

The **ScienceMath**-project: **Refraction and Concept of Variable**
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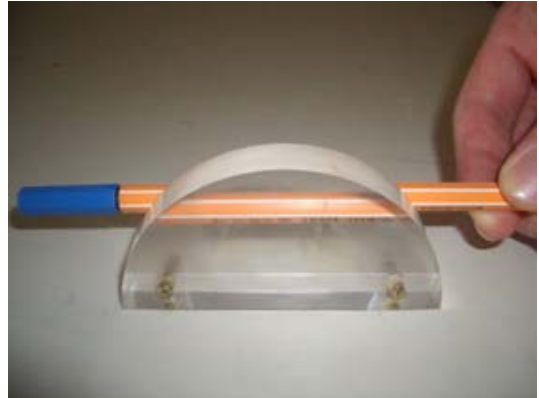
Teaching Material

Worksheet (see next pages)

worksheet

refraction

Put a pen behind the glass top in such a way that the ends of the pens aren't behind. Look at the pen (at best slanted from above). What happens to the pen, if it is behind glass? Isn't glass transparent?



Discuss in your group

On the table you see:

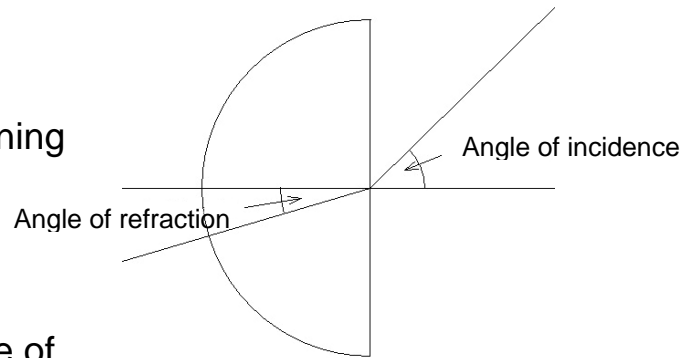
- A lamp with a small opening
- A glass top
- A scale to measure angles
- A mains receiver

Have a closer look at these materials before you turn to the next page

To the experiment:

- Put the glass top on the scale. Set the mains receiver to **6 Volt**. Aim the lamp to the glass top. The light beam should go through the middle of the scale. What do you notice?
 Is there a relationship to what you have seen with the pen through the glass top?

- Change the angle of incidence by turning the scale. What do you notice?



The angle of incidence is the angle between the orthogonal to the surface of the glass top and the incoming light beam.

Now we examine this phenomenon with concrete measuring values.

- Measure the angle of incidence and the corresponding angle of refraction. Measure 6 angles at least. Take care, that the angles of incidence are below 30°

- Look at the pairs of measuring values that are upside down. Use the back of this page and “play” with these pairs.
 Do you find a relationship for all these pairs? Which?
 Describe in complete sentences.

Look at picture on the right.

The same phenomenon can be seen with water. Is your formula you found in task no.5 still valid or not? Explain.

If not, what would be different in your formula?



9. A friend in your class has been sick and has never seen such a formula. How would you explain that formula? Write your explanation down.

10. Write a protocol, which contains all important facts of this experiment.

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Protocol

Write down all important results of the experiment. Highlight the most important results. It will be easier to present your experiment, if you do so.

What have you learned?