Image obtained with a convex lens

Task and equipment

Information for teachers

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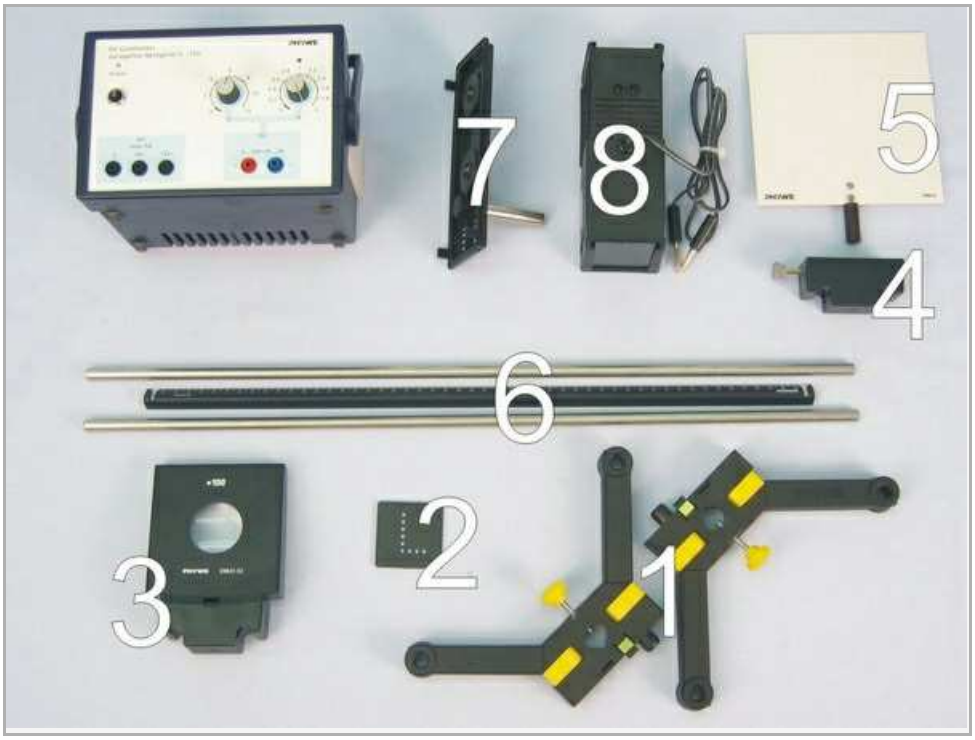
Task

Equipment



Position No.	Material	Order No.	Quantity
1	Support base, variable	02001-00	1
2	Object -L-, glass bead	11609-00	1
3	Lens on slide mount, f=+100mm	09820-02	1
4	Slide mount for optical bench	09822-00	1
5	Screen, white, 150x150mm	09826-00	1
6	Support rod, stainless steel, l = 600 mm, d = 10 mm	02037-00	2
6	Meter scale for optical bench	09800-00	1
7	Bottom with stem for light box	09802-10	1
8	Light box, halogen 12V/20 W	09801-00	1
	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1

Set-up and procedure

Set-up

Using the two support rods and the variable support base assemble the optical bench and place the scale for the optical bench against the front support rod.

Fig. 1

Fig. 2

Place the bottom with stem under the light box.

Fig. 3

Fig. 4

Clamp it in the left part of the support base so that the lens end points away from the optical bench.

Fig. 5

Insert an opaque cover in front of the lens and the cover with the glass-bead-L into the slot at the other side of the light box.

Fig. 6

Complete the setup by mounting the lens and screen according to the figure 7.

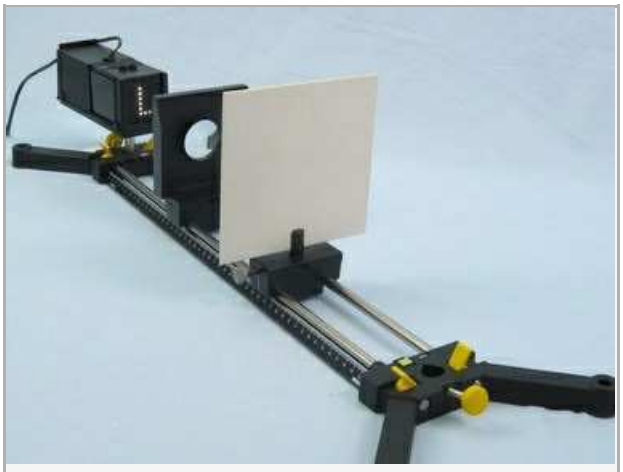


Fig. 7

Procedure

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

Fig. 8

Set the distance between the lens and the glass-bead-L (the object distance g) so that $g > 2f$.
The move the screen until the -L- is sharply focused.

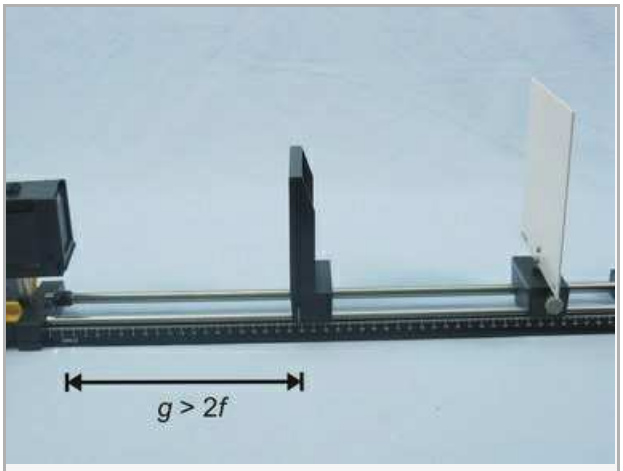


Fig. 9

Measure the image distance b and compare it with the focal length f; observe the image. Record your values in table 1 in the report.
To characterise the three major properties of the image use the words: "upright" or "inverted"; "enlarged", "reduced" or "same size"; "real" or "virtual".

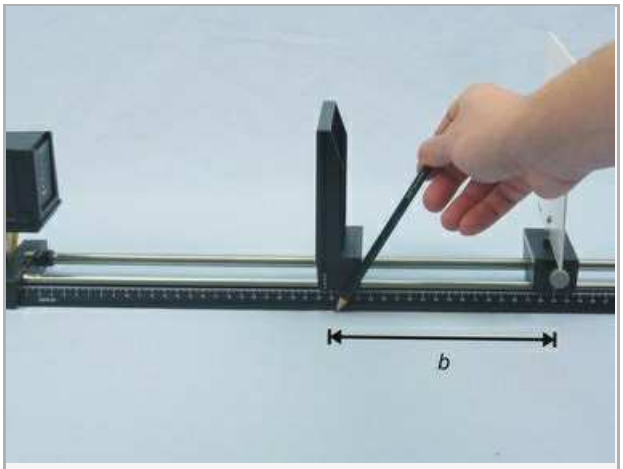


Fig. 10

Perform the same steps for the other cases listed on the task page and note your results in table 1 in the report.
Switch off the power supply.

Report: Image obtained with a convex lens

Result – Table 1

Note down your observations in table.

Object distance	Image distance	Properties of the image		
g > 2f	2f > b > f	1	1	1
g = 2f	$\frac{1}{\pm 0}$	inverted	1	1
2f > g > f	$\frac{1}{\pm 0}$	1	enlarged	1
g < f	negative	1	1	virtual

Evaluation – Question 1

Under what conditions is the real image formed by a convex lens?

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Evaluation – Question 2

Under what conditions is a virtual image always formed by a convex lens?

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Evaluation – Question 3

What happens when the object is located at the focal length of the convex lens ($g = f$)?

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Evaluation – Question 4

What can you say about the images formed by a convex lens which a piece (for example, the lower haft) is the broken off?

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Evaluation – Question 5

There is a simple optical device which one often uses when one desires to examine small objects or see details of a large object. Surely you have used this device.

- What is it called?
- Give several examples for its use.

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