

## Matter and Its Interactions (continued)

Standard	Learning Objective	Clarification Statement
<p><b>MS.PS1.5</b> 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.</p> <p><i>Assessment Boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.</i></p>	<p><b>5.0</b> Describe the <b>law of conservation</b> of matter.</p>	<p>Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.</p>
<p><b>MS.PS1.6</b> Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.</p> <p><i>Assessment Boundary: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.</i></p>	<p><b>6.0</b> Construct a device that releases or absorbs <b>thermal energy</b> by chemical processes.</p>	<p>Emphasis is on the design, controlling the transfer of energy to the environment, and modification of a device using factors such as type and concentration of a substance. Examples of designs could involve chemical reactions such as dissolving ammonium chloride or calcium chloride.</p>

## Motion and Stability: Forces and Interactions

Standard	Learning Objective	Clarification Statement
<p><b>MS.PS2.1</b> Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.</p> <p><i>Assessment Boundary: Assessment is limited to vertical or horizontal interactions in one dimension.</i></p>	<p><b>1.0</b> Apply <b>Newton's Third Law</b>.</p>	<p>Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle.</p>
<p><b>MS.PS2.2</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.</p> <p><i>Assessment Boundary: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time. Assessment does not include the use of trigonometry.</i></p>	<p><b>2.1</b> Investigate <b>Newton's First Law</b>. <b>2.2</b> Investigate <b>Newton's Second Law</b>.</p>	<p>Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units.</p>
<p><b>MS.PS2.3</b> Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.</p> <p><i>Assessment Boundary: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.</i></p>	<p><b>3.1</b> Determine the <b>factors that affect the strength of electric forces</b>. <b>3.2</b> Determine the <b>factors that affect the strength of magnetic forces</b>.</p>	<p>Examples of devices that use electric and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor.</p>