

NGSS MS-PS3

Energy

Full Standard BUNDLE

- ✓ Everything You Need to Teach NGSS MS-PS3
- ✓ Lessons, Activities, Labs, Projects, and more
- ✓ MS-PS3-1, PS3-2, PS3-3, PS3-4, PS3-5



Bundles Included

NGSS MS-PS3-1 Curriculum Bundle Kinetic Energy, Mass & Speed

- ✓ 1 Lesson and 2 Activities
- ✓ Everything You Need to Teach NGSS MS-PS3-1



NGSS MS-PS3-3 Curriculum Bundle Thermal Energy Transfer Design Projects

- ✓ 3 Activities
- ✓ Everything You Need to Teach NGSS MS-PS3-3



NGSS MS-PS3-2 Curriculum Bundle Potential Energy & Distance Modeling

- ✓ 2 Lessons and 1 Activity
- ✓ Everything You Need to Teach NGSS MS-PS3-2



NGSS MS-PS3-4 Curriculum Bundle Thermal Energy & Temperature Investigation

- ✓ 3 Lessons and 2 Activities
- ✓ Everything You Need to Teach NGSS MS-PS3-4



NGSS MS-PS3-5 Curriculum Bundle Kinetic Energy and Energy Transfer

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



Everything You Need to Completely Cover NGSS MS-PS3

Complete Lessons

Activities

Labs

Projects

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.



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.



Relationship Between Kinetic Energy Mass and Speed

Included in your Lesson:

- What Energy Is
- Kinetic Energy
- Kinetic Energy and Mass
- Kinetic Energy and Speed
- Examples
- Practice



Energy at a Distance Understanding Potential Energy 6th, 7th, 8th Grade Lesson

- ✓ Comprehensive Content Overview - Covers how potential energy is stored and changes based on the position, mass, and distance between objects in systems involving gravity, magnets, static electricity, and elastic forces.
- ✓ Student-Friendly Format - Clear visuals and comparisons support understanding of complex concepts.

Particle Motion, Temperature, and States of Matter

Included in your bundle:

- Matter
- States of Matter
- Solids, Liquids, and Gases
- State Conversions
- Particle Motion and Kinetic Energy
- Temperature
- Heat Transfer and Thermal Energy

Middle School



SOLAR OVEN ENGINEERING CHALLENGE

MIDDLE SCHOOL

STEM CHALLENGE

TWF



Reading Comprehension Passage and Questions

The Science of Roller Coasters

6th, 7th, and 8th Grade Science

- ✓ No Prep, Ready-to-Use Resource in Google and Office Format
- ✓ Includes Comprehension and Extension Questions



Answer Key

1. What pattern do you observe between mass and kinetic energy?
As the mass increases (with speed constant), the kinetic energy also increases. The effect is that doubling mass more than doubles the kinetic energy.

2. What happens to the kinetic energy as the speed increases?
Kinetic energy increases with the square of the speed. When speed is doubled, the kinetic energy increases by a factor of four. When speed is tripled, the kinetic energy increases by a factor of nine.

3. Which factor had a greater effect on kinetic energy - mass or speed? Why?
Speed had a greater effect on kinetic energy because it is squared in the equation. Doubling the speed caused the kinetic energy to increase by a factor of four, while doubling the mass only doubled the energy.

4. What might happen if you doubled both mass and speed?
Both mass and speed are squared in the kinetic energy equation. Doubling both would cause the kinetic energy to increase by a factor of 16 (4 x 4).

Reading Comprehension Passage

The investigation described that both mass and speed affect an object's kinetic energy, but speed has a greater impact due to its exponential relationship in the formula $KE = \frac{1}{2}mv^2$. You also learned that as mass increased, the speed of the object also increased. The speed increases the kinetic energy of an object. In the roller coaster, the kinetic energy increased as the roller coaster descended the track. The kinetic energy increased most when the roller coaster was at the top of the track, where it had the most potential energy. The kinetic energy was converted into kinetic energy as the roller coaster descended the track. The kinetic energy was then converted back into potential energy as the roller coaster ascended the track. The kinetic energy was then converted back into kinetic energy as the roller coaster descended the track.

Kinetic Energy Challenge

Design Task: For this task, you will design and build a catapult using the materials listed below.

Materials:

- 1. A wooden clothespin
- 2. A rubber band
- 3. A paper cup
- 4. A paper plate
- 5. A paper straw
- 6. A paper clip
- 7. A paper fastener
- 8. A paper bandage
- 9. A paper string
- 10. A paper tape

What you need to do:

1. Use the materials listed above to design and build a catapult.
2. Launch the catapult and observe the path of the projectile.
3. Record the distance the projectile travels.
4. Repeat the process and observe the path of the projectile.

Design: Use the space below to design your catapult.

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

Objectives:

Students will investigate how different materials affect temperature change when ice melts in each cup.

Materials:

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

Steps:

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

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

Questions:

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

The Insulator - Thermal Insulator Challenge

- ✓ Classroom Ready - Just Print and Go!
- ✓ Active Engagement - Keep Students' Attention
- ✓ Direct Video Link Included

WATCH VIDEO



Includes Word and PDF Versions

Designing a Thermal Energy Transfer Device Using Chemical Reactions



- ✓ 4 activities
- ✓ 2 endothermic and 2 exothermic reactions

The Standard is Explained and the Resources it Incorporates are Outlined

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 PS3-1: Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a wiffle ball versus a tennis ball.

Resources:

- Relationship Between Kinetic Energy Mass & Speed – Lesson
- Rolling Into Energy - Lab Investigation
- Kinetic Catapult Challenge

MS PS3-2: Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Examples of models could include representations, diagrams, pictures, and written descriptions of systems.

Assessment Boundary: Assessment is limited to two objects and electric, magnetic, and gravitational interactions.

Resources:

- Energy at a Distance - Understanding Potential Energy – Lesson
- Gravitational Potential Energy – Lesson
- The Science of Roller Coasters - Reading

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**