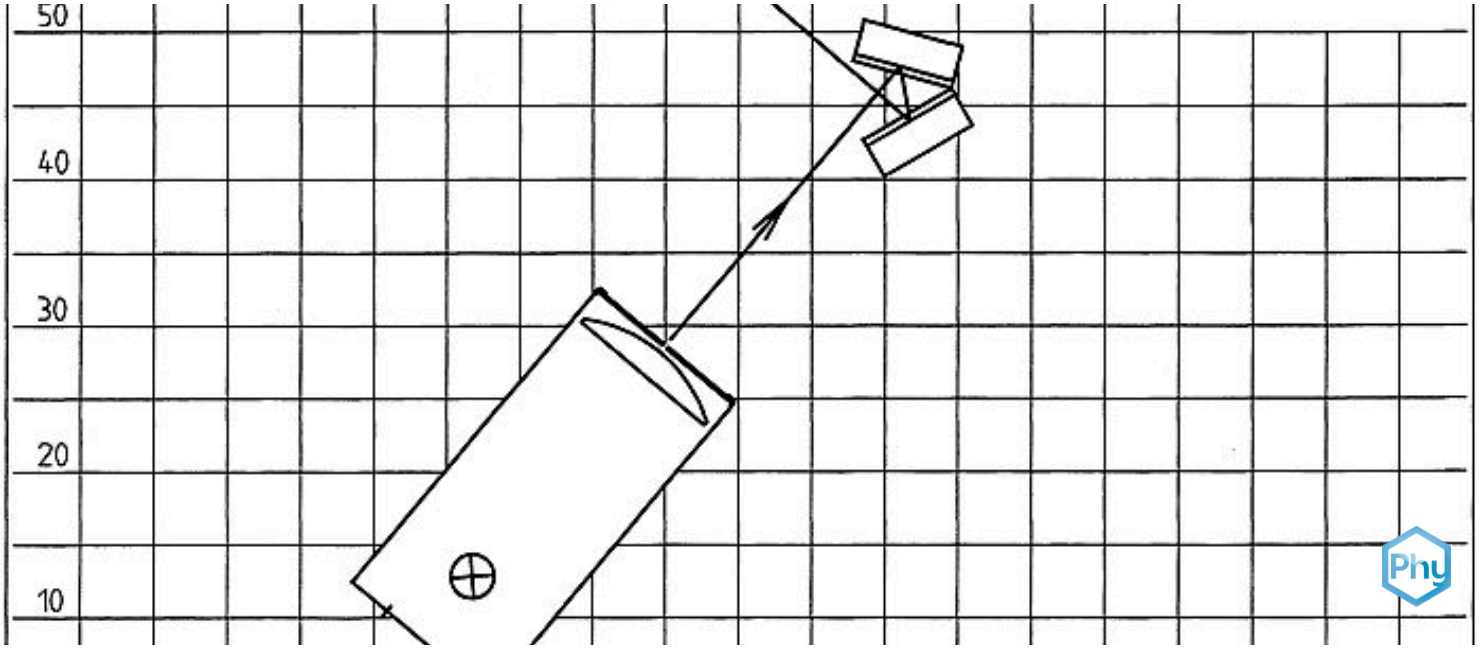
Applications of reflection by plane mirrors



Physics > Light & Optics > Reflection & refraction of light

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

This content can also be found online at:

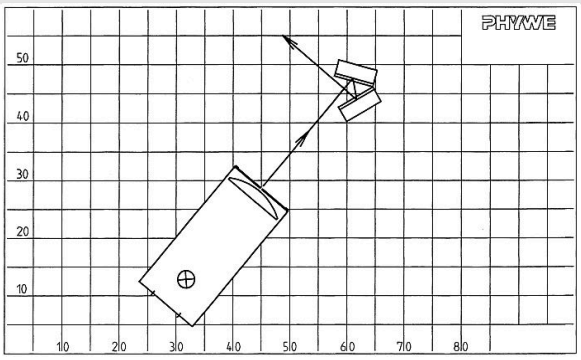
http://localhost:1337/c/642824805e30a7000275ea0c

PHYWE

Teacher information

Application

PHYWE



Experimental set-up:

Angled mirror

Light propagates in a straight line. If a light beam hits a reflecting object, the light beam also spreads out in a straight line from there.

The angle of incidence of a light beam to a reflecting object (mirror) always corresponds to the angle of reflection of the light beam.

Since the angle of incidence always corresponds to the angle of reflection, this small series of experiments shows that, regardless of the direction of incidence, two mirrors ensure that the reflection beam is always reflected in the same way relative to the input direction.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Other teacher information (1/2)

PHYWE

Prior knowledge

The students need theoretical knowledge about the straight-line, ray-shaped propagation of light and that objects reflect light rays.

Principle

It is to be shown how the law of reflection can be applied in optical devices by using two plane mirrors (angle mirror, reflector, periscope).

Other teacher information (2/2)

PHYWE

Learning objective

The students should gain knowledge about the principles of light reflection. The focus should be on understanding the use of mirrors in technical devices.

Tasks

The students should understand that technical systems can specifically influence the beam path independently of the direction of incidence but relative to it.

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Additional teacher information

PHYWE

Note

For better differentiation of the beam paths in the periscope, it is recommended to place a small coloured glass pane or a filter from the colour filter set (09807-00) in a light beam by means of an aperture with holder (08270-10).

You should proceed accordingly if you also use two parallel beams in the other applications.

Safety instructions

PHYWE

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

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

PHYWE

Student information

Motivation

PHYWE

Microscope

A microscope is an optical device that makes it possible to look at very small things in a very big way.

But before we learn how a microscope zooms, we need to understand how it is possible that we can look around the corner in a microscope like in the picture.

We have already learned that a light beam is always straight. This experiment shows how we can still look around corners in a microscope. A little hint: it's about mirrors!

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

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	Opt. block,triangular,magnet held	08270-06	1
4	Plane mirror, magnet held	08270-13	2
5	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
6	G-clamp	02014-00	2

PHYWE

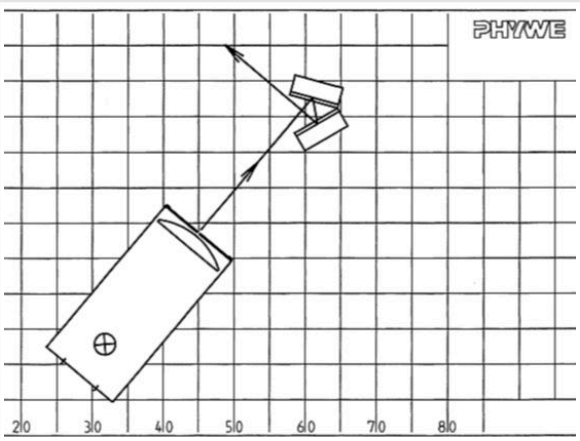
Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Set-up and Procedure (1/3)

PHYWE



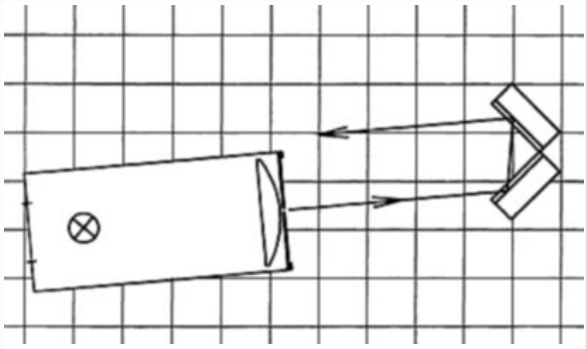
Experiment:

Angled mirror

- Place right-angled triangle on adhesive board
- Place the plane mirror so that the mirror glasses touch and form an angle of 45° with each other.
- Remove triangle
- Position luminaire with 1-slit aperture so that the beam is reflected at each mirror
- Change the direction of the beam emitted by the luminaire several times.

Set-up and Procedure (2/3)

PHYWE



Experiment:

Reflector

- Place triangle right-angled triangle on adhesive board
- Place the plane mirror so that the mirror glasses touch and form an angle of 90° with each other.
- Remove triangle
- Position luminaire with 1-slit aperture so that the beam is reflected at each mirror
- Change the direction of the beam emitted by the luminaire several times.

PHYWE

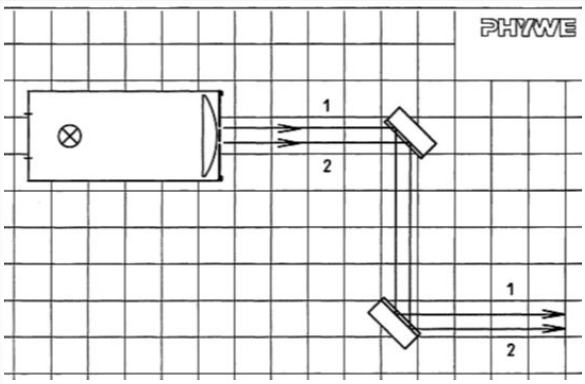
Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Set-up and Procedure (3/3)

PHYWE



Experiment:

Periscope

- Put on the luminaire with the 2-slit cover
- Place the plane mirror in the beam path so that it deflects the beams by 90°.
- Set up the second plane mirror parallel to the first and deflect the rays by 90° again.

PHYWE

Report

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

Task 1

PHYWE

Write down your observations of the different experimental set-ups. At what angle and in what direction does the reflected beam spread?

Task 2

PHYWE

If two plane mirrors enclose an angle of 45°, then the reflection beam runs ... to the original beam.

- centre
- opposite
- horizontal
- vertical

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de

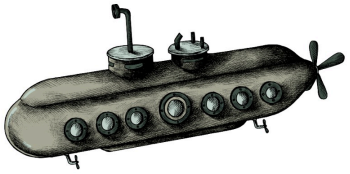
Task 3

PHYWE

In the pictures you will find everyday objects that are based on the principles of the three experiments.

Angle mirror Ex. Surveys

Reflectors Ex. Reflectors



Periscope Ex. periscope submarine

Slide	Score / Total
Slide 15: Reflection beam	0/3

Total 0 / 3

Solutions | Repeat | Export text

PHYWE

Robert-Bosch-Breite 10
37079 Göttingen

Tel.: 0551 604 - 0
Fax: 0551 604 - 107

info@phywe.de
www.phywe.de