ACHIEVEMENT LEVEL DESCRIPTORS
Washington Comprehensive Assessment of Science
Grade 11

August 2018

Science Assessment Team
Office of Superintendent of Public Instruction
August 2018

Grade 11 Level 2

An 11th grade student performing at **Level 2** applies, with support, science and engineering practices and crosscutting concepts to explain phenomena and design solutions to problems in the natural and the designed world. The student uses models, information, and patterns in data to support scientific arguments, identify the relationship between two variables, and make predictions about how changes to one variable will affect other variables. The student describes the data to collect in an investigation in order to identify proportional relationships among variables. The student uses patterns in data to identify a solution that meets given criteria and constraints of a problem. The student uses data, basic algebraic thinking, and scientific principles to support explanations of scientific processes and arguments about how systems and system parts will change over time.

A student performing at Level 2 can do things like:

1. Use a model of atomic structure and patterns in data to describe how electrons determine properties of atoms and matter and to support the argument that temperature changes affect reaction rates. (Derived from PS1)
2. Use basic algebraic thinking and data from an investigation to describe the effect of net force and mass on the acceleration of an object. (Derived from PS2)
3. Describe a device that converts energy from one form to another, and use a model to describe how energy changes in one part of a system affect other parts of the system. (Derived from PS3)
4. Use a model to quantitatively describe the relationships among amplitude, frequency and wave speed and to describe how wave speed depends on the medium through which waves travel. (Derived from PS4)
5. Use data and a model to support an explanation of how DNA determines protein structure and how multicellular organisms are organized into interacting systems with specialized functions. (Derived from LS1)
6. Use basic algebraic thinking to support a quantitative argument about the cycling of matter and flow of energy among organisms in an ecosystem. (Derived from LS2)
7. Ask questions that help to identify relationships among DNA, chromosomes, and traits, and use evidence to support an argument about causes of inheritable genetic variation. (Derived from LS3)
8. Use data to support an explanation about the factors that cause evolution and to support an argument about how environmental conditions affect genetic variation within populations. (Derived from LS4)
9. Use basic algebraic thinking to predict the motion of objects in the solar system, and use information to describe the processes within stars that produce elements. (Derived from ESS1)
10. Use a model to identify changes in climate that are caused by variations in energy flow into and out of Earth's systems. (Derived from ESS2)
11. Use data from climate models to predict changes in climate and impacts on Earth's systems. (Derived from ESS3)
12. Identify qualitative and quantitative criteria for a successful solution to a major global problem that takes into account what people need and want. (Derived from ETS1)

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Grade 11 Level 3

An 11th grade student performing at **Level 3** effectively applies science and engineering practices and crosscutting concepts to explain phenomena and design solutions to problems in the natural and the designed world. The student develops models and uses information and patterns in data to support scientific arguments, describe relationships among variables, and predict how the variables will change over time. The student plans investigations to determine proportional relationships among variables. The student analyzes patterns in data to evaluate how well a solution meets the criteria and constraints of a problem. The student uses data, mathematical and computational thinking, and scientific principles to construct explanations of scientific processes and arguments about how systems and system parts will change over time.

In addition to the skills and knowledge demonstrated at Level 2, a student performing at Level 3 can do things like:

1. Develop and use a model of atomic structure and patterns in data to predict properties of matter and to construct an explanation about the effect of temperature on reaction rates. (Derived from PS1)
2. Plan an investigation to collect data that can, with mathematical and computational thinking, support a quantitative argument about the effect of net force and mass on the acceleration of an object. (Derived from PS2)
3. Design a device that converts energy from one form to another, and develop and use a model to quantitatively describe how energy changes in one part of a system affect other parts of the system. (Derived from PS3)
4. Develop and use a model to quantitatively predict how a change in medium will affect amplitude, frequency and wave speed. (Derived from PS4)
5. Use data to develop a model and construct an explanation of how DNA determines protein structure and how multicellular organisms are organized into interacting systems with specialized functions. (Derived from LS1)
6. Use mathematical and computational thinking to construct a quantitative argument about the cycling of matter and flow of energy among organisms in an ecosystem. (Derived from LS2)
7. Ask questions to describe relationships among DNA, chromosomes, and traits, and use evidence to construct arguments about causes of inheritable genetic variation. (Derived from LS3)
8. Use data to construct an explanation of how given factors result in evolution and to construct an argument about how environmental conditions affect genetic variation within populations. (Derived from LS4)
9. Use mathematical and computational thinking to qualitatively predict the motion of objects in the solar system, and use information to describe that the processes and elements produced within stars depend on the mass and age of the star. (Derived from ESS1)
10. Develop a model that describes how changes in climate are caused by variations in energy flow into and out of Earth's systems. (Derived from ESS2)
11. Use data from climate models to predict the rate of change in climate and whether impacts on Earth's systems are reversible. (Derived from ESS3)
12. Define qualitative and quantitative criteria for a successful solution to a major global problem that takes into account what people need and want. (Derived from ETS1)

Grade 11 Level 4

An 11th grade student performing at **Level 4** effectively, consistently, and appropriately applies science and engineering practices and crosscutting concepts to explain phenomena and design solutions to problems in the natural and the designed world. The student uses information to evaluate patterns in data and revise models that support scientific claims, explain relationships among variables, and predict, based on scientific principles and reasoning, how the variables will change over time. The student revises the design of investigations in order to collect data that can describe quantitative relationships among variables. The student analyzes patterns in data to determine which solution best meets the criteria and constraints of a problem. The student uses data, mathematical and computational thinking, and scientific principles to construct explanations of scientific processes and arguments about stability and change within systems.

In addition to the skills and knowledge demonstrated at Level 3, a student performing at Level 4 can do things like:

1. Use mathematical and computational thinking and a model of atomic structure to predict matter and energy changes during chemical reactions and to evaluate claims about the effect of temperature on reaction rates. (Derived from PS1)
2. Evaluate an investigation designed to collect data that can, with mathematical and computational thinking, support a quantitative explanation of the effect of net force and mass on the acceleration of an object. (Derived from PS2)
3. Design and evaluate a device that converts energy from one form to another, and evaluate a model that quantitatively describes how energy changes to one part in a system affect other parts of the system. (Derived from PS3)
4. Evaluate a model that quantitatively predicts how the properties of the medium affect amplitude, frequency and wave speed. (Derived from PS4)
5. Use evidence to evaluate and revise a model to explain how DNA determines protein structure and function and how multicellular organisms are organized into interacting systems with specialized functions. (Derived from LS1)
6. Use mathematical and computational thinking to evaluate and revise a quantitative argument about the cycling of matter and flow of energy among organisms in an ecosystem. (Derived from LS2)
7. Ask questions and use scientific reasoning to explain relationships among DNA, chromosomes, and traits, and use evidence to evaluate and revise arguments about causes of inheritable genetic variation. (Derived from LS3)
8. Use data to evaluate an explanation of how given factors result in evolution and to revise an argument about how environmental conditions affect genetic variation within populations. (Derived from LS4)
9. Use mathematical and computational thinking to quantitatively predict the motion of objects in the solar system and use information and scientific reasoning to explain how the processes and elements produced within stars depend on the mass and age of the star. (Derived from ESS1)
10. Evaluate and revise a model that describes how changes in climate are caused by variations in energy flow into and out of Earth's systems. (Derived from ESS2)
11. Analyze data from climate models to identify how limitations in the models affect predicted rates of change in climate and whether impacts on Earth's systems are reversible. (Derived from ESS3)
12. Use qualitative and quantitative criteria to evaluate solutions to a major global problem that takes into account what people need and want. (Derived from ETS1)

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