

# Grade 7 Science



## Priority Standards and Instructional Units

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## Unit 1: Kinetic Energy

<p style="text-align: center;"><b><u>MS-PS3-3</u></b></p> <p><b>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.]</b></p>	<b>Priority Standard</b>
<p style="text-align: center;"><b><u>MS-PS3-4</u></b></p> <p><b>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.]</b></p>	<b>Priority Standard</b>
<p style="text-align: center;"><b>MS-ETS1-1</b></p> <p>Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.</p>	Supporting Standard
<p style="text-align: center;"><b>MS-ETS1-2</b></p> <p>Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</p>	Supporting Standard
<p style="text-align: center;"><b>RST.6-8.1</b></p> <p>Cite specific textual evidence to support analysis of science and technical texts.</p>	Supporting Standard
<p style="text-align: center;"><b>RST.6-8.3</b></p> <p>Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p>	Supporting Standard
<p style="text-align: center;"><b>RST.6-8.9</b></p> <p>Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p>	Supporting Standard
<p style="text-align: center;"><b>WHST.6-8.7</b></p> <p>Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p>	Supporting Standard
<p style="text-align: center;"><b>WHST.6-8.8</b></p> <p>Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.</p>	Supporting Standard

<p style="text-align: center;"><b>WHST.6-8.9</b> Draw evidence from informational texts to support analysis, reflection, and research.</p>	Supporting Standard
<p style="text-align: center;"><b>MP.2:</b> Reason abstractly and quantitatively.</p>	Supporting Standard
<p style="text-align: center;"><b>6.SP.B.5</b> Summarize numerical data sets in relation to their context.</p>	Supporting Standard
<p style="text-align: center;"><b>7.EE.3</b> Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</p>	Supporting Standard

## Unit 2: Chemical Reactions

<b><u>MS-PS1-2</u></b>	
<b>Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. [Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.] [Assessment Boundary: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.]</b>	<b>Priority Standard</b>
<b><u>MS-PS1-5</u></b>	
<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. [Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.] [Assessment Boundary: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.]</b>	<b>Priority Standard</b>
<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.* [Clarification Statement: 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.] [Assessment Boundary: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.]	Supporting Standard
<b>RST.6-8.1</b>	
Cite specific textual evidence to support analysis of science and technical texts.	Supporting Standard
<b>RST.6-8.3</b>	
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	Supporting Standard
<b>RST.6-8.7</b>	
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	Supporting Standard
<b>WHST.6-8.7</b>	
Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	Supporting Standard
<b>MP.2</b>	
Reason abstractly and quantitatively.	Supporting Standard
<b>MP.4</b>	
Model with mathematics.	Supporting Standard
<b>6.RP.A.3</b>	
	Supporting Standard

Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.	
<b>6.SP.B.4</b> Display numerical data in plots on a number line, including dot plots, histograms, and box plots.	Supporting Standard
<b>6.SP.B.5</b> Summarize numerical data sets in relation to their context.	Supporting Standard

## Unit 3: Structure & Function

<b><u>MS-LS1-1</u></b>	
<b>Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. <i>[Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.]</i></b>	<b>Priority Standard</b>
<b><u>MS-LS1-2</u></b>	
<b>Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. <i>[Clarification Statement: Emphasis is on the cell functioning as a whole system and the primary role of identified parts of the cell, specifically the nucleus, chloroplasts, mitochondria, cell membrane, and cell wall.] [Assessment Boundary: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.]</i></b>	<b>Priority Standard</b>
<b><u>MS-LS1-6</u></b>	
<b>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. <i>[Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.] [Assessment Boundary: Assessment does not include the biochemical mechanisms of photosynthesis.]</i></b>	<b>Priority Standard</b>
<b>RST.6-8.1</b>	
Cite specific textual evidence to support analysis of science and technical texts.	Supporting Standard
<b>RI.6.8</b>	
Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.	Supporting Standard
<b>WHST.6-8.1</b>	
Write arguments focused on <i>discipline-specific content</i> .	Supporting Standard
<b>WHST.6-8.7</b>	
Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	Supporting Standard
<b>SL.8.5</b>	
Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.	Supporting Standard
<b>6.EE.C.9</b>	
Represent and analyze quantitative relationships between dependent and independent variables.	Supporting Standard

**6.SP.A.2**

Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

Supporting Standard



## Unit 4: Growth, Development, & Reproduction

<p style="text-align: center;"><b><u>MS-LS1-4</u></b></p> <p><b>Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. [Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds, and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.]</b></p>	<p><b>Priority Standard</b></p>
<p style="text-align: center;"><b><u>MS-LS1-5</u></b></p> <p><b>Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. [Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.] [Assessment Boundary: Assessment does not include genetic mechanisms, gene regulation, or biochemical processes.]</b></p>	<p><b>Priority Standard</b></p>
<p style="text-align: center;"><b>RST.6-8.1</b></p> <p style="text-align: center;">Cite specific textual evidence to support analysis of science and technical texts.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>RST.6-8.2</b></p> <p style="text-align: center;">Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>RI.6.8</b></p> <p style="text-align: center;">Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>WHST.6-8.1</b></p> <p style="text-align: center;">Write arguments focused on discipline-specific content.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>WHST.6-8.2</b></p> <p style="text-align: center;">Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>WHST.6-8.9</b></p> <p style="text-align: center;">Draw evidence from informational texts to support analysis, reflection, and research.</p>	<p>Supporting Standard</p>

<p style="text-align: center;"><b>6.SP.A.2</b></p> <p>Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p>	Supporting Standard
<p style="text-align: center;"><b>6.SP.B.4</b></p> <p>Display numerical data in plots on a number line, including dot plots, histograms, and box plots.</p>	Supporting Standard

## Unit 5: Body Systems

<p style="text-align: center;"><b>MS-LS1-3</b></p> <p>Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. <b>[Clarification Statement: Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems.] [Assessment Boundary: Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.]</b></p>	<p><b>Priority Standard</b></p>
<p style="text-align: center;"><b>MS-LS1-7</b></p> <p><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. [Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.] [Assessment Boundary: Assessment does not include details of the chemical reactions for photosynthesis or respiration.]</b></p>	<p><b>Priority Standard</b></p>
<p style="text-align: center;"><b>RST.6-8.1</b></p> <p>Cite specific textual evidence to support analysis of science and technical texts.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>RST.6-8.2</b></p> <p>Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>WHST.6-8.2</b></p> <p>Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>WHST.6-8.9</b></p> <p>Draw evidence from informational texts to support analysis, reflection, and research.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>SL.8.5</b></p> <p>Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>6.EE.C.9</b></p> <p>Represent and analyze quantitative relationships between dependent and independent variables.</p>	<p>Supporting Standard</p>

## Unit 6: Electromagnetic and Mechanical Waves

<p><b><u>MS-PS4-1</u></b></p> <p><b><i>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. [Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.] [Assessment Boundary: Assessment does not include electromagnetic waves and is limited to standard repeating waves.]</i></b></p>	<p><b>Priority Standard</b></p>
<p><b><u>MS-PS4-2</u></b></p> <p><b>Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.] [Assessment Boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.]</b></p>	<p><b>Priority Standard</b></p>
<p><b>MS-PS4-3</b></p> <p>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. [Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in wifi devices, and conversion of stored binary patterns to make sound or text on a computer screen.] [Assessment Boundary: Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.]</p>	<p>Supporting Standard</p>
<p><b>RST.6-8.1</b></p> <p>Cite specific textual evidence to support analysis of science and technical texts.</p>	<p>Supporting Standard</p>
<p><b>RST.6-8.2</b></p> <p>Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.</p>	<p>Supporting Standard</p>
<p><b>RST.6-8.7</b></p> <p>Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).</p>	<p>Supporting Standard</p>
<p><b>RST.6-8.9</b></p> <p>Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</p>	<p>Supporting Standard</p>
<p><b>WHST.6-8.9</b></p> <p>Draw evidence from informational texts to support analysis, reflection, and research.</p>	<p>Supporting Standard</p>
<p><b>SL.7.5</b></p> <p>Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.</p>	<p>Supporting Standard</p>

<p style="text-align: center;"><b>MP.2</b> Reason abstractly and quantitatively.</p>	<p style="text-align: center;">Supporting Standard</p>
<p style="text-align: center;"><b>MP.4</b> Model with mathematics.</p>	<p style="text-align: center;">Supporting Standard</p>
<p style="text-align: center;"><b>6.RP.A.1</b> Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."</i></p>	<p style="text-align: center;">Supporting Standard</p>
<p style="text-align: center;"><b>6.RP.A.3</b> Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.</p>	<p style="text-align: center;">Supporting Standard</p>
<p style="text-align: center;"><b>7.RP.A.2</b> Recognize and represent proportional relationships between quantities.</p>	<p style="text-align: center;">Supporting Standard</p>
<p style="text-align: center;"><b>7.EE.B.3</b> Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.</p>	<p style="text-align: center;">Supporting Standard</p>
<p style="text-align: center;"><b>8.F.A.3</b> Interpret the equation <math>y = mx + b</math> as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function <math>A = s^2</math> giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.</p>	<p style="text-align: center;">Supporting Standard</p>

## Unit 7: Magnetism & Electricity

<p style="text-align: center;"><b><u>MS-PS2-3</u></b></p> <p><b><i>Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. [Clarification Statement: 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.] [Assessment Boundary: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.]</i></b></p>	<p><b>Priority Standard</b></p>
<p style="text-align: center;"><b><u>MS-PS2-5</u></b></p> <p><b><i>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. [Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically-charged pith balls. Examples of investigations could include first-hand experiences or simulations.] [Assessment Boundary: Assessment is limited to electric and magnetic fields, and limited to qualitative evidence for the existence of fields.]</i></b></p>	<p><b>Priority Standard</b></p>
<p style="text-align: center;"><b>RST.6-8.1</b></p> <p style="text-align: center;">Cite specific textual evidence to support analysis of science and technical texts.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>RST.6-8.3</b></p> <p style="text-align: center;">Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>WHST.6-8.7</b></p> <p style="text-align: center;">Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>SL.7.5</b></p> <p style="text-align: center;">Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.</p>	<p>Supporting Standard</p>
<p style="text-align: center;"><b>MP.2</b></p> <p style="text-align: center;">Reason abstractly and quantitatively.</p>	<p>Supporting Standard</p>

## Unit 8: Transfer of Gravitational Energy

<p style="text-align: center;"><b><u>MS-PS2-4</u></b></p> <p><b>Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. [Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system.] [Assessment Boundary: Assessment does not include Newton's Law of Gravitation or Kepler's Laws.]</b></p>	<b>Priority Standard</b>
<p style="text-align: center;"><b><u>MS-PS3-2</u></b></p> <p><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. [Clarification Statement: 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.]</b></p>	<b>Priority Standard</b>
<p style="text-align: center;"><b><u>MS-PS3-5</u></b></p> <p><b>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.]</b></p>	<b>Priority Standard</b>
<p style="text-align: center;"><b>RST.6-8.1</b></p> <p style="text-align: center;">Cite specific textual evidence to support analysis of science and technical texts.</p>	Supporting Standard
<p style="text-align: center;"><b>WHST.6-8.1</b></p> <p style="text-align: center;">Write arguments focused on discipline-specific content.</p>	Supporting Standard
<p style="text-align: center;"><b>SL.7.5</b></p> <p style="text-align: center;">Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.</p>	Supporting Standard
<p style="text-align: center;"><b>MP.2</b></p> <p style="text-align: center;">Reason abstractly and quantitatively.</p>	Supporting Standard
<p style="text-align: center;"><b>6.RP.A.1</b></p> <p style="text-align: center;">Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."</i></p>	Supporting Standard
<p style="text-align: center;"><b>7.RP.A.2</b></p>	Supporting Standard

Recognize and represent proportional relationships between quantities.	
<p style="text-align: center;"><b>8.F.A.3</b></p> <p>Interpret the equation <math>y = mx + b</math> as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. <i>For example, the function <math>A = s^2</math> giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.</i></p>	Supporting Standard