

DCI: Energy

4.PS3.A: Definitions of Energy

The faster a given object is moving, the more energy it possesses. (4-PS3-1)

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4.PS3.A: Definitions of Energy

Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2), (4-PS3-3)

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4.PS3.B: Conservation of Energy and Energy Transfer

Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2), (4-PS3-3)

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4.PS3.B: Conservation of Energy and Energy Transfer

Light also transfers energy from place to place. (4-PS3-2)

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4.PS3.B: Conservation of Energy and Energy Transfer

Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2), (4-PS3-4)

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4.PS3.C: Relationship Between Energy and Forces

When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)

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4.PS3.D: Energy in Chemical Processes and Everyday Life

The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)

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4.ETS1.A: Defining and Delimiting Engineering Problems

Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (4-PS3-4)

Science and Engineering Practice

Asking Questions and Defining Problems

Asking questions and defining problems in grades 3–5 builds from grades K–2 experiences and progresses to specifying qualitative relationships. Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3)

Science and Engineering Practice

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)

Science and Engineering Practice

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. **Use evidence** (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1)

Science and Engineering Practice

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. **Apply scientific ideas** to solve design problems. (4-PS3-4)

Crosscutting Concept

Energy and Matter

Energy can be transferred in various ways and between objects. (4-PS3-1), (4-PS3-2), (4-PS3-3), (4-PS3-4)