Science
Geophysical Science
Unit 2: Motion

Essential Understandings	▪ Causation: Nothing "just happens". Everything is caused. ▪ Interrelatedness: Everything in the universe is connected to everything else in the universe. ▪ Dynamism: Everything is changing in some way all the time. ▪ Entropy: Change has direction. Generally, simple precedes complex. Generally, order changes toward disorder. ▪ Uniformitarianism: The way the universe works today is the way it worked yesterday and the way it will work tomorrow.
Essential Questions	▪ What are the similarities and differences among speed, velocity and acceleration? ▪ How does the slope of a position/time graph represent the motion of an object? ▪ How does the slope of a position/time graph predict the motion of an object? ▪ What does the slope of a velocity/time curve represent? ▪ What are the ideas of relative motion and frames of reference? ▪ How does inertia relate to the change in motion of an object?
Essential Knowledge	▪ Motion is the change of position. ▪ Average speed is the ratio of distance traveled to the time elapsed. ▪ Acceleration is the rate at which velocity changes. ▪ Inertia is the amount an object resists changes to its current motion. ▪ Mass is the measure of the object's inertia.
Vocabulary	▪ <u>Terms</u>: o constant speed, average speed, instantaneous speed, velocity, acceleration, inertia, mass
Essential Skills	▪ Use mathematics to calculate velocity, acceleration, time and distance. ▪ Analyze motion to realize the relationships among distance, velocity and acceleration. ▪ Interpret the slopes on motion graphs.
Related Maine Learning Results	<u>Science and Technology</u> A. Unifying Themes A1. Systems Students apply an understanding of systems to explain and analyze man-made and natural phenomena. a. Analyze a system using the principles of boundaries, subsystems, inputs, outputs, feedback, or the system's relation to other systems and design solutions to a system problem. b. Explain and provide examples that illustrate how it may not always be possible to predict the impact of changing some part of a man-made or natural system.

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Related Maine Learning Results	A2.Models Students evaluate the effectiveness of a model by comparing its predications to actual observations from the physical setting, the living environment, and the technological world. B. The Skills and Traits of Scientific Inquiry and Technological Design B1.The Skills and Traits of Scientific Inquiry Students methodically plan, conduct, analyze data from, and communicate results of in-depth scientific investigations, including experiments guided by a testable hypothesis. a. Identify questions, concepts, and testable hypotheses that guide scientific investigations. b. Design and safely conduct methodical scientific investigations, including experiments with controls. c. Use statistics to summarize, describe, analyze, and interpret results. d. Formulate and revise scientific investigations using logic and evidence. e. Use a variety of tools and technologies to improve investigations and communications. f. Recognize and analyze alternative explanations and models using scientific criteria. g. Communicate and defend scientific ideas. D. The Physical Setting D4.Force and Motion Students understand that the laws of force and motion are the same across the universe. a. Describe the contribution of Newton to our understanding of force and motion, and give examples of and apply Newton's three laws of motion and his theory of gravitation. b. Explain and apply the ideas of relative motion and frame of reference. c. Describe the relationship between electric and magnetic fields and forces, and give examples of how this relationship is used in modern technologies. d. Describe and apply characteristics of waves, including wavelength, frequency, and amplitude. e. Describe and apply an understanding of how waves interact with other waves and with materials including reflection, refraction, and absorption. f. Describe kinetic energy (the energy of motion), potential energy (dependent on relative position), and energy contained by a field (including electromagnetic waves) and apply these understandings to energy problems.

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Sample Lessons And Activities	▪ Word problem worksheets ▪ Motion Labs, i.e., constant velocity, acceleration ▪ Lectures ▪ Motion demonstrations ▪ Motion Videos
Sample Classroom Assessment Methods	▪ Chapter Tests ▪ Motion Quizzes ▪ Laboratory Reports
Sample Resources	▪ Publications: o Glencoe Physical Science o MARVEL Data bases * o GALE Resource Data bases ** ▪ Videos: o The Mechanical Universe o ESPN Sports Figures