

## Refraction Quiz

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Image Source: <http://arstechnica.com/science/2012/08/bending-light-stronger-than-ever-before-by-accelerating-electrons/>

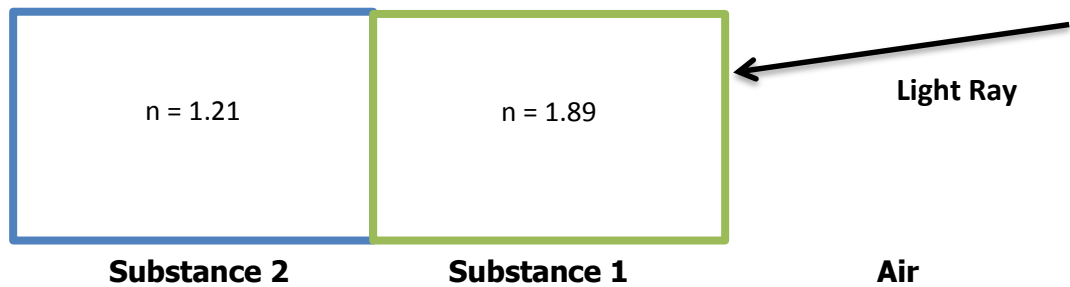
- 1. Explain why the straw in the above image does not look straight.**
  
- 2. If a light beam bends to a larger angle in substance 2 than in substance 1, which has a larger index of refraction?**
  
- 3. Light coming straight from a laser pointer passes from air into a tub of liquid. It hits the surface of the liquid at an angle of  $28^\circ$  from vertical, and continues into the**

liquid at an angle of  $34^\circ$ . What is the index of refraction of the substance in the tub?

4. You want to see if your goldfish Freddie will follow a laser pointer, so you flash it at his tank. If you point it at exactly a  $45^\circ$  angle, what angle will it come out in the water on little Freddie's side of the glass?

5. Fill in the Blanks: A denser object will usually have a \_\_\_\_\_ index of refraction.

6. Sketch the path of the light beam from the right to the left using a dashed line.



7. Explain why the index of refraction of a vacuum is  $n=1$ . Use the word "atoms" and "Snell's Law."

8. Put the following materials in order of the speed of light within them, from fastest to slowest: air, glass, water, vacuum.

9. Why do you think diamond makers cut diamond rings with many different angles?

**10. If you are scuba diving in a tank of water, and you see your friend who is above the level of the water standing to the side of the tank, does she look lower or higher than she actually is?**