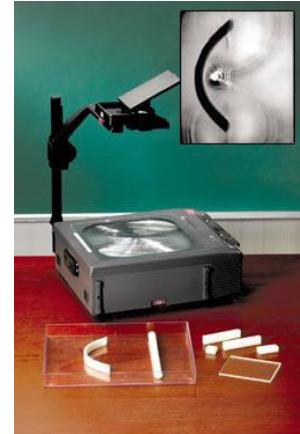


Ripple Tank

P7-7260



CONTENTS:

11" x 14" tank
1 9" white plastic rod
2 white plastic blocks, 4" long
1 white plastic block, 2" long

1 white plastic block, 1" long
1 4"x5"x1/4" clear plastic block
1 parabolic reflector
1 grid transparency

Also required:

Standard overhead projector

Water

DEMONSTRATION SETUP INSTRUCTIONS:

1. Place the tank on the stage of an overhead projector.
2. Slowly add water to the tank, adding small leveling blocks under the tank if necessary.
3. Fill the tank to about 3/8" depth.
4. Turn on the projector.
5. Place the rod into the water. (Fig. 1) Using one hand, roll the rod gently back and forth. Observe that each wave creates a dark shadow on the screen.
6. Practice creating single wave pulses and low- and high-frequency traveling waves.
7. Remove the rod, and practice creating circular waves with your fingertip or a dropper pipet.

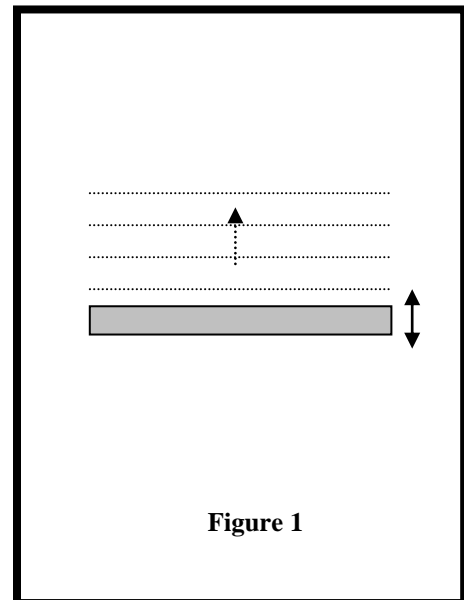


Figure 1

8. When finished demonstrating, carefully lift and pour the water into a wide-mouth container.

STUDENT LAB SETUP INSTRUCTIONS:

1. Place the tank on a light colored flat surface.
2. Slowly add water to the tank, adding small leveling blocks under the tank if necessary.
3. Fill the tank to about $\frac{1}{2}$ " depth.
4. Place the rod into the water. (Fig. 1) Using one hand, roll the rod gently back and forth. Observe that each wave crest is visible from above.
5. Practice creating single wave pulses and low- and high-frequency waves.
6. Remove the rod, and practice creating circular waves with your fingertip or a dropper pipet.
7. When finished demonstrating, carefully lift and pour the water into a large-mouth container.

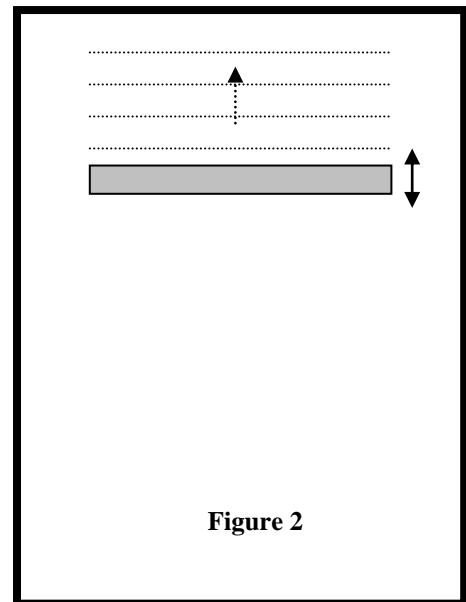
WAVE DEMONSTRATIONS:

Note: Demonstrations are written as if used with an overhead projector, but all work for individual student work as well.

REFLECTION FROM A STRAIGHT BARRIER I

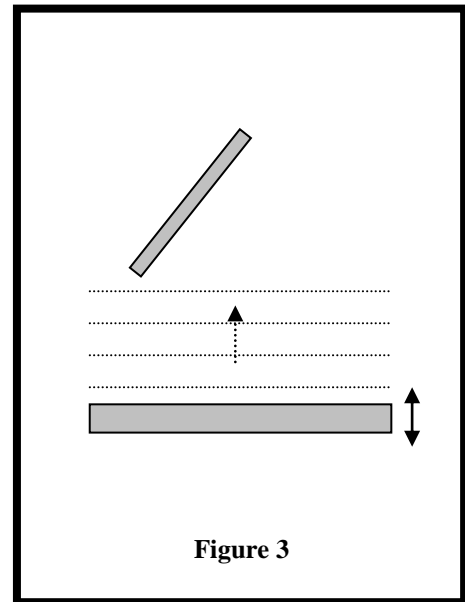
Arrange the tank and projector so that one short end of the tank is visible in the projection area.

1. Arrange the tank and projector so that one short end of the tank is visible in the projection area.
2. Place the rod near the center of the tank (Fig. 2).
3. Send a single wave pulse toward the tank edge. Observe the reflected wave.
4. Send low- and high-frequency waves toward the tank edge. Observe the reflected waves.



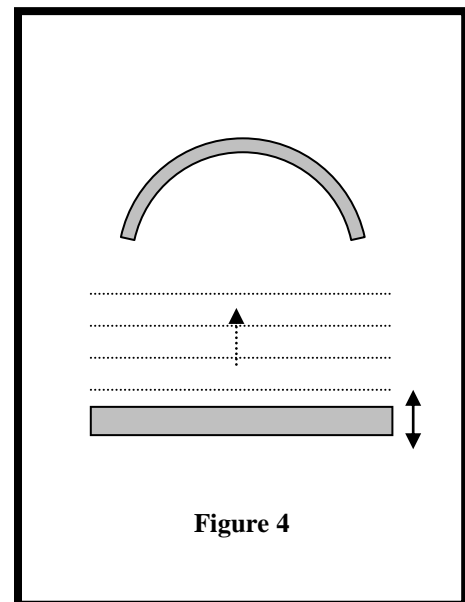
REFLECTION FROM A STRAIGHT BARRIER II

1. Place the rod near the center of the tank.
2. Place the 4" white block at a 45° angle to the rod (**Fig. 3**). For a longer barrier, both white blocks may be used.
3. Send a single wave pulse toward the block. Observe the reflected wave.
4. Send low- and high-frequency waves toward the barrier. Observe the reflected waves.



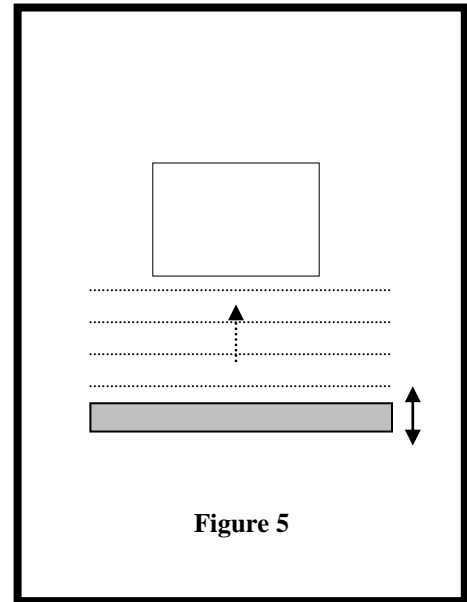
REFLECTION FROM A PARABOLIC BARRIER

1. Place the parabolic reflector near the center of the tank.
2. Place the rod a short distance from the concave side of the parabola (**Fig. 4**).
3. Send traveling waves toward the parabola. Observe as the waves reflect to a single focal point. Note the location of the focal point.
4. Allow the water to settle. Use a fingertip or dropper to create a single circular wave at the focal point. Observe the linear wave that reflects from the barrier.



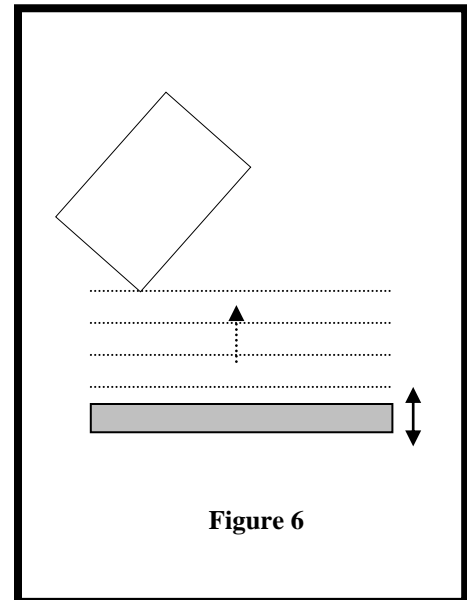
TRANSMISSION MEDIUM AND WAVE SPEED

1. You may wish to place the centimeter grid under the tank for these demonstrations.
2. Place the $\frac{1}{4}$ " thick clear plastic block near the center of the tank (**Fig. 5**). Press down on the block so it rests securely on the bottom of the tank. Add water so that the block is completely covered.
3. Place the rod a short distance from the block, parallel to one edge.
4. Send traveling waves toward the block. Observe how the wave speed changes as they pass over the block and through the shallow water. To help observe this change, it water can be added or removed from the ripple tank. A turkey baster is useful for this adjustment.



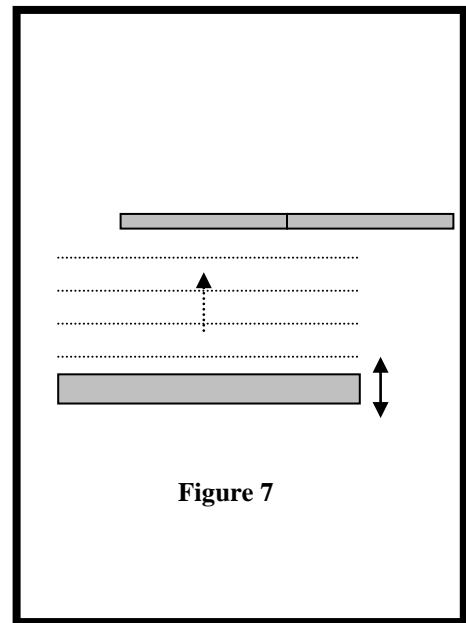
REFRACTION

1. You may wish to place the centimeter grid under the tank for these demonstrations.
2. Place the $\frac{1}{4}$ " thick clear plastic block at an angle near the center of the tank (**Fig. 6**). Press down on the block so it rests securely on the bottom of the tank. Add water so that the block is completely covered.
3. Place the rod a short distance from the block, at an angle to one edge.
4. Send traveling waves toward the block. Observe how the wave direction changes as they pass over the block and through the shallow water.



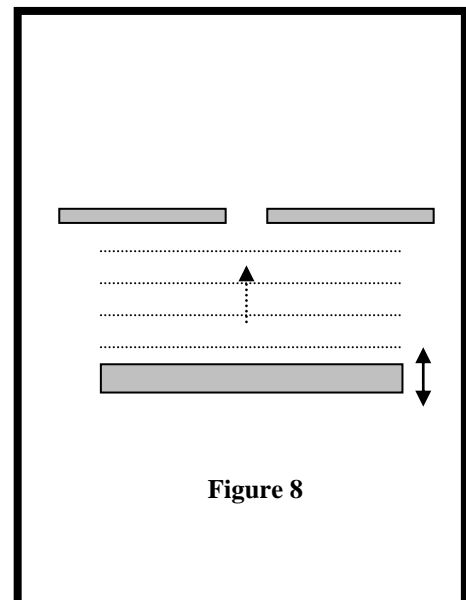
DIFFRACTION AROUND A SINGLE BARRIER

1. Place the two 4" blocks in the tank, with their ends together and one end on the edge of the tank. (Note: blocks should be placed so that they stand $\frac{3}{4}$ " tall in the tank.)
2. Place the rod about 3" from the blocks, parallel to the barrier and extending beyond the open end (**Fig. 7**).
3. Send high-frequency traveling waves toward the barrier and observe as the waves bend around the barrier.
4. Send low-frequency waves toward the barrier and observe the difference in the amount of bending. (Low frequency waves bend more.)



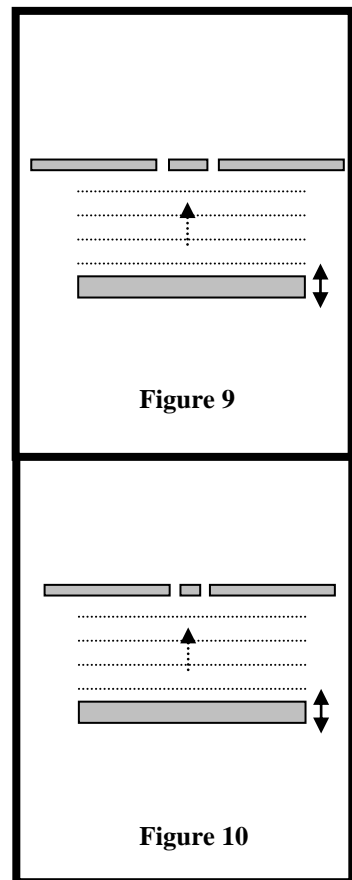
SINGLE-SLIT DIFFRACTION

1. Place the two 4" blocks in the tank, with their ends approximately 1" apart.
2. Place the rod near the blocks (**Fig. 8**). Send high-frequency traveling waves toward the blocks and observe the waves that result beyond the slit.
3. Send low-frequency traveling waves toward the blocks and observe the difference.
4. Reduce the size of the slit to $\frac{1}{2}$ " and repeat steps 3 and 4. Observe.



DOUBLE-SLIT DIFFRACTION

1. Place the two 4" blocks in the tank, with their ends approximately 3" apart. Place the 2" block in the gap.
2. Place the rod near the blocks (**Fig. 9**).
3. Send high-frequency traveling waves toward the blocks and observe the waves that result beyond the slits. Specifically look for points of constructive interference (darker shadows where the wave crests intersect).
4. Send low-frequency traveling waves toward the blocks and observe the difference in the interference pattern.
5. Reduce the slit spacing by replacing the 2" block with the 1" block and sliding the 4" blocks inward (**Fig. 10**). Repeat steps 3 and 4, noting the differences.



TROUBLESHOOTING:

- For excessive reflections from tank sides try reducing water depth.
- If wave fronts are difficult to observe try reducing water depth.
- If barriers move when the waves strike them try pressing barriers onto the bottom of the tank and slide them back and forth to seal.

RELATED PRODUCTS:

Laser Pointer Education Kit (P2-7205). Kit contains a laser pointer and components for studying different aspects of light and light waves.

Traveling Wave Demonstration (P7-7300). Demonstrate how wave energy travels through a medium using your overhead projector.

Doppler Ball (P7-7120). Simple but memorable demonstration of the Doppler effect.

