

NGSS MS-PS3-5

Curriculum Bundle

Kinetic Energy & Energy Transfer

- ✓ 2 Lessons and 2 Activities
- ✓ Everything You Need to Teach NGSS MS-PS3-5



Resources Included



2 Lessons



2 Activities

- Thermal Energy Temperature and Heat Lesson
- When Kinetic Energy Changes - Energy Transfers Lesson
- Heat by Friction – Activity
- Crash Test Challenge - Activity

Thermal Energy, Temperature, & Heat Transfer
6th, 7th, 8th Grade Lesson

✓ **Comprehensive Content Overview** – Covers Thermal Energy, Temperature, Particle Motion, and Heat Transfer.
✓ **Student-Friendly Format** – Clear visuals and comparisons support understanding of complex concepts.



Touch With Energy

When Kinetic Energy Changes Lesson
6th, 7th, 8th Grade

✓ **Comprehensive Content Overview** – Covers how changes in motion cause energy transfer and temperature changes.
✓ **Student-Friendly Format** – Clear visuals and comparisons support understanding of complex concepts.



Touch With Energy

Hot vs. Cold – How Does Mass Affect Temperature Change?

Objective:
Students will investigate how the mass of a substance (water) affects how much its temperature changes when heat is added.

Materials:

- Hot water (same temperature for all samples)
- 2 containers of water: one with 100 mL, one with 200 mL
- Thermometers
- Timer

Steps:

- Initial Temperature:
 - Measure and record the starting temperature of both water samples.
 - Example: Both are at 25°C.
- Add Heat:
 - Place both containers under a heat lamp or near a safe heat source for 5 minutes.
- Measure Final Temperature:
 - Record the final temperatures.
 - Example Data:

Water Volume (mL)	Starting Temp (°C)	Final Temp (°C)

Analyze the Data:

- Smaller masses heat up faster.
- Heat energy causes particles to move faster (higher average kinetic energy = higher temperature).

Questions:

- Which sample heated up more?
- Why did the smaller sample heat faster?
- What does this show about mass and energy transfer?

Ice Melt Mystery – How Does the Type of Matter Affect Heat Transfer?

Objective:
Students will investigate how different materials affect temperature change when ice melts in each one.

Materials:

- 3 cups of room-temperature substances (same mass): water, cooking oil, rubbing alcohol
- Ice cubes (same size)
- Thermometers
- Timer

Steps:

- Set the Stage:
 - Each cup contains 100 mL of a different liquid at the same temperature.
 - Place an equal-sized ice cube in each.
- Monitor Melting:
 - Record temperature every minute for 10 minutes.

Liquid	Starting Temp (°C)	Final Temp (°C)	Ice Melt Time (min)
Water			
Oil			
Rubbing Alcohol			

Questions

- Different substances transfer energy (heat) at different rates.
- Faster melting = faster energy transfer = more change in particle motion.

Everything You Need to Teach

NGSS MS-PS3-5

Thermal Energy, Temperature, & Heat Transfer 6th, 7th, 8th Grade Lesson

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When Kinetic Energy Changes Lesson 6th, 7th, 8th Grade

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Water Volume (mL)	Starting Temp (°C)	Final Temp (°C)

4. Analyze the Data:
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Questions:

1. Which sample heated up more?
2. Why did the smaller sample heat faster?
3. What does this show about mass and energy transfer?

The Standard is Explained and the Resources it Incorporates are Outlined

Next Generation Science Standards Package MS PS3 Energy

Note: There may be resources that overlap between the standards. Simply choose the order that best fits your classroom. Also, there are more resources here than you will most likely decide to use. I have provided extra so you can make the best decision for your students on what is best to include.

MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. [Clarification Statement: Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup.] [Assessment Boundary: Assessment does not include calculating the total amount of thermal energy transferred.]

Resources:

- The Insulator – Thermal Insulator Challenge
- Thermal Energy Change Reactions Experiments and Demonstrations
- Solar Oven STEM Engineering Challenge

MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample. [Clarification Statement: Examples of experiments could include comparing final water temperatures after different masses of ice melted in the same volume of water with the same initial temperature, the temperature change of samples of different materials with the same mass as they cool or heat in the environment, or the same material with different masses when a specific amount of energy is added.] [Assessment Boundary: Assessment does not include calculating the total amount of thermal energy transferred.]

Resources:

- Thermal Energy Temperature and Heat Lesson
- Particle Motion, Temperature, and States of Matter Lesson
- Relationship Between Kinetic Energy, Mass, and Speed Lesson
- How Does the Type of Matter Affect Heat Transfer – Activity
- How Does Mass Affect Temperature Change – Activity

MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. [Clarification Statement: Examples of empirical evidence used in arguments could include an inventory or other representation of the energy before and after the transfer in the form of temperature changes or motion of object.] [Assessment Boundary: Assessment does not include calculations of energy.]

Resources:

- Thermal Energy Temperature and Heat Lesson
- When Kinetic Energy Changes Energy Transfers
- Heat by Friction – Activity
- Crash Test Challenge - Activity

Who is this Bundle for?

- **Teachers who teach middle school science and use the NGSS**
- **Teachers who want multiple resources at their fingertips including lessons and a variety of activities, in order to meet the standard**
- **Teachers who don't have time to develop their own resources or organize what to teach and when**