

Three Ways Heat Moves

Mission: Visit three lab stations (a frying pan, a pot of water, and a heat lamp) and discover the three ways thermal energy moves: conduction, convection, and radiation.

Big question: How does thermal energy move by conduction, convection, and radiation?

Warm-up: Quick sort

Which kind of heat transfer? Guess and explain.

Feeling warm standing in sunshine ✓ **Radiation.**

A metal slide burning your legs in summer ✓ **Conduction.**

Key vocabulary

Conduction	Heat moving through touching particles.
Convection	Heat moving through currents in liquids and gases.
Radiation	Heat moving as waves (infrared light) through space.
Absorb	Take in energy.

1 Box 1

Station 1: frying pan

In the simulator: Turn on the burner at the frying pan until the metal handle gets hot (above 60 °C).

The handle never touched the flame. How did it get hot?

- ☐ Conduction: particles passed energy along the metal ☐ Radiation from the flame only
☐ Convection currents in the metal

✓ **Conduction: particles passed energy along the metal**

2 Box 2

Station 2: pot of water

In the simulator: Go to the pot and turn on the burner. Watch the colored particles.

What pattern did the warm (orange) and cool (blue) water make?

- ☐ A current: warm water rises, cool water sinks ☐ All the water stayed still ☐ Warm water sank to the bottom

✓ **A current: warm water rises, cool water sinks**

3 Box 3

Station 3: heat lamp

In the simulator: Turn on the heat lamp until the black can passes 40 °C.

Record both cans.

Can	Temperature (°C)
Black can	from simulator
White can	from simulator

No contact needed

The lamp never touched the cans and there was no current of air. How did energy reach them?

- ☐ Radiation: waves travel through the air ☐ Conduction through the table ☐ Convection from the cans

✓ **Radiation: waves travel through the air**

4 Box 4

Sort real examples

Sort each example.

Sort: Ironing a shirt · Hot air balloon rising · Sunburn · Ice melting in your hand · Sea breeze · Warmth from a campfire across the circle

Conduction	Convection	Radiation
Ironing a shirt Ice melting in your hand	Hot air balloon rising Sea breeze	Sunburn Warmth from a campfire across the circle

5 Box 5

Legend: all three 🏆 Legend only

A pot of soup on a campfire. Describe where conduction, convection, AND radiation happen.

Look for: Conduction example; Convection example; Radiation example; at least 18 words

6 Box 6

Station summary (CER)

Why did the black can heat up more than the white can?

Claim

Look for: Dark colors absorb more; at least 6 words

Evidence

Look for: Compares with the white can; a number from the simulator; at least 10 words

Reasoning

Look for: Explains radiation; Explains absorb vs reflect; at least 10 words

🔑 Exit ticket: answer the big question in your own words

How does thermal energy move by conduction, convection, and radiation?

Look for: Conduction moves heat through direct contact (pan to handle). Convection moves heat as warm liquid or gas rises and cool sinks, making currents (water in a pot). Radiation moves heat as waves through space or air, with no contact needed (heat lamp, the Sun); dark surfaces absorb more.

Completion codes

Students see a code like **ABC-I3** when they finish. The first part must match below. The letter is the level (E = Explorer, I = Investigator, L = Legend), and the number at the end is how many stars they earned.

Level	Code starts with
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 Explorer	WWG-E
 Investigator	19A-I
 Legend	17R-L



Watch for these misconceptions

- "Cold moves into things." Heat moves; objects feel cold because heat leaves your hand.
- "Only moving things have energy." Stored (potential) energy counts too.
- "Radiation needs air to travel." Radiation crosses empty space, which is how sunlight reaches Earth.