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| M. Angileri ♣  1-15-18 | **6th grade science** | | **Lesson Plans: Changes in motion, Force, and Direction: Forces and Motion #2** | | | | |
| NGSS Standard | **MS-PS2-2**  **DCI:** **MS-PS2.A2**  **PS2. A.3**  S & E practices  CCC | | The student is expected to plan an investigation to provide evidence that the change in an object’s motion depends on the sum of the forces on the object and the mass of the object.  **Forces and Motion:** The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. **Forces and Motion:** All positions of objects and the directions of forces and motions must be described in an arbitrary chosen reference frame arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared.  **Planning an Investigation:**  Plan an investigation individually and collaboratively, and in the design, identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.  **Stability and Change:** Explanations of stability and change in natural or designed systems can be constructed by examining changes over time and forces at different scales, including the atomic scale. | | | | |
| Vocabulary: | | **Energy:** The ability to work or cause change.  **Kinetic Energy:** The energy an object has due to its motion. Motion energy that is proportional to the mass of the moving object and grows with the square of its velocity. KE=1/2m x v squared  **Mass:** The amount of matter in an object.  **Direction:** A straight path that an object can move along.  **Reference Frame:** A system that uses coordinates or background objects to establish position or measure movement of a point in space.  **Newton’s Law of Force and Acceleration:** Acceleration of an object depends on the object's mass and magnitude of the force acting upon it (F=ma) is often referred to as Newton's Second Law of Motion**.**  **Unbalanced Force:** When net force is not zero, forces are unbalanced and a change of motion occurs**.**  **Balanced Force:** When net force is zero, forces are balanced and no change of motion occurs.  **Acceleration:**  A change in an object's speed or direction  **Motion:** The change in an objects position with respect to time and in comparison, to the position of other objects used as a reference points. **Interacting Objects**: Objects that affect one another.  **Newton’s Third Law:** It states that for every action, there is an equal and opposite reaction, often referred to as Newton’s third law of motion  Net Force: The sum of all forces acting on an abject.  **Newton:** Unit of force needed to accelerate a mass of one kilogram at a rate of one meter per second squared.  **System**: a group of related parts that make up a whole; the whole system can do things that the individual parts within the system cannot  **Proportional relationship:** When two values exist in a constant ratio.  **Speed:** The Ratio of change of position with respect to time.  **Mechanical Energy:** Kinetic or potential energy associated with the motion or position of an object. The sum of the potential and kinetic energy in an object.  **Light Energy:** A form of energy that exhibits wave like behavior as it travels through space; part of the electromagnetic spectrum.  **Transfer:**  Moving from one place to another.  **Potential Energy:** Energy that is stored in a system or object.  **Thermal Energy:** Total kinetic energy of the tiny particles that make up matter. The faster the particles move, the warmer the matter becomes.  **Sound Energy**: Form of energy that is made by vibrations and requires a medium ( air, Water, or solids) in order to travel. | | | | | |
|  | | **MONDAY** | | **TUESDAY** | **WEDNESDAY** | **THURSDAY** | **FRIDAY** |
| Content Objective: | |  | | SW demonstrate application of forces impacting motion of objects by carrying out the balanced and unbalanced forces activity. | SW demonstrate knowledge of forces impacting motion of objects by identifying the scenario that will show greater change in motion in the simulation. | SW demonstrate application of relationships between force, Mass, and Acceleration by carrying out an experiment. | SW demonstrate analysis of relationships between force, Mass, and Acceleration by finding connections between the experiment and real life occurrences. |
| Language objective | |  | | SW write to interpret forces impacting motion of objects using drawings and content specific vocabulary. | SW orally discuss forces impacting motion of objects in the PHET simulation using content specific vocabulary. | SW write to reflect on the Relationships between force, Mass, and Acceleration using the graphic organizer. | SW write to draw conclusions about the Relationships between force, Mass, and Acceleration using CER. |
| **Essential Question:** | | **Does the Mass of an object affect its motion?** | | **Does the Mass of an object affect its motion?** | **Does the Mass of an object affect its motion?** | **Does the Mass of an object affect its motion?** | **Does the Mass of an object affect its motion?** |
| In class today | | MLK Day | | Pretest  Hook and Balanced and Unbalanced forces.  Debriefing?  Due today: Experimentation with PHET simulation | Pre-Activity Discussion  Relationships between force, Mass, and Acceleration. | Do 2: Relationships between force, Mass, and Acceleration.  Conduct experiment | Relationships between force, Mass, and Acceleration.  Analyze results |
| Learning Target | |  | |  |  |  |  |

**The Verbs:** What should students be doing? **Construct an argument:** Say what you think and why. **Use an argument:** Make use of what you think. **Present an argument:** Show and tell people about what you think. **The Nouns**: What key terms are found in the standard? Motion energy: Kinetic energy Kinetic energy: Energy of motion Energy: Controls the amount of change that can occur within a system; without enough energy, change cannot occur

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| Enrichment |  | Balloon Car Job descriptions | Planning for Balloon Car | Material needs | Begin Build |