

## Grade 8 MISA Content-Specific PLDs

**A student at Level 5 will be able to:**

1. Evaluate and revise models to describe how the behavior of substances depends on their structures at atomic and molecular levels, which are too small to see.
2. Plan an investigation to produce evidence that can be used to evaluate an argument about how change in motion depends on mass and force.
3. Conduct and evaluate an investigation to provide evidence that fields exist between objects and exert forces on each other, even though the objects are not in contact with each other.
4. Evaluate and revise a device, based on Newton's Third Law, involving a collision of two objects, fully explaining the role of different system components and of the forces one object exerts on another.
5. Evaluate and revise a model, based on evidence, that supports the argument that organisms are made of cells that can form tissues, organs, and systems of organs.
6. Evaluate and revise a model that explains how photosynthetic organisms, using energy from the sun, acquire matter and transfer that matter in a cycle to all animals and other organisms.
7. Evaluate evidence (*e.g.*, validity and reliability of sources, sufficiency) and identify the strengths and weaknesses of the evidence used to support a claim that certain animal behaviors and specialized plant structures affect the probability of successful reproduction.
8. Evaluate and revise a model that describes the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
9. Evaluate and revise models of sexual and asexual reproduction, and explain, using causal scientific reasoning, how only sexual reproduction results in increased genetic variation, which can result in an increased probability of survival and reproduction in a specific environment.
10. Describe, using scientific reasoning, how patterns in fossil data provide evidence for changes in populations over time, and use the data to evaluate the explanation that some organisms survive better than other organisms because of differences in traits.
11. Evaluate and revise models of the Earth-sun-moon system and explain, using scientific reasoning, the patterns of movement that cause lunar phases, eclipses, and seasons.
12. Evaluate and revise models for how the geologic time scale is used to organize Earth's history, including evidence from the analyses of rock formations and fossils.

13. Evaluate and revise models to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity, fully integrating factors such as transpiration, condensation, and evaporation.
14. Ask questions and use evidence to construct arguments about how multiple factors, including mainly geologic processes, have resulted in the depletion and replenishing of Earth's mineral, energy, and groundwater resources, and that these resources are limited to current and near-future generations based on replenishing rates or distribution.
15. Use scientific reasoning to construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems, and apply scientific principles to evaluate and revise a method for monitoring and minimizing a human impact on the environment.

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**A student at Level 4 will be able to:**

1. Develop and use a model to describe the atomic composition of simple molecules and extended structures.
2. Use data from an investigation to construct an argument about how change in motion depends on mass and force.
3. Ask questions about data collected during an investigation to determine the factors that affect the strength of electric and magnetic forces, providing evidence that fields exist between objects and exert forces, even though the objects are not in contact with each other.
4. Explain or construct a device which, based on Newton's Third Law, serves as a model for the forces exerted by two colliding objects on each other.
5. Use data from an investigation to develop a model and support the argument that organisms are made of cells that can form tissues, organs, and systems of organs.
6. Use evidence to construct a scientific explanation, based on a model, for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
7. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction.
8. Develop and use a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
9. Develop and use models to describe sexual or asexual reproduction and to describe that only sexual reproduction results in increased genetic variation, which can result in an increased probability of survival and reproduction in a specific environment.
10. Describe how patterns in fossil data provide evidence for changes in populations over time, and use the data to construct an explanation that some organisms survive better than other organisms because of differences in traits.
11. Develop and use models of the Earth-sun-moon system to describe the patterns of movement that cause lunar phases, eclipses, and seasons.
12. Construct a scientific explanation based on evidence for how the geologic time scale is used to organize Earth's history, emphasizing how analyses of rock formations and fossils are used to establish relative ages of major events.
13. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
14. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

15. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems, and apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

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**A student at Level 3 will be able to:**

1. Identify the components (*e.g.*, individual atoms, molecules, repeating subunits) of a model relevant to describing the atomic composition of simple molecules and extended structures.
2. Describe how evidence from a given investigation supports the argument that change in an object's motion depends on mass and force.
3. Make observations, given an investigation plan, to support an explanation about fields that exist between objects and exert forces, even though the objects are not in contact with each other.
4. Describe the criteria, constraints, and limitations of a model used for representing the collision of two objects and the forces the first object exerts on the second.
5. Use data from an investigation and a model to support the argument that organisms are made of cells that can form tissues, organs, and systems of organs.
6. Describe how plants, algae, and photosynthetic microorganisms take in matter and use energy from the sun to produce carbon-based organic molecules, which they can use immediately or store, and release matter into the environment through photosynthesis.
7. Make and support a claim regarding how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction.
8. Use a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
9. Use models to identify differences between sexual or asexual reproduction and to identify which type of reproduction results in increased genetic variation of traits.
10. Identify patterns in fossil data that provide evidence for changes in populations over time and that support the explanation that some organisms survive better than other organisms because of differences in traits.
11. Use models of the Earth-sun-moon system to identify the patterns of movement that cause lunar phases, eclipses, and seasons.
12. Describe that the natural world operates today as it did in the past and will continue to do so in the future, connecting evidence from fossils as well as the geologic time scale of the Earth's history.
13. Use models to describe the cycling of water through Earth's systems.
14. Describe how past and current geoscience processes have caused the uneven distributions of Earth's mineral, energy, and groundwater resources.
15. Identify relationships between human activity and environmental impact, based on evidence, and describe how those relationships can facilitate the design of a solution.

Note: Content-specific performance level descriptors were not developed for Performance Level 2 for the MISA in Grade 5, as the standard setting simply determined the cut point for a borderline Level 3 student.

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