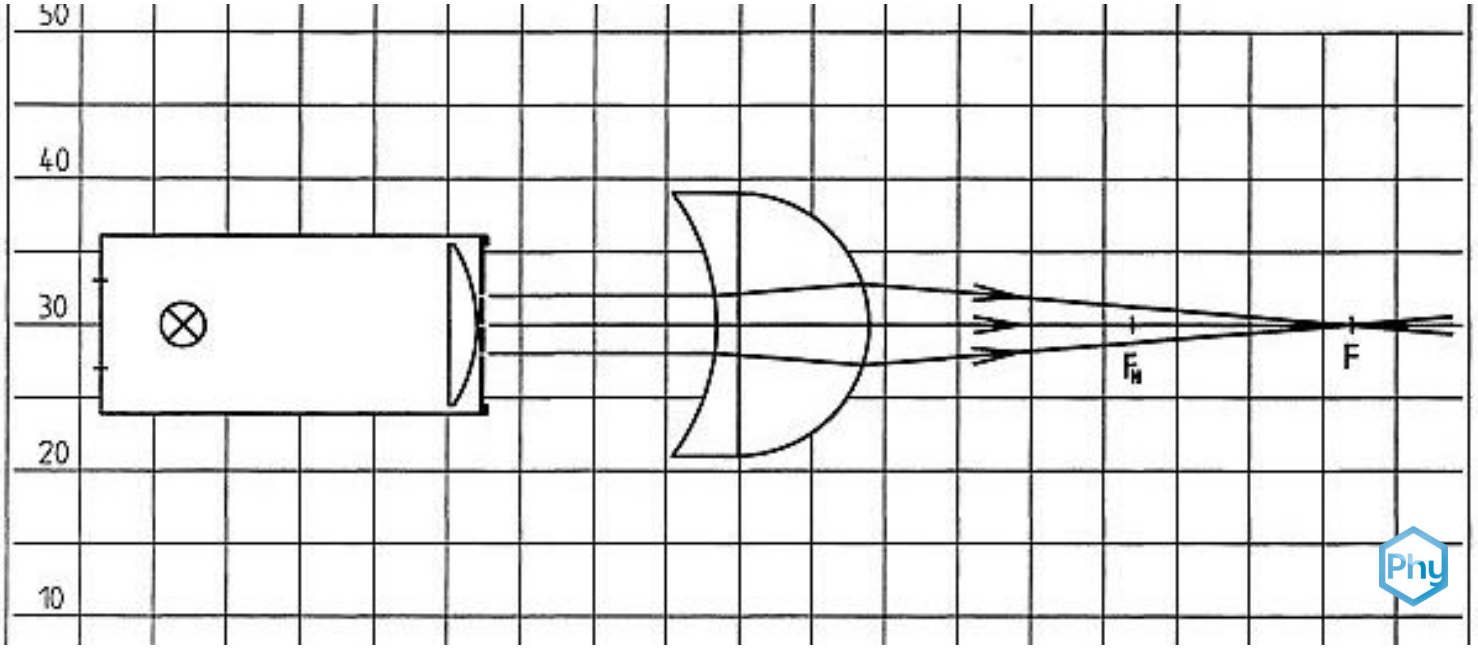
Lens combination consisting of a convergent and a divergentlens



Lens combination of a converging and diverging lens

Physics > Light & Optics > Optical devices & lenses

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/647214f9e1994e000281c776

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Teacher information

Application

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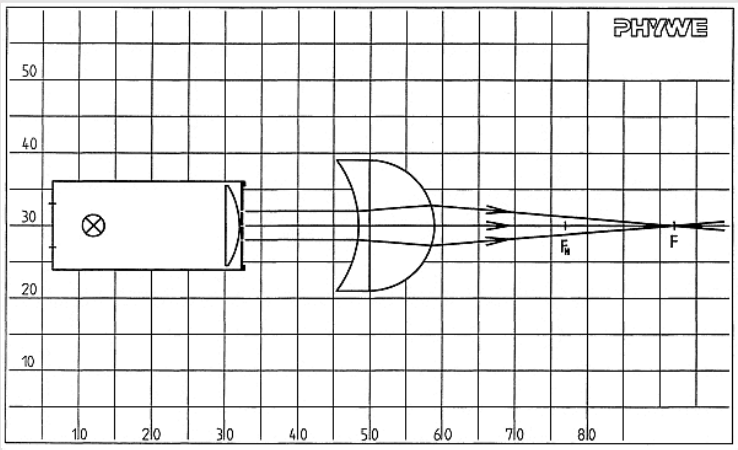

Beam path with converging and diverging lens

In the experiment below, students should observe the construction of a converging and diverging lens in combination and conclude qualitative results.

Depending on the passage of the rays, the lens combination can be used to remove a focal point or to correct the direction of the light rays.

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Other teacher information (1/2)

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Prior knowledge

Students need prior knowledge of converging and diverging lenses, as well as their behaviour under different light beam incidence.

Principle

The focal length of the combination of a converging and a diverging lens is to be investigated (qualitatively).

Other teacher information (2/2)

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Learning objective

Students should develop a sound knowledge of image construction.

Tasks

The students should observe the experiment and learn which concepts and properties are of high importance for the construction of the image.

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Additional teacher information

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Note

This experiment is also suitable for quantitative investigations, whereby the thickness of the lenses must be taken into account.

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

Motivation

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Camera with lens

A camera is a highly complex assembly of many individual parts. Different types of lenses help with imaging, zoom and focus.

Thus, not only converging lenses but also converging and diverging lenses meet in cameras.

The underlying experiment is intended to explain how a combination of these two different types of lenses works.

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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	Optical block, semicircular, magnet held	08270-01	1
4	Opt. block,planoconvex, magn.held	08270-02	1
5	Opt. block,planoconcave,magn.held	08270-03	1
6	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
7	G-clamp	02014-01	2

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Set-up and Procedure (1/2)

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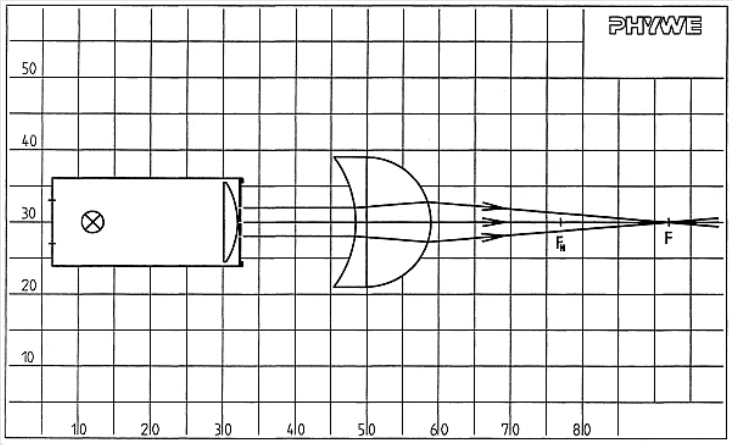
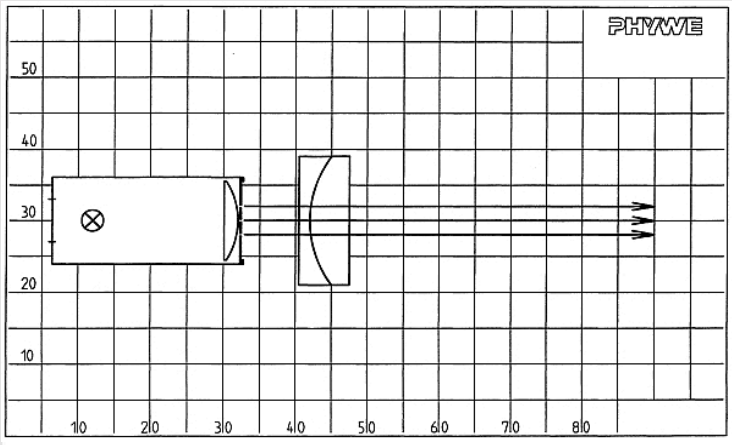


3-slit aperture on scatter-gather lens combination

- Set optical axis on the adhesive panel
- Position the luminaire with the 3-slit aperture so that the centre beam runs along the optical axis.
- Place model body semicircle on optical axis and adjust; mark focal point FH
- Adjust model body plano-concave lens in front of luminaire on optical axis and move towards converging lens until both lenses touch; mark focal point of combination F.

Set-up and Procedure (2/2)

PHYWE



3-slit aperture on collective diffusion lens combination

- Repeat the process with a plano-convex and the plano-concave model body in a similar way.
- Carry out the procedure until the end position of the lens bodies shown in the illustration is reached.

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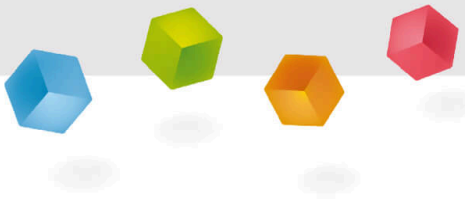

Report

Task 1

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Put the correct words into the gaps!

The _____ of a converging-diffusing combination is _____ than that of a converging lens alone. Furthermore, it is _____ on the distance between the _____ and is greatest when both lenses are _____.

- next to each other
- lenses
- larger
- dependent
- focal length

Check

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Task 2

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A combination of collecting and diffusing lens always acts like a plane-parallel prism

○ True ○ False

Check

The focal length depends strongly on the distance between the lenses.

○ True ○ False

Check

Slide	Score / Total
Slide 13: Collection Dispersing Combination Lens	0/5
Slide 14: Multiple tasks	0/2

Total 0 / 7

Solutions Repeat

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