

Educational Innovations[®]

HEA-450

Bimetallic Jumping Disk

Why Does the Disk Jump?



Here's how it works!

The jumping disk is made from "bi-metal," actually two pieces of thin metal fused together in the middle. When the temperature changes, the metals expand differently and bend the curve in either direction. When the disk is warmed to body temperature, you can "click it" into its loaded position and then carefully place it on a hard surface. At this point, your disk has potential energy. When the disk cools to room temperature, it suddenly snaps back to the original position, spontaneously propelling it about 12 inches into the air!

The same principle applies to a thermostat in your home or a shunt-valve in your car: a piece of bi-metal moves when the temperature changes. For instance, when the temperature drops in your home, the bi-metal in your thermostat cools, moves slightly, hits a contact, and activates a heater. This way, the temperature won't fall below the desired level. In a car, the bi-metal, reacting to heat, opens or closes the valve to the radiator, allowing the engine to warm up quickly, before starting the cooling process.



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In the case of the jumping disk, the bi-metal stays in one position when at room temperature, and in another temperature when at approximately 98 degrees F. First you warm it to the appropriate temperature in your hand, and then snap the disk between your fingers. If the metal is warmed enough, the disk will remain in the "inverted" position until it cools down. If your hands are too cool, you may need an outside heat source. Holding the disk against the outside of a warm cup of water or placing it on top of a room heater usually works. (Please caution students NOT to place the disk in their mouths to warm it.) Now, carefully and quickly, slide the disk onto a hard surface like a table. In a few seconds after the disk cools off, it will suddenly snap back into its original position and with a loud click it will fly into the air. Students can adjust the variables to test the difference between the temperature of the disk vs. the temperature of the surface it is placed upon and the time it takes for the disk to jump or the height at which it jumps.

