Performance Level Descriptors

Science
Grade 8

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Performance Level Descriptors

The Forward Exam is a summative assessment which provides information about what students know and can do in relation to the Wisconsin Academic Standards at each grade-level. Students receive a score based on their performance in each content area. The Student Performance Level is a categorical score.

Range performance levels are based on predetermined score ranges. The score ranges for each content area are set using a process in which Wisconsin educators carefully consider the academic standards, performance level descriptors, and test questions. There are four performance levels: *Developing*, *Approaching*, *Meeting*, and *Advanced*. The goal for all students is to score at the meeting or advanced level.

More-detailed descriptions of the specific concepts and skills are provided for each indicator in the **Performance Level Descriptors** (PLDs). Range PLDs are descriptions of the knowledge and skills expected at each of the four performance levels. The Range PLDs are based on the approved 2017 state-adopted content standards.

PLDs show a *progression of knowledge and skills* expected across the performance levels. It is important to understand that a student should demonstrate an understanding of the knowledge and skills within a performance level as well as all content and skills in any performance levels that precede it, if any. For example, a student who is meeting expectations should also possess the knowledge and skills described at the developing and approaching performance levels. Not all 8th grade crosscutting concepts, science and engineering practices, and disciplinary core ideas, or combinations thereof, are contained within this document.

Policy Performance Level Descriptors			
Developing	**Approaching**	**Meeting**	**Advanced**
Student is at the beginning stages of developing the knowledge and skills described in the Wisconsin Academic Standards for their grade level needed to be on-track for future learning.	Student is approaching the knowledge and skill expectations described in the Wisconsin Academic Standards for their grade level needed to be on-track for future learning.	Student is meeting the knowledge and skill expectations described in the Wisconsin Academic Standards for their grade level and is on-track for future learning.	Student demonstrates a thorough understanding of the knowledge and skills described in the Wisconsin Academic Standards for their grade level and is on-track for future learning.

Range Performance Level Descriptors			
Life Science: Students use science and engineering practices, crosscutting concepts, and an understanding of **life science** disciplinary core ideas, to make sense of phenomena and solve problems.			
Developing	**Approaching**	**Meeting**	**Advanced**
A student at this level Sometimes makes observations to use as evidence that an object is a living or non-living thing.	**A student at this level** Can collect and analyze data during an investigation to determine whether existence of cells can be a distinguishing characteristic of living things.	**A student at this level** Can conduct an investigation to provide evidence that tissues and organs are made of cells with specialized functions in the body system.	**A student at this level** Can use arguments based on scientific reasoning and evidence from multiple sources to support the idea that a body is a system of interacting subsystems composed of various cells.
Sometimes identifies evidence supporting the claim that some animal behaviors can affect the survival of another species.	Can use patterns to predict how a certain animal behavior will likely affect the reproductive success of multiple other species.	Can develop a model showing how genetic and/or environmental factors can affect an organism's growth and reproductive success.	Can analyze the validity and reliability of given evidence to solve problems related to biological and environmental factors affecting organisms.
Sometimes asks questions that could guide an investigation into differences between how plants and animals obtain food.	Can use a scientific model to describe how food molecules are rearranged through chemical reactions to form new molecules that support growth and/or to release energy as this matter moves through an organism.	Can construct a scientific explanation based on evidence or use a model to describe the role of photosynthesis in the cycling of matter and flow of energy into and out of ecosystems.	Can develop a model to track the changes of energy and matter into, out of, and within a system or ecosystem, noting the limitations of the model.
Sometimes engages in the understanding of phenomena associated with sense receptors responding to different inputs (i.e., mechanical, chemical, electromagnetic).	Can construct an explanation, based on cause-and-effect evidence, of a phenomenon that results in sensory receptors sending signals to the brain.	Can develop and use a model to show sensory receptors responding to stimuli by sending messages to the brain for immediate behavior or storage as memories.	Can synthesize information that provides evidence of causal relationships between information received by sensory receptors and behavior, at various time scales.

Sometimes describes how a change in the amount or availability of a natural resource can result in changes in a population of organisms.	Can analyze and interpret graphical displays of data (e.g., graphs, charts) to provide evidence of the relationships between resource availability and organism abundance.	Can make sense of phenomena related to patterns of interactions among organisms to help explain relationships within ecosystems.	Can use reasoning and evidence in an explanation of interactions within an ecosystem and predict future interactions based on patterns in that evidence.
Sometimes identifies examples of producers, consumers, and/or decomposers within an ecosystem and what effects they have in that system.	Can construct a model of how matter and energy are transferred between producers, consumers, and decomposers within an ecosystem.	Can construct an evidence-based argument describing the conservation of matter within and flow of energy into and out of an ecosystem.	Can develop and use a model to explain the transfer of matter (atoms) and energy between living and nonliving parts of the ecosystem at various levels within the system and define the boundaries of that system.
Sometimes recognizes that structural changes to genes (i.e., mutations) may result in observable changes in organisms.	Can use a model (i.e., Punnett square) to show that more genetic variation occurs in organisms that reproduce sexually compared to organisms that reproduce asexually.	Can use evidence related to a phenomenon (e.g., pictures of a litter of puppies or diagrams of fern spores and amoeba) to predict the differences in genetic variation resulting from sexual and asexual reproduction.	Can use a model of a protein to explain how changes to protein structure can lead to changes in its function that may cause beneficial, neutral, or harmful changes in the structures or functions of organisms.
Sometimes identifies a similar anatomical feature shared by organisms that suggests they are likely to be more closely related than other organisms that do not share the similar anatomical feature.	Can construct an argument based on evidence that some organisms sharing a pattern of anatomical features are likely to be more closely related than organisms that do not share a pattern of anatomical features.	Can apply scientific ideas and evidence to construct an explanation for the anatomical similarities and differences between modern and fossil organisms that describes evolution over time.	Can connect multiple sources of evidence comparing modern living animals and fossilized animals to support an argument for past connections of multiple lines of descent of different species.
Sometimes recognizes that data shows that some organisms will better survive and reproduce from generation to generation due to traits that are advantageous in a specific environment.	Can use patterns as evidence to support claims that some traits have advantages that make it more probable that an organism will be able to survive and reproduce in a specific environment.	Can evaluate different explanations about natural selection within a population of organisms to determine which is better supported by evidence.	Can analyze data to trace the increase or decrease of particular traits in a population over time and make claims about how those changes were likely the result of particular historical phenomena that changed their environment.
Physical Science: Students use science and engineering practices, crosscutting concepts, and an understanding of **physical science** disciplinary core			

ideas, to make sense of phenomena and solve problems.			
Developing	**Approaching**	**Meeting**	**Advanced**
A student at this level Sometimes uses simple models of different atoms and molecules as support for why different substances have different properties.	**A student at this level** Can plan experiments to identify different substances based on their characteristic physical properties (e.g., density, melting point).	**A student at this level** Can analyze data to identify changes in physical and chemical properties of substances before and after an interaction to make a claim about whether a chemical reaction occurred.	**A student at this level** Can use simple models to provide evidence for an argument that a change in properties of substances can be related to the rearrangement of atoms in a chemical reaction.
Sometimes makes sense of a phenomenon where a collision occurs by describing how a force was exerted by the first object on the second object.	Can use evidence to model the components within the system that are involved in a collision between two objects.	Can address a given problem involving a collision of two objects by detailing a process or system that helps solve the problem.	Can evaluate data on two designs for solving a problem involving a collision of two objects to determine which design better meets the criteria and constraints of the situation.
Sometimes uses information from a model to recognize that an object subjected to balanced forces does not change its motion and an object subjected to unbalanced forces does change its motion.	Can conduct an investigation involving the change in motion of an object and gather evidence identifying various factors affecting the object's motion.	Can use mathematical thinking to explain how changes in an object's motion can be due to the degree of balanced or unbalanced forces acting on the object as well as the mass of the object.	Can plan an investigation to provide evidence that the change in an object's motion depends on specific variables such as initial motion of the object, total forces acting on the object, and mass of the object.
Sometimes identifies the relative magnitude and direction of the forces between objects in a given system.	Can identify evidence from a given phenomenon to support the idea that gravitational forces are attractive and mass dependent.	Can construct an argument based on evidence that gravitational interactions are attractive and dependent on the masses of interacting objects.	Can evaluate evidence on how well it supports the idea that gravitational forces are attractive and mass dependent, identifying strengths and weaknesses of the evidence, and including possible alternative interpretations of it.
Sometimes recognizes that energy increases if either the mass or the speed of the object increases and that energy decreases if either the	Can interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an	Can construct graphical displays or other models to communicate the idea that the mass and speed of an object affect its kinetic energy.	Can design a solution to a problem identified by analyzing data from multiple sources that show the

mass or the speed of the object decreases.	object and to the speed of an object.		relationships of kinetic energy to the mass and speed of an object.
Sometimes identifies that the interactions of two objects at a distance can cause a transfer of energy between the objects.	Can analyze and interpret data to provide evidence that as the relative position of two objects changes, the potential energy of the system changes (e.g., an object higher off the ground has more gravitational potential energy).	Can 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.	Can plan and conduct an investigation to make sense of a given phenomenon involving two objects interacting at a distance.
Sometimes identifies examples of mechanical waves that need a medium through which they are transmitted.	Can describe a simple model for waves (repeating pattern) that includes how the amplitude of a wave is related to the energy in a wave.	Can use mathematical representations to evaluate a model for waves on whether it include evidence for how the amplitude of a wave is related to the energy in a wave.	Can develop a model to compare mechanical and electromagnetic waves and explain similarities and differences in how energy is transferred by each type of wave.
Sometimes identifies examples of waves interacting with materials by being reflected, absorbed, or transmitted.	Can use a given model to make sense of given phenomena involving reflection, absorption, or transmission properties of different materials for light and matter waves.	Can develop and use a model about phenomena involving light and/or matter waves to describe the differences between how light and matter waves interact with different materials.	Can design a solution to a problem using an understanding of waves, how they interact with different materials, and their applications in technologies for information transfer.
Earth and Space Science: Students use science and engineering practices, crosscutting concepts, and an understanding of **earth and space science** disciplinary core ideas to make sense of phenomena and solve problems.			
Developing	**Approaching**	**Meeting**	**Advanced**
A student at this level Sometimes uses evidence to describe how the Earth's rotation causes day/night cycle in Wisconsin.	**A student at this level** Can use a model of the Earth-Moon-Sun system to explain patterns in lunar phases.	**A student at this level** Can develop and use an Earth-Moon-Sun model to explain solar and lunar eclipses.	**A student at this level** Can develop and use a model of the Earth-Sun system, including the earth's atmosphere and tilt, to describe the cyclic patterns of seasons.

Sometimes recognizes that gravity causes a pattern of smaller and less massive objects orbiting around larger and more massive objects.	Can use a model to help describe gravity as an attractive force between solar system and galaxy objects that increases as the mass of the interacting objects increases, or decreases as the distances between objects increases.	Can ask scientific questions to clarify the role of gravity in the motions within galaxies and the solar system.	Can use computational thinking to develop and refine a qualitative or quantitative model that describes the role of gravity in the motions within galaxies and the solar system.
Sometimes organizes given data on solar system objects (e.g., surface features, object layers) from various Earth- and space-based instruments to allow for analysis and interpretation.	Can use quantitative analyses to describe similarities and differences among solar system objects by describing features of those objects at different scales.	Can use patterns in given data at varying scales to make conclusions about the identifying characteristics of different categories of solar system objects (e.g., planets, meteors, asteroids, comets) based on their features, composition, and locations within the solar system.	Can describe how advances in solar system science have been made possible by improved engineering (e.g., knowledge of the evolution of the solar system from lunar exploration and space probes) and new developments in engineering made possible by advances in science (e.g., space-based telescopes using different wavelengths).
Sometimes describes how newer rock layers sit on top of older rock layers, allowing for a relative ordering in time of the formation of the layers (assuming no disturbance of the layers).	Can construct an explanation of how the fossil record Can provide relative dates of change over time based on the appearance or disappearance of organisms (e.g., within fossil layers).	Can obtain, evaluate, and synthesize information about local geological features to use as evidence to construct an explanation about the relative order of events and relative ages of rock units.	Can make sense of a major event in Earth's history by constructing an argument supported by evidence from specific changes in fossils and geologic features over time (e.g., volcanic eruptions, glaciations, asteroid impacts).
Sometimes identifies examples of how humans Can protect themselves from natural disasters.	Can identify patterns by mapping the history of natural hazards in a region and understanding related geological forces.	Can construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.	Can analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
Engineering, Technology, and Applications of Science: Students use science and engineering practices, crosscutting concepts, and an understanding of **engineering, technology and applications of science** disciplinary core ideas, to make sense of phenomena and solve problems.			

Developing	Developing	Developing	Developing
A student at this level Sometimes identifies examples of how humans can positively and negatively impact the environment.	**A student at this level** Can define criteria and constraints for a solution to a local community problem that can be addressed through engineering.	**A student at this level** Can analyze data from tests to determine similarities and differences among several design solutions for solving a community problem to identify the best characteristics of each that can be combined into a new, optimized solution to better meet the criteria for success.	**A student at this level** Can analyze and interpret data from multiple sources to determine patterns among several design solutions to identify the best approach to a new solution to a community problem to better meet the criteria for success within the given the constraints.
Sometimes identifies limitations and possible negative consequences of the use of technologies.	Can design a technology-based solution to monitor or minimize negative effects that human activities have on the environment.	Can develop a model (i.e., prototype) of a proposed object, tool, or process that can generate data through iterative testing so that an optimal design can be achieved.	Can refine a prototype to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
Sometimes identifies problems that could be solved with the help of technology.	Can ask questions to clarify evidence of which solution best solves a local problem.	Can use a model of relevant systems to define a problem and show how possible solutions may help solve a problem.	Can develop and refine models of local and global systems to define a problem and show how possible solutions may help solve a local and/or global problem.
Sometimes identifies individual or societal needs and wants that can have environmental impacts.	Can use scientific principles to identify relationships between human activity and likely negative environmental impacts and determine whether a particular design will mitigate those impacts.	Can use evidence and scientific reasoning to design a solution that addresses the negative environmental impacts of a particular human activity.	Can plan and conduct investigations to evaluate how well designs monitor and minimize negative effects that human activities have on the environment.