

STEM *Sims*TM

Ripple Tank



Ripple Tank

**Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.**

Water waves can make some very interesting patterns when they collide. Take the following brief quiz to see how much you already know about waves and interference. See the bottom of page 4 to check your answers.

- Who is credited with inventing the first ripple tank used to study wave interactions?
 - Aristotle
 - Galileo
 - Young
 - Einstein
- In what year was this first ripple tank created?
 - 350 BC
 - 1592
 - 1803
 - 1906
- How many liters of water are in the largest water tank used to study tsunamis?
 - 9 million
 - 18 million
 - 9 billion
 - 18 billion
- How tall was the largest rogue wave ever recorded?
 - 10 meters
 - 15 meters
 - 20 meters
 - 25 meters
- As of 2022, how large is the largest indoor wave pool used for surfing?
 - 1,200 m²
 - 3,900 m²
 - 6,800 m²
 - 8,300 m²



Wave Machine

People have been interested in creating wave machines for a long time. Surfers who live in inland areas long for a wave to experience their sport without having to travel great distances to coastal areas. Can you make a wave machine that simulates ocean waves? Get started now.

Materials

- 4 – books (similar thickness)
- 1 – sheet of white copy paper
- 1- high intensity desk lamp
- water source
- 1- unsharpened pencil
- 1- large, clear rectangular baking dish
- 1- plastic ruler

Procedure

1. Stack two books on a stable flat surface like a kitchen countertop.
2. Stack the other two books about 30-centimeters from the other books.
3. Place the clear rectangular dish on top of and spanning the two book stacks as shown in Figure 1. Make sure the dish is stable and will not fall off the book stacks.
4. Place the sheet of white copy paper under the clear dish.
5. Fill the clear dish with water to a depth of about 1-cm.
6. Place the desk lamp so it shines down on the clear dish. Make sure the lamp cannot come directly in contact with the water.
7. Turn on the lamp and describe in Table 1 the appearance on the white copy paper below the dish.
8. Hold the plastic ruler horizontal and quickly touch the water at one end of the clear dish.
9. Describe in Table 1 the appearance on the white copy paper below the dish.
10. Hold the pencil vertically and quickly touch the water at one end of the clear dish.
11. Describe in Table 1 the appearance on the white copy paper below the dish.

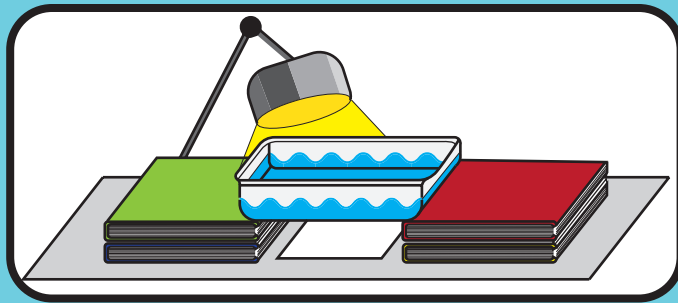


Table 1. Observations

| Condition | Observations |
|-----------------------------------|--------------|
| Light on only | |
| Ruler quickly touching the water | |
| Pencil quickly touching the water | |

Questions

1. What is required to make a water wave form?
2. Describe what happened when a water wave reached the end of the clear dish.

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Wave Maker

One of the world's oldest and most successful surf parks has been in operation since 1989. This park creates waves with faces about six feet high and allows surfers to experience rides for as long as eight seconds. But how are these waves created and what are some problems associated with this process?

This park uses a water drop and displace method of producing surf. Massive pumps fill twelve large chambers with 80,000 gallons of water that is stored above the normal surface of the pool. These storage chambers are wider at the top of the chamber than at the bottom. Hydraulic pumps control a series of gates that open and release the stored water down quickly into the pool area. This release of water from a higher point to a lower point uses gravity to produce the waves that surfers so desire. Many have compared this process used to make waves as the same as flushing a toilet. In most toilets, water is stored at higher level in a toilet tank and is quickly released into the bowl at a lower level to make the flushing action.



One of the major problems with making waves in a pool is the erosion that would take place if the pool had a sand bottom. To reduce erosion, most wave parks use a solid pool bottom. However, this creates other problems. First, waves hitting people in the pool could cause them to lose their footing and fall over striking their head on the hard bottom. To reduce this problem, most wave pools place abrasive materials on the pool bottom to increase the footing of people. This in turns creates a problem of causing abrasions when pool guests slide on the pool's bottom.

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Answers: Page 2 Answers: (1) c, (2) c, (3) a, (4) d, (5) b. Page 3 Answers: Wave Machine (1) There must be a disturbance in the water. (2) The water waves were reflected from the end of the dish.

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