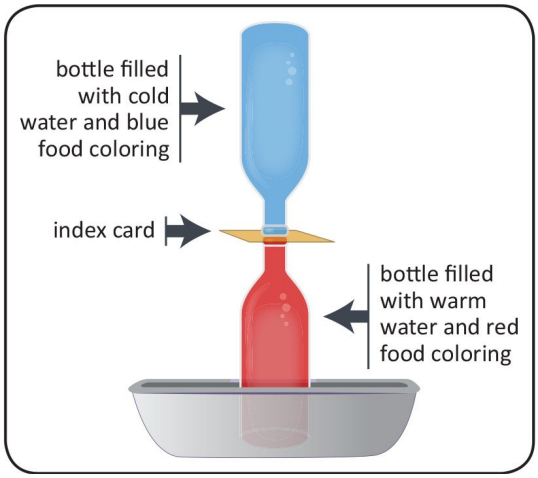
LAB STATION 1 — Blue and Red Water

Materials

- 2 same-size bottles or flasks
- Warm water source with red coloring added
- Cold water source with blue coloring added
- Index card, playing card, or piece of flat plastic
- Large shallow tub or pan to catch spills
- Paper towels

Directions

1. Fill one of the bottles with warm red water all the way to the top.
2. Fill one of the bottles with cold blue water all the way to the top.
3. Very carefully, set up the bottles as shown.
    a. Place the hot red water bottle in the pan.
    b. Place an index card on top of the cold blue water bottle.
    c. Carefully hold the index card in place, and flip the cold blue water bottle on top of the hot red water bottle.
    d. Leave the index card in place for 30 seconds to allow water to settle.
    e. Carefully pull out and remove the index card.
4. Observe the water in both bottles. Look closely to see small changes as they happen!



SAFETY NOTE

Flip the cold blue water bottle quickly and carefully. Clean up any spills outside the tub or pan immediately with paper towels.

Group Discussion

1. What is happening to the blue and red water? Why?
2. Where is the thermal energy transferring from and to?
3. What evidence do you see that supports your claim in Question 2?

Write notes in your science notebook.

Extension Challenge

1. What do you think would happen if you set up the bottles the opposite way—warm water on top and cold water on bottom? Why? (If you have time, try it!)
2. Where is thermal energy transferring from and to? What evidence do you see that supports your claim?

Adapted from Steve Spangler Science: Colorful Convection Currents.
https://www.stevespanglerscience.com/lab/experiments/colorful-convection-currents

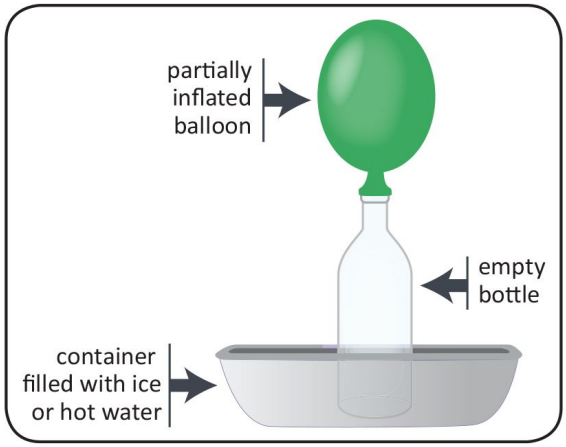
LAB STATION 2 — Cold Water and a Balloon

Materials

- Empty glass bottle, plastic bottle, or flask
- Balloon
- Container with ice
- Container with hot water
- Timer

Directions

1. Attach a partially inflated balloon onto the opening of the bottle or flask.
2. Place the bottle with the attached balloon in the container with ice.
3. Observe for 1 minute.
4. Move the bottle with the balloon to the container with hot water.
5. Observe for 1 minute.
6. Repeat steps 2–5 again.



SAFETY NOTE

Only one student should inflate the balloon.
Move the bottle into the hot water carefully.
Try to avoid spilling or splashing hot water.

Group Discussion

1. What is happening to the balloon? Why?
2. Describe what is happening to the thermal energy. Where is the thermal energy transferring from and to?
3. What evidence do you see that supports your claim in Question 2?

Write notes in your science notebook.

Adapted from Convection Connections by Ann M. L. Cavallo (May 2001). National Science Teachers Association.
http://www.nsta.org/publications/news/story.aspx?id=46222

LAB STATION 3 — Conductometer

Materials

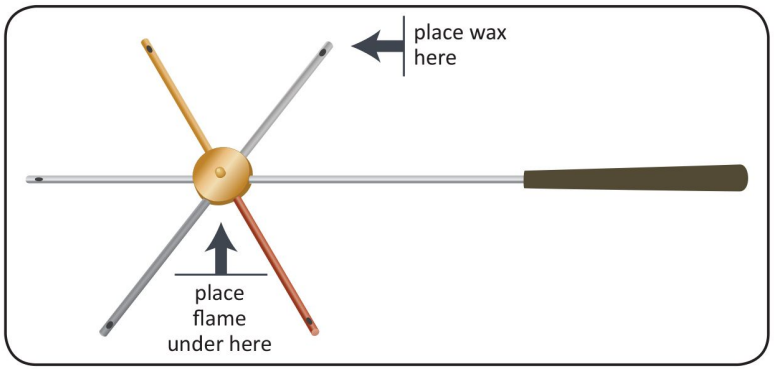
- Flame source (e.g., candle or Bunsen burner)
- Conductometer
- Wax
- Container with ice (for Extension Challenge)
- Paper towels

Directions

1. Place a small amount of wax in all five small holes on the ends of the metal rods on the conductometer.
2. Hold the conductometer by the black handle with the wax facing up.
3. Hold the round center part of the conductometer over the flame source.

SAFETY NOTE

Use proper safety practices in the presence of an open flame. Do not touch the hot wax.



Group Discussion

1. What is happening to the wax? Why?
2. Describe what is happening to the thermal energy. Where is the thermal energy transferring from and to?
3. What evidence do you see that supports your claim in Question 2?

Write notes in your science notebook.

Extension Challenge

1. What do you think would happen if you placed an ice cube on the center part of the conductometer? Why? (If you have time, try it!)
2. Where is thermal energy transferring from and to? What evidence do you see that supports your claim?

LAB STATION 4 — Butter Boat

Materials

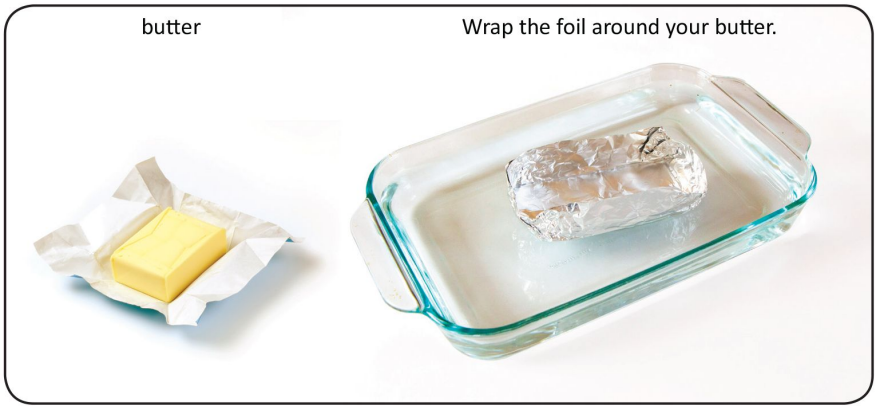
- Container of very hot water
- Butter, about 1 tablespoon at room temperature, nearly melting
- Piece of foil, approximately 4" x 8"
- Container with ice (for Extension Challenge)

Directions

1. Create a small foil boat just big enough for your piece of butter.
2. Place a small amount of butter inside your foil boat.
3. Carefully set the foil boat into the tub of hot water.

SAFETY NOTE

Carefully place your boat in the hot water. Try not to splash or spill the water.



Group Discussion

1. What is happening to the butter? Why?
2. Describe what is happening to the thermal energy. Where is the thermal energy transferring from and to?
3. What evidence do you see that supports your claim in Question 2?

Write notes in your science notebook.

Extension Challenge

1. What do you think would happen if you moved the foil boat into a container of ice? (If you have time, try it!)
2. Where is thermal energy transferring from and to? What evidence do you see that supports your claim?

LAB STATION 5 — Heat on Water

Materials

- Heat lamp or lamp with 150 Watt bulb
- Small cup of water
- Thermometer

Directions

1. Use the thermometer to check and record the temperature of the water.
2. Remove the thermometer.
3. Turn on the heat lamp, and wait 3 minutes.
4. Use the thermometer to check and record the final temperature of the water.

SAFETY NOTE

Do not touch the heat lamp. Heat lamps remain hot after they are turned off.

Group Discussion

1. What is happening to the water? Why?
2. Describe what is happening to the thermal energy. Where is the thermal energy transferring from and to?
3. What evidence do you see that supports your claim in Question 2?

Write notes in your science notebook.

LAB STATION 6 — Thermal Blanket

Materials

- Space blanket (with reflective side marked)
- Heat lamp or lamp with 150 Watt bulb

Directions

1. Cover one of your hands with the space blanket. Make sure the reflective side is touching your skin.
2. Place both hands (one covered and one uncovered) under the heat lamp for about 30 seconds.
3. Let all lab partners try the demonstration.

SAFETY NOTE

Do not touch the heat lamp. Heat lamps remain hot after they are turned off.

Group Discussion

1. What is happening to your body? Why?
2. Describe what is happening to the thermal energy. Where is the thermal energy transferring from and to?
3. What evidence do you see that supports your claim in Question 2?

Write notes in your science notebook.

Extension Challenge

1. What do you think would happen if you placed the reflective side of the blanket in the other direction (facing the heat source)? Why? (If you have time, try it!)
2. Where is thermal energy transferring from and to? What evidence do you see that supports your claim?