

CUT THROUGH ICE WITH A WIRE

A. Question: *Can a huge block of ice be cut through using only wire and weights?*

B. Materials Needed:

1. A large ice block
2. An iron or copper wire (about 1m long)
3. Two 1 kg weights or large rocks
4. A tripod (or tall tin can)

C: Procedure:

1. Place the ice block on the stand or on a tall tin can such that the ice block overhangs the edge of the can (the ice block should be larger in diameter than the can or tripod).
2. Tie the wire ends to the weights and hang it over the ice block, such that the weights are hanging (dangling) freely.
3. Leave the wire hanging for a while and observe the top part of the ice block which the wire rests (hang heavier weights on the wire to speed up the process).

D: Anticipated Results:

With time, the ice block will eventually be split in half.

E: Thought Questions for Class Discussion:

1. Why does the wire cut into the ice?
2. What happened to the water above the wire?
3. What property is being lowered by increasing the temperature?
4. Would a smaller ice block be cut faster?

F: Explanation:

Under high pressure the melting point of solids gets lowered. Under the wire, the ice molecules are pressed and thus they move faster. Immediately under the wire then, we get faster moving molecules, thus higher temperatures and melting of ice. The wire moves through this water, but as soon as the water gets above the wire, the pressure is off and the temperature of the water gets below 0°C and it freezes again.

The larger the weights, the higher the pressure on the ice, and thus the faster the temperature under the wire is raised. This increases the rate at which the wire cuts through the ice. The same thing happens when the size of the ice block or the surface area between the wire and the ice is reduced.