

## Curriculum Map: Physics

Course: \*PHYSICS Sub-topic: Physics

Grade(s): 12

**Course Description:** Physics is the study of the physical phenomena that we encounter in our daily lives. It will attempt to explain the puzzling nature of such things as automobile crashes, projectiles moving through the air, sound waves, motion of orbiting objects, image creation by mirrors, and the selection of appropriate eyeglass lenses by your optometrist. Students work with the instructor to learn Physics through a method of engagement, exploration, and explanation. The course is intended to fulfill a physical science prerequisite for those students preparing for a technical school education or for those students who wish an elementary knowledge of physics. Mathematics will be limited to the use of arithmetic, algebra, and a lot of graphs. Emphasis will be placed on verbal and written explanations of physical events. Laboratory activities will be prevalent. Students wishing for a more in-depth study of mechanics and other physical principles in preparation for future scientific study (including any medical, dental, engineering, chemical, biological, environmental, or physiological field) should choose HONORS PHYSICS.

**Course Textbooks, Workbooks, Materials Citations:** Textbook - Holt Physics

### Unit: 1. Linear Motion

Timeline: 2 Weeks

#### STANDARDS: STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

**3.2.P.B1 (Advanced)** Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration. Use force and mass to explain translational motion or simple harmonic motion of objects. Relate torque and rotational inertia to explain rotational motion.

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#### Topic: 1.1 Introduction to Linear Motion

Minutes for Topic: 86

#### Topic: 1.2 Acceleration

Minutes for Topic: 86

#### Topic: 1.3 Representations of Data

Minutes for Topic: 86

#### Topic: 1.4 Advanced Calculations

Minutes for Topic: 86

#### Topic: Lab: Off to the Races

Minutes for Topic: 86

#### Topic: 1. Review

Minutes for Topic: 86

#### Topic: 1. Test

Minutes for Topic: 86

### Unit: 2. Graphing Linear Motion

Timeline: Week 2

#### Topic: 2.1 Position-Time Graphs

Minutes for Topic: 86

#### Topic: 2.2 Velocity-Time Graphs

Minutes for Topic: 86

#### Topic: 2.3 Using Graphs to Make Graphs

Minutes for Topic: 86

#### Topic: 2. Review

Minutes for Topic: 86

#### Topic: 2. Assessment

Minutes for Topic: 86

### **Unit: 3. Forces**

Timeline: Week 4 to 6

#### **STANDARDS: STANDARDS**

STATE: Pennsylvania SAS Academic Standards (2009-2013)

**3.2.P.B1 (Advanced)** Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration. Use force and mass to explain translational motion or simple harmonic motion of objects. Relate torque and rotational inertia to explain rotational motion.

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#### **Topic: 3.1 Identifying Forces and Drawing Free Body Diagrams**

Minutes for Topic: 86

#### **Topic: 3.2 Newton's First Law**

Minutes for Topic: 86

#### **Topic: 3.3 Calculations with Net Force**

Minutes for Topic: 86

#### **Topic: 3.4 Balanced v Unbalanced Forces**

Minutes for Topic: 86

#### **Topic: 3.5 Newton's Second Law**

Minutes for Topic: 86

#### **Topic: 3.6 Weight, Free-Fall, and Air Resistance**

Minutes for Topic: 86

#### **Topic: 3.7 Newton's Third Law**

#### **Topic: 3.8 Additional Calculation Practice**

Minutes for Topic: 86

#### **Topic: 3. Review**

Minutes for Topic: 86

#### **Topic: 3. Test**

Minutes for Topic: 86

### **Unit: 4. Projectiles**

Timeline: Week 6 to 7

#### **STANDARDS: STANDARDS**

STATE: Pennsylvania SAS Academic Standards (2009-2013)

**3.2.P.B1 (Advanced)** Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration. Use force and mass to explain translational motion or simple harmonic motion of objects. Relate torque and rotational inertia to explain rotational motion.

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#### **Topic: 4.1 Projectiles in Motion**

Minutes for Topic: 86

#### **Topic: 4.2 Forces, Acceleration, and Velocity**

Minutes for Topic: 86

#### **Topic: 4.3 Projectile Math**

Minutes for Topic: 86

#### **Topic: 4. Lab: Marble Launch**

Minutes for Topic: 86

#### **Topic: 4. Review**

Minutes for Topic: 86

#### **Topic: 4. Assessment**

Minutes for Topic: 86

## Unit: 5. Circular Motion

Timeline: Week 8 to 9

### STANDARDS: STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

**3.2.P.B1 (Advanced)** Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration. Use force and mass to explain translational motion or simple harmonic motion of objects. Relate torque and rotational inertia to explain rotational motion.

**3.2.P.B2 (Advanced)** Explain the translation and simple harmonic motion of objects using conservation of energy and conservation of momentum. Describe the rotational motion of objects using the conservation of energy and conservation of angular momentum. Explain how gravitational, electrical, and magnetic forces and torques give rise to rotational motion.

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### Topic: 5.1 Circular Speed and Velocity

Minutes for Topic: 86

### Topic: 5.2 Acceleration and Force in Circular Motion

Minutes for Topic: 86

### Topic: 5.3 Gravity History

Minutes for Topic: 86

### Topic: 5.4 Universal Gravitation

Minutes for Topic: 86

### Topic: 5. Lab: Spinning Mass

Minutes for Topic: 86

### Topic: 5. Review

Minutes for Topic: 86

### Topic: 5. Test

Minutes for Topic: 86

## Unit: 6. Work and Energy

Timeline: Week 9 to 11

### STANDARDS: STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

**3.2.P.B2 (Advanced)** Explain the translation and simple harmonic motion of objects using conservation of energy and conservation of momentum. Describe the rotational motion of objects using the conservation of energy and conservation of angular momentum. Explain how gravitational, electrical, and magnetic forces and torques give rise to rotational motion.

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### Topic: 6.1 Work

Minutes for Topic: 86

### Topic: 6.2 Energy: Kinetic and Potential

Minutes for Topic: 86

### Topic: 6.3 Mechanical Energy and Conservation of Energy

Minutes for Topic: 86

### Topic: 6.4 Power

Minutes for Topic: 86

### Topic: 6.5 Non-Conservative Forces

Minutes for Topic: 86

### Topic: 6. Lab Inquiry Power

Minutes for Topic: 86

### Topic: 6. Review

Minutes for Topic: 86

### Topic: 6. Test

Minutes for Topic: 86

## Unit: 7. Momentum and Collisions

Timeline: Week 12 to 13

### STANDARDS: STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

3.2.P.B2 (Advanced) Explain the translation and simple harmonic motion of objects using conservation of energy and conservation of momentum. Describe the rotational motion of objects using the conservation of energy and conservation of angular momentum. Explain how gravitational, electrical, and magnetic forces and torques give rise to rotational motion.

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### Topic: 7.1 Momentum

Minutes for Topic: 86

### Topic: 7.2 Impulse

Minutes for Topic: 86

### Topic: 7.3 Collision Concepts

Minutes for Topic: 86

### Topic: 7.4 Conservation of Momentum

Minutes for Topic: 86

### Topic: 7. Quiz 7.1, 7.2

Minutes for Topic: 86

### Topic: 7. Lab The Gangster and the Gun

Minutes for Topic: 86

### Topic: 7. Lab Collision Carts

Minutes for Topic: 86

### Topic: 7. Review

Minutes for Topic: 86

### Topic: 7. Test

Minutes for Topic: 86

## Unit: 8. Wave Basics

Timeline: Week 14

### STANDARDS: STANDARDS

STATE: Pennsylvania SAS Academic Standards (2009-2013)

3.2.P.B5 (Advanced) Explain how waves transfer energy without transferring matter. Explain how waves carry information from remote sources that can be detected and interpreted. Describe the causes of wave frequency, speed, and wave length.

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### Topic: 8.1 Waves

Minutes for Topic: 86

### Topic: 8.2 Wave Characteristics

Minutes for Topic: 86

### Topic: 8.3 Wave Interactions

Minutes for Topic: 86

### Topic: 8.3 Wave Interference Activity

Minutes for Topic: 86

### Topic: 8. Review

Minutes for Topic: 86

### Topic: 8. Test

Minutes for Topic: 86

## Unit: 9. Oscillating Motion & Sound

Timeline: Week 15

**STANDARDS: STANDARDS**

STATE: Pennsylvania SAS Academic Standards (2009-2013)

**3.2.P.B1 (Advanced)** Differentiate among translational motion, simple harmonic motion, and rotational motion in terms of position, velocity, and acceleration. Use force and mass to explain translational motion or simple harmonic motion of objects. Relate torque and rotational inertia to explain rotational motion. &nbsp;

**3.2.P.B2 (Advanced)** Explain the translation and simple harmonic motion of objects using conservation of energy and conservation of momentum. Describe the rotational motion of objects using the conservation of energy and conservation of angular momentum. Explain how gravitational, electrical, and magnetic forces and torques give rise to rotational motion.

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**Topic: 9.1 Pendulums and Springs**

Minutes for Topic: 86

**Topic: 9.2 Standing Waves and Harmonics**

Minutes for Topic: 86

**Topic: 9. Lab Mass-Spring Systems**

Minutes for Topic: 86

**Topic: 9. Lab Pendulums**

Minutes for Topic: 86

**Topic: 9. Lab Musical Instrument**

Minutes for Topic: 86

**Topic: 9. Math Review**

Minutes for Topic: 86

**Topic: 9. Test**

Minutes for Topic: 86

**Unit: 10. Electromagnetic Spectrum and Sound**

Timeline: Week 16 to 17

**STANDARDS: STANDARDS**

STATE: Pennsylvania SAS Academic Standards (2009-2013)

**3.2.P.B4 (Advanced)** Explain how stationary and moving particles result in electricity and magnetism. Develop qualitative and quantitative understanding of current, voltage, resistance, and the connections among them. Explain how electrical induction is applied in technology.

**3.2.P.B5 (Advanced)** Explain how waves transfer energy without transferring matter. Explain how waves carry information from remote sources that can be detected and interpreted. Describe the causes of wave frequency, speed, and wave length. &nbsp;

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This Curriculum Map Unit has no Topics to display