



Keystone Exams Draft Performance Level Descriptors

OVERVIEW

Performance Level Descriptors (PLDs) are statements that describe the knowledge and skills expected of students at different performance levels with respect to Pennsylvania's Academic Content Standards and Eligible Content for each of the Keystone end-of-course exams. The descriptors are used to guide the standard-setting process for each of the keystones, and they are instrumental to the validity and defensibility of the standard-setting process. Following Standard Setting, the final performance level descriptors for each of the Keystone Exams were approved by the Pennsylvania Board of Education.

PLDs were developed and reviewed by committees of Pennsylvania educators consistent with the recently enacted Chapter 4 regulation. During this process, educators reviewed what students in Pennsylvania should know and be able to do based on the respective Keystone Assessment Anchor Content Standards. They also reviewed how students will demonstrate this knowledge and skill based on the respective Keystone Eligible Content, including the level of knowledge and skill necessary for each performance level. Educators made an initial determination relating to the

- necessary characteristics/concepts of performance at each level;
- categorization of the characteristics/concepts;
- definition in clear and easily understood language of each characteristic/concept;
and
- description of the performance continuum.

Once the initial drafts of the descriptors were developed, the educators were asked to provide a critique of the following. *Was each descriptor*

- *an appropriate description of the performance level?*
- *inappropriate for the specific Keystone Exam because the description of the performance level might be too demanding?*
- *inappropriate because the description of the performance level might be inconsistent with the expectation of high standards for the given Keystone Exam?*
- *inappropriate because the description of the performance level might be too easy?*

Feedback and responses from the educator panels informed the revisions, which are reflected in final documents.

Please note that these PLDs, along with the cut scores, were approved by the State Board of Education in summer 2011.

Basic

Proficient

Advanced

A Biology student performing at this level demonstrates a partial conceptual understanding of science content and the application of skills and processes related to biological concepts.

Students performing at this level demonstrate these abilities by recognizing scientific thinking, tools, and technologies in the study of biology. They identify the chemical basis and characteristics of life, and they recognize a simple structure and function relationship within a level of biological organization. Students define homeostasis and cellular transport, and they identify basic energy transformations in photosynthesis and cellular respiration. They recognize the steps of the cell cycle and the mechanisms and patterns of inheritance. Students use scientific processes to identify evidence that can describe evolutionary theory, and they recognize ecological organization and fundamental interactions within the biosphere.

A Biology student performing at this level demonstrates a general conceptual understanding of science content and the application of skills and processes related to biological concepts.

Students performing at this level demonstrate these abilities by applying scientific thinking, processes, tools, and technologies in the study of biology. They describe the chemical basis and characteristics of life and the relationships between structure and function at various levels of biological organization. Students explain mechanisms involved in homeostasis and cellular transport, and they describe the energy transformations in photosynthesis and cellular respiration. They compare the processes of mitosis and meiosis, and they describe how genetic information can be inherited, expressed, and altered. Students apply scientific processes to analyze evidence that can explain the mechanisms of evolutionary theory, and they describe ecological organization, biotic and abiotic components, and interactions within the biosphere.

A Biology student performing at this level demonstrates a thorough conceptual understanding of science content and the application of skills and processes related to biological concepts.

Students performing at this level demonstrate these abilities by evaluating the application of scientific reasoning, inventions, tools, and new technologies in the study of biology. They analyze the chemical basis and characteristics of life, and they make predictions based on relationships between structure and function at various levels of biological organization. Students recognize and interpret connections between life processes such as homeostasis, cellular transport, photosynthesis, and cellular respiration and their interrelated effects on organisms. They evaluate the processes and outcomes of mitosis and meiosis, and they predict how genetic information could be inherited, expressed, and altered. Students apply scientific processes to interpret evidence that can explain the mechanisms of evolutionary theory, and they explain ecological interdependencies and cause-and-effect relationships within the biosphere.

A student at this level is able to do the following:

- Recognizes scientific thinking, tools, and technologies in the study of biology.
- Identifies cell structures and their functions.
- Identifies the characteristics of life.
- Recognizes the hierarchy of biological organization.
- Recognizes the unique properties of water that support life on Earth.
- Recognizes biological macromolecules and their basic functions.
- Identifies the role of enzymes as a catalyst and the factors that influence their activity.
- Identifies energy transformations through appropriate cell structures.
- Identifies structures and processes involved in the movement of materials into, out of, and within a cell.
- Identifies the benefits of homeostasis.
- Identifies the events and/or outcomes of the cell cycle and nuclear division.
- Recognizes the role of DNA in inheritance and protein synthesis.
- Recognizes patterns of inheritance.
- Recognizes the impacts of genetic engineering.
- Defines the scientific terms of hypothesis, inference, law, theory, principle, fact, and observation.
- Identifies mechanisms and evidence related to the theory of evolution.
- Recognizes the hierarchy of the levels of organization in the biosphere.
- Identifies biotic and abiotic components in an ecosystem.
- Recognizes interactions and relationships in an ecosystem.
- Recognizes that ecosystems change in response to natural and human disturbances.

A student at this level is able to do the following:

- Applies scientific thinking, processes, tools, and technologies in the study of biology.
- Describes structural and functional similarities and differences between prokaryotes and eukaryotes.
- Interprets relationships between structures and functions at various levels of biological organization.
- Describes how the unique properties of water support life on Earth.
- Describes and interprets relationships between structure and function at various levels of biochemical organization.
- Explains the role of enzymes as a catalyst and the factors that influence their activity.
- Describes cell structures and processes that transform energy in living systems.
- Describes structures and processes involved in the movement of materials into, out of, and within a cell.
- Explains mechanisms that permit organisms to maintain homeostasis.
- Describes the three stages and the outcomes of the cell cycle.
- Explains how genetic information is inherited, altered, and expressed.
- Describes the processes associated with protein synthesis.
- Explains the impacts of genetic engineering on medicine, forensics, and agriculture.
- Distinguishes between the scientific terms of hypothesis, inference, law, theory, principle, fact, and observation.
- Analyzes and explains the mechanisms and evidence related to the theory of evolution.
- Describes ecological levels of organization in the biosphere.
- Describes interactions and relationships in an ecosystem as they relate to energy flow, biotic components, biogeochemical cycles, and limiting factors.
- Describes changes in an ecosystem in response to natural and human disturbances.

A student at this level is able to do the following:

- Evaluates the application of scientific reasoning, inventions, tools, and new technologies in the study of biology.
- Analyzes structural and functional similarities and differences between prokaryotes and eukaryotes.
- Evaluates relationships between structures and functions at various levels of biological organization.
- Analyzes the unique properties of water and explains how they support life on Earth.
- Evaluates relationships between structure and function at various levels of biochemical organization.
- Analyzes and predicts how enzymes can regulate biochemical reactions within a cell.
- Analyzes cell structures and processes that transform energy in living systems.
- Analyzes and predicts how cell structures transport material into, out of, and within a cell.
- Analyzes how organisms use feedback and response mechanisms to maintain homeostasis.
- Compares and analyzes the three stages and the outcomes of the cell cycle.
- Analyzes and predicts how genetic information is inherited, altered, and expressed.
- Analyzes the processes associated with protein synthesis.
- Predicts the impacts of genetic engineering on medicine, forensics, and agriculture.
- Applies the scientific concepts of hypothesis, inference, law, theory, principle, fact, and observation.
- Evaluates the mechanisms and sources of evidence related to the theory of evolution.
- Compares ecological levels of organization in the biosphere.
- Analyzes interactions and relationships in an ecosystem as they relate to energy flow, biotic components, biogeochemical cycles, and limiting factors.
- Predicts changes in an ecosystem in response to natural and human disturbances.