

Title: Physics

Unit:	Kinematics				
Big Ideas:	Objects that move in translational motion are described in terms of position, velocity, and acceleration				
Unit Essential Questions:	How can the motion of an object be described in a measurable and quantitative way?				
Concept & Pacing	New Emphasis (Pa Core Standard)	Key Vocabulary	Mini-Lessons/Activities	Instructional Materials	Assessments
Speed, and average speed. Velocity and average velocity Kinematics Acceleration due to gravity. 3 weeks	3.2.9-12I	Kinematics Reference Frame Displacement Average Speed Average Velocity Instantaneous Velocity Average Acceleration Instantaneous Acceleration Acceleration due to gravity	Measuring speed Measuring acceleration Measuring acceleration due to gravity. Derive kinematic equations. Kinematic example problems Meet with an expert.	Dynamics tracks and carts. Motion sensors Tickertape timers Photogates Chromebooks with SparkVue Stopwatches Measuring tapes	Long Term Problem Set Kinematic Lab report Written Test – Multiple choice and open ended.
Unit:	Vectors				
Big Ideas:	Vector quantities are fully described using both magnitude and direction.				
Unit Essential Questions:	How can the direction of a vector be described graphically and analytically?				
Concept & Pacing	New Emphasis (Pa Core Standard)	Key Vocabulary	Mini-Lessons/Activities	Instructional Materials	Assessments
Graphical addition of vectors. Vector resolution. Analytical addition of vectors. Projectile motion. 3 weeks	3.2.9-12J	Vector Scalar Vector components Resultant vector Projectile motion Trajectory	Graphical addition of vectors Analytical addition of vectors Predict the range of a projectile. Example Projectile motion problems. Meet with an expert. Projectile motion lab	Rulers Protractors Measuring tapes Photogates Projectile Launchers Chromebooks with SparkVue	Long Term Problem Set Projectile Motion Lab report Written Test – Multiple choice and open ended.

Unit:	Dynamics				
Big Ideas:	Forces are essential to understanding motion.				
Unit Essential Questions:					
Concept & Pacing	New Emphasis (Pa Core Standard)	Key Vocabulary	Mini-Lessons/Activities	Instructional Materials	Assessments
Newton's Three Laws of Motion. Free Body Diagrams Vertical and Horizontal forces. Friction Inclined Planes 3 Weeks	3.2.9-12k	Inertia Force Mass Normal Force Force due to gravity Net Force Static Friction Kinetic Friction Coefficient of friction	Newton's Laws Demonstrations. Horizontal net force examples Vertical net force examples. Meet with an expert. Inclined plane examples. Investigate Friction Investigate inclined planes. Atwood's Device lab	Newton's Laws demonstrations. Inclined planes. Friction blocks Measuring tapes Standard masses Mass balance Stopwatches Force sensors Smart pulleys Chromebooks with SparkVue	Long Term Problem Set Atwood's Device Lab report Written Test – Multiple choice and open ended.
Unit:	Circular Motion and Gravitation				
Big Ideas:	Objects can move in circles. All objects in the universe attract all other objects in the universe.				
Unit Essential Questions:	How can we describe the circular motion of an object in a quantitative way? How do satellites orbit?				
Concept & Pacing	New Emphasis (Pa Core Standard)	Key Vocabulary	Mini-Lessons/Activities	Instructional Materials	Assessments

Uniform Circular Motion. Horizontal and Vertical Circles. Law of Gravitation Orbits 3 weeks	3.2.9-12L	Tangential Velocity Radius Centripetal acceleration and force Centrifugal acceleration and force Universal Gravitation Universal Gravitational Constant.	Centripetal vs. Centrifugal. Horizontal and Vertical circles. Example centripetal force problems Meet with an expert. Gravitation Orbits Example orbit problems Centripetal force lab	Compasses Measuring tapes Force sensors Photogates Standard masses Mass balance Pendulum rod Chromebooks with SparkVue	Long Term Problem Set Centripetal Force Lab report Written Test – Multiple choice and open ended.
Unit:	Work and Energy				
Big Ideas:	Energy and its conservation are essential to describing and analyzing motion				
Unit Essential Questions:	What is the law of conservation of energy and it's applications?				
Concept & Pacing	New Emphasis (Pa Core Standard)	Key Vocabulary	Mini-Lessons/Activities	Instructional Materials	Assessments
Work Energy Work-energy principle Energy conservation Non-conservative force Power 3 weeks	3.2.9-12O,P,Q	Work Energy Kinetic Energy Gravitational Potential Energy Elastic Energy Work Energy Principle Law of Conservation of energy Friction Power	Work (constant force) Work (Varying force) Area under the curve Energy Conservation demonstration Derive Mechanical energy equations Work example problems. Energy conservation energy problems. Energy Conservation lab.	Energy conservation demonstration Dynamics track Frictionless cart. Mass balance Spring launch accessory Photogates Chromebooks with SparkVue	Long Term Problem Set Conservation of Energy Lab report Written Test – Multiple choice and open ended.