
AP Physics

Curriculum Guide

Scranton School District

Scranton, PA



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Curriculum Guide**

AP Physics

Prerequisite:

- Algebra II/Trig
- Be in compliance with the [SSD Honors and AP Criteria Policy](#)

AP Physics 1 is a full year, algebra-based physics course, equivalent to the first semester of a typical introductory, algebra-based college physics course. It meets for 46 minute periods each day for the entire school year with additional weekly laboratory periods. The students will participate in inquiry-based explorations to gain a more conceptual understanding of physics concepts. Students will spend less of their time in traditional formula-based learning and more of their effort will be directed to developing critical thinking and reasoning skills. The AP Physics course is designed around the six “**Big Ideas**” and seven “**Science Practices**” identified by the College Board in the AP Physics Curriculum Framework that bring together the fundamental science principles and theories of general physics. These big ideas are intended to encourage students to think about physics concepts as interconnected pieces of a puzzle. The solution to the puzzle is how the real world around them actually works. The seven “**Science Practices**” combine with “**Essential Knowledge**” to create “**Learning Objectives**” which provide clear and detailed articulation of what students should know and be able to do.

Big Idea 1: Objects and systems have properties such as mass and charge. Systems may have internal structure.

Big Idea 2: Fields existing in space can be used to explain interactions.

Big Idea 3: The interactions of an object with other objects can be described by forces.

Big Idea 4: Interactions between systems can result in changes in those systems.

Big Idea 5: Changes that occur as a result of interactions are constrained by conservation laws.

Big Idea 6: Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.

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Science Practice 1: The student can use representations and models to communicate scientific phenomena and solve scientific problems.

Science Practice 2: The student can use mathematics appropriately.

Science Practice 3: The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.

Science Practice 4: The student can plan and implement data collection strategies in relation to a particular scientific question.

Science Practice 5: The student can perform data analysis and evaluation of evidence.

Science Practice 6: The student can work with scientific explanations and theories.

Science Practice 7: The student is able to connect and relate knowledge across various scales, concepts, and representations in and across domains.

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Year-at-a-glance

Subject: AP Physics	Grade Level: 12	Date Completed: 07-29-15
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1st Quarter

Topic	Resources	Big Ideas/Science Practices
1D Kinematics	Approved textbook Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book	Big Ideas 3, 4 Science Practices 1,2,3,4,5,6,7
2D Kinematics	Approved textbook Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book	Big Ideas 2, 3, 4 Science Practices 1,2,3,4,5,6,7
Dynamics of Force and Motion - Newton's Laws of motion	Approved textbook Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book	Big Ideas 1, 2, 3, 4 Science Practices 1,2,3,4,5,6,7

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2nd Quarter

Topic	Resources	Big Ideas for AP Physics 1
Dynamics of Force and Motion - Circular Motion, Rotation, and the Universal Law of Gravitation	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Big Ideas 1, 2, 3, 4</p> <p>Science Practices 1,2,3,4,5,6,7</p>
Impulse, Linear Momentum and Conservation of Linear Momentum	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Big Ideas 3, 4, 5</p> <p>Science Practices 1,2,3,4,5,6,7</p>
Work, Energy, and Conservation of Energy	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Big Ideas 3, 4, 5</p> <p>Science Practices 1,2,3,4,5,6,7</p>

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3rd Quarter

Topic	Resources	Big Ideas for AP Physics 1
Rotational Kinematics and Conservation of Angular Momentum	Approved textbook Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book	Big Ideas 3, 4, 5 Science Practices 1,2,3,4,5,6,7
Simple Pendulum and Mass-Spring Systems	Approved textbook Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book	Big Ideas 3, 4, 5 Science Practices 1,2,3,4,5,6,7
Waves and Sound	Approved textbook Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book	Big Ideas 6 Science Practices 1,2,3,4,5,6,7
Electrostatics	Approved textbook Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book	Big Ideas 1, 3, 5 Science Practices 1,2,3,4,5,6,7

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4th Quarter

Topic	Resources	Big Ideas for AP Physics 1
DC Circuits	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Big Ideas 1, 5</p> <p>Science Practices 1,2,3,4,5,6,7</p>
AP Physics 1 Exam Review	<p>Teacher prepared review materials, approved textbook, AP review book</p>	<p>Big ideas 1,2,3,4,5,6</p> <p>Science Practices 1,2,3,4,5,6,7</p>
Selected topics in AP Physics 2, Projects, Final Exam Review	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Big ideas 1,2,3,4,5,6</p> <p>Science Practices 1,2,3,4,5,6,7</p>

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General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
<p>Introduction Mathematical concepts, SI system, dimensional analysis, graphs and measurements</p> <p>One Dimension Kinematics, displacement, velocity, acceleration</p>	<p>Big Ideas 3, 4</p> <p>Science Practices 1,2,3,4,5,6,7</p>	<p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Teacher prepared tests, quizzes, lab reports</p>	<p>14 days</p>
<p>Vectors and Two Dimensional Kinematics and Projectile motion</p>	<p>Big Ideas 2, 3, 4</p> <p>Science Practices 1,2,3,4,5,6,7</p>	<p>Fields existing in space can be used to explain interactions.</p> <p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Teacher prepared tests, quizzes, lab reports</p>	<p>13 days</p>

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General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
<p>Dynamics of Force and Motion – Newton’s Laws of motion</p>	<p>Big Ideas 1, 2, 3, 4</p> <p>Science Practices 1,2,3,4,5,6,7</p>	<p>Objects and systems have properties such as mass and charge. Systems may have internal structure.</p> <p>Fields existing in space can be used to explain interactions.</p> <p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Teacher prepared tests, quizzes, lab reports</p>	<p>16 days</p>
<p>Dynamics of Force and Motion – Circular Motion, Rotation, and the Universal Law of Gravitation</p>	<p>Big Ideas 1, 2, 3, 4</p> <p>Science Practices 1,2,3,4,5,6,7</p>	<p>Objects and systems have properties such as mass and charge. Systems may have internal structure.</p> <p>Fields existing in space can be used to explain interactions.</p> <p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Teacher prepared tests, quizzes, lab reports</p>	<p>11 days</p>

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General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
Impulse, Linear Momentum and Conservation of Linear Momentum, Collisions	<p>Big Ideas 3, 4, 5</p> <p>Science Practices 1,2,3,4,5,6,7</p>	<p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p> <p>Changes that occur as a result of interactions are constrained by conservation laws.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Teacher prepared tests, quizzes, lab reports</p>	<p>15 days</p>
Work, Energy, Conservation of Energy and Power	<p>Big Ideas 3, 4, 5</p> <p>Science Practices 1,2,3,4,5,6,7</p>	<p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p> <p>Changes that occur as a result of interactions are constrained by conservation laws.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Teacher prepared tests, quizzes, lab reports</p>	<p>23 days</p>

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General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
Rotational Kinematics and Conservation of Angular Momentum	<p>Big Ideas 3, 4, 5</p> <p>Science Practices 1,2,3,4,5,6,7</p>	<p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p> <p>Changes that occur as a result of interactions are constrained by conservation laws.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Teacher prepared tests, quizzes, lab reports</p>	<p>18 days</p>
Simple Pendulum and Mass-Spring Systems, Vibrations and Waves	<p>Big Ideas 3, 4, 5</p> <p>Science Practices 1,2,3,4,5,6,7</p>	<p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p> <p>Changes that occur as a result of interactions are constrained by conservation laws.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Teacher prepared tests, quizzes, lab reports</p>	<p>10 days</p>

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General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
Waves and Sound	Big Ideas 6 Science Practices 1,2,3,4,5,6,7	Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.	Approved textbook Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book	Teacher prepared tests, quizzes, lab reports	10 days
Electrostatics – Conductors, Conservation of Electric Charge, Electric Forces and Energy	Big Ideas 1, 3, 5 Science Practices 1,2,3,4,5,6,7	Objects and systems have properties such as mass and charge. Systems may have internal structure. The interactions of an object with other objects can be described by forces. Changes that occur as a result of interactions are constrained by conservation laws.	Approved textbook Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book	Teacher prepared tests, quizzes, lab reports	7 days

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DC Circuits	<p>Big Ideas 1, 5</p> <p>Science Practices 1,2,3,4,5,6,7</p>	<p>Objects and systems have properties such as mass and charge. Systems may have internal structure.</p> <p>Changes that occur as a result of interactions are constrained by conservation laws.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	<p>Teacher prepared tests, quizzes, lab reports</p>	<p>8 days</p>

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General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
AP Physics Exam Review	<p>Big ideas 1,2,3,4,5,6 Science Practices 1,2,3,4,5,6,7</p>	<p>Objects and systems have properties such as mass and charge. Systems may have internal structure.</p> <p>Fields existing in space can be used to explain interactions.</p> <p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p> <p>Changes that occur as a result of interactions are constrained by conservation laws.</p> <p>Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.</p>	<p>Teacher prepared review materials, approved textbook, AP review book</p>	<p>AP Physics Exam</p>	<p>10 days</p>

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General Topic	Academic Standard(s)	Essential Knowledge, Skills & Vocabulary	Resources & Activities	Assessments	Suggested Time
Selected topics in AP Physics 2, Projects, Final Exam Review	Big ideas 1,2,3,4,5,6 Science Practices 1,2,3,4,5,6,7	<p>Objects and systems have properties such as mass and charge. Systems may have internal structure.</p> <p>Fields existing in space can be used to explain interactions.</p> <p>The interactions of an object with other objects can be described by forces.</p> <p>Interactions between systems can result in changes in those systems.</p> <p>Changes that occur as a result of interactions are constrained by conservation laws.</p> <p>Waves can transfer energy and momentum from one location to another without the permanent transfer of mass and serve as a mathematical model for the description of other phenomena.</p>	<p>Approved textbook</p> <p>Teacher selected laboratories supporting course content, appropriate videos, internet resources, teacher demos, probeware, teacher prepared notes and worksheets, software, AP review book</p>	Teacher prepared assessments, Final Exam	25 days