Intensity of Refracted Light

Procedure:

1. Open the phet applet “Bending Light” at this url: http://phet.colorado.edu/en/simulation/bending-light
2. Click on the intensity meter and drag the meter to the incident light in order to record the incident light’s intensity in the data table below.
3. Turn on the light by pressing the red button. Record the incident light’s intensity in the data table below.
4. Move the intensity meter to the reflected light. Record the reflected light’s intensity in the data table below.
5. Move the intensity meter to the refracted light. Record the refracted light’s intensity in the data table below.
6. Change the refracting substance from water to glass.
7. Repeat steps 2 – 5.
8. Change the incident substance to water and the refracting substance to air.
9. Repeat steps 2 -5.
10. Change the refracting substance to glass.
11. Repeat steps 2-5.

Data Table

<table>
<thead>
<tr>
<th>Incident Substance</th>
<th>Incident Index of Refraction</th>
<th>Refracting Substance</th>
<th>Refracting Index of Refraction</th>
<th>Intensity of Incident Light</th>
<th>Intensity of Reflected Light</th>
<th>Intensity of Refracted Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>1.00</td>
<td>Water</td>
<td>1.33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td>1.00</td>
<td>Glass</td>
<td>1.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>1.33</td>
<td>Air</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>1.50</td>
<td>water</td>
<td>1.33</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Questions:

1. How did the intensity of reflected light compare to the intensity of the incident light?
2. When light was refracted from a substance with a lower index of refraction to one with a higher index of refraction, what happened in general to the intensity of the refracted light?

3. What happened to the intensity of light when the index of refraction of the refracting material increased? (refracting material changed from water to glass)

4. Did the same trends described in numbers 2 and 3 occur when the light tried to pass to a substance with a lower index of refraction?

5. How did the total intensity of reflected and refracted light compare to the intensity of incident light? Was there any change due to how the index of refraction of incident light compared to the index of refraction of refracted light?
Unit 6: Electromagnetic Radiation

Intensity of Refracted Light

Procedure:

2. Click on the intensity meter and drag the meter to the incident light in order to record the incident light’s intensity in the data table below.
3. Turn on the light by pressing the red button. Record the incident light’s intensity in the data table below.
4. Move the intensity meter to the reflected light. Record the reflected light’s intensity in the data table below.
5. Move the intensity meter to the refracted light. Record the refracted light’s intensity in the data table below.
6. Change the refracting substance from water to glass.
7. Repeat steps 2 – 5.
8. Change the incident substance to water and the refracting substance to air.
9. Repeat steps 2 -5.
10. Change the refracting substance to glass.
11. Repeat steps 2-5.

Data Table

<table>
<thead>
<tr>
<th>Incident Substance</th>
<th>Incident Index of Refraction</th>
<th>Refracting Substance</th>
<th>Refracting Index of Refraction</th>
<th>Intensity of Incident Light</th>
<th>Intensity of Reflected Light</th>
<th>Intensity of Refracted Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air</td>
<td>1.00</td>
<td>Water</td>
<td>1.33</td>
<td>100</td>
<td>5.29</td>
<td>94.71</td>
</tr>
<tr>
<td>Air</td>
<td>1.00</td>
<td>Glass</td>
<td>1.50</td>
<td>100</td>
<td>9.29</td>
<td>90.81</td>
</tr>
<tr>
<td>Water</td>
<td>1.33</td>
<td>Air</td>
<td>1.00</td>
<td>100</td>
<td>22.63</td>
<td>77.37</td>
</tr>
<tr>
<td>Glass</td>
<td>1.50</td>
<td>water</td>
<td>1.33</td>
<td>100</td>
<td>1.84</td>
<td>98.16</td>
</tr>
</tbody>
</table>

Questions:

1. How did the intensity of reflected light compare to the intensity of the incident light?

   The intensity of the reflected light was always smaller than that of the incident light.
2. When light was refracted from a substance with a lower index of refraction to one with a higher index of refraction, what happened in general to the intensity of the refracted light?

In general, the intensity of refracted light decreased compared to the intensity of the incident light.

3. What happened to the intensity of light when the index of refraction of the refracting material increased? (refracting material changed from water to glass)

As the index of refraction increases, the intensity of the refracted light decreased more.

4. Did the same trends described in numbers 2 and 3 occur when the light tried to pass to a substance with a lower index of refraction?

The intensity of the refracted light still decreased compared to the intensity of the incident light, however how much it decreased did not follow this trend. The smallest decrease in intensity of light occurred when light went from glass to water.

5. How did the total intensity of reflected and refracted light compare to the intensity of incident light? Was there any change due to how the index of refraction of incident light compared to the index of refraction of refracted light?

The total intensity of reflected and refracted light compared to the intensity of incident light was always equal. There was no difference in this trend depending on substance.