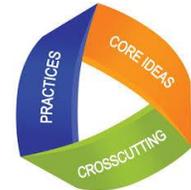


Grade 7 Science

Grade Level Overview | Seventh grade is a year long study of the crosscutting concepts of systems and system models. Students model and explain the interactions of living and nonliving systems in the environment and use the idea of systems and system models to design artificial body parts.

NGSS 3 Dimensions		
Disciplinary Core Ideas	Science and Engineering Principles	Crosscutting Concepts
Physical Science	Chemistry of Materials	Asking questions (for science) and defining problems (for engineering)
	Chemical Reactions	Developing and using models
Life Science	Ecology	Planning and carrying out investigations
		Analyzing and interpreting data
Earth and Space Science	Geological Processes	Using mathematics and computational thinking
	Earth's Resources	Constructing explanations and designing solutions
Engineering, Technology, & Applications of Science	Biomedical Engineering	Engaging in argument from evidence
	Chemical Reactions	Obtaining, evaluating, and communicating information



Unit: Chemistry of Materials

Essential Question	Performance Expectations	CCSS ELA	CCSS Math
What are the environmental impacts of producing, using, and disposing of materials?	<i>Students who demonstrate understanding can:</i>	Reading in Science and Technical Subjects	Mathematical Practice
	MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.		Reason abstractly and quantitatively.
	MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	Writing in History/Social Studies, Science, and Technological Subjects	Ratios and Proportional Reasoning
	MS-PS1-4: 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.		7.RP.A. Recognize and represent proportional relationships between quantities.

Unit: Chemical Reactions

Essential Question	Performance Expectations	CCSS ELA	CCSS Math	
How do people use chemical reactions to solve problems?	<i>Students who demonstrate understanding can:</i>	Reading in Science and Technical Subjects	Mathematical Practice	
	MS-PS1-2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.		Reason abstractly and quantitatively.	
	MS-PS1-5: 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.	Writing in History/Social Studies, Science, and Technological Subjects	Expressions and Equations	Statistics and Probability
	MS-PS1-6: Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.			
	MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	Speaking and listening	Engage effectively in a range of collaborative discussions.	
	MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.			

Unit: Ecology

Essential Question	Performance Expectations	CCSS ELA	CCSS Math	
How and why do organisms interact with their environment and what are the effects of these interactions?	<i>Students who demonstrate understanding can:</i>	Reading in Science and Technical Subjects	Mathematical Practice	
	MS-LS1-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		Reason abstractly and quantitatively.	
	MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	Writing in History/Social Studies, Science, and Technological Subjects	Expressions and Equations	Model with mathematics.
	MS-LS2-3: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.			
	MS-LS4-3: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	Speaking and listening	Statistics and Probability	GRP.A.1 Understand the concept of a ratio, and use ratio language to describe a ratio between two quantities.
	MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services.			GRP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
			SEE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.	

Unit: Geological Processes

Essential Question	Performance Expectations	CCSS ELA	CCSS Math
	<i>Students who demonstrate understanding can:</i>	Mathematical Practice	Reason abstractly and quantitatively.
	MS-ESS2-1: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.		Model with mathematics.

Where should we store our nuclear waste?	MS-ESS2-2: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	Reading in Science and Technical Subjects	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.	The Number System	6NSC.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/ below sea level, credits/debits, positive/negative electrical charge), use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of zero in each situation. 6RPA.1 Understand the concept of a ratio, and use ratio language to describe a ratio between two quantities. 7RP.A.1 Recognize and represent proportional relationships between quantities.
	MS-ESS2-3: Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.		Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks.		
	MS-ESS3-1: Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	Writing in History/Social Studies, Science, and Technological Subjects	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.		
	MS-ESS3-2: Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.		Write informative/explanatory texts to examine and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. Write arguments focused on discipline-specific content. Draw evidence from informational texts to support analysis, reflection, and research.		
		Speaking and listening	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound and valid reasoning, and well-chosen details: use appropriate eye contact, adequate volume, and clear pronunciation. Engage effectively in a range of collaborative discussions.		

Unit: Earth's Resources

Essential Question	Performance Expectations		CCSS ELA		CCSS Math
How is a growing human population affecting the availability of natural resources?	<i>Students who demonstrate understanding can:</i>	Reading in Science and Technical Subjects	Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks.	Mathematical Practice	Reason abstractly and quantitatively.
	MS-ESS1-4: Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.		Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.		Ratios and Proportional Reasoning
	MS-ESS3-1: Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	Writing in History/Social Studies, Science, and Technological Subjects	Write informative/explanatory texts to examine and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.	Statistics and Probability	6SP.B.5 Summarize numerical data sets in relation to their context.
	MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.		Write arguments focused on discipline-specific content. Draw evidence from informational texts to support analysis, reflection, and research.		

Unit: Biomedical Engineering

Essential Question	Performance Expectations		CCSS ELA		CCSS Math
How can engineering be used to improve the lives of those living with medical conditions?	<i>Students who demonstrate understanding can:</i>	Reading in Science and Technical Subjects	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	Mathematical Practice	Reason abstractly and quantitatively. Model with mathematics.
	MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.		Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.		Expressions and Equations
	MS-ETS1-3: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	Writing in History/Social Studies, Science, and Technological Subjects	Draw evidence from informational texts to support analysis, reflection, and research.	Ratios and Proportional Reasoning	6RP.A.1 Understand the concept of a ratio, and use ratio language to describe a ratio between two quantities. 6RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
	MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.		Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound and valid reasoning, and well-chosen details: use appropriate eye contact, adequate volume, and clear pronunciation.		

Social and Emotional Standards

Social and Emotional Standards		ISTE Standards			
Self-Awareness and Self-Management	SEL.7.1B.2 Recognize the outside influences on development of personal characteristics (examples include body image, self-esteem, behavior).	Empowered Learner	Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.		
	SEL.7.1C.1 Identify resources to help progress toward a goal (examples include research materials).	Creative Communicator	Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.		
	SEL.7.1C.3 Analyze how you might have made better use of supports and overcome obstacles in working on a recent goal. SEL.7.1C.4 Distinguish between a short and long-term goal. SEL.7.1C.5 Apply goal-setting skills to develop academic success.	Computational Thinker	Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.		
Social-Awareness and Relationship Skills	SEL.7.2A.2 Recall a situation where your behavior impacted the feelings of others either positively or negatively.	Knowledge Constructor	Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.		
	SEL.7.2B.2 Identify negative depictions of differences among people (examples include gender or sexual orientation stereotyping, discrimination against socioeconomic or culture minorities, prejudices based on misinformation in readings completed for coursework).	Digital Citizen	Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act and model in ways that are safe, legal and ethical.		
	SEL.7.2B.3 Explain how a lack of understanding of social and cultural differences can contribute to intolerance. SEL.7.2B.4 Evaluate ways of overcoming a lack of understanding of those who are different.	Global Collaborator	Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.		
Responsible Decision-Making	SEL.7.2C.5 Demonstrate an ability to both assume leadership and be a team player in achieving group goals.	Innovative Designer	Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.		
	SEL.7.3A.6 Judge the seriousness of unethical behaviors (examples include cheating, lying, stealing, plagiarism, etc).				
	SEL.7.3C.2 Identify responsibilities of citizenship (examples include obeying laws, serving on juries, being informed about issues, being involved in influencing public policy).				