**Physical Science**

**MS-PS2 Motion and Stability: Forces and Interactions**

**MS-PS2-1 Apply Newton’s Third Law to design a solution to a problem involving the motion of two colliding objects.**

Further explanation: 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.

Constructing explanations and designing solutions; forces and motion; system and system models;

**MS-PS2-2 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.**

Further explanation: Emphasis is on balanced (Newton’s First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton’s Second Law), frame of reference, and specification of units.

Plan and carry out investigations; forces and motion; stability and change;

**MS-PS2-3 Ask questions about data to determine the factors that affect the strength of electrical and magnetic forces.**

Further explanation: Examples of devices that use electrical and magnetic forces could include electromagnets, electric motors, or generators. Examples of data could include the effect of the number of turns of wire on the strength of an electromagnet, or the effect of increasing the number or strength of magnets on the speed of an electric motor. Possible explorations include the effects of living near high tension power lines, the similarities found in hydroelectric generators and wind turbines or the growing electric car market in Maine.

Asking questions and defining problems; types of interactions; cause and effect;

**MS-PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.**

Further explanation: Examples of evidence for arguments could 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. Examples include the gravitational effects of the moon on Maine tides.

Engaging in argument from evidence; types of interactions; system and system models;

**MS-PS2-5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.**

Further explanation: Examples of this phenomenon could include the interactions of magnets, electrically-charged strips of tape, electrically-charged pith balls, and maglev trains. Examples of investigations could include first-hand experiences or simulations.

Plan and carry out investigations; types of interactions; cause and effect;