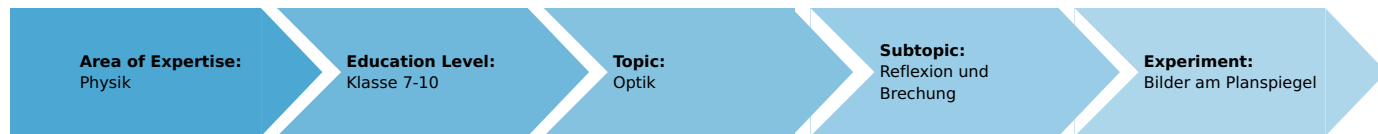


Images in a plane mirror (Item No.: P1063800)

Curricular Relevance



Difficulty



Easy

Preparation Time



10 Minutes

Execution Time



10 Minutes

Recommended Group Size



2 Students

Additional Requirements:

- Ruler (approx. 30 cm)
- White paper (DIN A4)
- Eraser

Experiment Variations:

Keywords:

Task and equipment

Information for teachers

Additional Information

With this experiment the students should be led to insights which they are likely to be already familiar with qualitatively, but which they are probably not consciously aware of (daily observation in a mirror).

In the first part of the experiment, qualitative investigations of the properties of a mirror image compared to the original are made.

In the second part the correlation between object distance g and image distance b in a plane mirror are determined. Additionally, while doing so the students become familiar with a first possibility of forming images by rays of light.

The second part of the experiment is more demanding on the students' abilities and experimental proficiency than the first part; the two experiments can be seen as a unit. However, they can also be performed separately.

Suggestions

- In the first part of the experiment a pocket mirror can be used instead of the mirror on a block. This makes the observations slightly easier.
- When performing the second task, special care must be taken that the mirror does not move during the repositioning of the light box and that the light box is not placed too far away from the mirror (distance should be about 10 cm). Otherwise, the slight divergence of the light beam which is still present will make exact marking more difficult.
- The present procedure of marking the path of several light beams is new to the students. For helping them to avoid confusing the marks it makes sense to use different colours or symbols.
- A slight tolerance in the intersection point of the three extended rays of light is acceptable; larger deviations are the result of inexact measurements in the students' experimental procedure.

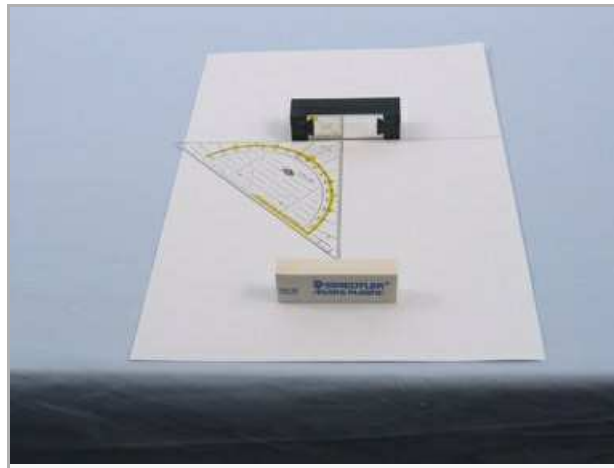
Images in a plane mirror (Item No.: P1063800)

Task and equipment

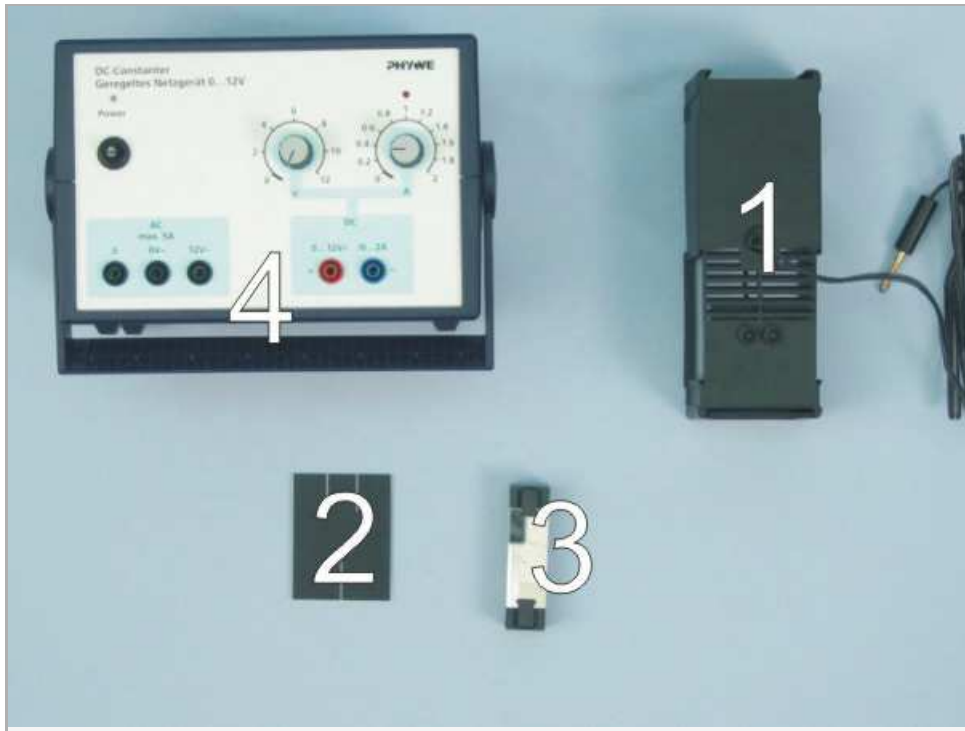
Task

How are mirror images formed?

In this experiment the properties of mirror images are determined and you will learn how an image is formed by a plane mirror.



Equipment



Position No.	Material	Order No.	Quantity
1	Light box, halogen 12V/20 W	09801-00	1
2	... with single-slit/double-slit aperture		1
3	Mirror on block, 50 mm x 20 mm	08318-00	1
4	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1
Additional material			
	Ruler (approx. 30 cm)		1
	White paper (DIN A4)		1
	Eraser		1

Set-up and procedure

Set-up

- Take the eraser and write something on one side.



Fig. 1

- Divide a sheet of paper with a pencil line with the 2:1 ratio. Put the mirror on the line. Place the set square and the eraser as shown in the picture.

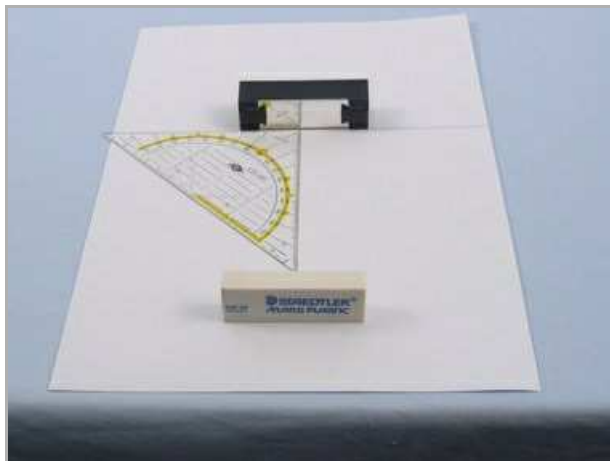


Fig. 2

Procedure

1. Properties of mirror images

- Look at the image of the eraser and the set square in the mirror.

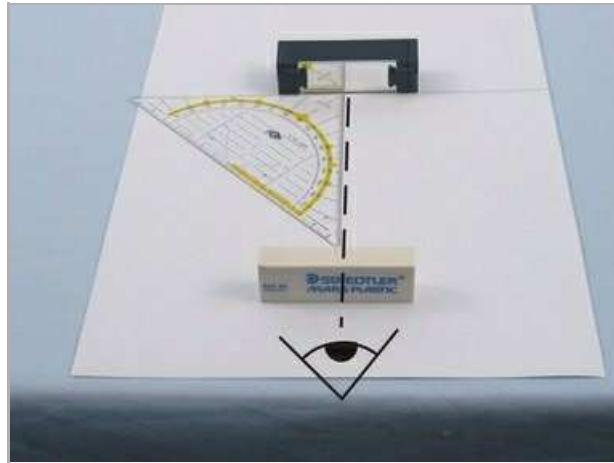


Fig. 3

- Compare the image to the original. Note your conclusions in Table 1 in the report.

2. Image formation

- Draw the marks X, Y and Z on the pencil line. Perpendicular to X, draw the point G. (Use the distances given in the picture.)

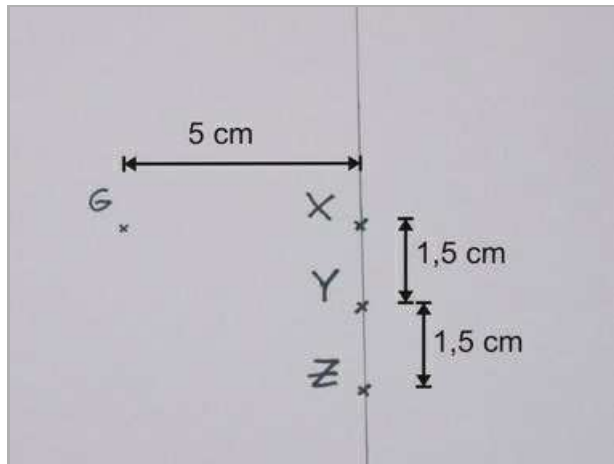


Fig. 4

- Connect the light box to the power supply (12 V AC) and switch it on.



Fig. 5

- Place the mirror on the line so that the marks X, Y and Z lie within its boundaries. Mount the single-slit aperture on the light box and let the light beam hit the mirror.

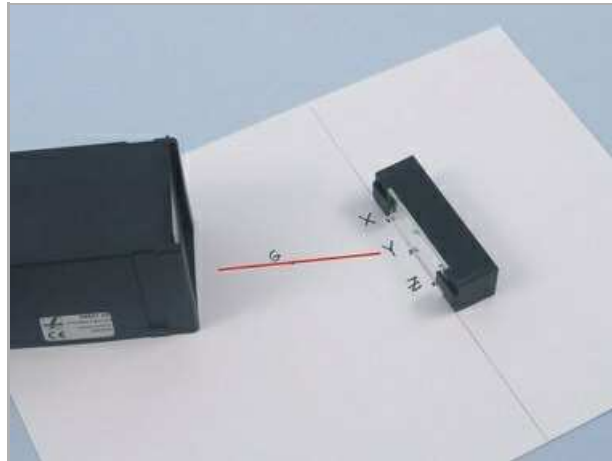


Fig. 6

- Place the light box so that the beam runs through the marks G and Y. Mark both the incident and the reflected light beams with two crosses each.

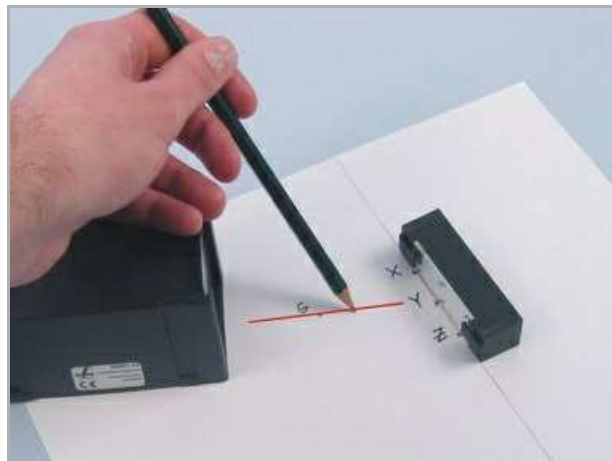


Fig. 7

- Now, move the light box until the beam runs through G and X (be careful not to move the mirror). Mark the incident and the reflected light beams again. This time, use a different colour or symbol.
- Finally, repeat the experiment with G and Z. Again use another colour/symbol this time.
- Switch off the power supply and remove the light box and the mirror from the paper.
- Connect every two marks that belong together (reassure yourself that the point G was touched by all incident light beams). Now, extend the reflected rays of light to the right beyond the perpendicular line (plane of the mirror), using dashed pencil lines.
- What do you notice? Note your observations.
- Measure the distance from point G to the mirror.
- Record the value.
- Mark the intersection point of the dashed extension lines as B. Measure the distance from B to the mirror.
- Record the value.

Report: Images in a plane mirror

Result - Table 1

Note your observations.

Comparison of original and image	Set square or ruler	Eraser
Size	1	
Distance from the plane of the mirror	1	
Position of the sides	1	

Result - Observations 1

Note your observations during the second experiment.

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Result - Observations 2

Distance from point G to the mirror: $g =$ cm (object distance)

Distance from point B to the mirror: $b =$ cm (image distance)

Evaluation - Question 1

What properties of mirror images can be derived from your observations compared to the original?

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Evaluation - Question 2

Compare the distance g from point G to the mirror (object distance) with the distance b from point B to the mirror (image distance) and with your observations from the first part of the experiment.

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Evaluation - Question 3

Why do you see yourself in a shop window pane when passing in front of it?

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Evaluation - Question 4

Give some examples of uses for plane mirrors.

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