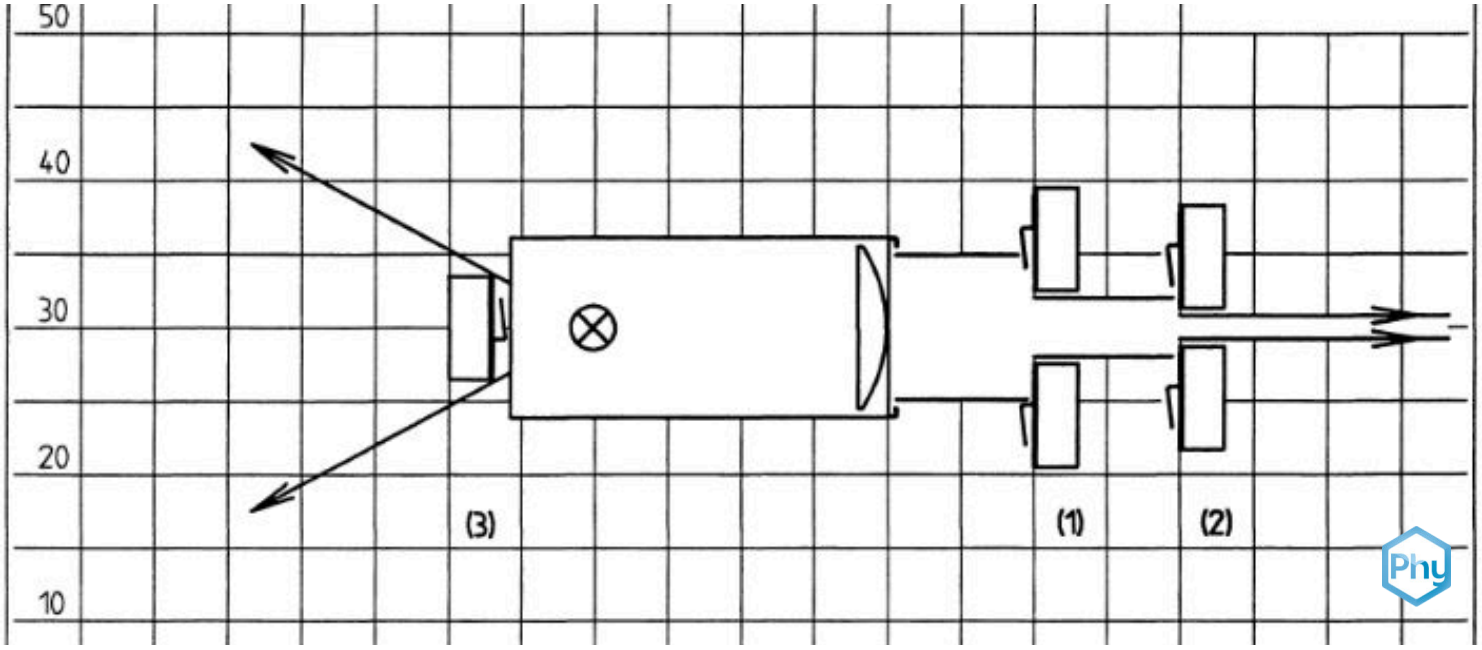
# Rectilinear propagation of light




Physics > Light & Optics > Dispersion 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/6428118a5e30a7000275e9e6

PHYWE

# Teacher information

## Application

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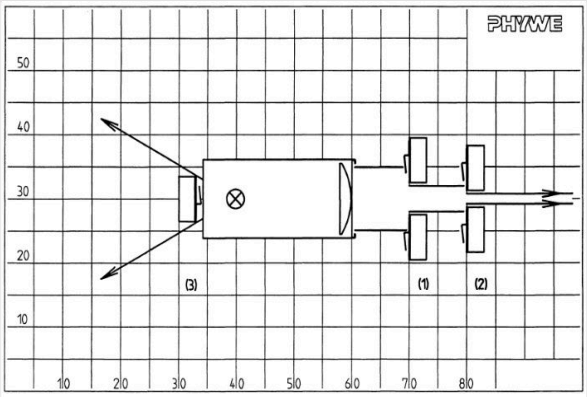


Experimental set-up:

Adhesive luminaire with screens on

Light propagates in a straight line. The direction of propagation of light is indicated by light rays, which are understood as the axes of narrow light bundles.

Scattering light beams are called divergent.

Collecting light beams are called convergent.

A light beam is the model of a light bundle. To draw convergent, divergent or wide parallel light beams, it is generally sufficient to draw the edge rays.



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## Other teacher information (1/2)

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**Prior knowledge**

The students do not need any previous knowledge, the experiment covers the basics of rectilinear light propagation.

**Principle**

Light beams are to be reduced to narrow beams by means of diaphragms. be narrowed to facilitate the abstraction to the concept of light ray. It is to be shown that light propagates in a straight line.

## Other teacher information (2/2)

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**Learning objective**

The students should learn about the basic propagation of light. The aim is to show that a bundle of rays consists of many small straight rays.

**Tasks**

The students should collect observations and findings on the propagation behaviour of light.



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## Safety instructions

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

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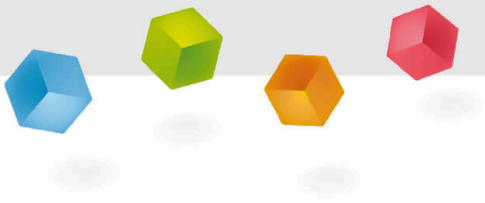

# Student information



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# Motivation

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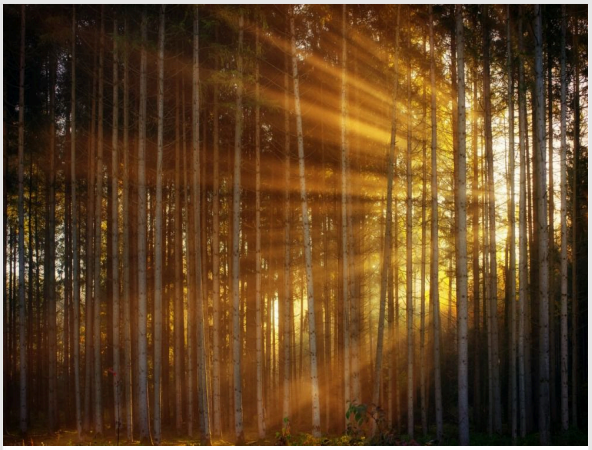

Woodland flooded with sunlight

In the picture on the left, a true natural spectacle has been captured. Surely everyone has had the pleasure of observing the light rays of the evening sun, but have you ever asked yourself how it comes about that light appears in the form of rays under certain conditions?

And what is a beam of light anyway?

This experiment is intended to clarify these and other questions on the subject of light beams.



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# 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,planoconvex, magn.held | 08270-02 | 1 |
| 4 | Concave/convex mirror,magnet held | 08270-12 | 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 |



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## Set-up

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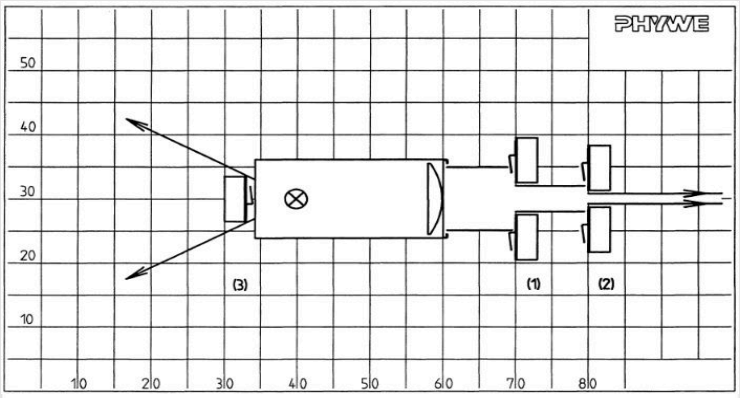


Fig.1

Adhesive luminaire with trim

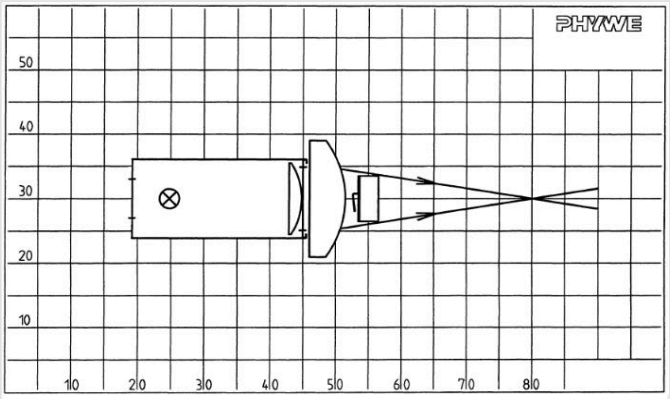


Fig.2

Adhesive luminaire with converging lens and diaphragm

## Procedure (1/2)

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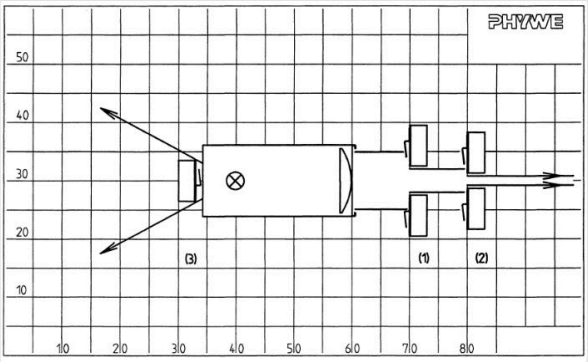


Fig.1

Adhesive luminaire with trim

- Place the adhesive luminaire approximately in the middle of the adhesive panel
- Demonstrate parallel light beam
- Place apertures on both sides of the beam path and move them towards each other until the light beam passing between the apertures is very narrow. (cf. fig. 1)
- Loosen the rear wall covering of the luminaire and expose the light well; demonstrate divergent light beam
- Place an aperture in the divergent light beam (fig. 1, (3)) and move it closer and closer to the adhesive luminaire until the divergent edge beam is reduced.



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## Procedure (2/2)

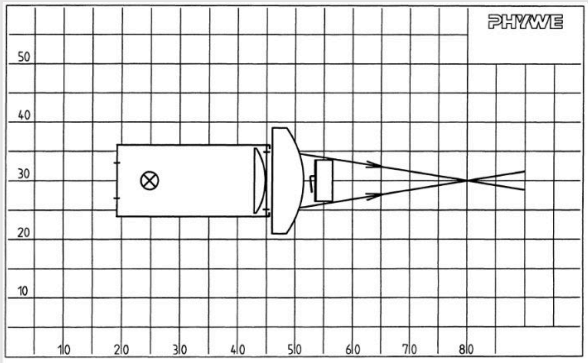


Fig.2

Adhesive luminaire with converging lens and diaphragm

- Close the back cover of the luminaire and place the plano-convex model (converging lens) in front of the luminaire, demonstrate convergent light beam (Fig. 2).
- Place the diaphragm in the convergent light beam and move it until the light beam is reduced to two very narrow edge beams (cf. Fig. 2) (If necessary, use the second diaphragm placed at the focal point to prevent the convergent light beam from changing back into a divergent one).

# Report



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# Task

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Fill in the blanks

Light propagates _____.
The _____ of propagation of light is indicated by _____, which are understood as the axes of narrow light beams.
A light ray is the model of a _____. To draw convergent, divergent or broad parallel light beams, it is generally sufficient to draw the _____.

edge rays
light rays
in a straight line
direction
light beam

Check

| Slide | Score / Total |
|---|---|
| Slide 13: Observation and evaluation | 0/5 |

Total 0 / 5

Solutions Repeat



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