

Grade 8  
Performance Level Descriptions – All Dimensions

Claim/Target	Level 2	Level 3	Level 4
Claim 1: Physical Science	Students in this range typically comprehend and <b>describe</b> scientific and engineering ideas, connecting concepts, and procedures or practices (targets A–E), and they apply scientific and engineering knowledge <b>consistently</b> to problems of <b>low complexity</b> and <b>inconsistently</b> to problems of <b>moderate complexity</b> in the physical sciences (targets A–F).	Students in this range typically comprehend and <b>explain</b> scientific and engineering ideas, connecting concepts, and procedures or practices (targets A–E), and they apply scientific and engineering knowledge <b>consistently</b> to problems of <b>moderate complexity</b> and <b>inconsistently</b> to problems of <b>high complexity</b> in the physical sciences (targets A–F).	Students in this range typically comprehend and <b>analyze</b> scientific and engineering ideas, connecting concepts, and procedures or practices (targets A–E), and they apply scientific and engineering knowledge <b>consistently</b> to problems of <b>high complexity</b> in the physical sciences (targets A–F).
Target A: Structure and Properties of Matter	Students can identify atomic or molecular structures, organize information about the chemical properties of substances, and describe the effects of temperature changes on substances.	Students can use models to describe atomic or molecular structures, relate collected information about the properties of designed materials to their chemical properties, and develop a model to describe changes to substances caused by temperature changes.	Students can use models to relate chemical properties to atomic or molecular structures, collect and synthesize information about the chemical properties of designed materials to evaluate potential impacts, and develop models to explain the chemical or physical changes that occur when the material's thermal energy changes.
Target B: Chemical Reactions	Students can identify the occurrence of chemical reactions, describe how mass is conserved in a chemical reaction, and recognize different factors that cause changes in thermal energy.	Students can analyze data to identify the occurrence of chemical reactions, develop a model to describe how mass is conserved in a chemical reaction, and design a device that uses changes in thermal energy.	Students can support an argument with evidence for the occurrence of chemical changes, develop and use models to explain how mass is conserved in chemical reactions, and design and optimize a device that uses changes in thermal energy.

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Target C: Forces and Interactions	Students can observe and record the changes in motion of unbalanced forces, recognize that gravity is an attractive force between objects of various masses, and describe the effects of electric and magnetic fields on objects.	Students can investigate the changes in motion of unbalanced forces, use evidence to argue for the gravitational interaction between objects of various masses, and collect evidence for the effects of electric and magnetic fields on objects.	Students can investigate and analyze data from the changes in motion of unbalanced forces, evaluate evidence to argue for the gravitational interaction between objects of various masses, and collect evidence to explain the effects of electric and magnetic fields on objects.
Target D: Energy	Students can describe the relationship of kinetic energy to the mass and speed of objects; identify potential energy in different systems; and describe how the temperature of objects depends upon energy, mass, and types of matter.	Students can construct and interpret data to describe the relationship of kinetic energy to the mass and speed of objects; develop a model to describe the interactions of objects in a system based upon potential energy; and investigate changes in temperature relating to energy transfer, mass, and types of matter.	Students can generate, collect, and interpret data to explain the relationship of kinetic energy to the mass and speed of objects; develop models to explain the interactions of objects in a system based upon different forms of potential energy; and investigate and analyze changes in temperature relating to energy transfer, mass, and types of matter.
Target E: Waves and Electromagnetic Radiation	Students can identify various wave properties and behavior, observe how waves interact with different media, and describe the reliability of digital and analog signals.	Students can use mathematical representations to describe wave properties and behavior, develop models to describe wave interactions with different media, and support a claim for the reliability of digital over analog signals.	Students can use mathematical representations and models to describe wave properties and behavior, collect data and develop models that describe wave interactions with different media, and use evidence to support an argument for the reliability of digital over analog signals.

Claim/Target	Level 2	Level 3	Level 4
Target F: Engineering Design in Physical Science	Students can describe potential impacts of a design, compare competing designs to solve a specific problem, use test data to compare design solutions, and explain how to improve a design through repeated testing.	Students can describe the potential impacts of a design in order to define criteria and constraints, evaluate competing designs to solve a specific problem using criteria and constraints, analyze test data to compare design solutions, and develop a model to optimize a design through repeated testing.	Students can evaluate the potential impacts of a design in order to prioritize criteria and constraints, support an argument for the best design to solve a specific problem using criteria and constraints, analyze test data to support an argument for an optimal design, and synthesize data to develop a model to optimize a design through repeated testing.

Claim/Target	Level 2	Level 3	Level 4
Claim 2: Life Science	Students typically comprehend and <b>describe</b> scientific and engineering ideas, connecting concepts, and procedures or practices (targets A–E), and they apply scientific and engineering knowledge <b>consistently</b> to problems of <b>low complexity</b> and <b>inconsistently</b> to problems of <b>moderate complexity</b> in the life sciences (Targets A–F).	Students typically comprehend and <b>explain</b> scientific and engineering ideas, connecting concepts, and procedures or practices (targets A–E), and they apply scientific and engineering knowledge <b>consistently</b> to problems of <b>moderate complexity</b> and <b>inconsistently</b> to problems of <b>high complexity</b> in the life sciences (targets A–F).	Students typically comprehend and <b>analyze</b> scientific and engineering ideas, connecting concepts, and procedures or practices (targets A–E), and they apply scientific and engineering knowledge <b>consistently</b> to problems of <b>high complexity</b> in the life sciences (targets A–F).
Target A: Structure, Function, and Information Processing	Students can recognize that living things are made of cells, describe how cells or parts of cells work together, and describe how interacting groups of cells perform life functions.	Students can use data from investigations as evidence that living things are made of cells, develop models to describe how cells or parts of cells work together, and support an argument for how interacting groups of cells perform life functions.	Students can use models and data from investigations as evidence that living things are made of cells, develop models to support an argument for how cells or parts of cells work together, and critique an argument of how interacting groups of cells perform life functions.

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Target B: Matter and Energy in Organisms and Ecosystems	Students can explain how photosynthesis moves matter and energy through organisms in cycles, explain how energy is used in organisms, and describe how organisms within an ecosystem depend upon living and nonliving components.	Students can use evidence to explain how photosynthesis moves matter and energy through organisms in cycles, develop a model of chemical reactions involving food molecules to explain how energy is used in organisms, and develop a model that describe how organisms within an ecosystem depend upon the cycling of living and nonliving components.	Students can collect and use evidence to explain how photosynthesis moves matter and energy through organisms in cycles, collect data to develop a model of chemical reactions involving food molecules to explain how energy is used in organisms, and collect data to develop models that explain how organisms within an ecosystem depend upon the cycling of living and nonliving components.
Target C: Interdependent Relationships in Ecosystems	Students can identify different interactions of organisms in ecosystems and describe the effects of human actions upon biodiversity.	Students can explain interaction patterns among organisms in ecosystems and evaluate solutions that minimize the effects of human actions upon biodiversity.	Students can make generalized hypotheses about interaction patterns among organisms in ecosystems and evaluate and refine solutions that minimize the effects of human actions upon biodiversity or upon ecosystem services.
Target D: Growth, Development, and Reproduction in Organisms	Students can identify various animal behaviors or plant structures that affect reproduction, explain how genetic and environmental factors affect organisms, and identify information about how humans influence inheritance of traits in organisms.	Students can use evidence to support the claim that animal behaviors or plant structures affect reproduction, use evidence to explain how genetic and environmental factors affect organisms, and gather and synthesize information about how humans influence the inheritance of traits in organisms.	Students can gather and use evidence to support the claim that animal behaviors or plant structures affect reproduction; use models and evidence to explain how genetic and environmental factors affect organisms; and gather, synthesize, and communicate information about how humans influence the inheritance of traits in organisms.

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Target E: Natural Selection and Adaptations	Students can 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, and predict changes in traits within populations over time.	Students can analyze data to explain patterns of relatedness of organisms and fossils based on anatomy, use evidence to explain why specific traits will lead to increases or decreases in survival or reproduction chances, and use mathematical relationships to explain changes in traits within populations over time.	Students can investigate and analyze data to explain patterns of relatedness of organisms and fossils based on anatomy, use evidence and models to explain why specific traits will lead to increases or decreases in survival or reproduction chances, and analyze data and use mathematical relationships to explain changes in traits within populations over time.
Target F: Engineering Design in Life Science	Students can describe potential impacts of a design, compare competing designs to solve a specific problem, use test data to compare design solutions, and explain how to improve a design through repeated testing.	Students can describe the potential impacts of a design in order to define criteria and constraints, evaluate competing designs to solve a specific problem using criteria and constraints, analyze test data to compare design solutions, and develop a model to optimize a design through repeated testing.	Students can evaluate the potential impacts of a design in order to prioritize criteria and constraints, support an argument for the best design to solve a specific problem using criteria and constraints, analyze test data to support an argument for an optimal design, and synthesize data to develop a model to optimize a design through repeated testing.

Claim/Target	Level 2	Level 3	Level 4
Claim 3: Earth and Space Science	Students typically comprehend and <b>describe</b> scientific ideas, connecting concepts, and procedures or practices (targets A–E), and they apply scientific and engineering knowledge <b>consistently</b> to problems of <b>low complexity</b> and <b>inconsistently</b> to problems of <b>moderate complexity</b> in the earth and space sciences (targets A–F).	Students typically comprehend and <b>explain</b> scientific ideas, connecting concepts, and procedures or practices (targets A–E), and they apply scientific and engineering knowledge <b>consistently</b> to problems of <b>moderate complexity</b> and <b>inconsistently</b> to problems of <b>high complexity</b> in the earth and space sciences (targets A–F).	Students typically comprehend and <b>analyze</b> scientific ideas, connecting concepts, and procedures or practices (target A–E), and they apply scientific and engineering knowledge <b>consistently</b> to problems of <b>high complexity</b> in the earth and space sciences (targets A–F).
Target A: Space Systems	Students can identify patterns involving the Sun and the Moon based upon their relative positions, recognize how gravity affects motion within the solar system and within galaxies, and identify properties of objects in the solar system.	Students can use a model to explain patterns involving the Sun and the Moon based upon their relative positions, model how gravity explains motion within the solar system and within galaxies, and analyze data to determine the properties of objects in the solar system.	Students can use a model to explain patterns and make predictions involving the Sun and the Moon based upon their relative positions, gather information to develop a model of how gravity explains motion within the solar system and within galaxies, and analyze data to explain the differences in the properties of objects in the solar system.
Target B: History of Earth	Students can use rock formations and fossils to describe Earth’s history, identify geological processes that create geological features, and describe evidence of past tectonic-plate motions.	Students can use rock formations and fossil evidence to explain Earth’s history, explain how geological processes of different time and spatial scales create geological features, and analyze and interpret data that provide evidence of past tectonic-plate motions.	Students can synthesize information from rock formations and fossil evidence to explain Earth’s history, gather evidence to explain how geological processes of varying time and spatial scales create geological features, and analyze and interpret data to develop models that provide evidence of past tectonic-plate motions.

Claim/Target	Level 2	Level 3	Level 4
Target C: Earth's Systems	Students can describe the role of energy in the cycling of Earth's materials, describe the roles of energy and gravity in the water cycle, and describe how Earth's processes are related to the distribution of natural resources.	Students can model and describe the role of energy in the cycling of Earth's materials, develop a model to describe the roles of energy and gravity in the water cycle, and use evidence from Earth's processes to explain the distribution of natural resources.	Students can model and use evidence to explain the role of energy in the cycling of Earth's materials, develop and use a model to explain the roles of energy and gravity in the water cycle, and evaluate evidence from Earth's processes to explain the distribution of natural resources.
Target D: Weather and Climate	Students can relate the interaction of air masses to changes in weather and describe how heat and Earth's rotation produce differences in atmospheric and oceanic circulation patterns that lead to different climates.	Students can gather evidence of the interaction of air masses to explain changes in weather and use a model to describe how heat and Earth's rotation produce differences in atmospheric and oceanic circulation patterns that lead to different climates.	Students can gather and evaluate evidence of the interaction of air masses to explain changes in weather and use evidence to develop a model that explains how heat and Earth's rotation produce differences in atmospheric and oceanic circulation patterns that lead to different climates.
Target E: Human Impacts	Students can recognize characteristics of natural hazards, describe human impacts on the environment, and describe how population growth increases the use of natural resources and causes environmental changes.	Students can identify in data patterns about natural hazards, design a method to monitor or minimize human impacts on the environment, and use evidence to argue that population growth increases the use of natural resources and causes environmental changes.	Students can evaluate strategies to minimize dangers from natural hazards through forecasting and technology, design and refine a method to monitor or minimize human impacts on the environment, and gather and use evidence to argue that population growth increases the use of natural resources and causes environmental changes.

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Target F: Engineering Design in Earth and Space Science	Students can describe potential impacts of a design, compare competing designs to solve a specific problem, use test data to compare design solutions, and explain how to improve a design through repeated testing.	Students can describe the potential impacts of a design in order to define criteria and constraints, evaluate competing designs to solve a specific problem using criteria and constraints, analyze test data to compare design solutions, and develop a model to optimize a design through repeated testing.	Students can evaluate the potential impacts of a design in order to prioritize criteria and constraints, support an argument for the best design to solve a specific problem using criteria and constraints, analyze test data to support an argument for an optimal design, and synthesize data to develop a model to optimize a design through repeated testing.

Note: All Engineering targets share similar PLD features but should not be compared.