Basic Optics Ray Table

OS-8465A

Introduction

The Basic Optics Ray Table is designed to be used with the Basic Optics Light Source (OS-8470). When light from the Light Source is directed into the included D-shaped lens, students can use the Ray Table to measure angles of incidence, refraction, and reflection. You can also use the Ray Table with other components, such as a plane mirror or the polarizer found in products such as the Basic Optics System (OS-8515D).

You can change the angle of incidence by rotating the upper half of the ray table. The non-skid feet will keep the base firmly in place while the upper half rotates. Pencil marks can easily be made and erased on the table's white surface, allowing you to temporarily mark angles and directly trace rays on the surface.

Components





1 Basic Optics Ray Table

2 D-shaped lens

Required equipment:

• Basic Optics Light Source (OS-8470)

Recommended equipment:

- Plane mirror
- Polarizer, as found in the Basic Optics System (OS-8515D) or the Polarizer Set (OS-8473)

Setup with D-shaped lens

The following steps outline a simple procedure for measuring angles of refraction and reflection using the provided D-shaped lens.

- 1. Set up the Basic Optics Light Source (OS-8470) to project a single ray of light. For more information on this, see the manual for the Light Source.
- 2. Position the Light Source against the rectangular tab on the Ray Table, so that the ray from the Light Source crosses directly over the center of the Ray Table.
- 3. Rotate the Ray Table until one of the 0° marks aligns with the incident ray, as shown in Figure 1.



Figure 1: Aligning the Light Source with the Ray Table.

- 4. Place the D-shaped lens over the lens outline on the ray table. In this position, the flat surface of the lens is aligned with the "COMPONENT" line on the table and the lens's curved surface is concentric with the table.
- 5. Rotate the table to change the angle of incidence. Observe how the angles of the refracted and reflected rays change as you do so. If you look down through the lens, you can observe that the rays are only refracted at the flat surface and do not refract at the curved surface, as shown below.



Setup with mirror

Use the same setup as described in the **Setup with D-shaped lens**, but replace the lens with a plane mirror. Position the mirror so its reflective surface lines up with the table's **COMPONENT** line, as shown below.



Using a polarizer

A polarizer can be placed in the path of the beam from the Light Source to polarize the light, altering the behavior of the ray upon striking the D-shaped lens. The rectangular tab on the Ray Table contains a slot which is designed to hold the type of polarizer found in the Polarizer Set (OS-8473) or the Basic Optics System (OS-8515D), as shown below.



The polarizer can be inserted into the slot in the tab in four possible orientations, with the **0**, **90**, **180**, or **270** degree marker on top. The structure of the polarizer prevents it from rotating too far from these four orientations. When light passes through the polarizer while it is in the 0° or 180° orientations, the reflected and refracted rays will not appear to be significantly affected. However, when the polarizer is in the 90° or 270° orientations, the reflected ray will become much fainter or disappear entirely. This is due to the fact that light becomes partially polarized parallel to the reflecting surface. When the polarizer is in the 90° or 270° positions, the light is polarized at an angle perpendicular to the angle of polarization from the reflection, preventing much of the light from being reflected. For this reason, the Ray Table, lens, and polarizer can be used in experiments to determine Brewster's angle for the lens.

Experiment files

Download one of several student-ready activities from the PASCO Experiment Library. Experiments include editable student handouts and teacher notes. Visit <u>pasco.com/freelabs/OS-8465A</u>.

Technical support

Need more help? Our knowledgeable and friendly Technical Support staff is ready to answer your questions or walk you through any issues.

□ Chat	pasco.com
Shone Phone	1-800-772-8700 x1004 (USA) +1 916 462 8384 (outside USA)
⊠ Email	support@pasco.com

Limited warranty

For a description of the product warranty, see the Warranty and Returns page at www.pasco.com/legal.

Copyright

This document is copyrighted with all rights reserved. Permission is granted to nonprofit educational institutions for reproduction of any part of this manual, providing the reproductions are used only in their laboratories and classrooms, and are not sold for profit. Reproduction under any other circumstances, without the written consent of PASCO scientific, is prohibited.

Trademarks

PASCO and PASCO scientific are trademarks or registered trademarks of PASCO scientific, in the United States and in other countries. All other brands, products, or service names are or may be trademarks or service marks of, and are used to identify, products or services of, their respective owners. For more information visit <u>www.pasco.com/legal</u>.