

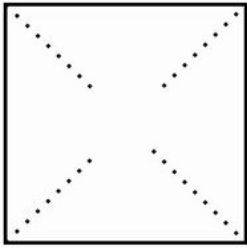
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## Steam Turbines: Modeling Geothermal Power SPH4C

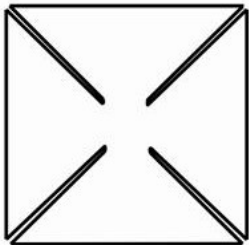
*Caution: Water, when heated under pressure, can become super-heated, reaching temperatures above 100°C. When the pressure is removed, the water will turn to rapidly-expanding steam. Do not heat water without an outlet to relieve the pressure!*

### Step 1: Building the model turbine

Construct a pinwheel according to the directions below. Use heavy-weight paper. You may wish to use tape, glue, or other material to secure the pin in the straw.



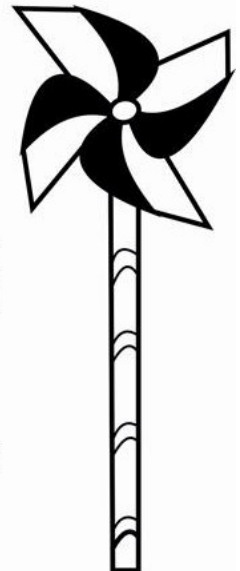
1. Draw diagonal lines



2. Cut along the diagonal lines



3. Turn the left corner and glue to the centre. Do this with all the 4 sections. Fix the wheel with a pin in the centre onto one end of the straw. Blow on it or hold it against the breeze to make it spin.



### Step 2: Building the model geothermal reservoir

Using a beaker, water, aluminum foil, a straw, and tape build a model of a geothermal reservoir:

The aluminum foil covers the beaker to model the bedrock and soil above the reservoir. The straw through the aluminum foil provides a narrow outlet that is the model hot spring, mudpit, fumarole, or geyser. You may need to use tape to secure the foil and straw.

Place the model reservoir on a hot plate. Do not over-heat the beaker. What happens?

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Hold the model turbine over your model geyser. What happens? Explain why.

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Carefully remove the beaker from the hot plate and allow it to cool. Reconstruct your geothermal reservoir, this time allowing for at least five outlets. Place the model reservoir on a hot plate again. Do not over-heat the beaker. Remove it and allow it to cool after heating. What changed?

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The Geysers in California reached peak production in 1987, at that time serving 1.8 million people. Since then, the steam field has been in gradual decline as its underground water source decreases. Explain how this relates to your many-outlet model reservoir:

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What do you think has been proposed as a solution?

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