Next Generation Science Standards Science

Grade 3

Adopted 2013

Motion and Stability: Forces and Interactions 3-PS2

Students who demonstrate understanding can:

3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. 3-PS2-1

3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. 3-PS2-2

3-PS2-3. Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. 3-PS2-3

3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets. 3-PS2-4

From Molecules to Organisms: Structures and Processes 3-LS1

Students who demonstrate understanding can:

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. 3-LS1-1

Ecosystems: Interactions, Energy, and Dynamics 3-LS2

Students who demonstrate understanding can:

3-LS2-1. Construct an argument that some animals form groups that help members survive. 3-LS2-1

Heredity: Inheritance and Variation of Traits 3-LS3

Students who demonstrate understanding can:

3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. 3-LS3-1

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. 3-LS3-2

Biological Evolution: Unity and Diversity 3-LS4

Students who demonstrate understanding can:

3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. 3-LS4-1

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. 3-LS4-2

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. 3-LS4-3

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. 3-LS4-4

Earth's Systems 3-ESS2

Students who demonstrate understanding can:

3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. 3-ESS2-1

3-ESS2-2. Obtain and combine information to describe climates in different regions of the world. 3-ESS2-2

Earth and Human Activity 3-ESS3

Students who demonstrate understanding can:

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. 3-ESS3-1

Engineering Design 3-5-ETS1

Students who demonstrate understanding can:

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. 3-5-ETS1-1

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. 3-5-ETS1-2

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. 3-5-ETS1-3

Science and Engineering Practices SEP

1. Analyzing and Interpreting Data SEP.1

3-5. Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. SEP.1.3-5

- Analyze and interpret data to make sense of phenomena using logical reasoning. SEP.1.3-5.1
- Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. SEP.1.3-5.2

2. Asking Questions and Defining Problems SEP.2

3-5. Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. SEP.2.3-5

- Ask questions that can be investigated based on patterns such as cause and effect relationships. SEP.2.3-5.1
- Define a simple problem that can be solved through the development of a new or improved object or tool. SEP.2.3-5.2
- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. SEP.2.3-5.4

3. Constructing Explanations and Designing Solutions SEP.3

3-5. Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. SEP.3.3-5

- Use evidence (e.g., observations, patterns) to support an explanation. SEP.3.3-5.1
- Use evidence (e.g., observations, patterns) to construct an explanation. SEP.3.3-5.2
- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. SEP.3.3-5.5
- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. SEP.3.3-5.7

4. Developing and Using Models SEP.4

3-5. Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. SEP.4.3-5

- Develop models to describe phenomena. SEP.4.3-5.1

5. **Engaging in Argument from Evidence** SEP.5

   3-5. Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). SEP.5.3-5

   - Construct an argument with evidence, data, and/or a model. SEP.5.3-5.1
   - Construct an argument with evidence. SEP.5.3-5.2
   - Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. SEP.5.3-5.3

6. **Obtaining, Evaluating, and Communicating Information** SEP.6

   3-5. Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. SEP.6.3-5

   - Obtain and combine information from books and other reliable media to explain phenomena. SEP.6.3-5.1

7. **Planning and Carrying Out Investigations** SEP.7

   3-5. Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. SEP.7.3-5

   - Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. SEP.7.3-5.1
   - Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. SEP.7.3-5.2

8. **Scientific Investigations Use a Variety of Methods** SEP.8

   - Science investigations use a variety of methods, tools, and techniques. SEP.8.3

9. **Scientific Knowledge is Based on Empirical Evidence** SEP.9

   - Science findings are based on recognizing patterns. SEP.9.2

Disciplinary Core Ideas DCI

A. Forces and Motion DCI.PS2.A

- Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) DCI.PS2.A.3-5.1
- The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) DCI.PS2.A.3-5.2

B. Types of Interactions DCI.PS2.B

- Objects in contact exert forces on each other. DCI.PS2.B.3-5.1
- Electric, and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. DCI.PS2.B.3-5.2

B. Growth and Development of Organisms DCI.LS1.B

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. DCI.LS1.B.3-5.2

C. Ecosystem Dynamics, Functioning, and Resilience DCI.LS2.C

- When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. DCI.LS2.C.3-5.1

D. Social Interactions and Group Behavior DCI.LS2.D

- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). DCI.LS2.D.3-5.1

A. Inheritance of Traits DCI.LS3.A

- Many characteristics of organisms are inherited from their parents. DCI.LS3.A.3-5.2
- Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. DCI.LS3.A.3-5.3

B. Variation of Traits DCI.LS3.B

- Different organisms vary in how they look and function because they have different inherited information. DCI.LS3.B.3-5.2
- The environment also affects the traits that an organism develops. DCI.LS3.B.3-5.3

A. Evidence of Common Ancestry and Diversity DCI.LS4.A

- Some kinds of plants and animals that once lived on Earth are no longer found anywhere. DCI.LS4.A.K-2.1
- Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. DCI.LS4.A.3-5.2

B. Natural Selection DCI.LS4.B

- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. DCI.LS4.B.3-5.1

C. Adaptation DCI.LS4.C

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. DCI.LS4.C.3-5.1

D. Biodiversity and Humans DCI.LS4.D

- Populations live in a variety of habitats, and change in those habitats affects the organisms living there. DCI.LS4.D.3-5.2

D. Weather and Climate DCI.ESS2.D

- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. DCI.ESS2.D.3-5.2
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. DCI.ESS2.D.3-5.3

B. Natural Hazards DCI.ESS3.B

- A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. DCI.ESS3.B.3-5.2

A. Defining and Delimiting Engineering Problems DCI.ETS1.A

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. DCI.ETS1.A.3-5.1

B. Developing Possible Solutions DCI.ETS1.B

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. DCI.ETS1.B.3-5.2
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. DCI.ETS1.B.3-5.3
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. DCI.ETS1.B.3-5.4

C. Optimizing the Design Solution DCI.ETS1.C

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. DCI.ETS1.C.3-5.2

Crosscutting Concepts CCC

1. Patterns CCC.1

- Patterns of change can be used to make predictions. CCC.1.3-5.5
- Similarities and differences in patterns can be used to sort and classify natural phenomena. CCC.1.3-5.6

2. Cause and Effect CCC.2

- Cause and effect relationships are routinely identified. CCC.2.3-5.3
- Cause and effect relationships are routinely identified, tested, and used to explain change. CCC.2.3-5.4
- Cause and effect relationships are routinely identified and used to explain change. CCC.2.3-5.5

3. Scale, Proportion, and Quantity CCC.3

- Observable phenomena exist from very short to very long time periods. CCC.3.3-5.1

4. Systems and System Models CCC.4

- A system can be described in terms of its components and their interactions. CCC.4.3-5.2

8. **Influence of Engineering, Technology, and Science on Society and the Natural World** CCC.8
    - Engineers improve existing technologies or develop new ones to increase their benefits (e.g., better artificial limbs), decrease known risks (e.g., seatbelts in cars), and meet societal demands (e.g., cell phones). CCC.8.3-5.4
    - People's needs and wants change over time, as do their demands for new and improved technologies. CCC.8.3-5.5
    - Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. CCC.8.3-5.8

9. **Interdependence of Science, Engineering, and Technology** CCC.9
    - Scientific discoveries about the natural world can often lead to new and improved technologies, which are developed through the engineering design process. CCC.9.3-5.2
    - Knowledge of relevant scientific concepts and research findings is important in engineering. CCC.9.3-5.3

11. **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** CCC.11
    - Science assumes consistent patterns in natural systems. CCC.11.3-5.3

12. **Science is a Human Endeavor** CCC.12
    - Science affects everyday life. CCC.12.3-5.1