

# Middle School

## Matter and its Interactions MS-PS1

- A** Develop models to describe the atomic composition of simple molecules and extend structures MS-PS1-1

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- B** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. MS-PS1-2

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- C** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. MS-PS1-3

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- D** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. MS-PS1-4

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- E** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. MS-PS1-5

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- F** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes. MS-PS1-6

## Motion and Stability: Forces and Interactions MS-PS2

- A** Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. MS-PS2-1

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- B** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object MS-PS2-2

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- C** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. MS-PS2-3

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- D** Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. MS-PS2-4

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- E** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. MS-PS2-5

## Energy MS-PS3

- A** 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. MS-PS3-1

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**B** 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. MS-PS3-2

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**C** Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. MS-PS3-3

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**D** 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. MS-PS3-4

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**E** 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. MS-PS3-5

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**Waves and their Applications in Technologies for Information Transfer** MS-PS4

**A** Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. MS-PS4-1

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**B** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. MS-PS4-2

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**C** Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. MS-PS4-3

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**From Molecules to Organisms: Structures and Processes** MS-LS1

**A** Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. MS-LS1-6

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**B** Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. MS-LS1-7