with moving parts.

Place the model on a light-coloured surface on the bench and turn the movable short strips so that the four at the two ends of the long strip are all pointing diagonally towards the right and the two in the centre pointing diagonally to the left, as in the lower picture.

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Procedure

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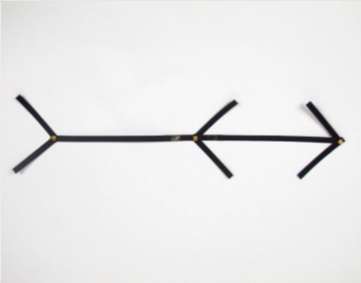
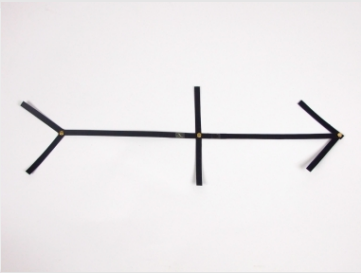
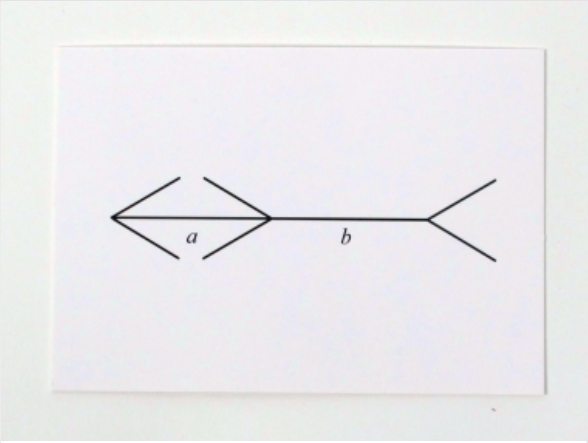




Then reverse their directions, so that the four strips at the ends are pointing diagonally towards the left and the two in the centre are pointing diagonally towards the right. How do the different figures appear to you? Form also new figures by rotating the short strips and examine their effect.

What do you notice when the strips all point in the same direction? What if the middle ones are at a 90° angle to the long strip?

Explanation



Schematic drawing

To see does not mean to perceive things absolutely, such as that the length of a side is 25 cm. Rather, it is that the brain always compares what it sees with the surroundings of the picture and thus obtains information.

Thus, in this experiment, the line that lies between the lines that are directed towards each other (distance a) appears shorter, since the outer ends of the short lines are closer together. In the opposite case (distance b) the distance appears longer, although both distances are of equal length.

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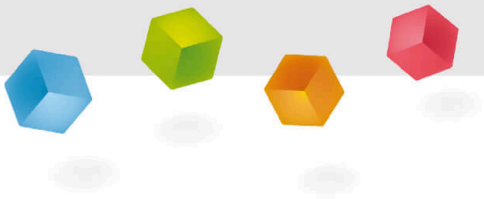

Report

Task 1

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What are most optical illusions based on?

- On the fact that the left eye is processed in the right half of the brain and the right eye in the left.
- The texture of the paper
- On processing by the brain of what is perceived by the eyes
- How the eyes work

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Task 2

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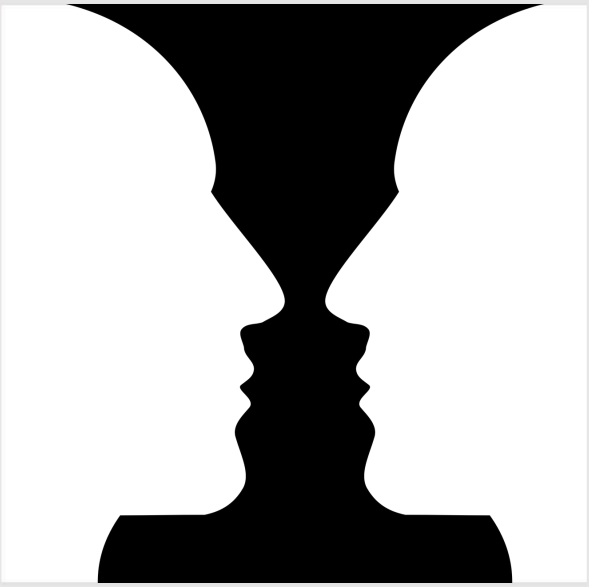
What can you see in the picture on the right?

- [ ] A vase
- [ ] A parking meter
- [ ] 13 dolphins
- [ ] Two profile of two human faces

Check



Task 3

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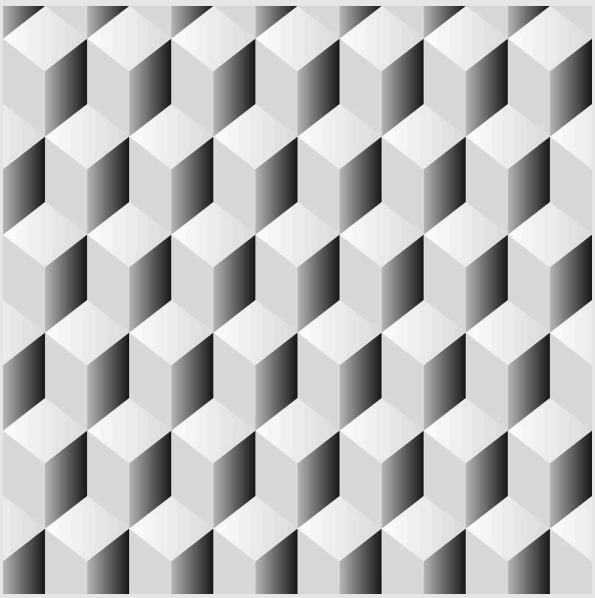
Which Dutch artist became famous mainly for his depiction of impossible figures?

- Maurits Cornelis Escher
- Edvard Munch
- HR Giger
- Vincent van Gogh



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Slide	Score / Total
Slide 15: Optical illusions	0/1
Slide 16: Example optical illusion	0/2
Slide 17: Artist depiction of impossible figures	0/1

Total Score 0 / 4

Show solutions Retry

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