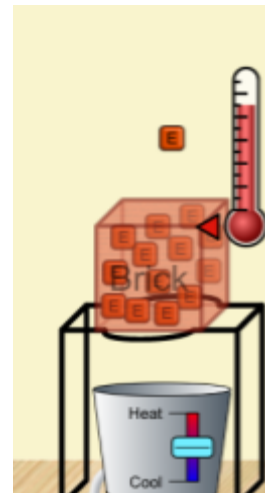


Energy changes

Goal: Be able to describe how energy is transferred between two objects at different temperatures and explain when and why this process stops.

Directions:

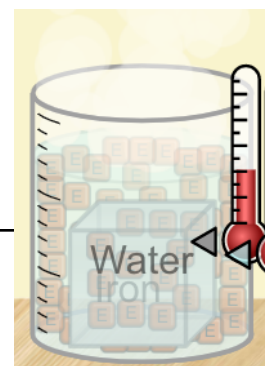
1. Google search: "[energy transfer phet](#)" click the play button
2. Click on Intro
3. Check both boxes: "Energy Symbols" & "Link Heaters"
4. Put the brick on top of one heater, and the iron on top of the other.
5. Drag a thermometer to each block. *Tip: make sure the little arrow next to the thermometer is the color of the object to ensure it is measuring the temp!*
6. Heat up both objects, until both thermometers are at maximum. *Note how long it took each object to reach maximum temperature.*



Answer the following questions about what you are seeing. Please use complete sentences.

A. Describe how heat moves through the system	
B. As the brick warms up, we see "energy particles" leave the brick. What is this showing?	
C. Which object reached the highest temperature fastest?	
D. Why do you think adding the same amount of heat resulted in different temperatures for brick and iron.	

7. In the simulation, add a thermometer to the water.
8. Re-heat the iron to maximum temperature.
9. Pick up the iron and drop it into the water.
10. Watch what happens to the energy cubes AND the temperature (*it goes fast, do it a few times if you need*)



F. Describe the path the heat takes. Does heat move from the hot object to the cold one or the other way around?	
G. What happens to the temperature of the iron and the water?	
H. When does the temperature stop changing?	

Why do you think this is?	
I. If you let it sit for a while without changing anything, what do you think would happen to the temperature of the water and the iron? Explain your answer.	

11. Add a thermometer to the **oil**
12. Heat the iron block all the way up
13. Add it to the oil

J. How did the temperature change differ from when you placed it in the water?	
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Read the following:

Heat Capacity and Specific Heat

🔗 *On what factors does the heat capacity of an object depend?*

The amount of heat needed to increase the temperature of an object exactly 1°C is the **heat capacity** of that object. **🔗** The heat capacity of an object depends on both its mass and its chemical composition. The greater the mass of the object, the greater its heat capacity. One of the massive steel cables on the bridge in Figure 17.3, for example, requires much more heat to raise its temperature 1°C than a small steel nail does.

Different substances with the same mass may have different heat capacities. On a sunny day, a 20-kg puddle of water may be cool, while a nearby 20-kg iron sewer cover may be too hot to touch. This situation illustrates how different heat capacities affect the temperature of objects. Assuming that both the water and the iron absorb the same amount of radiant energy from the sun, the temperature of the water changes less than the temperature of the iron in the same amount of time because the specific heat capacity of water is larger than the specific heat capacity of iron.

The specific heat capacity, or simply the **specific heat**, of a substance is the amount of heat it takes to raise the temperature of 1 g of the substance 1°C. Table 17.1 gives specific heats for some common substances. Water has a very high specific heat compared with the other substances in the table. Metals generally have low specific heats. The same amount of heat affects the temperature of objects of the same mass with a high specific heat much less than the temperature of those with a low specific heat.

Analysis:

This lab had you investigate two properties of thermodynamics:

- **The direction of heat flow**
- **How different substances absorb heat differently**

In two well written paragraphs, answer the following:

- How does heat move within a system?

- Why does adding the same amount of heat to two different objects result in a different temperature change?

Use a [CER format](#) for each paragraph. Use **examples from the lab** to support your explanation.