

INTERACTIVE METHOD - ONE OF THE MOST POPULAR TYPES OF TODAY'S PEDAGOGICAL TECHNOLOGIES

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ABSTRACT

This article plays an important role in conducting virtual laboratory work on distance learning platforms from scientific advances, in particular PhET Interactive Simulations, at the time when modern innovative technologies are evolving. This program allows students to create a real laboratory environment in front of their eyes by creating models that virtually combine images, diagrams, animations, quantitative instruments.

Keywords: Pedagogical technologies, interactive method, laboratory, PhET.

INTRODUCTION

Interactive techniques are joint activity of the student and the teacher, which mainly motivates students to think. Teaches to come to the necessary conclusions, analyze and apply them in practice. The main task of the teacher here is to show the students the way, give directions, say the most correct conclusion.

Interactive methods, again, are of the same importance, the teacher never sharply refutes the student's opinion, only in time will tell the right conclusion, as a result of which the student himself will understand the error. And this prevents them from falling into depression, from thinking, from stopping. Interactive techniques are based on mutual respect between the student and the teacher.

PhET Interactive simulations (in the next place - sims) was founded on the project of PhET interactive simulations by Karl Wiman, professor of the University of Colorado - Boulard, Nobel Prize laureate. PhET interactive simulation project at the University of Colorado – Boulard creates free interactive mathematical and scientific simulations. PhET is a software resource created in 2002 year, it was originally modeled on the computer in the process of teaching physics. The program is designed to create a vivid model of various physical processes through the use of virtual equipment, tools and weapons as visual materials. This program contains 158 simulations, which are translated into 93 different languages, including many simulations into Uzbek, too.

Materials and methods

In addition, among the increasing and increasing popularity of sims in Chemistry, Biology, Mathematics and a number of other disciplines at present, the use of PhET software in carrying out complex and large-scale research is being used in practice (PhET Team, 2009).

PhET sims provide users with easy and convenient management, dynamic thinking and a high level of interactivity from the point of view of multiple shows (Adams, 2008a; Adams, 2008b).

Teachers who have conducted experiments within the framework of PhET sims have seen that it is easy and clear how their students work with PhET sims, solving the problem they need to know.

In simple cases, that is, a student who has listened to one or two lectures without the use of PhET sims, after reading the relevant section in the textbook, thinks of each issue (phenomenon) as it seemed to him, without creating a rational imagination (simulation) or without a complete understanding of events and phenomena.

Many teachers deliver several equipment (batteries, lamps, magnets, compasses and wires) to students and tell them how to perform a particular task. In this kind of work, students quickly get lost, get confused without directions, go in the direction of wrong thinking and do not get the necessary knowledge for themselves (Mayer, 2004).

There is a lot of evidence that PhET interactive simulations can be a powerful tool for students to achieve in-depth learning of subjects. In particular, studies conducted using PhET interactive simulations found that students form a concerted understanding of science, that teachers use strictly guided activities do not impede students' deep thinking and learning.

Recent studies have shown that proper construction of the material is necessary to help students in creating a scientific basis about conceptions. Then the students formulate and improve the concepts in this framework. Our work is to increase the effectiveness of how students use simulations in constructing these models.

In this research work, a brief discussion will be made on instructional theories on how to effectively create different ways of conveying knowledge and attracting students.

Relevance and justification of the topic: application of the PhET program in the laboratory work of physical science. Improve and improve the quality of modern education through the application of PhET program models.

Theoretical significance: in the study of theories, the student first perceives the material. In this student gets acquainted with the content of education, understands the tasks that he/she needs to know, intuition, perception and imagination are involved in this process. In the second place, he understands the teaching material, knows and summarizes its contents. This acquires new knowledge by thinking, discussing, comparing and drawing conclusions.

Studies on reading indicate that students need a framework of basic ideas for the formation of knowledge (Bransford, 2004). In other words, learning is an active process in which students will have the ability to feel active.

Interactive simulations encourage learners to identify what type and what information is needed to solve the task.

Practical significance: in the process of using PhET interactive simulators, students apply their theoretical knowledge to life even if it is virtual. This makes students more interested in reading and research, and ultimately leads to the creation of industry news and discoveries, while also making students directly involved in research work.

Application of PhET interactive simulation project models in the processes of teaching physics (optics).

Optics is a branch of physics that studies the issues of the interaction of light with matter, the nature of light, taking into account the phenomena of propagation of electromagnetic waves, which consist of ultraviolet and infrared radiation, capable of transmitting light through the human eye, having a certain specific spectral range (380 nm to 770 nm), and which is not visible. According to the history and development of optics in the XXI century, the optics department of physics is studied as classical optics and modern optics.

Results and analysis

In the study of classical optics, we study it in two ways. This is geometric optics and physical optics.

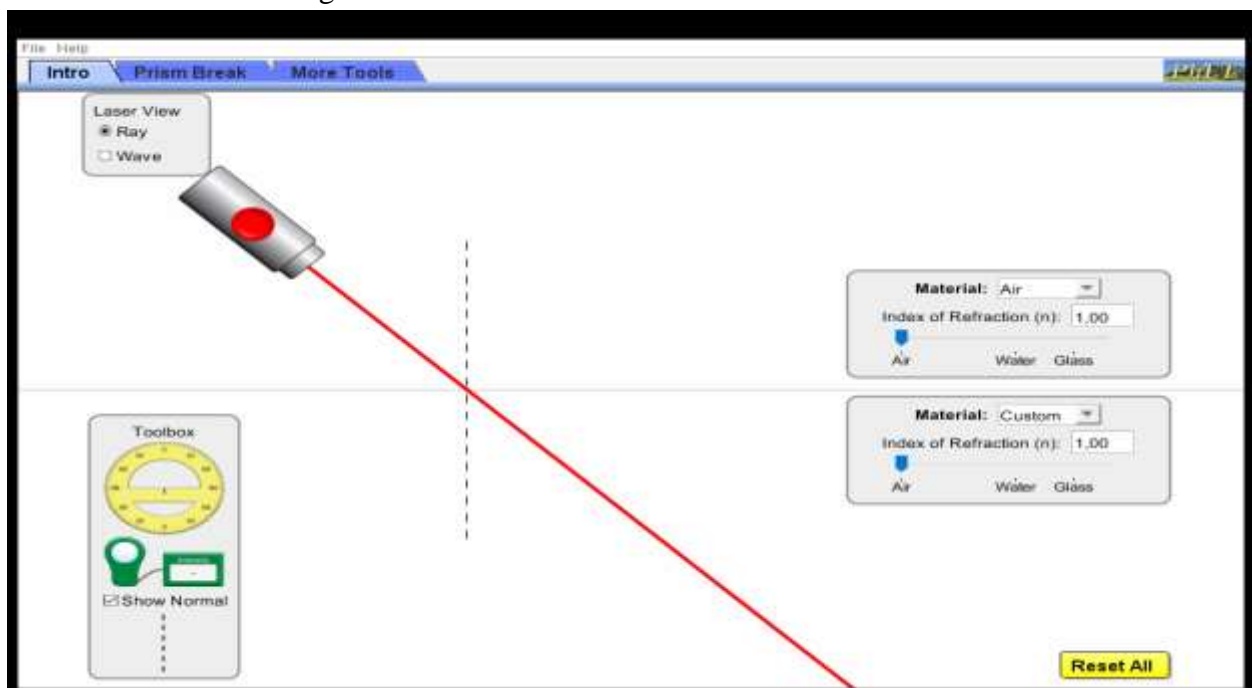
Geometrical optics

Geometrical optics is basically a step 1: light is a light that radiates in a transparent environment along a straight line, as well as through the concepts of a line that carries the energy of light along with itself, studies the laws of the propagation of light rays.

Step 2: if the light passes from one environment to another environment, the return of the light from the separation boundary of the two environments to the first environment is called the return of the light. This teaches the mistress through the law of return of light.

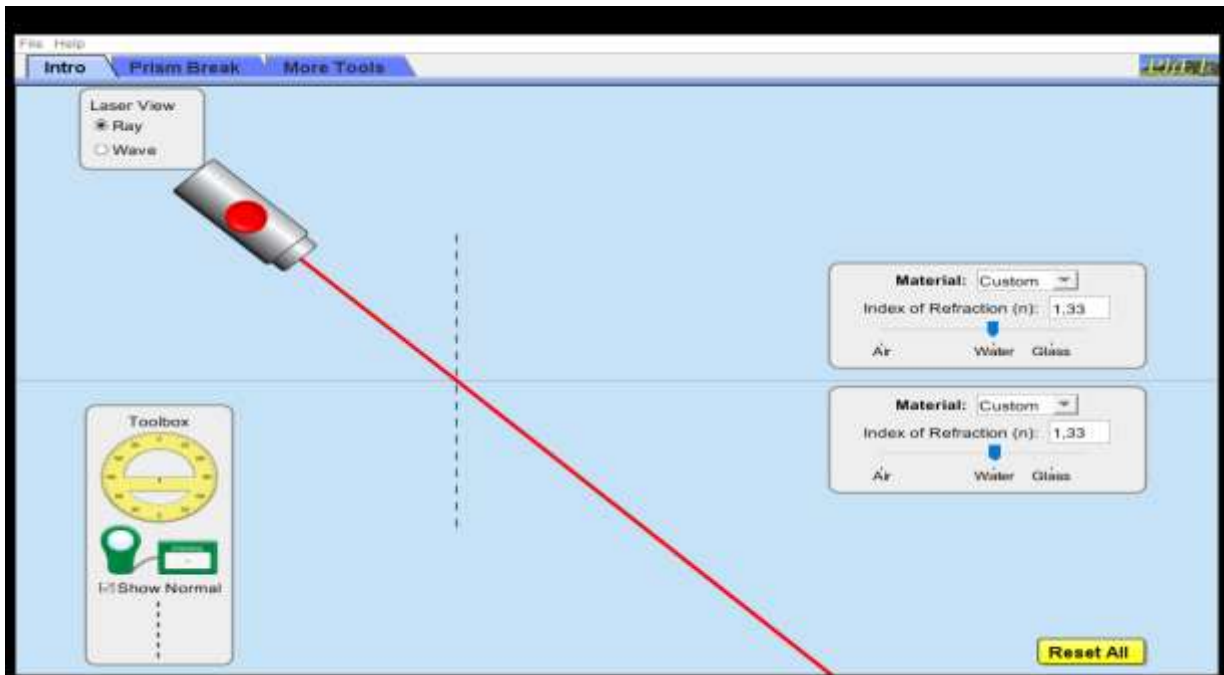
Step 3: the transition of light from one transparent environment to another transparent environment, and the change of its propagation direction in this transition is called refraction of light.

Step 4: explain the rules of making images in different optical systems (lenses, prisms, etc.) and teach the solution by doing its task. Geometrical optics: light that spreads in a transparent environment over a straight line.



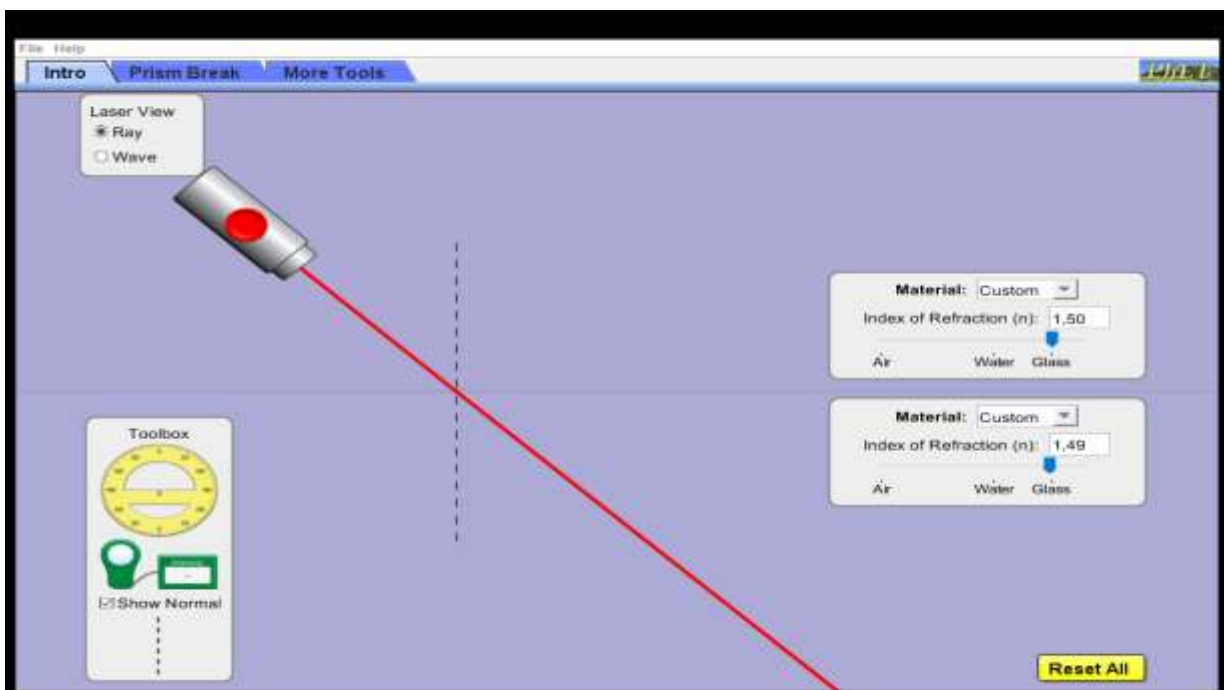
Picture 1.

In picture 1, the light beam of light passes from the 1- ambient air to the 2 - ambient air. In this case, the light beam spreads along a straight line.



Picture 2

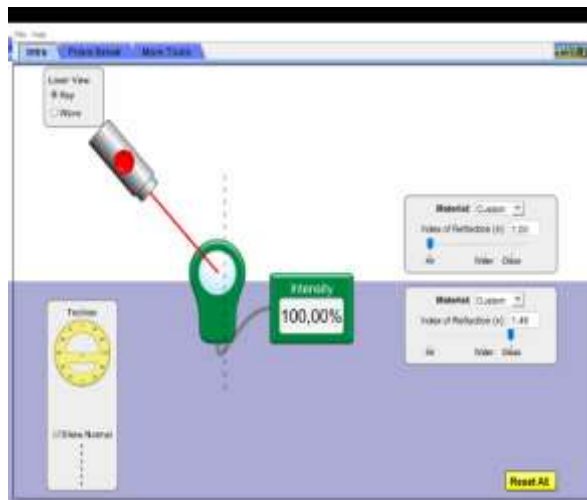
In picture 2, the light beam of light spreads along a straight line from 1 – environment water to 2 – environment water (from water to water).



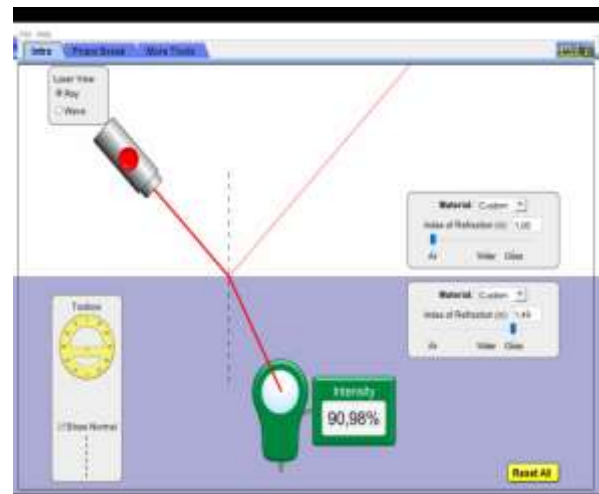
Picture 3

In the picture 3, the light beam 1-the environment is moving from the bottle to the bottle 2-the environment.

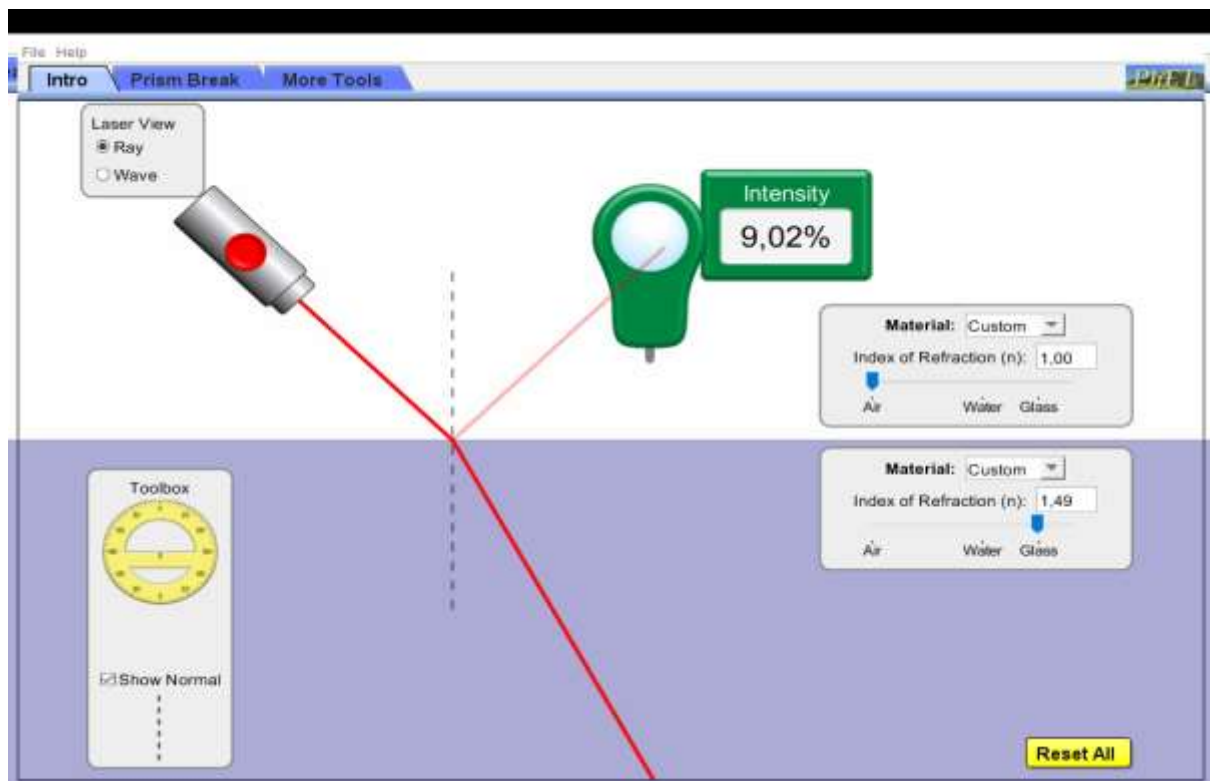
The spread on a straight line is clearly visible from the picture 3-when the light passes through the glass to the glass.



Picture 4

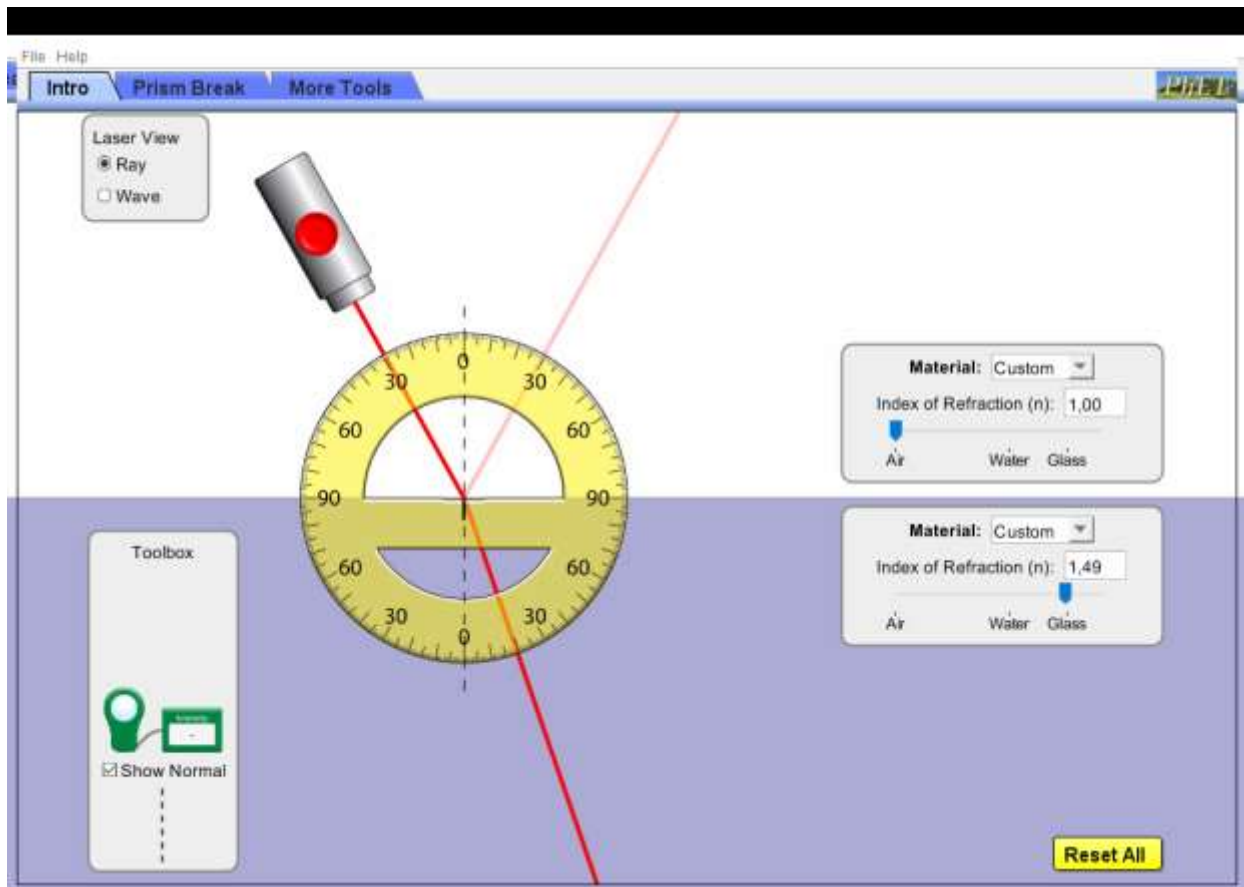


Picture 5



Picture 6

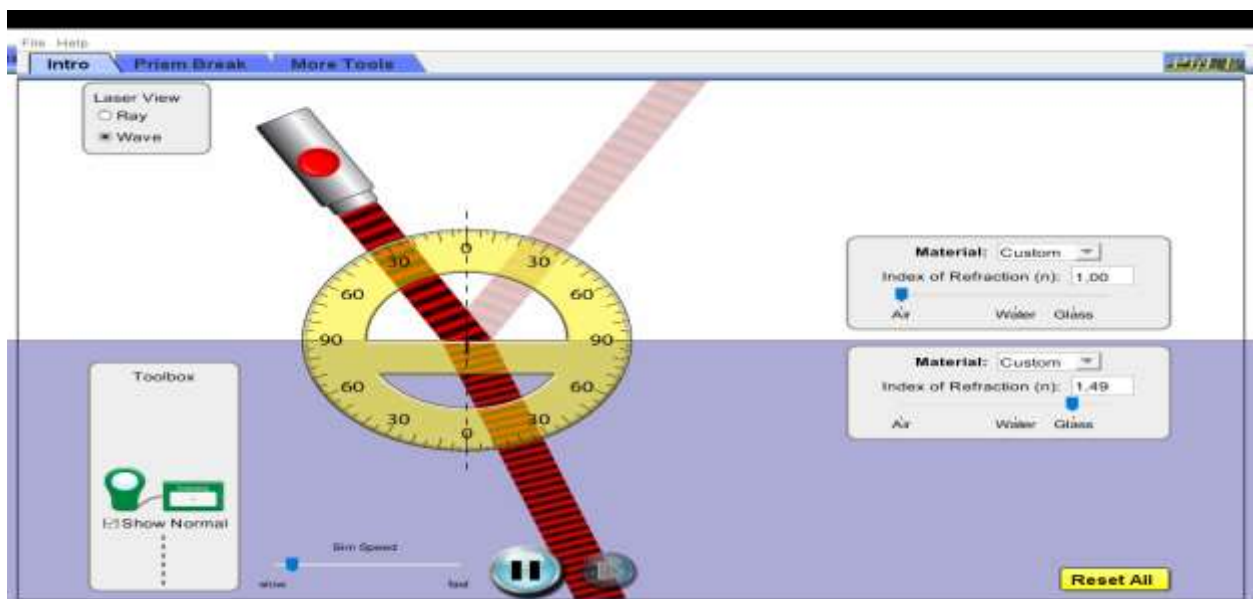
Geometrical optics studies the laws of light propagation phenomena through teeth, which together with the light itself is a line that carries light energy. (4 – 5 - 6 – pictures)



Picture 7

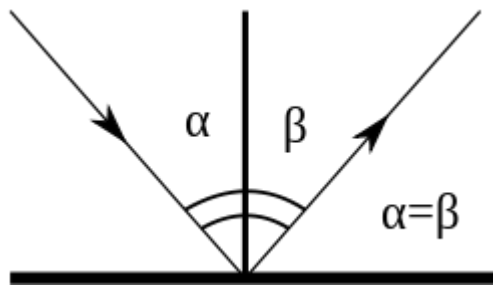
The law of return of light (picture 7)

1. The falling light lies in a perpendicular plane, which is transferred from the point of falling of the rotating light and light to the boundary of the two mediums.
2. The angle of inclination of the beam is equal to the angle of rotation.



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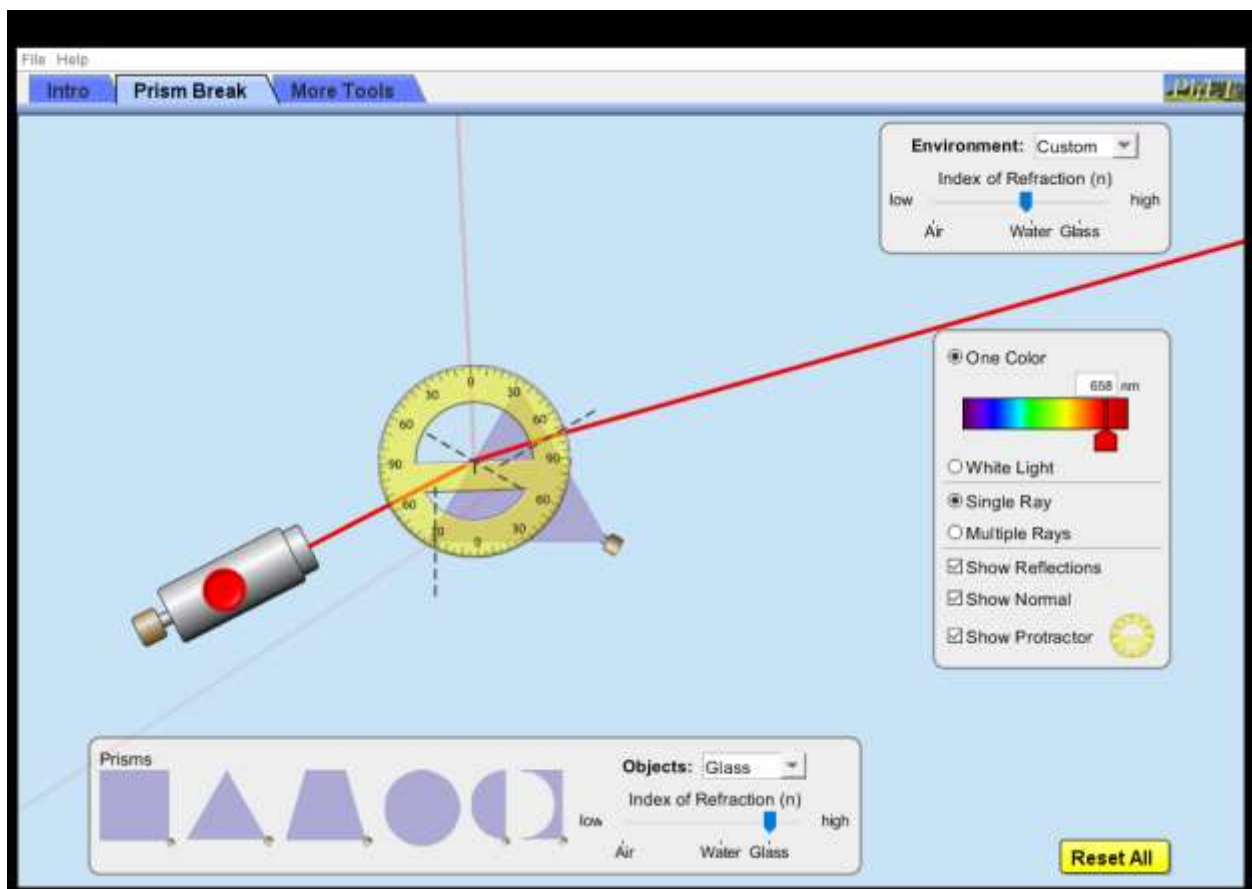
Simple empirical laws, which form the basis of geometrical optics, the PhET program is able to demonstrate brilliantly in its models. (Picture 8) below is a drawing of the law of Return of light through a drawing in the traditional style.



The law of return of light

1. The falling light lies in a perpendicular plane, which is transferred from the point of falling of the rotating light and light to the boundary of the two mediums.

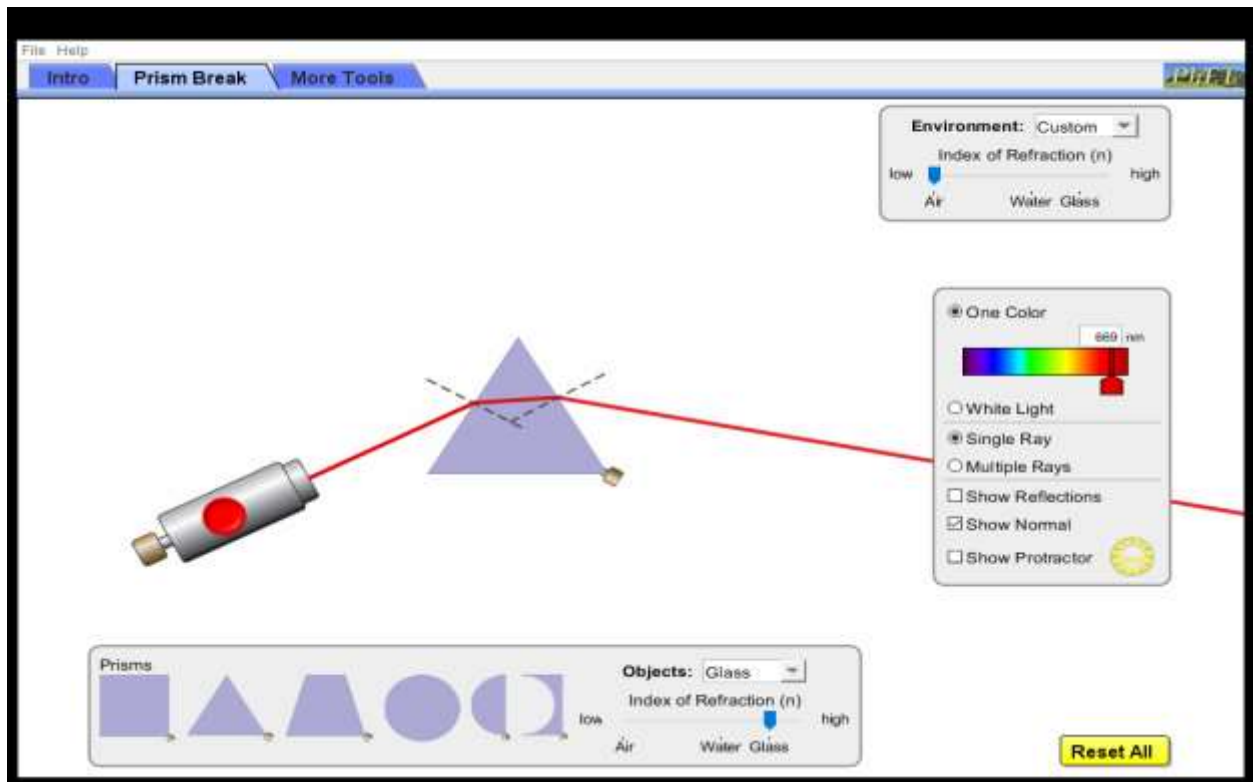
2. The angle of inclination of the beam is equal to the angle of rotation.



Picture 9

When the red light is directed to the prism of the glass, the return beam of the light beam is observed and the rotating beam is depicted in pink. The angle of Return is equal to 600. (Picture 9)

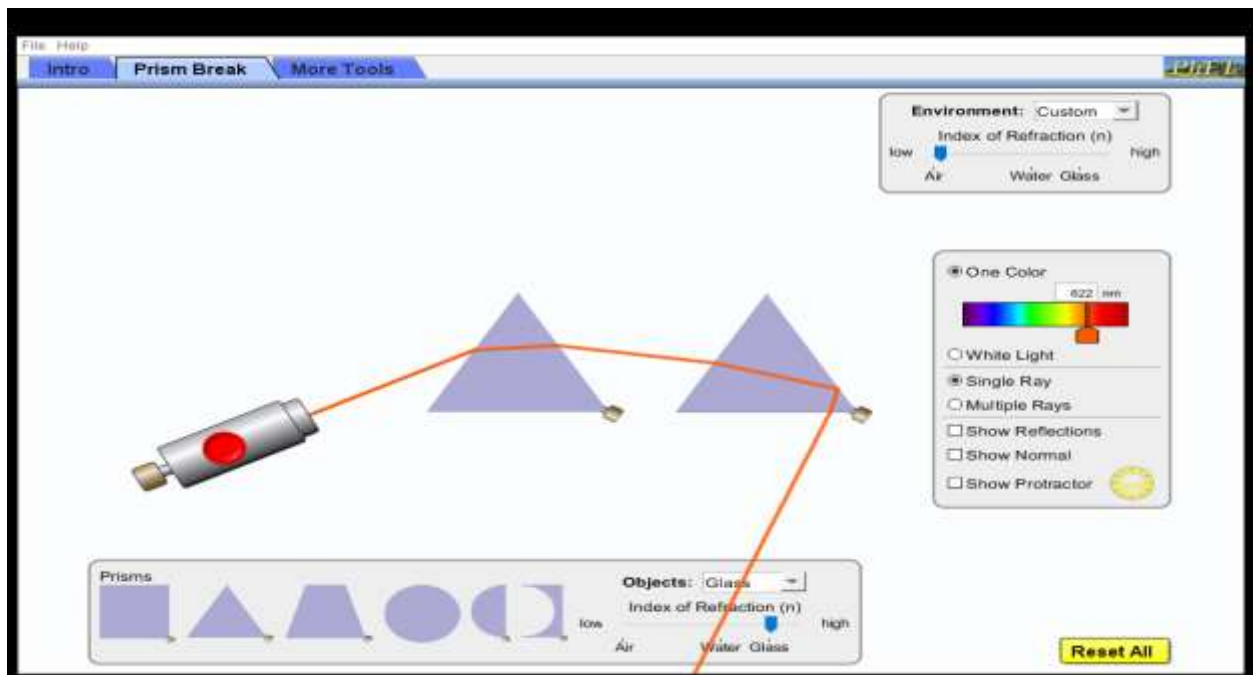
Simple empirical laws, which form the basis of geometrical optics, the PhET program is able to demonstrate brilliantly in its models.



Picture 10

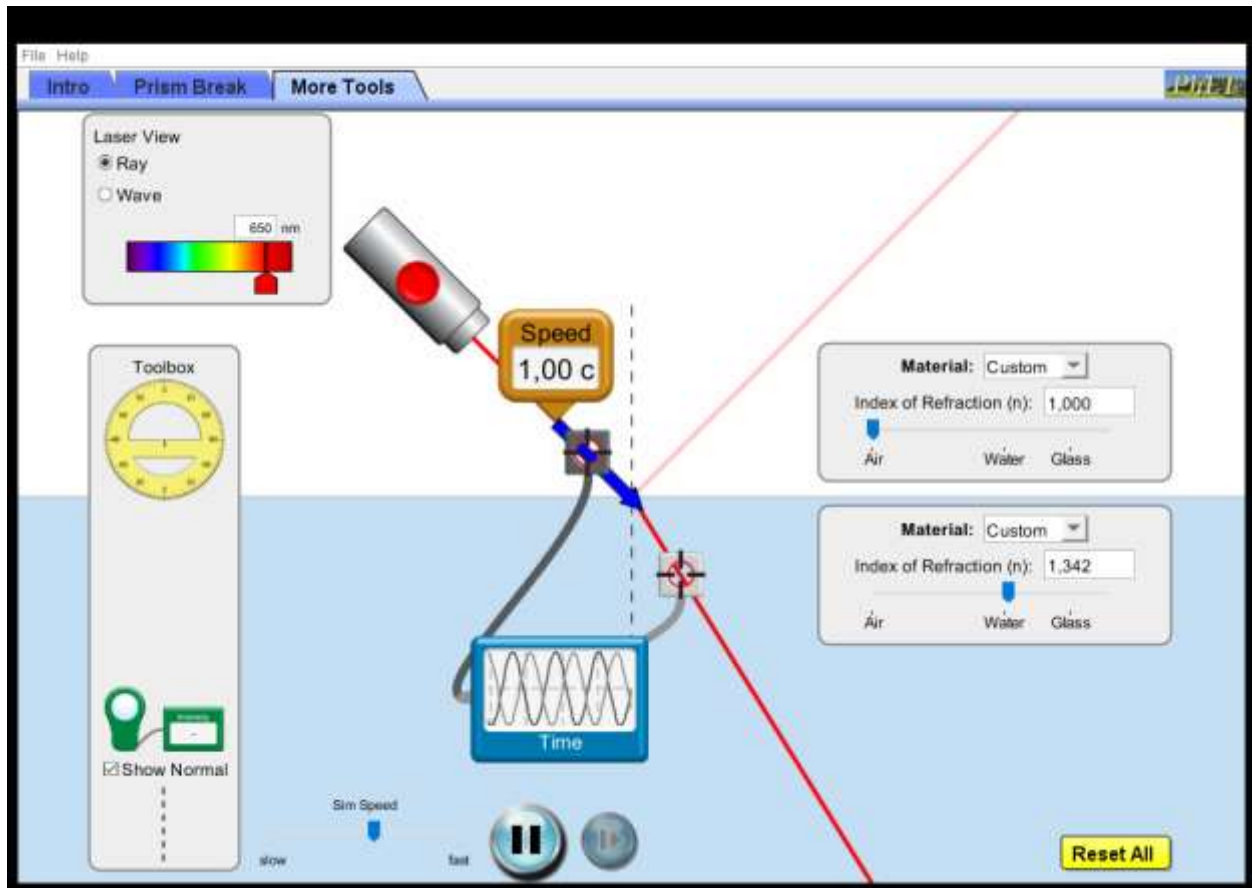
The law of refraction of light (picture 10)

Light refracts at the boundary of the transition from one medium to another medium, that is, light changes its propagation direction. (Picture 10-11)



Picture 11

Geometrical optics has defined its task to explain the rules of making images and find solutions in various optical systems (prisms, lenses, etc.)



Picture 12.

In physical optics, light is an electromagnetic wave that is perceived by the human eye. The sims have been carefully designed and tested. They are easy to use and fun for students. Classes with Sims include a wide range of activities.

These precise guide wires can save students' time. In addition, students will be able to delve deeper into the material without clear instructions or feedback from the teacher. At the same time, the manual on the subject presented by sims and the amount that the teacher should provide is clear.

CONCLUSION

PhET is written in Java or Flash programs for the purpose of facilitating access to Sims. Then they work using a simple web browser. In addition, users can download the website (currently 60 MB) for offline use and install it on any equipment. This is especially convenient when students' computer laboratories or lecture halls are not connected to the Internet. These sims work very well on computers.

Through the PhET program is to engage students in effective self-management, discovery. PhET in physics was created as an independent means of teaching. It gives teachers, students, at any time, the opportunity to choose which sims to use and how to use them. It is most

effective when the teacher is carried out with the help of lectures or home work, using the advanced method of teaching in laboratory classes.

These sims are a versatile means of teaching lectures. It has activities that serve as powerful visual weapons, showcase traditional classes, and provide opportunities for sims-interactive lectures or interactive sessions.

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