Catch a WAVE

Purpose: To allow you to observe important wave properties in a variety of situations.

RIPPLE TANK

The “ripple tank” (pan with a *shallow* layer of water) is used to observe the behavior of waves. Observe the tank as you produce a pulse by touching your finger or a pencil tip once to the surface.

**What is the shape of the pulse? Draw it.**

**Does the speed of the pulse seem to be the same in all directions?**

Place the pencil in the water. Produce a straight wave front by rolling the pencil forward 1 cm.

**What is the shape of the pulse? Draw it.**

Place a block in the tank so that its sides are parallel with the pan. Be sure the level of the water is less than the height of the block. With the pencil generate a pulse that strikes the barrier straight on.

**What does the pulse do when it reaches the barrier? Draw the incoming pulse in one color and the reflected pulse in another.**

**After the pulse strikes the barrier, what is the new direction of the pulse? Is this reflection or refraction?**

Move the block to change the angle at which the pulse strikes it.

**What is the shape of the reflected pulse? Draw your observations.**

Produce circular wave pulses with water drops from a plastic dropper.

**How do the pulses reflect from the block?**

**From what point do the reflected pulses appear to be originating?**

Place a convex curved block into the tank and send a straight wave pulse.

**What happens to the reflected pulse after it rebounds off the curved block?**

**Draw it.**

Generate circular waves with the dropper with the convex block in place.

**What shape are the reflected waves?**

Place a concave block in the tank and send a straight wave pulse.

**What happens to the reflected pulse after it rebounds off the curved block?**

**Draw it. Find the point where the reflected pulses meet. Label it as the focus.**

Place a block that is taller than the depth of the water in the tank so that one side butts up against one side of the pan. Send a straight wave.

**Draw what happens. Is this reflection or diffraction?**

Repeat with a circular wave. **Draw what happens.**

Now use two blocks and place them so that there is only a 1-2 cm gap between them. Send a straight wave. **Draw what happens.**

**How does putting the block further apart affect what happens?**

Place a yellow thin block in the pan and be sure the water level in the pan covers the top of the block with a shallow layer of water. You have now made a “deep” and “shallow” end of the pool. Send a straight wave.

**What happens? – pay attention to the wave speed.**

**Now send a straight wave at an angle – draw what happens.**

**What is this phenomenon called?**

**Define the following terms:**

**Reflection –**

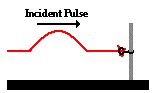
**Refraction –**

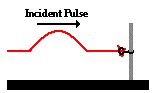
**Diffraction -**

Go to: <http://www.physicsclassroom.com/Class/waves/U10L3a.cfm> here you can analyze the boundary behavior of waves.

**ROPES:**.

Fixed end reflection:  Watch a pulse sent down the rope – this is called the **incident pulse**. Specifically observe the reflected pulse – the wave coming back to you. Draw the reflected pulse. What did you notice about the wave’s speed?



Free end reflection: Watch the same thing except this time be sure that the end away from you is free to move. The incident pulse is sent; observe the reflected pulse. Draw the reflected pulse? How was it different from when the end was fixed?

Now, watch a rope that has a small and larger rope tied together.  See an impulse sent down the small rope side. Observe how the wave behaves when it encounters the boundary and then observe how the reflected wave travels as well.

Show how it would change if the impulse was sent down the more dense side to the less dense side.