## Vocabulary

**Matter and Atoms**

atoms, molecule, element, matter, solid, liquid, gas, states of matter, proton, neutron, electron, nucleus, density, compound, thermal energy, kinetic energy, changes of state, condensation, vaporization, evaporation, melting, freezing, sublimation, boiling, Niels Bohr, particle, natural resource, synthetic materials, Periodic Table of Elements, Dmitri Mendeleev, chemistry

**Chemical Reactions**

chemical change, physical change, property, physical property, chemical property, conservation of mass/matter, odor, flammability, density, melting point, boiling point, solubility, chemical reaction, solution, mixture

## Crosscutting Concepts

| MS.PS1.1 | MS.PS1.3 | MS.PS1.4 | MS.PS1.2 | MS.PS1.5, 1.6 |
|---|---|---|---|---|
| Scale, Proportion, and Quantity<br><br>Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. | Structure and Function<br><br>Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. | Cause and Effect<br><br>Cause and effect relationships may be used to predict phenomena in natural or designed systems. | Patterns<br><br>Macroscopic patterns are related to the nature of microscopic and atomic-level structure. | Energy and MatterMatter is conserved because atoms are conserved in physical and chemical processes. (1.5)<br><br>The transfer of energy can be tracked as energy flows through a designed or natural system. (1.6) |

## Resources *

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# Seventh Grade • First Quarter Pacing Guide

# Science

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# Grade 7 Science First Quarter

| Matter & Atoms MS.PS1.1 | Matter & Atoms MS.PS1.3 | Matter & Atoms MS.PS1.4 | Chemical Reactions MS.PS1.2 | Chemical Reactions MS.PS1.5 | Chemical Reactions MS.PS1.6 |
|---|---|---|---|---|---|
| **I CAN STATEMENT** | | | | | |
| ☐ **I CAN** develop models to describe the atomic composition of simple molecules and extended structures. | ☐ **I CAN** gather and make sense of information to describe that synthetic materials come from natural resources and impact society. | ☐ **I CAN** 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. | ☐ **I CAN** analyze and interprete data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. | ☐ **I CAN** develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is | ☐ **I CAN** undertake a design project to construct, test and modify a device that either releases or absorbs thermal energy by chemical processes. |
| **Standard** | | | | | |
| **Develop models to describe the atomic composition of simple molecules and extended structures.**<br><br>*Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawings, 3D ball and stick structures, or computer representations* | **Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.**<br><br>*Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.* | **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.**<br><br>*Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawings and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water,* | **Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.**<br><br>*Clarification Statement: Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with hydrogen chloride.* | **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.**<br><br>*Clarification Statement: Emphasis is on law of conservation of matter and on physical models or drawings, including digital forms, that represent atoms.* | **Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.***<br><br>*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* |
| **Science and Engineering Practices** | | | | | |
| **Developing and Using Models**<br>Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.<br>► Develop a model to predict and/or describe phenomena. | **Obtaining, Evaluating, and Communicating Information**<br>Obtaining, evaluating, and communicating information in 6–8 builds on K–5 and progresses to evaluating the merit and validity of ideas and methods.<br>► Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported | **Developing and Using Models**<br>Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.<br>► Develop a model to predict and/or describe phenomena. | **Analyzing and Interpreting Data**<br>Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.<br>► Analyze and interpret data to determine similarities and differences in findings. | **Developing and Using Models**<br>Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.<br>► Develop a model to describe unobservable mechanisms. | **Constructing Explanations and Designing Solutions**<br>Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.<br>► Undertake a design project, engaging in the design cycle, to construct and/or implement |

## Vocabulary

**Cells: Structure, Function, and Information Processing**

cytoplasm, mitochondria, vacuole, cell wall, cell membrane, nucleus, chloroplast, chromosome, nucleolus, tissue, chlorophyll, organelle, cell, golgi complex, lysosome, ribosome, endoplasmic reticulum, cell theory, Robert Hooke, Anton van Leeuwenhoek,

## Crosscutting Concepts

**MS.LS1.1**
**Scale, Proportion, and Quantity**
Phenomena that can be observed at one scale may not be observable at another scale.

**MS.LS1.2**
**Structure and Function**
Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/ systems can be analyzed to determine how they function.

**MS.LS1.3**
**Systems and System Models**
Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems.

**MS.LS1.8**
**Cause and Effect**
Cause and effect relationships may be used to predict phenomena in natural systems.

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Seventh Grade • Second Quarter

Pacing Guide

# Science

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# Grade 7 Science Second Quarter

| Cells: Structure, Function, and Information Processing MS.LS1.1 | Cells: Structure, Function, and Information Processing MS.LS1.2 | Cells: Structure, Function, and Information Processing MS.LS1.3 | Cells: Structure, Function, and Information Processing MS.LS1.8 |
|---|---|---|---|
| **I CAN STATEMENT** | | | |
| ☐ **I CAN** conduct an investigation to provide evidence that living things are made of cells; either one cellor many different number and types of cells. | ☐ **I CAN** develop and use a model to describe the function of a cell as awhile and ways parts of cells contribute to the function. | ☐ **I CAN** use an argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. | ☐ **I CAN** gather and synthesize information that sensory immediate behavior or storage as memories. |
| **Standard** | | | |
| **Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.**<br><br>*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.* | **Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.**<br><br>*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.* | **Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.**<br><br>*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.* | **Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.** |
| **Science and Engineering Practices** | | | |
| **Planning and Carrying Out Investigations**<br><br>Planning and carrying out investigations in 6-8 builds on K- 5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.<br>► Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. | **Developing and Using Models**<br><br>Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.<br>► Develop and use a model to describe phenomena. | **Engaging in Argument from Evidence**<br><br>Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).<br>► Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon. | **Obtaining, Evaluating, and Communicating Information**<br><br>Obtaining, evaluating, and communicating information in 6-8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods.<br>► Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. |

## Vocabulary

**Growth, Development, and Reproduction of Organisms**

unicellular, multicellular, red blood cells, muscle cells, skin cells, indentify, nucleus, chloroplasts, mitochondria, cell membrane, cell wall, function, organelles, living cells organisms, non-living organisms, system, tissues, organs, organ systems, genotype, phenotype, Punnett square

## Crosscutting Concepts

**MS.LS1.4, 1.5**

**Cause and Effect**
Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

**MS.LS3.1**

**Structure and Function**
Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function.

**MS.LS3.2**

**Cause and Effect**
Cause and effect relationships may be used to predict phenomena in natural systems.

**MS.LS4.5**

**Cause and Effect**
Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability.

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# Seventh Grade • Third Quarter Pacing Guide

# Science

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# Grade 7 Science Third Quarter

| Growth, Development, and Reproduction of Organisms MS.LS1.4 | Growth, Development, and Reproduction of Organisms MS.LS1.5 | Growth, Development, and Reproduction of Organisms MS.LS3.1 | Growth, Development, and Reproduction of Organisms MS.LS3.2 | Growth, Development, and Reproduction of Organisms MS.LS4.5 |
|---|---|---|---|---|
| **I CAN STATEMENT** | | | | |
| ☐ **I CAN** 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 animal and plants respectively. | ☐ **I CAN** construct a scientific explanation based on evidence for how environmenal and genetic factors influence the growth of organisms. | ☐ **I CAN** 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. | ☐ **I CAN** 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. | ☐ **I CAN** gather and synthesize information about the technologies that have changed the way inheritance of desired traits in organisms. |
| **Standard** | | | | |
| **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.**<br>*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.* | **Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.**<br>*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.* | **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.**<br>*Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins.* | **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.**<br>Clarification Statement: Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause and effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation. | **Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.**<br>Clarification Statement: Emphasis is on synthesizing information from reliable sources about the influence of humans on genetic outcomes in artificial selection (such as genetic modification, animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries. |
| **Science and Engineering Practices** | | | | |
| **Engaging in Argument from Evidence**<br>Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).<br>► Use an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. | **Constructing Explanations and Designing Solutions**<br>Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.<br>► Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. | **Developing and Using Models**<br>Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.<br>► Develop and use a model to describe phenomena. | **Developing and Using Models**<br>Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.<br>► Develop and use a model to describe phenomena. | **Obtaining, Evaluating, and Communicating Information**<br>Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.<br>► Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. |

## Vocabulary

## Crosscutting Concepts

**MS.LS1.6**
**Energy and Matter**

Within a natural system, the transfer of energy drives the motion and/or cycling of matter.

**MS.LS1.7**
**Energy and Matter**

Matter is conserved because atoms are conserved in physical and chemical processes.

**MS.ESS2.5**
**Cause and Effect**

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

**MS.ESS3.5**
**Stability and Change**

Stability might be disturbed either by sudden events or gradual changes that accumulate over time.

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Seventh Grade • Fourth Quarter

# Pacing Guide

# Science

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# Grade 7 Science Fourth Quarter

| Matter and Energy in Organisms and Ecosystems MS.LS1.6 | Matter and Energy in Organisms and Ecosystems MS.LS1.7 | Weather and Climate MS.ESS2.5 | Weather and Climate MS.ESS2.6 | Weather and Climate MS.ESS3.5 |
|---|---|---|---|---|
| **I CAN STATEMENT** | | | | |
| ☐ **I CAN** construct a scientific explanation based on evidence for photosynthesis in the cycling of matter and flow of energy into and out of organisms. | ☐ **I CAN** develop a model to describe how food is arranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. | ☐ **I CAN** collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. | ☐ **I CAN** develop a model to show how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. | ☐ **I CAN** ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. |
| **Standard** | | | | |
| **Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.**<br><br>*Clarification Statement:*<br>*Emphasis is on tracing movement of matter and flow of energy.* | **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.**<br><br>*Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.* | **Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.**<br><br>*Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather(defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).* | **Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.**<br><br>*Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.* | **Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.**<br><br>*Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.* |
| **Science and Engineering Practices** | | | | |
| **Constructing Explanations and Designing Solutions**<br><br>Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.<br>► Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. | **Developing and Using Models**<br><br>Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.<br>► Develop a model to describe unobservable mechanisms. | **Planning and Carrying Out Investigations**<br><br>Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.<br>► Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. | **Developing and Using Models**<br><br>Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.<br>► Develop and use a model to describe phenomena. | **Asking Questions and Defining Problems**<br><br>Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.<br>► Ask questions to identify and clarify evidence of an argument. |