

Achievement Level Descriptors

for

Biology

Georgia Department of Education
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Achievement Levels and Achievement Level Descriptors

With the implementation of the Georgia Milestones Assessment System, Georgia educators have developed four achievement levels to describe student mastery and command of the knowledge and skills outlined in Georgia's content standards. Most students have at least some knowledge of the content described in the content standards; however, achievement levels succinctly describe how much mastery a student has. Achievement levels give meaning and context to scale scores by describing the knowledge and skills students must demonstrate to achieve each level.

The four achievement levels on Georgia Milestones are *Beginning Learner, Developing Learner, Proficient Learner,* and *Distinguished Learner.* The general meaning of each of the four levels is provided below:

Beginning Learners **do not yet demonstrate proficiency** in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students ***need substantial academic support*** to be prepared for the next grade level or course and to be on track for post-secondary readiness.

Developing Learners **demonstrate partial proficiency** in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students ***need additional academic support*** to ensure success in the next grade level or course and to be on track for post-secondary readiness.

Proficient Learners **demonstrate proficiency** in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students ***are prepared*** for the next grade level or course and are on track for post-secondary readiness.

Distinguished Learners **demonstrate advanced proficiency** in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students ***are well prepared*** for the next grade level or course and are well prepared for post-secondary readiness.

More detailed and content-specific concepts and skills are provided for each grade, content area, and course in the **Achievement Level Descriptors** (ALDs). ALDs are narrative descriptions of the knowledge and skills expected at each of the four achievement levels and were developed for each grade level, content area, and course by committees of Georgia educators in March 2015 and July 2015. The ALDs are based on the state-adopted content standards.

ALDs show a *progression of knowledge and skills* for which students must demonstrate competency across the achievement levels. It is important to understand that a student should demonstrate mastery of the knowledge and skills within the student's achievement level *as well as all content and skills in any achievement levels that precede the student's own, if any*. For example, a Proficient Learner should also possess the knowledge and skills of a Developing Learner *and* a Beginning Learner.

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POLICY ALDs				
	Beginning Learner	**Developing Learner**	**Proficient Learner**	**Distinguished Learner**
	Beginning Learners do not yet demonstrate proficiency in the knowledge and skills necessary at this grade level/course of learning, as specified in Georgia's content standards. The students need substantial academic support to be prepared for the next grade level or course and to be on track for *post-secondary readiness.*	**Developing Learners demonstrate partial proficiency in the knowledge and skills** necessary at this grade level/course of learning, as specified in Georgia's content standards. The students need additional academic support to ensure success in the next grade level or course and to be on track for *post-secondary readiness.*	**Proficient Learners demonstrate proficiency in the knowledge and skills** necessary at this grade level/course of learning, as specified in Georgia's content standards. The students are prepared for the next grade level or course and are on track for *post-secondary readiness.*	**Distinguished Learners demonstrate advanced proficiency in the knowledge and skills** necessary at this grade level/course of learning, as specified in Georgia's content standards. The students are well prepared for the next grade level or course and are well prepared for *post-secondary readiness.*
RANGE ALDs				
Standard	**Beginning Learner**	**Developing Learner**	**Proficient Learner**	**Distinguished Learner**
	A student who achieves at the **Beginning Learner** level demonstrates minimal command of the grade-level standards. The pattern exhibited by student responses indicates that students are most likely able to:	A student who achieves at the **Developing Learner** level demonstrates partial command of the grade-level standards. The pattern exhibited by student responses indicates that students are most likely able to:	A student who achieves at the **Proficient Learner** level demonstrates proficiency of the grade-level standards. The pattern exhibited by student responses indicates that students are most likely able to:	A student who achieves at the **Distinguished Learner** level demonstrates advanced proficiency of the grade-level standards. The pattern exhibited by student responses indicates that students are most likely able to:

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Cells				
SB1a SB1b SB1c SB1d SB1e	• identify the structures and functions of cell parts; • recognize the role of cellular reproduction in maintaining genetic continuity; • relate the structure of macromolecules to their interactions in carrying out cellular processes; • recognize that cellular transport is involved in maintaining homeostasis; • recognize the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell;	• explain that cell structures and organelles interact as a system to maintain homeostasis; • recognize models used to explain the role of cellular reproduction in maintaining genetic continuity; • select arguments that are supported by evidence to relate the structure of macromolecules to their interactions in carrying out cellular processes; • identify investigations used to determine the role of cellular transport in maintaining homeostasis; • identify questions used to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell;	• construct an explanation of how cell structures and organelles (i.e., nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, Golgi, endoplasmic reticulum, vacuoles, ribosomes, mitochondria) interact as a system to maintain homeostasis; • develop and use models to explain the role of cellular reproduction (i.e., binary fission, mitosis, and meiosis) in maintaining genetic continuity; • construct arguments supported by evidence to relate the structure of macromolecules (carbohydrates, proteins, lipids, and nucleic acids) to their interactions in carrying out cellular processes; • plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis; • ask questions to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell (e.g., single-celled alga);	• refine explanations of how cell structures and organelles interact as a system to maintain homeostasis; • refine models to explain the role of cellular reproduction in maintaining genetic continuity; • refine arguments supported by evidence to relate the structure of macromolecules to their interactions in carrying out cellular processes; • refine investigations to determine the role of cellular transport in maintaining homeostasis; • analyze complex questions used to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell;

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Cellular Genetics & Heredity				
SB2a SB2b SB2c SB3a SB3b SB3c	• identify features in the structures of DNA and; • recognize that genetic variations may result from new genetic combinations through meiosis; • identify considerations related to the use of biotechnology in forensics, medicine, and agriculture; • recognize examples of Mendel's laws; • identify general patterns of inheritance; • communicate that there are advantages and disadvantages of sexual and asexual reproduction;	• recognize that the structures of DNA and RNA lead to the expression of information within the cell via the processes of replication, transcription, and translation; • provide examples of inheritable genetic variations that may result from new genetic combinations through meiosis; • gather and communicate information about the use and ethical considerations of biotechnology in forensics, medicine, and agriculture; • describe Mendel's laws and recognize how they can be used to explain the role of meiosis in reproductive variability; • determine how models can be used to explain patterns of inheritance; • describe the advantages and disadvantages of sexual and asexual reproduction;	• construct an explanation of how the structures of DNA and RNA lead to the expression of information within the cell via the processes of replication, transcription, and translation; • construct an argument based on evidence to support the claim that inheritable genetic variations may result from new genetic combinations through meiosis (crossing over, nondisjunction); non-lethal errors occurring during replication (insertions, deletions, substitutions); and/or heritable mutations caused by environmental factors (radiation, chemicals, viruses); • ask questions to gather and communicate information about the use and ethical considerations of biotechnology in forensics, medicine, and agriculture; • use Mendel's laws (segregation and independent assortment) to ask questions and define problems that explain the role of meiosis in reproductive variability; • use mathematical models to predict and explain patterns of inheritance;	• refine an explanation of how the structures of DNA and RNA lead to the expression of information within the cell via the processes of replication, transcription, and translation; • analyze an argument based on evidence to support the claim that inheritable genetic variations may result from new genetic combinations through meiosis; non-lethal errors occurring during replication; and/or heritable mutations caused by environmental factors; • refine questions used to gather and communicate information about the use and ethical considerations of biotechnology in forensics, medicine, and agriculture; • use Mendel's laws to answer questions and solve problems related to the role of meiosis in reproductive variability; • analyze mathematical models used to predict and explain patterns of inheritance; • refine an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction;

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			• construct an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction;	
Classification & Phylogeny				
SB4a SB4b SB4c	• identify patterns in structures and function among clades of organisms; • recognize that patterns of common ancestry and the theory of evolution can be used to determine relationships among major groups of organisms; • identify characteristics of viruses;	• explain patterns in structures and function among clades of organisms, including the origin of eukaryotes by endosymbiosis; • analyze and interpret simple data related to patterns of common ancestry and the theory of evolution to determine relationships among major groups of organisms; • describe the characteristics of viruses and organisms;	• construct an argument supported by scientific information to explain patterns in structures and function among clades of organisms, including the origin of eukaryotes by endosymbiosis; • analyze and interpret data to develop models (i.e., cladograms, phylogenetic trees) based on patterns of common ancestry and the theory of evolution to determine relationships among major groups of organisms; • construct an argument supported by empirical evidence to compare and contrast the characteristics of viruses and organisms;	• refine an argument supported by scientific information to explain patterns in structures and function among clades of organisms, including the origin of eukaryotes by endosymbiosis; • use data to evaluate models based on patterns of common ancestry and the theory of evolution to determine relationships among major groups of organisms; • refine an argument supported by empirical evidence to compare and contrast the characteristics of viruses and organisms;
Ecology				
SB5a SB5b SB5c SB5d SB5e	• identify factors affecting biodiversity and populations in ecosystems; • describe the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration;	• analyze data to support explanations about factors affecting biodiversity and populations in ecosystems; • identify models that can be used to analyze the cycling of matter and flow of energy within ecosystems through the processes of	• plan and carry out investigations and analyze data to support explanations about factors affecting biodiversity and populations in ecosystems; • develop and use models to analyze the cycling of matter and flow of energy within ecosystems through the	• refine investigations to support explanations about factors affecting biodiversity and populations in ecosystems; • refine models used to analyze the cycling of matter and flow of energy within ecosystems through the

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	• identify a possible impact of an environmental change on the stability of an ecosystem; • identify ways that human activity impacts the environment; • recognize that an organism's ability to survive is affected by changing environmental limits;	photosynthesis and respiration; • predict the impact of different types of environmental changes on the stability of an ecosystem; • identify a solution that could be used to reduce the impact of a human activity on the environment; • identify explanations that predict an organism's ability to survive within changing environmental limits;	processes of photosynthesis and respiration; • construct an argument to predict the impact of environmental change on the stability of an ecosystem; • design a solution to reduce the impact of a human activity on the environment; • construct explanations that predict an organism's ability to survive within changing environmental limits (e.g., temperature, pH, drought, fire);	processes of photosynthesis and respiration; • explain why a specific argument can be used to predict the impact of environmental change on the stability of an ecosystem; • refine a solution to reduce the impact of a human activity on the environment; • analyze explanations used to predict an organism's ability to survive within changing environmental limits;
Theory of Evolution				
SB6a SB6b SB6c SB6d SB6e	• recognize that new understandings of Earth's history have influenced our understanding of biology; • define the terms biodiversity and speciation; • recognize that evidence from comparative morphology, embryology, biochemistry and genetics support the theory that all living organisms are related by way of common descent; • recognize that undirected genetic changes in natural selection and genetic drift have led to changes in populations of organisms; • determine the role of natural selection in causing biological resistance.	• identify an explanation of how new understandings of Earth's history, the emergence of new species from pre-existing species, and our understanding of genetics have influenced our understanding of biology; • identify patterns in biodiversity that result from speciation; • identify an argument used to support the claim that evidence from comparative morphology, embryology, biochemistry and genetics support the theory that all living organisms are related by way of common descent; • identify mathematical models that can be used to support explanations of how undirected genetic changes in	• construct an explanation of how new understandings of Earth's history, the emergence of new species from pre-existing species, and our understanding of genetics have influenced our understanding of biology; • analyze and interpret data to explain patterns in biodiversity that result from speciation; • construct an argument using valid and reliable sources to support the claim that evidence from comparative morphology (analogous vs. homologous structures), embryology, biochemistry (protein sequence) and genetics support the theory that all living organisms are	• compare explanations of how new understandings of Earth's history, the emergence of new species from pre-existing species, and our understanding of genetics have influenced our understanding of biology; • make predictions or inferences based on analyzed data related to biodiversity that results from speciation; • evaluate an argument using valid and reliable sources to support the claim that evidence from comparative morphology, embryology, biochemistry and genetics support the theory that all living organisms are related by way of common descent; • refine mathematical models to support explanations of

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		natural selection and genetic drift have led to changes in populations of organisms; • identify a model that can be used to explain the role of natural selection in causing biological resistance.	related by way of common descent; • develop and use mathematical models to support explanations of how undirected genetic changes in natural selection and genetic drift have led to changes in populations of organisms; • develop a model to explain the role of natural selection in causing biological resistance (e.g., pesticides, antibiotic resistance, influenza vaccines).	how undirected genetic changes in natural selection and genetic drift have led to changes in populations of organisms; • refine a model to explain the role of natural selection in causing biological resistance.

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