# Learning About Energy Using a PhET Simulation Intro

In this simulation you will be able to see the relationship between energy and temperature and show in both words and pictures how energy is transferred between two objects at different temperatures.

**Learning Objective:**

- Predict how energy will flow when objects are heated or cooled, or for objects in contact that have different temperatures.

The PhET Simulation: Energy Forms and Changes is available at: https://phet.colorado.edu/sims/html/energy-forms-and-changes/latest/energy-forms-and-changes_en.html

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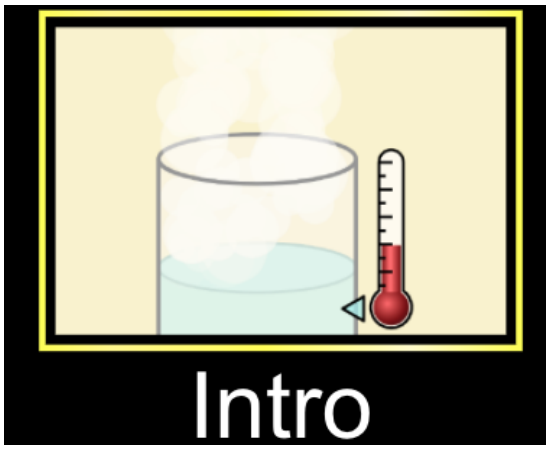
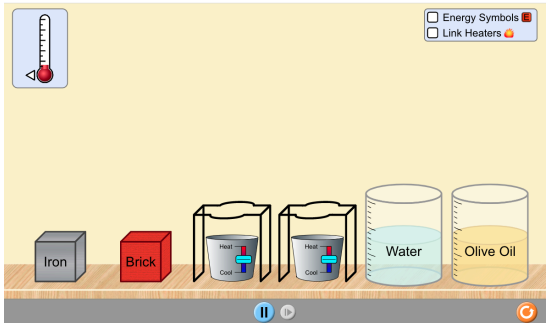
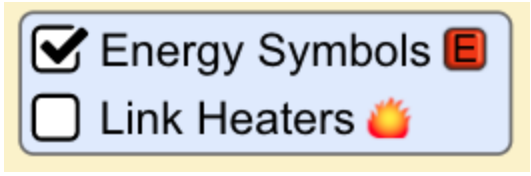
| Getting Familiar With The Options<br><br>Go to the **INTRO** picture and click on it. |  |
| This will take you to the virtual lab |  |
| Before you start - Be sure to check **Energy Symbols** so they are on - so you can see the flow of energy in the objects. |  |

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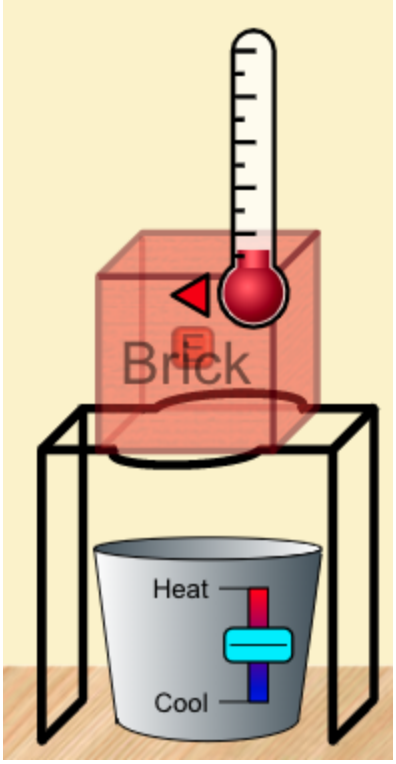
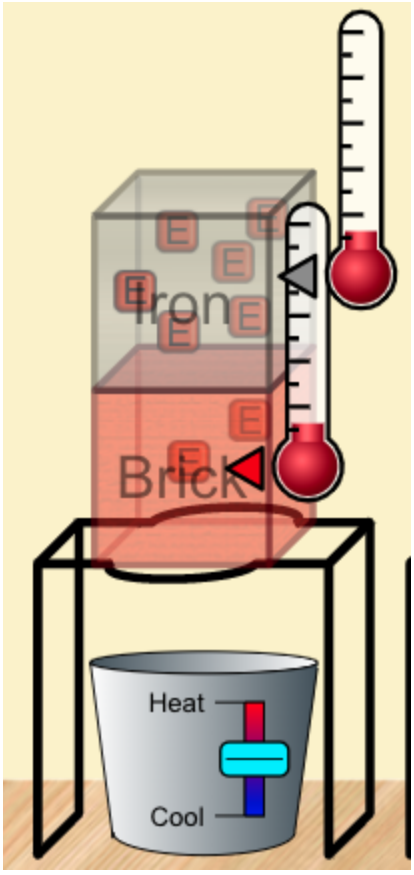
| “Mess About” - Play with moving the objects around. The water, olive oil, iron cube, and brick cube can all be moved around.<br><br>You can add a thermometer to any of these 4 objects to see it relative temperature<br><br>You can heat and cool objects by moving the tab on the bucket under the stand, |  |
| You can stack objects |  |

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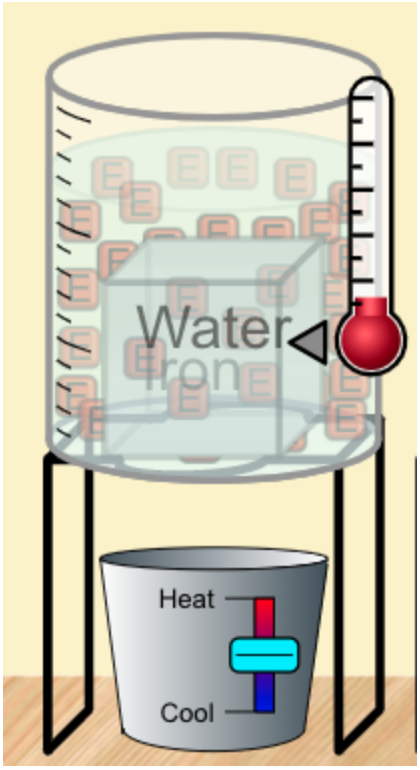
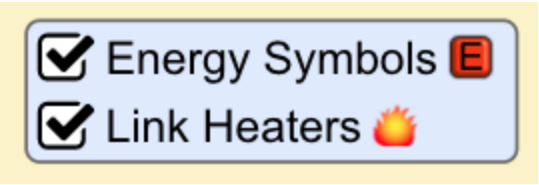
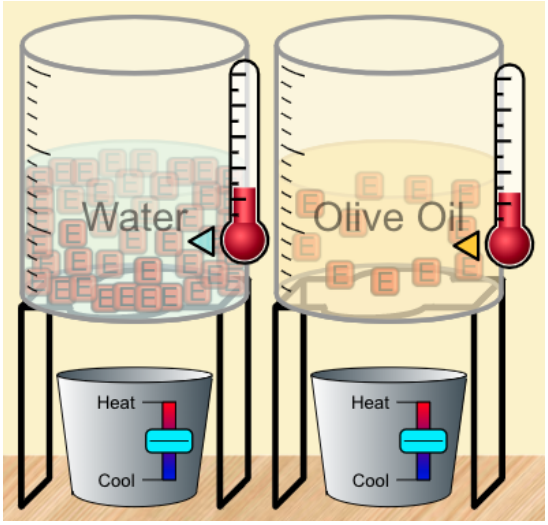
| You can put a cube in water and heat it or cool it. |  |
| You can link the heaters if you want to heat or cool two things at the same time |  <br>  |

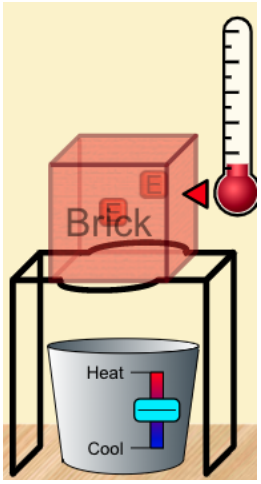
Below are some questions to guide your learning. You can do these or create your own inquiry and experiment to learn more about how energy is transferred between objects when you heat and cool them.

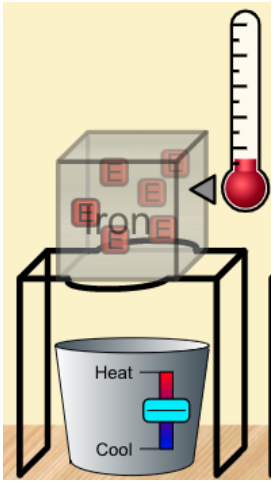
1. What happens when you heat the water?  What direction does the energy flow? Does the temperature keep increasing  even when you keep adding more heat?

2. Link the heaters and heat both the water and the olive oil at the same time.  How are they the same? How are they different? How is the energy the same and different?

3. Chill the water as much as possible – then add heat and observe.  List at least three things you noticed. Do the same for the olive oil.

4. Heat up the brick and the iron to the same temperature. Draw what you notice.



- Which one can hold more energy (Brick or Iron)?

- How/where do they lose their energy?

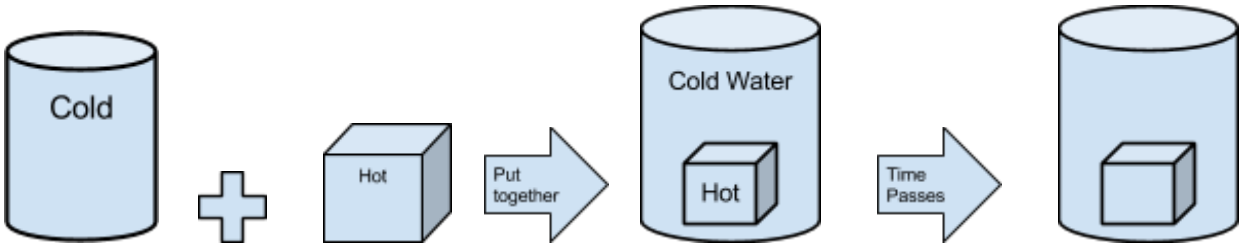
5. Place the brick on top of the iron and add heat. Draw and describe what happens.

6. Take the same set up from #5, and instead of heating it up, cool it down. Draw and describe what happens.

7. Once the brick and the iron are cooled down, do they have the same thermal energy? Do they have the same temperature? Does the room temperature water have more or less thermal energy?

8. What material can hold the most heat? Which takes the longest to cool down? (Is it the same order?)

9. Put a hot object into cold water. Draw what happens to the energy in each of the stages.




**Challenge:** What does temperature measure? Support your answer with evidence from the simulation. If you need to do some reading on this before you answer the question, here are some resources:

- http://indianapublicmedia.org/amomentofscience/heat-and-kinetic-energy/
- https://www.classzone.com/books/ml_science_share/vis_sim/mem05_pg101_kintheory/mem05_pg101_kintheory.html
- Video : What is Heat? A brief introduction at the particle level.

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