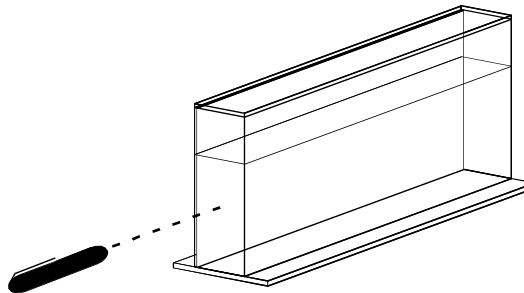


PHYZLAB SPRINGBOARD: MIRAGE TANK



• Apparatus •

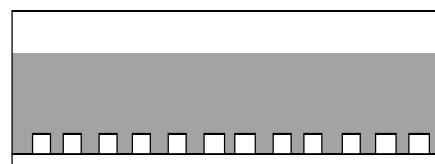
- __ Laser Beam Viewing System
- __ acrylic tank with opaque white insert
- __ laser pointer
- __ access to scattering agent
- __ wood or plastic stirrer (no sharp edges!)
- __ access to **hot** tap water and a vessel to carry it
- __ about 10 sugar cubes



LASER USAGE WARNING! DO NOT EXPOSE EYES TO DIRECT LASER LIGHT OR SPECULAR REFLECTED LASER LIGHT AS THIS MAY CAUSE DAMAGE TO EYES. DO NOT AIM THE LASER BEAM AT OTHER PEOPLE OR ANIMALS. DIFFUSELY REFLECTED LASER LIGHT IS SAFE TO VIEW.

• Set Up: Beginning of Class •

1. Remove the insert and set it aside.
2. Fill the tank about two-thirds the way with hot tap water.
3. Add the scattering agent and mix completely.
4. Drop the sugar cubes into the tank so that they are evenly distributed along the bottom. See the diagram to the right.
5. Leave the tank undisturbed until further notice. We need to allow the sugar to thoroughly dissolve.

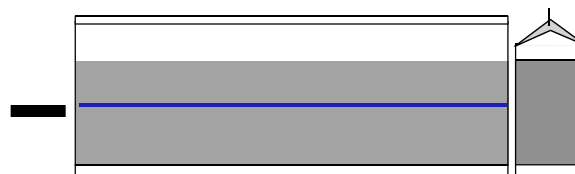


DO NOT DISTURB THE WATER IN THE TANK. IT IS IMPORTANT THAT IT REMAIN UNMIXED THROUGHOUT THESE OBSERVATIONS!

• Observations: Considerably Later •

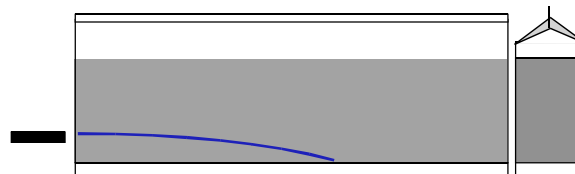
1. Position a "beam catcher" such as a milk carton at one end of the tank. Pass the laser beam horizontally through the water near the top of the tank. Sketch the results on the diagram to the right and describe below.

The beam is (fairly) straight. [Some observations may vary.]



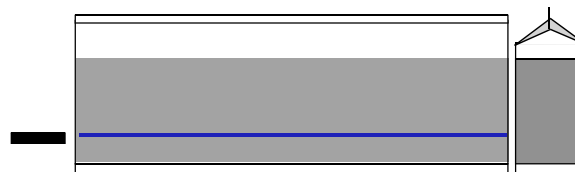
2. Pass the laser beam horizontally through the water near the bottom of the tank. Sketch the results on the diagram to the right and describe below.

The beam curves downward.



3. When the instructor tells you to, mix the water thoroughly. Repeat step 2.

The beam is (fairly) straight.



4. Clean up. Use special care to avoid spilling the sugar-water; wipe up any spills with a **wet** towel. Rinse the tank thoroughly to remove any remaining sugar from it.

• **Analysis: Post Mirage Discussion** •

5. Describe what these observations have to do with mirages and looming.

This demonstration showed gradual refraction (due to an index of refraction gradient). This is the principle underlying mirages and looming. In this activity, it was due to saturated sugar-water; in mirages and looming, the gradient comes about due to variations in temperature.