

SCIENCE PERFORMANCE LEVEL DESCRIPTORS – GRADE 8

ADVANCED

An 8th grade student performing at Advanced effectively, consistently, and appropriately applies science and engineering practices to explain phenomena and design solutions to problems in the natural and the designed world. The student evaluates how well models, information, and patterns in data describe relationships among parts of systems, and uses scientific principles and reasoning to make predictions about how systems change over time. The student plans and evaluates investigations designed to determine the relationship between two variables. The student uses patterns in data to determine which solution to a problem best meets the criteria for success. The student uses data, mathematical and computational thinking, and scientific reasoning to construct and evaluate arguments and explanations about how parts of a system depend on each other.

PROFICIENT

An 8th grade student performing at Proficient effectively applies science and engineering practices to explain phenomena and design solutions to problems in the natural and the designed world. The student develops models and uses information and patterns in data to describe relationships among parts of systems and to identify scientific principles, which can be used to make predictions about how systems change over time. The student asks questions and plans investigations to determine the relationship between two variables. The student identifies criteria and constraints and uses patterns in data to evaluate solutions to problems. The student uses data and mathematical and computational thinking to construct arguments and explanations about how parts of a system depend on each other.

BASIC

An 8th grade student performing at Basic applies, with support, science and engineering practices to explain phenomena and design solutions to problems in the natural and the designed world. The student uses models, information, and patterns in data to describe relationships among parts of systems and to make predictions about how systems change over time. The student describes the data to collect in an investigation in order to identify the relationship between two variables. The student identifies a solution to a problem that meets given criteria for success. The student uses data and basic mathematical thinking to support arguments and explanations about cause and effect relationships among parts of systems.

BELOW BASIC

An 8th grade student performing at Below Basic seldom applies science and engineering practices to explain phenomena and design solutions to problems in the natural and the designed world. The student occasionally identifies models, information, and patterns in data to describe relationships among parts of systems and to make predictions about how systems change over time. The student infrequently recognizes trends in the data collected during an investigation in order to identify the relationship between two variables. The student can sometimes identify a solution to a problem. The student occasionally uses data and basic mathematical thinking to explain the cause and effect relationships among parts of systems.

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Physical Science	Below Basic A student who has reached the level of <i>Below Basic</i> level is to successfully address some, but not all, of the following:	Basic A student who has reached the level of <i>Basic</i> is able to successfully address some, but not all, of the following:	Proficient A student who has reached the level of <i>Proficient</i> is able to successfully address some, but not all, of the following:	Advanced A student who has reached the level of <i>Advanced</i> is able to successfully address some, but not all, of the following:
Matter and Its Interactions	Identify atomic or molecular structures.	Use models to describe atomic or molecular structures.	Use models to describe atomic composition of molecular structures.	Evaluate models ability to describe atomic composition of molecular structures.
	Organize information about the chemical properties of substance.	Relate collected information about the properties of designed materials to their chemical properties.	Collect and synthesize information about the chemical properties of designed materials.	Collect and synthesize information about the chemical properties of designed materials to evaluate potential impact.
	Describe the effects of temperature changes on substances.	Identify a model which describes changes to substances caused by temperature changes.	Use models to explain the physical changes that occur when the materials thermal energy changes.	Develop models to explain the changes in particle motion, temperature, and state of matter that occur when the materials thermal energy changes.
	Identify the occurrence of chemical reactions.	Use data to identify the occurrence of chemical reactions.	Interpret data for the occurrence of chemical changes.	Analyze and interpret data on the properties of substances for the occurrence of chemical changes.
	Describe how mass is conserved in a chemical reaction.	Identify a model which describes how mass is conserved in a chemical reaction.	Develop and use models to explain how mass is conserved in chemical reactions.	Develop and use models which use the total number of atoms to explain how mass is conserved in chemical reactions.
	Identify different factors that cause changes in thermal energy.	Identify a device that uses changes in thermal energy.	Design and modify a device that uses changes in thermal energy by chemical processes.	Construct, test, and optimize a device that uses changes in thermal energy by chemical processes.

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Motion Stability: Forces and Interactions	Identify a solution which minimizes the force of an object during a collision.	Identify solutions which minimizes the force of an object during a collision.	Design a solution which minimizes the force of an object during a collision.	Design and evaluate a solution which minimizes the force of an object during a collision.
	Use data to identify the change in an object's motion on the forces on the object and the mass of the object.	Investigate the change in an object's motion on the forces on the object and the mass of the object.	Conduct an investigation into the change in an object's motion on the forces on the object and the mass of the object.	Plan and conduct an investigation the change in an object's motion on the sum of forces on the object and the mass of the object.
	Organize provided evidence of gravitational interaction between objects of various masses or distances.	Identify evidence from a graph of gravitational interaction between objects of various masses or distances.	Create and analyze a graph for evidence of the gravitational interaction between objects of various masses or distances.	Evaluate evidence to argue for the gravitational interaction between objects of various masses and distances.
	Recognize that electric or magnetic forces are a noncontact force between objects of various masses.	Use evidence to explain the effects of electric or magnetic fields between objects of various masses.	Identify evidence which explains the effects of electric and magnetic fields on objects.	Analyze diagrams and collect evidence to explain the effects of electric and magnetic fields on objects.
	Describe the effects of electric and magnetic fields on objects.	Identify and collect evidence for the effects of electric and magnetic fields on objects.	Design an investigation regarding the force exerted by electrical and magnetic fields.	Design and evaluate an investigation regarding the force exerted by electrical and magnetic fields.
Energy	Describe the relationship of kinetic energy to the mass and speed of objects.	Organize data to describe the relationship of kinetic energy to the mass and speed of objects.	Analyze a graph the relationship of kinetic energy to the mass or speed of objects.	Generate, collect, and interpret graphical displays to explain the relationship of kinetic energy to the mass and speed of objects.
	Identify potential energy in different systems.	Identify a model to describe the interactions of objects in a system based upon potential energy.	Develop models to explain the interactions of objects in a system based upon different forms of potential energy;	Develop models to explain the interactions of objects at different distances in a system based upon different forms of potential energy.
	Describe how the temperature of objects depends upon energy, mass, and types of matter.	Identify changes in temperature relating to energy transfer, mass, and types of matter.	Analyze changes in temperature relating to energy transfer, mass, and types of matter.	Plan and conduct an investigation to analyze changes in temperature relating to energy transfer, mass, and types of matter.

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	Describe how thermal energy is transferred in a device.	Identify a device which minimizes or maximizes thermal energy transfer.	Design a device that either minimizes or maximizes thermal energy transfer.	Design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
	Identify opportunities when kinetic energy of an object changes.	Identify evidence that supports the kinetic energy of an object changes, energy is transferred.	Use an argument that when the kinetic energy of an object changes, energy is transferred.	Construct and use an argument that when the kinetic energy of an object changes, energy is transferred.
Waves and Their Applications in Technologies for Information Transfer	Identify various wave properties and behavior.	Use mathematical representations to describe wave properties and behavior.	Use mathematical representations and models to describe wave properties and behavior.	Use mathematical representations and models to describe wave properties and behavior.
	Observe how waves interact with different media.	Identify models to describe wave interactions with different media.	Develop models that describe wave interactions with different media.	Develop models that can be used to collect data which describes wave interactions with different media.

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Life Science	Below Basic A student who has reached the level of <i>Below Basic</i> level is to successfully address some, but not all, of the following:	Basic A student who has reached the level of <i>Basic</i> is able to successfully address some, but not all, of the following:	Proficient A student who has reached the level of <i>Proficient</i> is able to successfully address some, but not all, of the following:	Advanced A student who has reached the level of <i>Advanced</i> is able to successfully address some, but not all, of the following:
From Molecules to Organisms: Structure and Processes	Recognize that living things are made of cells.	Use data from investigations as evidence that things are made of cells.	Use models and data from investigations as evidence that living things are made of cells.	Use models and data from investigations as evidence that living things are made of cells and distinguish between living and non-living things.
	Describe how cells or parts of cells work together.	Identify models which describe how cells or parts of cells work together.	Develop models to describe the function of cells or how parts of cells work together.	Develop and use models to support an argument for how cells or parts of cells work together.
	Describe how interacting groups of cells perform life functions.	Support an argument for how interacting groups of cells perform life functions.	Critique an argument of how interacting groups of cells perform life functions.	Develop an argument of how interacting groups of cells perform life functions.
	Identify body systems that interact to carry out key body functions.	Describe how body systems interact to carry out key body functions.	Identify evidence that body systems interact to carry out key body functions.	Evaluate evidence that body systems interact to carry out key body functions.
	Identify animal behaviors and plant structures related to reproduction.	Describe how animal behaviors and plant structures related to reproduction.	Gather and use evidence to support the claim that animal behaviors or plant structures affect reproduction.	gather and use evidence to construct an explanation that animal behaviors or plant structures affect reproduction;
	Identify different interactions of organisms in ecosystems.	Explain interaction patterns among organisms in ecosystems.	Construct an explanation based on evidence of how genetic and environmental factors affect organisms.	Evaluate a scientific explanation based on evidence to explain how genetic and environmental factors affect organisms.
	Identify examples of photosynthesis and cellular respiration.	Construct an explanation of the role of photosynthesis or cellular respiration in the cycling of matter and flow of energy into and out of organisms.	Construct an explanation of the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.	Evaluate an explanation of the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.

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Ecosystems: Interactions, Energy, and Dynamics	Identify the effects of resource availability on individual organisms and populations of organisms in an ecosystem.	Organize data to provide evidence for the effects of resource availability on individual organisms and populations of organisms in an ecosystem.	Analyze data to provide evidence for the effects of resource availability on individual organisms and populations of organisms in an ecosystem.	Analyze and interpret data to provide evidence for the effects of resource availability on individual organisms and populations of organisms in an ecosystem.
	Identify abiotic and biotic factors in an ecosystem.	Identify the pattern between abiotic and biotic factors.	Make generalized hypotheses about interaction patterns among biotic or abiotic factors in ecosystems.	Evaluate hypotheses about interaction patterns among biotic and abiotic factors in ecosystems.
	Explain how energy is used in organisms.	Identify a model of chemical reactions involving food molecules to explain how energy is used in organisms.	Develop a model which describes the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	Develop and evaluate a model which describes the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
	Describe how organisms within an ecosystem depend upon living and nonliving components.	Describes how organisms within an ecosystem depend upon the cycling of living and nonliving components.	Construct an argument how physical or biological components of an ecosystem affect populations.	Evaluate an argument how physical or biological components of an ecosystem affect populations.
	Describe the effects of human action upon biodiversity.	Evaluate solutions that minimize the effects of human actions upon biodiversity.	Evaluate the benefits and limitations of a design maintaining an ecosystem.	Evaluate the benefits and limitations of two designs for maintaining an ecosystem.
Biological Evolution: Unit and Diversity	Identify patterns of relatedness of organisms and fossils based on anatomy.	Explain patterns of relatedness of organisms and fossils based on anatomy.	Analyze data to explain patterns of relatedness of organisms and fossils based on anatomy.	Analyze and interpret data to explain patterns of relatedness of organisms and fossils based on anatomy.
	Recognize that specific traits will lead to increases or decreases in survival or reproduction chances.	Use evidence to explain why specific traits will lead to increases or decreases in survival or reproduction chances.	Construct an explanation to explain why specific traits will lead to increases or decreases in survival or reproduction chances.	Evaluate an explanation used to explain why specific traits will lead to increases or decreases in survival or reproduction chances.
	Identify humans influence the inheritance of desired traits in organisms.	Identify technologies that have changed the way humans influence the inheritance of desired traits in organisms.	Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.	Evaluate information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.

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	Predict changes in traits within populations over time.	Use mathematical relationships to explain changes in traits within populations over time.	Interpret graphical representations to support how natural selection may lead to increases and decreases of specific traits in populations over time.	Evaluate how a graphical representations to support how natural selection may lead to increases and decreases of specific traits in populations over time.
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Earth and Space Science	Below Basic A student who has reached the level of <i>Below Basic</i> level is to successfully address some, but not all, of the following:	Basic A student who has reached the level of <i>Basic</i> is able to successfully address some, but not all, of the following:	Proficient A student who has reached the level of <i>Proficient</i> is able to successfully address some, but not all, of the following:	Advanced A student who has reached the level of <i>Advanced</i> is able to successfully address some, but not all, of the following:
Earth's Place in the Universe	Identify patterns involving the Sun and the Moon based upon their relative positions.	Use a model to explain patterns involving the Sun and the Moon based upon their relative positions.	Use a model to explain patterns and make predictions involving the Sun and the Moon based upon their relative positions.	Evaluate models to explain patterns and make predictions involving the Sun and the Moon based upon their relative positions.
	Recognize how gravity affects motion within the solar system and within galaxies.	Model how gravity explains motion within the solar system and within galaxies.	Identify the best model of how gravity explains motion within the solar system and within galaxies.	Gather information to develop a model of how gravity explains motion within the solar system and within galaxies.
	Identify properties of objects in the solar system.	Describe the properties of objects in the solar system.	Analyze data to identify patterns in the properties of objects in the solar system.	Analyze data to explain the difference in the properties of objects in the solar system.
	Use rock formations and fossils to describe Earth's history.	Identify rock formations and fossil evidence to explain Earth's history.	Analyze information from rock formations and fossil evidence to explain Earth's history.	Synthesize information from rock formations and fossil evidence to explain Earth's history.
	Use rock strata to organize Earth's history.	Identify a scientific explanation from rock strata to organize Earth's history.	Construct a scientific explanation from rock strata to organize Earth's history.	Evaluate a scientific explanation from rock strata to organize Earth's history.
Earth's Systems	Describe the role of energy in the cycling of Earth's materials.	Model and describe the role of energy in the cycling of Earth's materials.	Model and use evidence to explain the role of energy in the cycling of Earth's materials.	Evaluate two models and use evidence to explain the role of energy in the cycling of Earth's materials.
	Identify geological processes that create geological features.	Explain how geological processes of different time and spatial scales create geological features.	Identify evidence to explain how geological processes of varying time and spatial scales create geological features.	Gather evidence to explain how geological processes of varying time and spatial scales create geological features.
	Describe evidence of past tectonic plate motions.	Organize data that provide evidence of past tectonic plate motions.	Analyze and interpret data of past tectonic plate motions.	Evaluate data of past tectonic plate motions for its usefulness in developing a model.

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	Describe the roles of energy and gravity in the water cycles.	Identify a model to describe the roles of energy and gravity in the water cycle.	Develop and use a model to explain the roles of energy and gravity in the water cycle.	Evaluate different models which explain the roles of energy and gravity in the water cycle.
	Relate the interaction of air masses to changes in weather.	Gather evidence of the interaction of air masses to explain changes in weather.	Gather and analyze evidence of the interaction of air masses to explain changes in weather.	Gather and evaluate data of the interaction of air masses to explain changes in weather.
	Describe how heat and Earth's rotation produce differences in atmospheric and oceanic circulation patterns that lead to different climates.	Use a model to describe how heat and Earth's rotation produce differences in atmospheric and oceanic circulation patterns that lead to different climates.	Develop a model to describe how heat and Earth's rotation produce differences in atmospheric and oceanic circulation patterns that lead to different climates.	Evaluate the limitations of a model to describe how heat and Earth's rotation produce differences in atmospheric and oceanic circulation patterns that lead to different climates.
Earth and Human Activity	Describe how Earth's processes are related to the distribution of natural resources.	Identify evidence from Earth's processes to explain the distribution of natural resources.	Construct a scientific explanation based on evidence that explains the distribution of natural resources.	Evaluate explanations from Earth's processes to explain the distribution of natural resources.
	Recognize characteristics of natural hazards.	Identify in data patterns about natural hazards,	Analyze and interpret data related to strategies to minimize dangers from natural hazards through forecasting and technology.	Analyze and interpret data related to strategies to minimize dangers from natural hazards through forecasting and technology which mitigates effects.
	Describe how population growth increases the use of natural resources and causes environmental changes.	Use provided evidence to argue that population growth increases the use of natural resources and causes environmental changes.	Analyze data that population growth increases the use of natural resources and causes environmental changes.	Evaluate data for use as evidence that population growth increases the use of natural resources and causes environmental changes.
	Describe human impacts on the environment.	Design a method to monitor or minimize human impacts on the environment.	Design and refine a method to monitor or minimize human impacts on the environment.	Evaluate competing designs to monitor or minimize human impacts on the environment.

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	Identify factors that cause a change in global temperatures for the past century.	Identify evidence of factors that cause a change in global temperatures for the past century.	Analyze evidence of factors that cause a change in global temperatures for the past century.	Evaluate evidence of factors that cause a change in global temperatures for the past century.
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Engineering and Technology Science	Below Basic A student who has reached the level of <i>Below Basic</i> level is to successfully address some, but not all, of the following:	Basic A student who has reached the level of <i>Basic</i> is able to successfully address some, but not all, of the following:	Proficient A student who has reached the level of <i>Proficient</i> is able to successfully address some, but not all, of the following:	Advanced A student who has reached the level of <i>Advanced</i> is able to successfully address some, but not all, of the following:
	Compare competing designs to solve a specific problem.	Identify between competing designs to solve a specific problem using criteria and constraints.	Support an argument for a design to solve a specific problem using criteria and constraints.	Support an argument for the best design to solve a specific problem using criteria and constraints.
	Describe potential impacts of design.	Identify the potential impacts of a design in order to define criteria and constraints.	Analyze the potential impacts of a design in order to prioritize criteria and constraints.	Evaluate the potential impacts of a design in order to prioritize criteria and constraints.
	Use test data to compare design solutions.	Analyze test data to compare design solutions.	Analyze test data to support an argument for an optimal design.	Evaluate test data to best support an argument for an optimal design.
	Explain how to improve a design through repeated testing.	Develop a model to optimize a design through repeated testing.	Synthesize data to develop a model to optimize a design through repeated testing.	Evaluate data used to develop a model to optimize a design through repeated testing.