

School of the Future * Curriculum Map for Physics I: Mechanics Teacher(s) Michael Zitolo

Year Long Essential Question: How can physics be used to improve our understanding of the world? & How and to what extent can physics be used to describe, make predictions for, and create explanations of things we observe in our world?

Year Long Enduring Understandings:

1. Scientific Models are representations of physical structures, systems, or phenomena. There are many types of representations that can be used as part of a model, including written statements, diagrams, tables, graphs, and equations.
2. Scientific models are used to describe, explain, predict, design, and control physical structures, systems, and phenomena. However, no one scientific model is ever complete, and all models have limitations.
3. Scientists create models by studying real systems, conducting experiments, generalizing results, and applying them to determine limitations.
4. Given the velocity and acceleration of an object, its motion can be predicted at any later time.
5. Objects have a natural tendency to maintain their state of motion. A net force is required to cause change in the state of motion of an object. Unconsidered sources of resistance often lead to misconceptions about motion.
6. When two objects interact, they both apply equal magnitudes of force on one another, but in opposite directions.
7. The horizontal forces do not affect the vertical motion of an object (and vice versa).
8. A (constant) centripetal net force is required to cause objects to move in a circle.
9. Energy cannot be created nor destroyed, but energy can be converted from one form to another.
10. During a collisions and explosions, momentum is conserved.

Subject: Physics I: Mechanics

Time Frame	Enduring Concepts	Content	Skills	Unit Assessments/PBATS <i>Diagnostic/Formative /Summative</i>	Differentiated Texts/ Materials
September 1st Unit: Scientific Methods	See Above, #1-3	<ul style="list-style-type: none"> •Pendulums •Linearizing Data •SI & Metric System 	<ul style="list-style-type: none"> •Making conversions •Using Excel to produce professional graphs •Creating appropriate mathematical models for data 	Diagnostic <ul style="list-style-type: none"> • FCI • Analyzing Data PBAT #1 • Push Ups Formative <ul style="list-style-type: none"> • Pendulum Lab Analysis • Class Discussions 	<ul style="list-style-type: none"> •<i>Introductory Physics</i> by Karplus •<i>Everything Science</i> •<i>Active Physics</i> by Eisenkraft •PhET

				<ul style="list-style-type: none"> • Whiteboard Presentations • Gallery Walk • Exit Cards • Homework Summative <ul style="list-style-type: none"> • Conversion Quiz • Linearizing Data TOD • Excel TOD 	Simulations <ul style="list-style-type: none"> • <i>The Physics Classroom</i> • <i>Conceptual Physics</i> by Hewitt • <i>The Physics of Superheroes</i> by Kakalios
October- November 2nd Unit: Kinematics	See Above, #4	<ul style="list-style-type: none"> • Position & Displacement • Speed & Velocity • Acceleration • Motion Diagrams • Motion Graphs • Motion Equations • Race Tracks 	<ul style="list-style-type: none"> • Solving Level II & III Problems • Using Equation Editor • Reporting values with significant figures • Thoroughly analyzing data 	Diagnostic <ul style="list-style-type: none"> • Push Ups • Ranking Tasks Formative <ul style="list-style-type: none"> • Buggy Lab Analysis • Dueling Buggies Lab Practicum • Fan Cart Lab Practicum • Class Discussions • Whiteboard Presentations • Gallery Walks • Exit Cards • Homework Summative <ul style="list-style-type: none"> • Kinematics Test • Problem-Solving TOD • Analyzing Data TOD 	<ul style="list-style-type: none"> • <i>Introductory Physics</i> by Karplus • <i>Everything Science</i> • <i>Active Physics</i> by Eisenkraft • PhET Simulations • <i>The Physics Classroom</i> • <i>Conceptual Physics</i> by Hewitt • <i>The Physics of Superheroes</i> by Kakalios
December - January 3rd Unit: Forces & Newton's	See Above, #5 & 6	<ul style="list-style-type: none"> • Inertia & Mass • Forces: Weight, Normal, Tension, and Friction • Force Body Diagrams • Newton's Laws • Equilibrium 	<ul style="list-style-type: none"> • Solving Level III & IV Problems • Resolving vectors • Discussing Sources of Error • Supporting claims with 	Diagnostic <ul style="list-style-type: none"> • FCI • Push Ups Formative <ul style="list-style-type: none"> • Bowling Ball Activity 	<ul style="list-style-type: none"> • <i>Introductory Physics</i> by Karplus • <i>Everything Science</i> • <i>Active Physics</i> by

Laws		<ul style="list-style-type: none"> • Net Force • Free-Fall • Coefficient of Friction • Vectors • Car Crashes 	multiple forms of evidence	<ul style="list-style-type: none"> • Elevator Activity • Free-Fall Lab • Atwood Lab • Safety Feature Write Up • Egg Drop Project • Class Discussions • Whiteboard Presentations • Gallery Walk • Exit Cards • Homework Summative <ul style="list-style-type: none"> • Safety Feature Comparative Analysis • Forces Unit Test • Problem-Solving TOD • Analyzing Data PBAT #2 	Eisenkraft <ul style="list-style-type: none"> • <i>PhET Simulations</i> • <i>The Physics Classroom</i> • <i>Conceptual Physics</i> by Hewitt • <i>The Physics of Superheroes</i> by Kakalios • <i>The Physics of Sports</i>
February 4th Unit: Projectile Motion	See Above, #7	<ul style="list-style-type: none"> • Projectiles • Independence of Horizontal and Vertical Motion • Vectors • Drag • Catapults 	<ul style="list-style-type: none"> • Solving Level V Problems • Resolving vectors • Discussing alternatives 	Diagnostic <ul style="list-style-type: none"> • Push Ups • Ranking Tasks • Catapult Initial Research Formative <ul style="list-style-type: none"> • Baseball Clip Analysis • Bull's-eye Practicum • Catapult Project • Class Discussions • Whiteboard Presentations • Gallery Walks 	<ul style="list-style-type: none"> • <i>Introductory Physics</i> by Karplus • <i>Everything Science</i> • <i>Active Physics</i> by Eisenkraft • <i>PhET Simulations</i> • <i>The Physics Classroom</i> • <i>Conceptual Physics</i> by

				<ul style="list-style-type: none"> • Exit Cards • Homework Summative <ul style="list-style-type: none"> • Projectile Motion Test • Problem-Solving TOD • Analyzing Data TOD • Alternative TOD 	Hewitt <ul style="list-style-type: none"> • <i>The Physics of Superheroes</i> by Kakalios • <i>The Physics of Baseball</i> • <i>Movie Physics</i>
March 5th Unit: Uniform Circular Motion	See Above, #8	<ul style="list-style-type: none"> • Period • Centripetal Force • Centripetal Acceleration • Centrifugal Forces • Bends & Curves • Newton's Law of Universal Gravity • Satellites 	<ul style="list-style-type: none"> • Solving Level V Problems • Statistical Analysis of Data 	Diagnostic <ul style="list-style-type: none"> • Push Ups • Ranking Tasks Formative <ul style="list-style-type: none"> • Circular Motion Lab Analysis • Planet Practicum • Class Discussions • Whiteboard Presentations • Gallery Walks • Exit Cards • Homework Summative <ul style="list-style-type: none"> • Uniform Circular Motion Test • Problem-Solving TOD • Analyzing Data TOD 	<ul style="list-style-type: none"> • <i>Introductory Physics</i> by Karplus • <i>Everything Science</i> • <i>Active Physics</i> by Eisenkraft • <i>PhET Simulations</i> • <i>The Physics Classroom</i> • <i>Conceptual Physics</i> by Hewitt • <i>The Physics of Superheroes</i> by Kakalios
April 6th Unit: Energy	See Above, #9	<ul style="list-style-type: none"> • Energy: Kinetic, Gravitational Potential, and Elastic Potential • Conservation of Energy • Friction & Dissipated Energy • Roller Coasters 	<ul style="list-style-type: none"> • Solving Level VI Problems • Determining the meaning of technical vocabulary, symbols, and equations from a text • Making clear and complex claims 	Diagnostic <ul style="list-style-type: none"> • Push Ups • Ranking Tasks • Roller Coaster Initial Research Formative <ul style="list-style-type: none"> • Energy Stations Activity 	<ul style="list-style-type: none"> • <i>Introductory Physics</i> by Karplus • <i>Everything Science</i> • <i>Active Physics</i> by Eisenkraft • <i>PhET</i>

				<ul style="list-style-type: none"> • Conservation of Energy Practicum • Roller Coaster Design Project • Class Discussions • Whiteboard Presentations • Gallery Walks • Exit Cards • Homework Summative <ul style="list-style-type: none"> • Energy Test • Problem-Solving TOD • Analyzing Data TOD 	<i>Simulations</i> <ul style="list-style-type: none"> • <i>The Physics Classroom</i> • <i>Conceptual Physics</i> by Hewitt • <i>The Physics of Superheroes</i> by Kakalios • <i>Amusement Park Physics</i>
May 7th Unit - Momentum	See Above, #10	<ul style="list-style-type: none"> • Momentum • Impulse • Collisions & Explosions • Conservation of Momentum 	<ul style="list-style-type: none"> • Solving Level VI Problems • Determining the meaning of technical vocabulary, symbols, and equations from a text • Discussing alternatives 	Diagnostic <ul style="list-style-type: none"> • Push Ups • Ranking Tasks Formative <ul style="list-style-type: none"> • Collision Stations Activity • Class Discussions • Whiteboard Presentations • Gallery Walks • Exit Cards • Homework Summative <ul style="list-style-type: none"> • Momentum Test • Problem-Solving TOD • Alternative TOD • Analyzing Data PBAT #3 	<ul style="list-style-type: none"> • <i>Introductory Physics</i> by Karplus • <i>Everything Science</i> • <i>Active Physics</i> by Eisenkraft • <i>PhET Simulations</i> • <i>The Physics Classroom</i> • <i>Conceptual Physics</i> by Hewitt

