How Stile aligns to the NGSS and suggested sequence of work

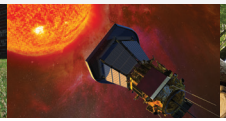
Suggested sequence of work

Grade 6


Cells


Body Systems


The Nervous System


Our place in Space


Resources


The Water Cycle


States of Matter

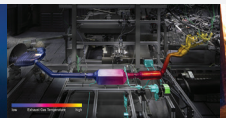

Physical and Chemical Change


Elements and Compounds

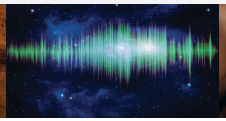
Grade 7


Ecosystems


Active Earth


Energy

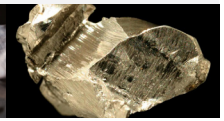

Thermal Energy (Heat)


Waves


Electromag-netism


Digital and Analog Signals


Chemical Reactions


Material Chemistry

Grade 8


Plants

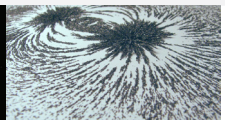

Genetics


Evolution


Earth's Systems


Reactions and Energy


Newton's Laws


Fields

How Stile aligns to the NGSS

Real world phenomena drive the unit and connections are also made to advances in Science, Engineering and Technology

Disciplinary Core Ideas are covered throughout the core lessons of the unit.

Crosscutting Concepts are explored as students learn about Scale, Proportion and Quantity

Students apply **Science and Engineering Practices** as they develop an understanding of cell models.

Crosscutting Concepts of Structure and Function are explored as students visualize, model and describe the structure and function of cell organelles.

Cells

Introduction: Battle of the burgers

1.1 Lesson: The building blocks of life
1.2 Extension: Sizes of cells
1.3 Lesson: Introduction to microscopes
1.4 Practical activity: Using a microscope
1.5 Practical: Measuring with microscopes
1.6 Extension: Cell theory

2.1 Lesson: Parts of a cell
2.2 Lesson: Animal vs. plant cells
2.3 Practical activity: Make a cell model
2.4 Lesson: Cells under the microscope
2.5 Practical: Observing plant and animal cells

3.1 Lesson: Specialized cells
3.2 Project: Putting cells to work
3.3 Extension: Cell biology and Aboriginal art
3.4 Extension: Mythbusters – Cell division

4.1 Lesson: Science and society
4.2 Career profile

Glossary

Test: Cells

Students apply **Science and Engineering Practices** as they create thier own cell models.

Students apply **Science and Engineering Practices** as they conduct investigations to collect data as evidence to meet the goals of the investigation.

Connections to **Common Core State Standards in Literacy** are possible as students conduct a short research project on specialized cells, drawing on several sources.

Students explore a phenomena from different perspectives through a Socratic Seminar. This also ties to **Common Core State Standards in Litearcy** as they can explore this issue through multiple avenues.

Career profiles showcase individuals exploring wonderful and fascinating careers related to STEM

A summative test checks for understanding across the **Disciplinary Core Ideas**, as well as Science and Engineering Practices and Crosscutting Concepts.

Life sciences

MS. Structure, Function, and Information Processing

Cells

Focusing on the essential question “how can we grow beef burgers in a lab using cells?”, this unit explores what cells are and cell structure and function. Highlights of the unit include a socratic seminar where students debate the ethics of cultured meat and a practical activity where students observe plant and animal cells under the microscope.

MS-LS1-1

Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

MS-LS1-2

Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.

Body Systems

This unit explores the body systems of humans and those of other animals. Students zoom in to examine the digestive, circulatory, respiratory and excretory systems. Highlights of the unit include creating a physial model of a lung and an investigation in the effects of low- and high-intensity exercise on heart rate. .

MS-LS1-3

Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MS. Structure, Function, and Information Processing

The Nervous System

Centred around the central question “could machines sniff out cancer better than dogs?”, students explore the nervous system, the role of neurons and the different kinds of sensory receptors. They also examine how the sense of smell works. Highlights include an investigation into taste and smell and a career profile on a behavioural psychologist who specializes in human-dog relationships.

MS-LS1-8

Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

MS. Matter and Energy in Ecosystems

Ecosystems

Focusing on the essential question “how can we prevent plastic from harming marine life?”, this unit explores how organisms interact with biotic and abiotic factors in ecosystems, how energy and matter flow through ecosystems and how humans can impact ecosystems both positively and negatively. Highlights of the unit include a simulation where students create their own marine environment, an engineering challenge where students build a device to clean our oceans and an investigation where students create an ecosystem model.

MS-LS1-6

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

MS-LS1-7

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.

MS-LS2-1

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem

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-LS2-4

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS2-4

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS. Interdependent Relationships in Ecosystems

Ecosystems

Focusing on the essential question “how can we prevent plastic from harming marine life?”, students also examine real-world data to understand different relationships among organisms, and the importance of biodiversity for healthy ecosystems.

MS-LS2-2

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems

MS-LS2-5

Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MS. Growth, Development, and Reproduction of Organisms

Plants

This unit explores some of the most unique types of plants – carnivorous plants! Students examine plant organs, plant structures and the importance of pollinators to sure successful reproduction of plants. Unit highlights include a practical activity where students observe plant cells under a microscope and a career profile of a botanical artist.

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.

MS. Growth, Development, and Reproduction of Organisms

Genetics

This unit is centred around the essential question “how can genes increase the risk of cancer?” Within the unit, students explore what genes are and how they’re passed from one generation to the next. A practical activity where students extract DNA from strawberries, a project where students construct a family tree and a career profile on a genetic counselor are some of the highlights of the unit.

MS-LS1-5

Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

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.

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.

MS-LS4-5

Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.

MS. Natural Selection and Adaptations

Evolution

The essential question for this unit asks students to consider “what do Mexican short-tailed bats and military submarines have in common?” They explore how humans have used science and engineering to develop sonar technology, but bats have evolved theirs over millions of years. Within this unit students explore natural selection and evidence of evolution. Highlights of this until include an interactive simulation to model natural selection in a population of frogs and a debate as to whether humans are still evolving.

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

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.

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.

MS-LS4-4

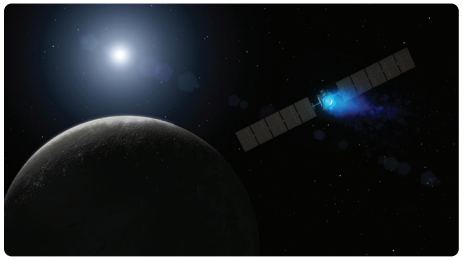
Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals’ probability of surviving and reproducing in a specific environment.

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.

Physical sciences

MS. Forces and Interactions



Newton's Laws

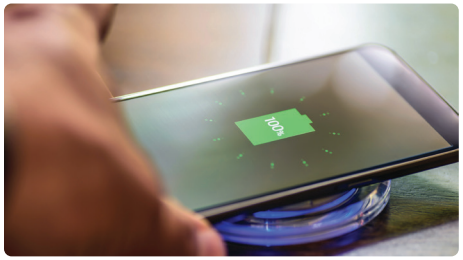
Focused around the essential question "how can we use physics to solve crash scene investigations?", this unit explores the three Laws of Motion. Unit highlights include practical activities to demonstrate each of the Laws, investigations where students create water rockets and a science and society project where students discuss what speed limits should be in built up areas. A vehicle collision investigator is the career profile for the unit.

MS-PS2-1

Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

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.



Magnetism

This unit is centred around the phenomena of a wireless self-charging room designed by the Disney Research Lab. This unit explores how electromagnetic forces can be attractive or repulsive and how they can be used to create electric currents. Students explore cause and effect as they investigate electromagnets and apply science and engineering practices as they make a simple electric motor.

MS-PS2-3

Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

MS. Forces and Interactions

Forces

Focused around the essential question “how can we use physics to solve crash scene investigations?”, this unit explores the three Laws of Motion. Unit highlights include practical activities to demonstrate each of the Laws, investigations where students create water rockets and a science and society project where students discuss what speed limits should be in built up areas. A vehicle collision investigator is the career profile for the unit.

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.

Fields - (Coming soon)

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.

MS. Energy

Energy - Coming Soon

This unit is centred around the overarching theme of how engineers are taking inspiration from nature to improve renewable energy technology. Within this unit, students examine kinetic energy, potential energy and the transfer of energy from one object to another. Unit highlights include an investigation to examine different forms of energy and the effect of gravitational potential energy when dropping the same object from different heights.

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.

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-PS3-5

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

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Heat

In this unit students explore the secret ingredient to the perfect pizza – heat! Within this unit students explore the transfer of thermal energy from one object to another. They also apply science and engineering practices as they investigate the difference between insulators and conductors and build a solar oven in an engineering challenge.

MS-PS3-3

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

MS-PS3-4

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.

MS. Waves and Electromagnetic Radiation

Light

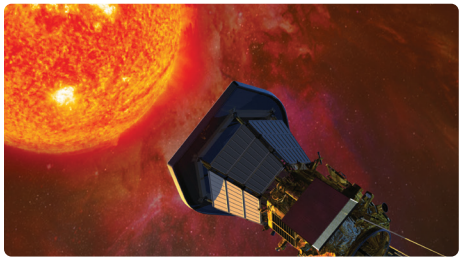
In this unit students explore the relationship between light and colour to appreciate the beauty of the natural world around them. Students examine models for waves that include how the amplitude of the wave is related to the energy of the wave. Students explore whether waves are reflected, absorbed or transmitted through various materials. Highlights of the unit include a practical activity where students use science and engineering practices to examine properties of bubbles.

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.

MS-PS4-2

Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.



Signals - (Coming soon)

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.

MS. Structure and Properties of Matter

Elements and Compounds

This unit asks the essential question “what happens if the world runs out of helium?”, as students explore the difference between elements and compounds and the atomic composition of simple molecules. Highlights of this unit include an investigation where students burn magnesium to work out which compound is produced and a career profile on a flavour chemist.

MS-PS1-1

Develop models to describe the atomic composition of simple molecules and extended structures

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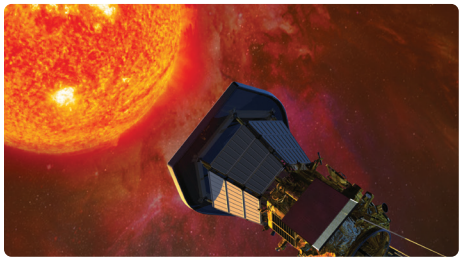


Materials Chemistry - (Coming soon)

MS-PS1-3

Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

States of Matter

Focusing on the essential question “how can we supply water to colonies on Mars?”, this unit explores models of atoms in solids, liquids and gases and how atoms respond to temperature changes. Highlights of the unit include an investigation where students observe changes in state and a project where students describe what life on Mars could be like.

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.

MS. Chemical Reactions

Physical and Chemical Changes

Students bite into this tasty unit as they explore the science of chocolate. Throughout the unit they consider the difference between physical and chemical properties and what signs to look for that a chemical change has taken place. Highlights of this unit include an investigation into three mystery chemicals and a career profile that explores how a professional chocolate taster applies STEM skills to their job.

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.

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.

Reactions and Energy

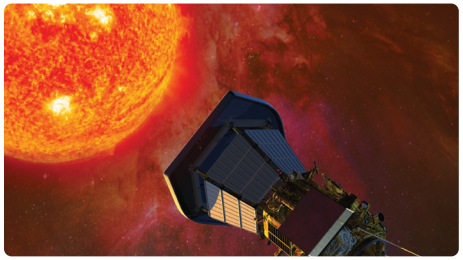
Within this unit students conduct an engineering challenge to design, construct and a hand warming device.

MS-PS1-6

Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

Earth and space sciences

MS. Space Systems



Our Place in Space

This unit explores our place in space. Students examine the solar system, the objects within it and the role of gravity in the motion of those objects. They then zoom in on Earth to understand the relationship between the Sun, Earth and Moon to understand the phases of the moon, eclipses and seasons. Highlights of the unit include opportunities to create physical models to explain the reason behind day and night and the phases of the Moon.

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.

MS-ESS1-2

Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

MS-ESS1-3

Analyze and interpret data to determine scale properties of objects in the solar system.

MS. History of Earth

Active Earth

Students develop an appreciation of the ever-changing planet Earth as they explore this unit through the context of the 2015 Nepal Earthquake. Within this unit students explore the different types of plate tectonics and how these have created ocean floors and continental crust. They examine patterns in rocks and fossils to understand how Earth's plates have moved great distances. An interactive simulations of the different types of plate tectonics is a unit highlight.

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.

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.

MS-ESS2-2

Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

MS. Earth's Systems

The Rock Cycle

Students develop an appreciation of the ever-changing planet Earth as they explore this unit through the context of the 2015 Nepal Earthquake. Students explore the processes of melting, crystallization, weathering, deformation and sedimentation to understand the rock cycle. An interactive simulation of the rock cycle is a unit highlight.

MS-ESS2-1

Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

The Water Cycle

Focusing on the essential question "would you drink your own urine?", students explore the importance of recycling water on the International Space Station. To do this they examine the water cycle and the states of matter. Building a solar still to purify salt water and stimulate aspects of the water cycle is a unit highlight.

MS-ESS2-4

Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity

MS. Weather and Climate

Resources

Focusing on the essential question “how has our use of resources changed over time?”, students examine what resources are, the difference between renewable and non-renewable resources and how we can use them more sustainably. Unit highlights include an interactive simulation that allows students to explore the natural resources that go into making items in a bedroom and an interactive simulation that explores how energy use at home affects coal consumption.

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.

Earth Systems

This unit provides the building blocks to understand the science behind climate change. Within this unit students examine the difference between climate and weather, ocean currents and greenhouse gases. A unit highlight includes a citizen science project where students help track CO2 levels and an interactive simulation where they help to terraform a planet.

MS-ESS2-5

Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.

MS-ESS3-5

Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century

MS-ESS2-6

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.

MS. Human Impacts

Active Earth

Students develop an appreciation of the ever-changing planet Earth as they explore this unit through the context of the 2015 Nepal Earthquake. They examine evidence that allows for reliable predictions of natural hazards such as volcanic eruptions and earthquakes. A unit highlight includes an interactive where students examine evidence of past earthquakes and volcanic eruptions to predict where they may occur in the future.

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.

Ecosystems

Focusing on the essential question “how can we prevent plastic from harming marine life?”, this unit explores how we can minimize human impact on the natural environment. Highlights of the unit include a simulation that examines how events such as plastic pollution and agricultural runoff affect ecosystem populations and an engineering challenge where students build a device to clean our oceans and an investigation where students create an ecosystem model.

MS-ESS3-3

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment