Indiana Science/Computer Science Content Connectors

# Grade 7

## Motion and Stability: Forces and Interactions

1. Compare two solutions to a problem involving the motion of two colliding objects, applying Newton's Third Law. [Clarification Statement: Examples of practical problems could include the impact of collisions between two cars, between a car and stationary objects, and between a meteor and a space vehicle.] (E) MS-PS2-1A
2. Use evidence to support the claim that the changes in an object's motion depends on the sum of the forces on the object and the mass of the object. (E) MS-PS2-2A
3. Use data to determine the factors that affect the strength of electric or magnetic forces. MS-PS2-3A
4. Use evidence to support the claim that gravitational forces attract and depend on the masses of the objects. [Clarification Statement: Examples of evidence include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the sun, and orbital periods of objects within the solar system.] (E) MS-PS2-4A
5. Evaluate evidence needed to support a claim related to the existence of fields (i.e., magnetic fields, gravitational fields, or electric fields) between objects exerting forces on each other even when the objects are not in contact. [Clarification Statement: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, and electrically-charged pith balls.] MS-PS2-5A

## Energy

1. Use graphical displays of data to describe the relationship of kinetic energy to the mass of an object and the speed of an object. (E) MS-PS3-1A
2. Use a model to describe how distance affects the amount of potential energy stored in a system. MS-PS3-2A
3. Collect data to test or modify a device to minimize or maximize thermal energy transfer. [Clarification Statement: Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup.] (E) MS-PS3-3A
4. Identify the variables and data needed to conduct an experiment related to the relationships among energy transfer, type of matter, mass, and change in average kinetic energy as measured by the temperature of the sample. MS-PS3-4A
5. Sequence steps of an investigation related to the relationships among energy transfer, type of matter, mass, and change in average kinetic energy as measured by the temperature of the sample. MS-PS3-4B

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| | 6 Use evidence to support the claim that when the kinetic energy of an object changes, energy is transferring to or from the object. MS-PS3-5A |
| From Molecules to Organisms: Structures and Processes | 1 Identify the materials/tools to be used to provide evidence that living things are made of one cell or many different numbers and types of cells. [Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.] (E) MS-LS1-1A |
| | 2 Use a model to describe how cell structures (e.g., nucleus, chloroplasts, mitochondria, cell membrane, cell wall) contribute to the function of the cell as a whole. (E) MS-LS1-2A |
| | 3 Use evidence to describe the systems and subsystems created when cells form tissues and tissues form organs. MS-LS1-3A |
| | 4 Use a model to describe how food is rearranged and energy is released through chemical reactions in the process of cellular respiration. MS-LS1-7A |
| | 5 Summarize information about how sensory receptors respond to different inputs, sending signals to the brain for immediate behavior or storage as memories. MS-LS1-8A |
| Earth's Place in the Universe | 1 Sequence the relative order of events from Earth's history shown by rock strata and patterns of layering. [Clarification Statement: Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.] MS-ESS1-4A |
| Earth's Systems | 1 Use a model to describe cycling of Earth's materials and flow of energy, including processes of melting, crystallization, weather, deformation, and sedimentation. (E) MS-ESS2-1A |
| | 2 Describe how geoscience processes change Earth's surface at time and spatial scales that can be large (e.g., plate motions) or small (e.g., landslides). MS-ESS2-2A |
| | 3 Explain the different time scales of how water-related processes (e.g., rain, runoff, flood) change the surface of Earth. MS-ESS2-2B |
| | 4 Use evidence of the distribution of fossils to describe past plate motions. MS-ESS2-3A |
| | 5 Identify how the shapes along the edges of continents (fit like a jigsaw puzzle) demonstrate lithospheric plate movement, using models. MS-ESS2-3B |
| | 6 Identify how fossil comparisons along the edges of continents demonstrate lithospheric plate movement. MS-ESS2-3C |

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| **Earth and Human Activity** | **1** **Identify explanations of the uneven distributions of Earth's minerals, energy, and groundwater resources due to past and current geoscience processes. [Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).] (E)** MS-ESS3-1A |
| | **2** **Use data to predict future catastrophic events.** MS-ESS3-2A |
| | **3** **Use data to describe a solution to reduce the impact of a natural disaster on humans. [Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards.]** MS-ESS3-2B |
| **Engineering Design** | **1** **Define criteria and constraints (e.g., scientific principles, potential impacts on people, the natural environment) of a problem to ensure a successful solution.** MS-ETS1-1A |
| | **2** **Select the best solution to a problem using evidence of alignment to criteria and constraints.** MS-ETS1-2A |
| | **3** **Combine the best characteristics from multiple solutions into a new solution to better meet the criteria for success.** MS-ETS1-3A |
| | **4** **Use a model to generate data on how a design proposal can be modified for improvements through iterative testing** MS-ETS1-4A |