

MS-PS3-5 Energy

Students who demonstrate understanding can:

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.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed worlds.

- Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon.

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Science knowledge is based upon logical and conceptual connections between evidence and explanations

Disciplinary Core Ideas

PS3.B: Conservation of Energy and Energy Transfer

- When the motion energy of an object changes, there is inevitably some other change in energy at the same time.

Crosscutting Concepts

Energy and Matter

- Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion).

Observable features of the student performance by the end of the course:

1	Supported claims
a	Students make a claim about a given explanation or model for a phenomenon. In their claim, students include idea that when the kinetic energy of an object changes, energy is transferred to or from that object.
2	Identifying scientific evidence
a	Students identify and describe* the given evidence that supports the claim, including the following when appropriate:
i.	The change in observable features (e.g., motion, temperature, sound) of an object before and after the interaction that changes the kinetic energy of the object.
ii.	The change in observable features of other objects or the surroundings in the defined system.
3	Evaluating and critiquing the evidence
a	Students evaluate the evidence and identify its strengths and weaknesses, including:
i.	Types of sources.
ii.	Sufficiency, including validity and reliability, of the evidence to make and defend the claim.
iii.	Any alternative interpretations of the evidence and why the evidence supports the given claim as opposed to any other claims.
4	Reasoning and synthesis
a	Students use reasoning to connect the necessary and sufficient evidence and construct the argument. Students describe* a chain of reasoning that includes:
i.	Based on changes in the observable features of the object (e.g., motion, temperature), the kinetic energy of the object changed.
ii.	When the kinetic energy of the object increases or decreases, the energy (e.g., kinetic, thermal, potential) of other objects or the surroundings within the system increases or decreases, indicating that energy was transferred to or from the object.
b	Students present oral or written arguments to support or refute the given explanation or model for the phenomenon.