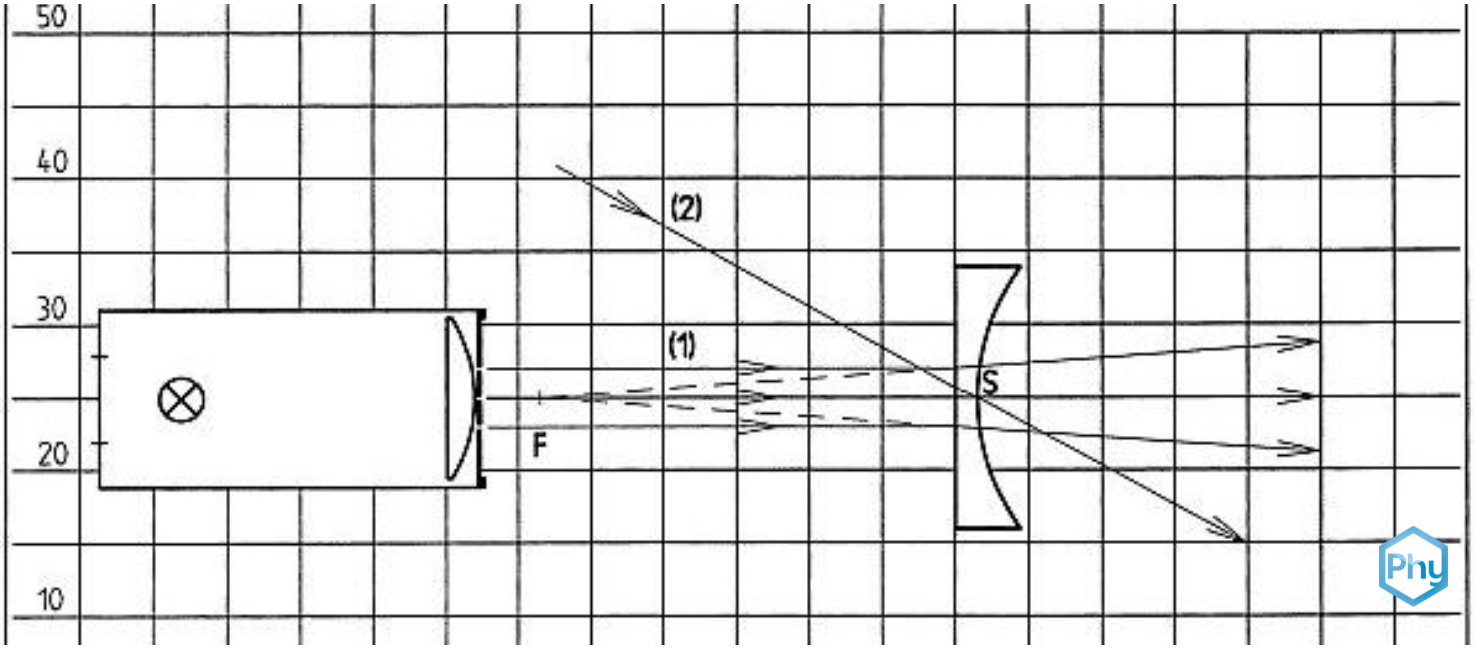
Properties of a divergent lens. OT 4.7



Properties of a 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/64721213e1994e000281c762

PHYWE

Teacher information

Application

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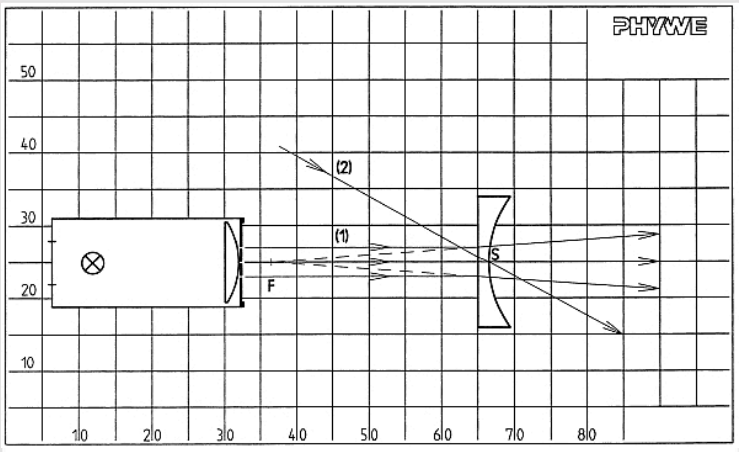

Experimental set-up:

Beam path with a diverging lens

The experiment below is designed to introduce students to the functions of a diverging lens.

The diverging lens breaks apart both divergent and parallel light. This creates a focal point on the object side of the lens, which can be used to construct the scattering.

The diverging lens works in reverse to the converging lens.

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Other teacher information (1/2)

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Prior knowledge

Students need prior theoretical knowledge about the straight-line, ray-shaped propagation of light. They should have gained experience about light refraction and refractive indices.

Principle

The properties of a diverging lens are to be determined; for this purpose, essential terms are to be introduced and the courses of light rays particularly suitable for image constructions are to be demonstrated.

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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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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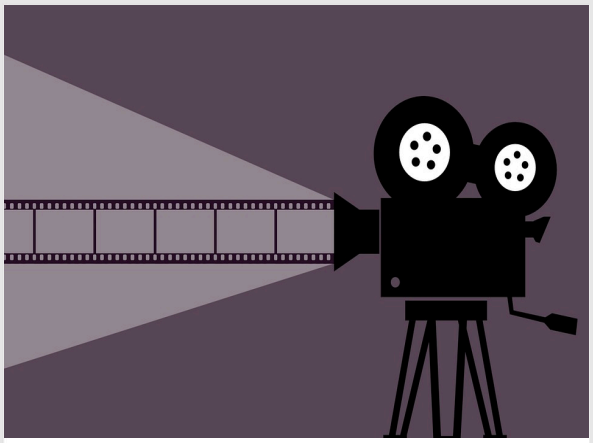
Motivation



Film projector

A film projector has only a few uses these days. Often it can only be found in cinemas with a traditional background.

Nowadays, such a projector is often replaced by a beamer. However, the optical technology behind these devices is based on the same principles.

With both devices, the image to be projected onto the screen is generated in small format in the device and projected onto a large screen with the aid of a diverging lens.

The underlying experiment is intended to explain the functions of such a diverging lens.

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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,planoconcave,magn.held	08270-03	1
4	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
5	G-clamp	02014-01	2

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Set-up and Procedure (1/2)

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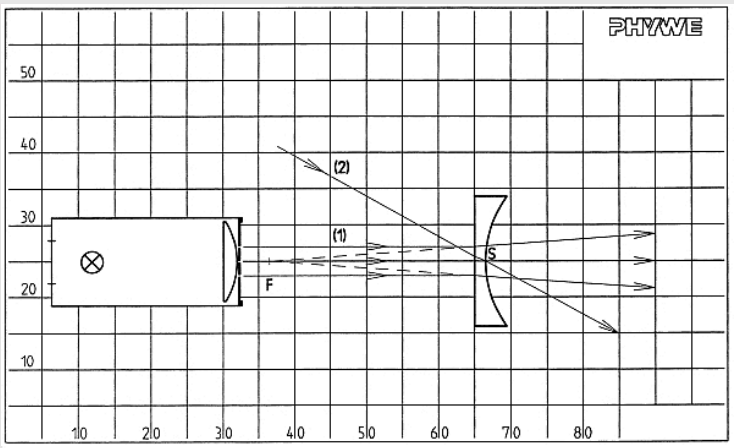

3-slit diaphragm directed towards diverging lens

- Set optical axis on adhesive panel
- Place the model body on the optical axis
- Position luminaire with 3-slit aperture so that the centre beam runs along the optical axis; readjust lens model if necessary.
- Determine apparent focal point F by backward extensions of the refracted rays to the optical axis; enter F

Set-up and Procedure (2/2)

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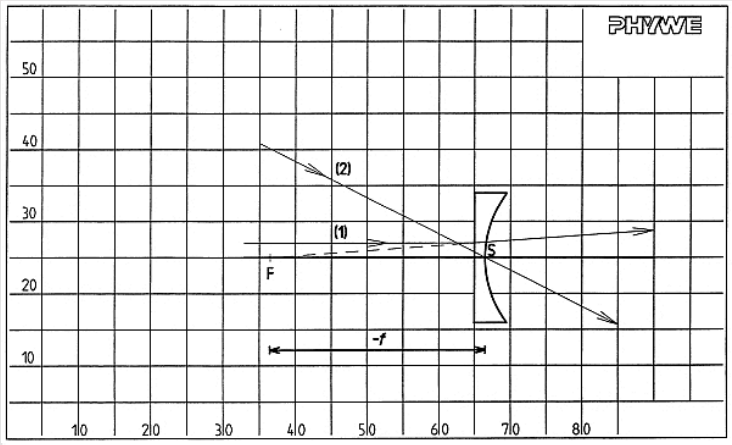

Sketched beam paths from different angles

- Use a 1-slit diaphragm and let the light beam fall obliquely to the optical axis so that it passes through the vertex S of the lens.
- Trace ray trajectories as far as possible in each case
- Sketch the outline of the lens and draw the vertex S.
- Remove luminaire and lens
- Complete ray trajectories; -f indicate
- Measure f

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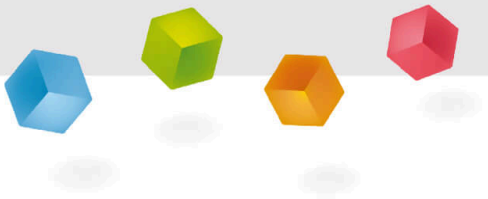

Report

Task 1

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Put the correct words into the gaps!

Rays incident ____ to the optical axis are ____ as they ____ through the diverging lens such that the refracted ____ appear to ____ from a ____ on the optical axis.

parallel
pass
refracted
emerge
rays
point F

Check

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Task 2

PHYWE

Rays passing through the apex of the lens change direction after passing through the lens.

○ True ○ False

Check

The rays passing through the vertex are more offset the more oblique their incidence.

○ True ○ False

Check

Task 3

PHYWE

The measured distance of the virtual focal point F to the vertex of the lens S is...

600mm.

150mm.

300mm.

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Slide	Score / Total
Slide 12: Refraction of the rays	0/6
Slide 13: Multiple tasks	0/2
Slide 14: Distance focal point and vertex	0/4

Total 0 / 12

Solutions Repeat

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