

Science Performance Level Descriptors

Grade 8

Basic

An **eighth-grade** student performing at the **Basic Level** recognizes open and closed systems; identifies variables and makes unsupported inferences based on the results of a scientific investigation; generates a potential solution to a problem; demonstrates emerging understanding of grade-band concepts in physical, earth and space, and life science.

A student performing at the **basic level** can do things like...

- Identify whether the system is open or closed when given the boundaries of a simple system
- Identify the manipulated, responding and controlled variables in a given scientific investigation
- Describe a vague relationship between variables without providing supporting evidence when given a data set from a scientific investigation
- Apply limited scientific knowledge by either identifying research that could lead to a solution or brainstorming solutions to a technological design problem
- Identify a force acting on an object
- Define atoms, elements and molecules
- Describe how a gas or a liquid will behave when placed in a container
- Identify transfers and transformations of energy in a simple system with guidance
- Identify gravity as the force governing predictable motions within the Earth-Moon-Sun system
- Identify most of the steps of the water cycle
- Identify processes that can cause geological change on Earth
- Describe that all living things are made of one or more cells that carry out life functions
- Identify that energy flows through an ecosystem from producers to consumers
- Describe that traits of organisms are passed on through the transfer of genetic information during reproduction

“With guidance” can mean: with the teacher’s assistance, with scaffolding, or with questioning

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Proficient

An **eighth-grade** student performing at the **Proficient Level** describes how matter and energy flow between systems; plans scientific investigations for given questions with most of the necessary steps; uses some data from scientific investigations to make inferences; prepares to solve a problem by identifying relevant knowledge and generating multiple potential solutions; demonstrates understanding of grade-band concepts in physical, earth and space, and life science.

In addition to the skills and knowledge demonstrated at the basic level, a student performing at the **proficient level** can do things like...

- Describe how energy or matter output from one system can be input in another system
- Plan a grade-appropriate investigation for a testable question by describing how to manipulate one variable, measure a responding variable and hold at least one variable constant with little guidance
- Describe, with little guidance, a relationship between variables including supporting evidence when given a data set from a scientific investigation
- Apply some scientific knowledge to a technological design problem by identifying research that could lead to a solution and brainstorming potential solutions
- Identify whether the forces acting on an object are balanced or unbalanced and then predict the resulting motion of the object
- Describe the difference between compounds and mixtures
- Describe each phase of matter in terms of particle motion
- Describe how energy interacts with matter in a system
- Describe that the predictable motions of the Earth-Moon-Sun system cause Moon phases and eclipses
- Describe the rock cycle and the water cycle
- Describe that landforms, rocks and fossils can give evidence of gradual or catastrophic geological change
- Explain that cells form tissues, tissues form organs, organs form systems, and systems form complex living things
- Explain that energy from the Sun is transformed to chemical energy by producers and then used by other organisms in an ecosystem
- Recognize that sexual reproduction leads to variation

“With guidance” can mean: with the teacher’s assistance, with scaffolding, or with questioning

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Advanced

An **eighth-grade** student performing at the **Advanced Level** describes societal issues involving science and technology from a systems point of view; plans reliable scientific investigations for given questions; analyzes data from scientific investigations to make supported inferences about the variables; evaluates solutions to problems and suggests improvements; demonstrates strong understanding of grade-band concepts in physical, earth and space, and life science.

In addition to the skills and knowledge demonstrated at the proficient level, a student performing at the **advanced level** can do things like...

- Describe how parts of a system influence other parts of the system in a given societal issue involving science and technology
- Plan a grade-appropriate investigation for a testable question, including controlled, manipulated, and responding variables, as well as repeated trials and recorded data
- Clearly describe a relationship between variables, incorporating strongly supportive evidence when given a data set from a scientific investigation
- Use criteria to determine the effectiveness of a proposed solution for a technological design problem and can redesign the solution to improve its effectiveness
- Describe the motion of an object from a graph of the object's position vs. time or a graph of the object's speed vs. time
- Describe the relationship among atoms, elements, molecules and compounds
- Describe conservation of mass as applied to physical and chemical changes in open and closed systems
- Explain the flow of energy in terms of conduction, radiation or convection from warmer to cooler objects
- Diagram the position of Earth, the Moon, and the Sun during phases of the Moon and eclipses
- Explain the role of plate tectonics in geological events on Earth's surface
- Interpret geological evidence to explain Earth's history
- Describe how the structure and organization of living systems enables both specialized and similar functions in all organisms
- Analyze an environmental issue in an ecosystem, including the effects of changes in living and/or nonliving factors in the ecosystem
- Describe how diversity of life on Earth can be explained by inherited variations becoming adaptations to a changing environment