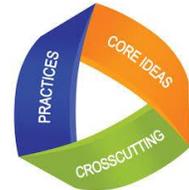


Grade 8 Science

Grade Level Overview Eighth grade is a year long study of the crosscutting concepts of scale, proportion, and quantity. Students explore and explain phenomena related to objects and interactions at a wide range of scales—from the molecules that comprise genes to the gravitational fields that operate within and beyond the solar system.

NGSS 3 Dimensions			
Disciplinary Core Ideas	Science and Engineering Principles	Crosscutting Concepts	
Physical Science	Force and Motion	Asking questions (for science) and defining problems (for engineering)	Patterns
	Fields and Interaction	Developing and using models	Cause and effect
	Waves	Planning and carrying out investigations	Scale, proportion, and quantity
Life Science	Reproduction	Analyzing and interpreting data	Systems and system models
	Evolution	Using mathematics and computational thinking	Energy and matter
		Constructing explanations and designing solutions	Structure and function
Earth and Space Science	Solar System and Beyond	Engaging in argument from evidence	Stability and change
		Obtaining, evaluating, and communicating information	
Engineering, Technology, & Applications of Science	Force and Motion		
	Fields and Interaction		



Unit: Force and Motion

Essential Question	Performance Expectations	CCSS ELA	CCSS Math
How can we reduce the risks of motor vehicle accidents?	<i>Students who demonstrate understanding can:</i>	Reading in Science and Technical Subjects	Mathematical Practice Reason abstractly and quantitatively.
	MS-PS2-1: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.		Ratios and Proportional Reasoning 6RP.A.2 Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. 7.RP.A. Recognize and represent proportional relationships between quantities.
	MS-PS2-2: 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.	Writing in History/Social Studies, Science, and Technological Subjects	Expressions and Equations 8EE.A.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
	MS-PS3-1: 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.		Statistics and Probability 6SP.B.5 Summarize numerical data sets in relation to their context.
	MS-ETS1-1: 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.		CCSS ELA Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. 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). Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks. 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. Draw evidence from informational texts to support analysis, reflection, and research. Write arguments focused on discipline-specific content.
	MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.		
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.			
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: Fields and Interaction

Essential Question	Performance Expectations	CCSS ELA	CCSS Math
How do different types of force fields help us design transportation?	<i>Students who demonstrate understanding can:</i>	Reading in Science and Technical Subjects	Mathematical Practice Reason abstractly and quantitatively.
	MS-PS2-3: Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.		Expressions and Equations 6EE.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 dependent variable, in terms of the other 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.
	MS-PS2-4: Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	Writing in History/Social Studies, Science, and Technological Subjects	Expressions and Equations 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. Write arguments focused on discipline-specific content. Draw evidence from informational texts to support analysis, reflection, and research.
	MS-PS2-5: 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.		Speaking and listening Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
	MS-PS3-2: 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-ETS1-1: 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.		
MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.			

Unit: Waves

Essential Question	Performance Expectations	CCSS ELA	CCSS Math
How are waves both helpful and harmful?	<i>Students who demonstrate understanding can:</i>	Reading in Science and Technical Subjects	Mathematical Practice Reason abstractly and quantitatively.
	MS-PS4-1: 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.		Model with mathematics
	MS-PS4-2: Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	Writing in History/Social Studies, Science, and Technological Subjects	Ratios and Proportional Reasoning 6RPA.1 Understand the concept of a ratio, and use ratio language to describe a ratio between two quantities. 7RPA1 Recognize and represent proportional relationships between quantities.
	MS-PS4-3: 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.		Draw evidence from informational texts to support analysis, reflection, and research.

Unit: Reproduction

Essential Question	Performance Expectations	CCSS ELA	CCSS Math
	<i>Students who demonstrate understanding can:</i>	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).	Reason abstractly and quantitatively.

What are the ethical issues involved in using genetic information?	MS-LS1-4: 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.	Reading in Science and Technical Subjects	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	Mathematical Practice	Model with mathematics.
	MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.		Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.		6SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution that can be described by its center, spread, and overall shape.
	MS-LS3-1: Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of an organism.	Reading Informational Text	Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks.	Statistics and Probability	6SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
	MS-LS3-2: Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.		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.		6SP.B5 Summarize numerical data sets in relation to their context.
		Writing in History/Social Studies, Science, and Technological Subjects	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.	Ratios and Proportional Reasoning	6RPA.1 Understand the concept of a ratio, and use ratio language to describe a ratio between two quantities.
			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	Engage effectively in a range of collaborative discussions.		

Unit: Evolution						
Essential Question	Performance Expectations		CCSS ELA		CCSS Math	
How are people affected by and affecting evolution?	<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-LS3-1: Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.		Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.		Model with mathematics.	
	MS-LS4-1: Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.		Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.	Ratios and Proportional Reasoning	6RPA.1 Understand the concept of a ratio, and use ratio language to describe a ratio between two quantities.	
	MS-LS4-2: Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.		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).	Statistics and Probability	6SP.B5 Summarize numerical data sets in relation to their context.	
	MS-LS4-3: Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.	Writing in History/Social Studies, Science, and Technological 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.			
	MS-LS4-4: Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.		Draw evidence from informational texts to support analysis, reflection, and research.			
	MS-LS4-5: Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.	Speaking and listening	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.			
	MS-LS4-6: Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.		Write informative/explanatory texts to examine and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.			
			Engage effectively in a range of collaborative discussions (e.g., one-on-one, in groups, teacher led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.			
			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.			

Unit: Solar System and Beyond						
Essential Question	Performance Expectations		CCSS ELA		CCSS Math	
What kinds of future space missions should we fund and conduct?	<i>Students who demonstrate understanding can:</i>	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.	Mathematical Practice	Reason abstractly and quantitatively.	
	MS-ESS1-1: Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.		Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.		Model with mathematics.	
	MS-ESS1-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.		Write informative/explanatory texts to examine and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.	Ratios and Proportional Reasoning	6RPA.1 Understand the concept of a ratio, and use ratio language to describe a ratio between two quantities.	
	MS-ESS1-3: Analyze and interpret data to determine scale properties of objects in the solar system.	Writing in History/Social Studies, Science, and Technological Subjects	Draw evidence from informational texts to support analysis, reflection, and research.			6SP.B5 Summarize numerical data sets in relation to their context.
			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.			
			Speaking and listening	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.		

Social and Emotional Standards		ISTE Standards			
Self-Awareness and Self-Management	SEL.8.1C.1 Set a goal that you could achieve in a month or two related to an area of interest (eg, a sport, hobby, musical instrument, etc).	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.8.1C.2 Establish action steps and timeframes toward achievement of this goal.	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.8.1C.3 Identify people who can help you achieve your goal and ask for help.	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.		
	SEL.8.1C.4 Monitor progress on achieving your goal and make adjustments in your plan as needed.	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.		
Social-Awareness and Relationship Skills	SEL.8.2A.1 Analyze why both parties in a conflict feel as they do.	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.8.2A.2 Recognize actions that hurt others.	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.		
	SEL.8.2A.3 Acknowledge the contributions of others.				
	SEL.8.2A.4 Provide support to others who are experiencing problems.				
Responsible Decision-Making	SEL.8.2B.1 Analyze the consequences of ignoring the rights of other people.				
	SEL.8.3B.1 Recognize the influence of peers on your social success.	Innovative Designer	Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.		