



Grade 8 Science

Achievement Level Descriptions

Grade 8 Statewide Science Assessment Reporting Category — Nature of Science

Students performing at the mastery level of this reporting category will be able to identify the test and outcome variables, differentiate experiments and investigations, analyze information to make inferences or predictions, differentiate replication and repetition, and distinguish between theories and laws.

Achievement Level	Achievement Level Descriptions
Level 5	<p><u>Students will consistently be able to</u></p> <ul style="list-style-type: none">• apply scientific thinking to evaluate an investigation;• analyze an experimental procedure to identify a design flaw and propose a method for correcting it;• distinguish between an experiment and other scientific investigations and assess the limitations and benefits of each;• evaluate the use of hypotheses in the design and evaluation of experiments;• analyze the test and outcome variables of an experiment;• analyze and interpret data to make inferences and predictions and to defend conclusions;• compare and evaluate the use and importance of repetition versus replication in a scientific investigation;• evaluate the reasons why and conditions under which scientific knowledge is subject to change;• provide justification to distinguish between scientific theories and laws;• analyze and evaluate the benefits and limitations of various models and methods used in different fields of science; and• analyze the role of technology and how it is essential to science.

<p style="text-align: center;">Level 4</p>	<p><u>Students will usually be able to</u></p> <ul style="list-style-type: none"> • apply scientific thinking to evaluate an investigation; • evaluate an experiment to identify a design flaw and choose a method for correcting it; • distinguish between an experiment and other scientific investigations and identify the limitations and benefits of each; • relate the use of hypotheses in the design and evaluation of experiments; • distinguish between test and outcome variables in a given scientific experiment; • analyze and interpret data to make inferences and predictions and to defend conclusions; • distinguish between and explain the need for repetition and replication; • relate the reasons why scientific knowledge is subject to change; • distinguish between scientific theories and laws; • evaluate the benefits and limitations of various models and/or methods used in different fields of science; and • evaluate the role of technology and relate how it is essential to science.
<p style="text-align: center;">Level 3</p>	<p><u>Students will generally be able to</u></p> <ul style="list-style-type: none"> • apply scientific thinking to evaluate an investigation; • evaluate an experiment for flaws and identify those flaws; • distinguish between an experiment and other scientific investigations; • evaluate the value of hypotheses; • identify test and outcome variables in a given scientific experiment; • identify inferences, predictions, and/or conclusions that are based on data in an experiment; • distinguish between repetition and replication; • recognize that scientific knowledge is subject to change; • recognize examples of scientific theories and laws; • identify the benefits and limitations of common models; and • identify the role of technology and how it is essential to science.

<p style="text-align: center;">Level 2</p>	<p><u>Students may be able to demonstrate limited ability to</u></p> <ul style="list-style-type: none"> • identify an investigation that uses scientific thinking; • recognize a hypothesis; • recognize a variable in a scientific experiment; • use simple data to draw a conclusion; • identify examples of repetition and replication; • recognize that some scientific knowledge has changed; • recognize the benefits of using scientific models; and • recognize the value of technology used in science.
<p style="text-align: center;">Level 1</p>	<p>Performance at this level indicates an inadequate level of success with the challenging content of the <i>Next Generation Sunshine State Standards</i> for science.</p>

Grade 8 Statewide Science Assessment Reporting Category — Earth and Space Science

Students performing at the mastery level of this reporting category will be able to relate the positions of the Sun, Moon, and Earth that result in tides, moon phases, and eclipses. Students will be able to identify how Earth changes due to weathering, erosion, and plate tectonics. Students will be able to recognize that the Sun’s energy influences global atmospheric patterns.

Achievement Level	Achievement Level Descriptions
<p align="center">Level 5</p>	<p><u>Students will consistently be able to</u></p> <ul style="list-style-type: none"> • compare relative distance and relative size in terms of light and space travel, as well as general composition of astronomical bodies in the universe; • classify stars using data, observations, and physical properties; • analyze models of solar properties and solar characteristics; • differentiate the characteristics of objects in the Solar System; • relate the role of gravity to the formation and motion of planets, stars, and solar systems; • analyze, from a historical perspective, why scientists created different models of the Solar System; • analyze how astronomical bodies in the Solar System affect each other; • analyze how patterns in the rock cycle relate to surface and subsurface events and landform formations; • analyze and give examples of the impact humans have had on Earth; • evaluate physical evidence to determine if it supports scientific theories that Earth has evolved, including scientific methods for measuring geologic time; • interpret the scientific theory of plate tectonics and how it relates to surface and subsurface structures and events; • relate the composition of the layers of Earth and how they interact; • differentiate and analyze interactions among Earth’s spheres, including cycling of water and global patterns that influence both weather and climate; • analyze the composition and function of the layers of Earth’s atmosphere and relate how it protects life and insulates the planet; • analyze how energy provided by the Sun influences global patterns of atmospheric movement and temperature differences between air, water, and land; and • differentiate convection, conduction, and radiation in both the Sun’s and the Earth’s systems.

<p>Level 4</p>	<p><u>Students will usually be able to</u></p> <ul style="list-style-type: none"> • compare relative distance, relative size, and general composition of astronomical bodies in the universe; • classify stars using data, observations, and physical properties; • evaluate models of solar properties and solar characteristics; • compare and contrast the characteristics of objects in the Solar System; • relate the role of gravity to the formation and motion of planets, stars, and solar systems; • compare historical models of the Solar System; • relate the effect of astronomical bodies on each other including the effect of the Sun and the Moon on Earth; • relate the patterns in the rock cycle to surface and subsurface events and landform formation; • identify examples of the impact humans have had on Earth; • evaluate physical evidence that supports scientific theories that Earth has evolved, including scientific methods for measuring geologic time; • relate the occurrence of geologic events and the formation of surface and subsurface structures to the scientific theory of plate tectonics; • compare the composition of the layers of Earth; • differentiate interactions among Earth's spheres, including cycling of water and global patterns that influence both weather and climate; • relate the composition and function of the layers of Earth's atmosphere to how it protects life and insulates the planet; • evaluate how energy provided by the Sun influences global patterns of atmospheric movement and temperature differences between air, water, and land; • evaluate the cause of different global patterns of atmospheric movement and temperature differences between air, water, and land; and • compare convection, conduction, and radiation in both the Sun's and Earth's systems.
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<p>Level 3</p>	<p><u>Students will generally be able to</u></p> <ul style="list-style-type: none"> • distinguish among the relative distance, relative size, and general composition of astronomical bodies in the universe; • identify the physical properties of stars; • compare models of solar properties; • identify solar properties on a model; • compare and contrast the characteristics of objects in the Solar System; • identify the role that gravity plays in the formation and motion of planets, stars, and solar systems; • compare common historical models of the Solar System; • recall the effect of astronomical bodies on each other, including the effect of the Sun and the Moon on Earth; • identify patterns in the rock cycle and their effect on surface and subsurface events and landform formation; • identify the impact humans have had on Earth; • interpret physical evidence that supports scientific theories that Earth has evolved, including scientific methods for measuring geologic time; • relate the scientific theory of plate tectonics to surface and subsurface structures and geologic events; • identify the layers of Earth; • recognize relationships among Earth's spheres, including cycling of water and global patterns that influence both weather and climate; • identify the composition and structure of the atmosphere and how the atmosphere protects life and insulates the planet; • relate how energy provided by the Sun influences global patterns of atmospheric movement and temperature differences between air, water, and land; and • compare convection, conduction, and radiation in both the Sun's and Earth's systems.
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<p style="text-align: center;">Level 2</p>	<p><u>Students may be able to demonstrate limited ability to</u></p> <ul style="list-style-type: none"> • recognize relative distance and relative size of astronomical bodies in the universe; • identify some of the physical properties of stars; • recognize some solar properties on models; • identify the characteristics of objects in the Solar System; • recognize that gravity plays a role in the formation and motion of planets, stars, and solar systems; • recognize historical models of the Solar System; • recognize some of the relationships between the Sun, Moon, and Earth; • recognize the steps of the rock cycle; • recognize that there are a variety of different landforms on Earth’s surface; • identify some impacts humans have had on Earth; • recognize that Earth has evolved over geologic time; • recognize that the movements of Earth’s plates result in various geologic events; • identify some of the layers of Earth; • identify some interactions among Earth’s spheres; • identify that the cycling of water influences both weather and climate; • recognize that the atmosphere protects life and insulates the planet; and • recognize that the Sun influences temperature differences between air, water, and land.
<p style="text-align: center;">Level 1</p>	<p>Performance at this level indicates an inadequate level of success with the challenging content of the <i>Next Generation Sunshine State Standards</i> for science.</p>

Grade 8 Statewide Science Assessment Reporting Category — Physical Science

Students performing at the mastery level of this reporting category will be able to classify substances by physical properties, differentiate physical and chemical change, distinguish between kinetic and potential energy, and differentiate contact forces and forces acting at a distance.

Achievement Level	Achievement Level Descriptions
<p align="center">Level 5</p>	<ul style="list-style-type: none"> • classify and compare substances using data, observations, and measureable physical properties; • calculate and analyze the densities of various materials using data; • analyze models of the scientific theory of atoms and the motion of atomic particles; • analyze how elements are grouped in the Periodic Table of the Elements according to similar properties and determine how they combine to produce compounds; • compare and classify the properties of compounds, including acids, bases, and/or salts; • analyze the properties of substances to determine if they are mixtures or pure substances; • determine whether a physical and chemical change has occurred through observations; • relate how mass is conserved when substances undergo physical or chemical changes; • compare the characteristics of waves using the electromagnetic spectrum; • analyze how waves move at different speeds through different materials; • evaluate how evidence from experiments or investigations supports that light waves can be reflected, refracted, or absorbed; • analyze the transformation of energy from one form to another; • differentiate potential energy and kinetic energy; • evaluate evidence that supports of the Law of Conservation of Energy; • cite evidence that heat flows in predictable ways; • use data to prove that adding heat to or removing heat from a system may result in a temperature change and possibly a change in state; • analyze different types of forces acting on objects; • analyze the relationship among distance, mass, and gravitational force between two objects; • differentiate mass and weight; • analyze observations and investigations to determine when a force acting on an object changes its speed and/or direction; and • analyze data of moving objects and interpret an object’s motion.

Level 4

Students will usually be able to

- classify and compare substances based on their measurable physical properties;
- calculate and evaluate the densities of various materials;
- apply knowledge of atoms and the motion of atomic particles;
- relate that all elements are grouped in the Periodic Table of the Elements according to similar properties and that they combine to produce compounds;
- compare and classify the properties of compounds, including acids, bases, and/or salts;
- distinguish between pure substances and mixtures;
- differentiate between physical and chemical changes;
- relate how the Law of Conservation of Mass applies to physical and chemical changes;
- compare the characteristics of waves using the electromagnetic spectrum;
- relate that waves move at different speeds through different materials;
- cite examples where light waves are reflected, refracted, or absorbed;
- evaluate the transformation of energy from one form to another;
- differentiate potential energy and kinetic energy;
- cite examples of the Law of Conservation of Energy;
- relate how heat flows;
- relate that adding heat to or removing heat from a system may result in a temperature change and possibly a change in state;
- classify different types of forces acting on objects;
- evaluate the relationship among distance, mass, and gravitational force between two objects;
- differentiate mass and weight;
- evaluate how an unbalanced force acting on an object changes its speed and/or direction; and
- interpret graphs of distance and time for an object moving at a constant speed.

<p>Level 3</p>	<p><u>Students will generally be able to</u></p> <ul style="list-style-type: none"> • classify and/or compare substances based on their measurable physical properties; • calculate and compare the densities of various materials; • relate the scientific theory of atoms using models; • recognize that all elements are grouped in the Periodic Table of the Elements according to similar properties and that they combine to produce compounds; • identify examples and compare the properties of compounds, including acids, bases, and/or salts; • compare pure substances and mixtures; • compare physical and chemical changes in common substances; • recognize that mass is conserved in physical and chemical changes; • compare the characteristics of waves using the electromagnetic spectrum; • recall that waves move at different speeds through different materials; • recognize that light waves can be reflected, refracted, or absorbed; • identify the transformation of energy from one form to another; • compare potential energy and kinetic energy; • identify examples of the Law of Conservation of Energy; • recognize how heat flows; • recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change in state; • distinguish between contact forces and forces that act at a distance; • relate the relationship among distance, mass, and gravitational force between two objects; • differentiate mass and weight; • recognize that an unbalanced force acting on an object changes its speed and/or direction; and • interpret graphs of distance and time for an object moving at a constant speed.
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<p style="text-align: center;">Level 2</p>	<p><u>Students may be able to demonstrate limited ability to</u></p> <ul style="list-style-type: none"> • identify some substances based on their measurable physical properties; • compare the densities of various materials; • identify atoms, elements, or compounds; • identify examples of pure substances and mixtures; • identify examples of physical and chemical changes; • identify some characteristics of the electromagnetic spectrum; • recognize that light waves can be reflected, refracted, or absorbed; • identify examples of energy that has been transformed from one form to another; • recognize that there is a difference between potential energy and kinetic energy; • recognize that heat flows from hot to cold materials; • recognize that adding heat to a substance results in a temperature change; • identify familiar forces that cause objects to move; • recognize that there is a relationship among distance, mass, and gravitational force between two objects; • recognize that there is a difference between mass and weight; • recognize that an unbalanced force acting on an object changes its speed and/or direction; and • recall that the speed of an object is determined by the distance it travels per unit of time.
<p style="text-align: center;">Level 1</p>	<p>Performance at this level indicates an inadequate level of success with the challenging content of the <i>Next Generation Sunshine State Standards</i> for science.</p>

Grade 8 Statewide Science Assessment Reporting Category — Life Science

Students performing at the mastery level of this reporting category will be able to identify the functions of the human body systems, classify organisms, identify ways genetic variation contributes to the scientific theory of evolution, determine probabilities for genotypic and phenotypic combinations, and distinguish relationships among organisms in a food web.

Achievement Level	Achievement Level Descriptions
<p align="center">Level 5</p>	<p><u>Students will consistently be able to</u></p> <ul style="list-style-type: none"> • analyze a model of the patterns in the hierarchical organization of organisms, from atoms to organisms; • relate the components of the cell theory and the importance of the cell theory; • analyze how cells maintain homeostasis; • analyze a model of the major organelles of plant cells and animal cells and relate the function of each organelle; • connect the general functions of the major systems of the human body to how they interact to maintain homeostasis; • compare different types of infectious agents and how they affect the human body; • analyze how and why organisms are classified; • cite examples that show how genetic variation and environmental factors contribute to the scientific theory of evolution by natural selection and diversity of organisms; • analyze ways in which fossil evidence is consistent with the scientific theory of evolution; • relate how species' inability to adapt may contribute to their extinction; • relate that every organism requires a set of instructions that specifies its traits and that genes located in chromosomes contain this hereditary information; • determine genotypic and phenotypic probabilities using Punnett squares; • differentiate sexual and asexual reproduction and how they relate to heredity; • analyze food webs to determine if they correctly illustrate the roles, relationships, and transfer of energy among organisms; • hypothesize the effects of limiting factors in an ecosystem; • evaluate how living systems obey the Law of Conservation of Mass and Law of Conservation of Energy; • analyze the processes of photosynthesis and cellular respiration; and • analyze models that show the transfer of matter in the carbon cycle.

<p>Level 4</p>	<p><u>Students will usually be able to</u></p> <ul style="list-style-type: none">• evaluate patterns in the hierarchical organization of organisms, from atoms to organisms;• relate the components of the cell theory;• evaluate the processes cells undergo to maintain homeostasis;• compare the structure and function of the major organelles of plant cells and animal cells;• differentiate the general functions of the major systems of the human body and relate how they interact to maintain homeostasis;• compare different types of infectious agents that affect the human body;• analyze how and why organisms are classified;• cite examples that show how genetic variation and environmental factors contribute to the scientific theory of evolution by natural selection and diversity of organisms;• analyze ways in which fossil evidence is consistent with the scientific theory of evolution;• relate that species' inability to adapt may contribute to their extinction;• relate that every organism requires a set of instructions that specifies its traits and that genes located in chromosomes contain this hereditary information;• determine genotypic and phenotypic probabilities using Punnett squares;• compare sexual and asexual reproduction and how they relate to heredity;• relate the roles and relationships of organisms in a food web;• analyze some of the effects of limiting factors in an ecosystem;• relate that living systems obey the Law of Conservation of Mass and Law of Conservation of Energy;• compare the processes of photosynthesis and cellular respiration; and• interpret how matter is transferred in the carbon cycle.
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<p style="text-align: center;">Level 3</p>	<p><u>Students will generally be able to</u></p> <ul style="list-style-type: none"> • identify patterns in the hierarchical organization of organisms, from atoms to organisms; • recall the components of the cell theory; • identify some of the processes that cells undergo to maintain homeostasis; • compare the structure and function of major organelles of plant and animal cells; • relate the general functions of the major systems of the human body to maintaining homeostasis; • classify different types of infectious agents that affect the human body; • recall how and why organisms are classified; • identify genetic variation and environmental factors that contribute to the scientific theory of evolution by natural selection and diversity of organisms; • identify ways in which fossil evidence is consistent with the scientific theory of evolution; • identify how a species' inability to adapt may contribute to its extinction; • recall that every organism requires a set of instructions that specifies its traits and that genes located in chromosomes contain this hereditary information; • determine genotypic and phenotypic probabilities using Punnett squares; • compare sexual and asexual reproduction and how they relate to heredity; • compare relationships among organisms in an ecosystem; • infer the roles and relationships of organisms in a food web; • identify limiting factors in an ecosystem; • recognize that living systems obey the Law of Conservation of Mass and Law of Conservation of Energy; • recall the processes of photosynthesis and cellular respiration; and • relate how matter is transferred in the carbon cycle.
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<p style="text-align: center;">Level 2</p>	<p><u>Students may be able to demonstrate limited ability to</u></p> <ul style="list-style-type: none"> • recognize the different levels of organization in living things; • identify one component of the cell theory; • identify some of the major organelles of plant and animal cells; • identify the general functions of some of the major systems of the human body; • identify some types of infectious agents that affect the human body; • group organisms according to shared characteristics; • recall that species may become extinct; • recognize that genetic material is contained in DNA; • identify the difference between sexual and asexual reproduction; • identify relationships among some organisms in an ecosystem; • trace the flow of energy in a food chain; • identify factors that affect populations in an ecosystem; • identify the difference between the purpose of photosynthesis and cellular respiration; and • recognize that matter is transferred in the carbon cycle.
<p style="text-align: center;">Level 1</p>	<p>Performance at this level indicates an inadequate level of success with the challenging content of the <i>Next Generation Sunshine State Standards</i> for science.</p>