GSE 8th Physical Science Pacing Guide
Crosscutting Concepts: Energy and Matter; Cause and Effect
Topics: Force, Mass, Motion

8-week Instructional Segment

Anchoring Phenomenon	**Standard**	**Instructional Segments**	**Disciplinary Core Ideas**	**Science and Engineering Practices**	**Instructional Notes**
Transportation Troubles: Outcomes of car and truck accidents have inspired many innovations and solutions that make driving safer. These instructional segments use a few of these phenomena such as seat belts and runaway truck ramps.	**S8P2.** a, b **S8P3.** a, b, c	**Runaway Truck Ramps** **Vehicular Motion**	From *A Framework for K-12 Science Education*: ***By the end of grade 8:*** **PS2.A: Forces and Motion** ● For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first but in the opposite direction (Newton's third law). ● 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 on an object and also change its shape or orientation. ● All positions of objects and the	● Planning and carrying out investigations ● Engaging in arguments from evidence ● Constructing explanations and designing solutions ● Analyzing and interpreting data	Background Begin the instructional segment with Runaway Truck Ramps (see sample lesson) and move toward specific details found in Vehicular Motion. By the end of this unit, students are using the following language in their speaking and writing during EXPLAIN or ELABORATE. ● Gravitational ● Potential energy ● Kinetic energy ● Mass ● Speed ● Velocity

			directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. **PS2.B: Stability and Instability in Physical Systems** ● A stable system is one in which any small change results in forces that return the system to its prior state (e.g., a weight hanging from a string). ● As system can be static but unstable (e.g., a pencil standing on end). ● A system can be changing but have a stable repeating cycle of changes; such as observed in Earth orbiting the sun. ● Motion energy is called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. ● A system of objects may also contain stored (potential) energy, depending on their relative positions. **PS3.C: Relationship Between Energy and Forces** ● When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object.		● Acceleration ● Displacement ● Balanced/Unbalanced forces ● Newton's Laws ● Inertia