

THS Physics Curriculum Unit Coversheet

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Course: Physics/Physics CP

Grades: 10-12

Unit Name: Unit 2: Motion in One Dimension

**Essential Questions/ Focus Questions:**

- How can you describe motion in terms of frame of reference, displacement, time, and velocity?
- How can position versus time, velocity versus time, and acceleration versus time graphs be used to interpret motion?
- How can you apply the kinematic equations to calculate distance, time, velocity, and acceleration?
- How does gravity affect the motion of a freely falling object?

**Suggested Time Frame:** Approximately 4 weeks

**Common Core Standards Covered:** N/A

**Corresponding HSCes:**

Standard P2: Motion of Objects

- P2.1A Calculate the average speed of an object using the change of position and elapsed time.
- P2.1B Represent the velocities for linear and circular motion using motion diagrams (arrows on strobe pictures).
- P2.1C Create line graphs using measured values of position and elapsed time.
- P2.1D Describe and analyze the motion that a position-time graph represents, given the graph.
- P2.1g Solve problems involving average speed and constant acceleration in one dimension.
- P2.2A Distinguish between the variables of distance, displacement, speed, velocity, and acceleration.
- P2.2B Use the change of speed and elapsed time to calculate the average acceleration for linear motion.
- P2.2C Describe and analyze the motion that a velocity-time graph represents, given the graph.
- P2.2e Use the area under a velocity-time graph to calculate the distance traveled and the slope to calculate the acceleration.
- P2.3a Describe and compare the motion of an object using different reference frames.

**Materials Used:**

- Holt Physics or Conceptual Physics textbook, Unit 2 Motion in One Dimension PowerPoint Presentation, MythBusters Penny Drop Video Clip, battery powered car lab, lab pro graphing lab, how high ball lab, reaction time lab

**Major Themes/ Concepts:**

- Displacement and velocity
- Acceleration
- Interpreting and constructing graphs
- Frames of reference
- Gravity and falling objects

**Assessments:**

- Pre-Test, Section Quizzes, Post-Test, Motion in One Dimension Unit 2 Test

## THS Physics Curriculum Unit Coversheet

**Course:** Physics/Physics CP

**Grades:** 10-12

**Unit Name:** Unit 1: The Science of Physics

**Essential Questions/ Focus Questions:**

- Why is the scientific method important in science?
- How are significant figures used in measurement and calculations?
- How can measurements be converted into scientific notation?
- How can dimensional analysis be used to convert and check the validity of expressions?

**Suggested Time Frame:** Approximately 1 week

**Common Core Standards Covered:** N/A

**Corresponding HSCEs:**

P1.1 Scientific Inquiry

- P1.1A Generate new questions that can be investigated in the laboratory or field.
- P1.1B Evaluate the uncertainties or validity of scientific conclusions using an understanding of sources of measurement error, the challenges of controlling variables, accuracy of data analysis, logic of argument, logic of experimental design, and/or the dependence on underlying assumptions.
- P1.1C Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision).
- P1.1D Identify patterns in data and relate them to theoretical models.
- P1.1E Describe a reason for a given conclusion using evidence from an investigation.

P1.2 Scientific Reflection and Social Implications

- P1.2A Critique whether or not specific questions can be answered through scientific investigations.
- P1.2B Identify and critique arguments about personal or societal issues based on scientific evidence.
- P1.2C Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.
- P1.2D Evaluate scientific explanations in a peer review process or discussion format.
- P1.2E Evaluate the future career and occupational prospects of science fields.

**Materials Used:**

- Holt Physics or Conceptual Physics textbook, Unit 1 Science of Physics PowerPoint Presentation., measurement lab, scientific method activity

**Major Themes/ Concepts:**

- Scientific notation
- Significant figures
- Accuracy and precision
- Scientific method

**Assessments:**

- Pre-Test, Section Quiz, Post-Test, Science of Physics Unit 1 Test

## THS Physics Curriculum Unit Coversheet

**Course:** Physics/Physics CP

**Grades:** 10-12

**Unit Name:** Unit 3: Two Dimensional Motion and Vectors

**Essential Questions/ Focus Questions:**

- How can vectors be added, subtracted, multiplied, and divided?
- How can the Pythagorean Theorem and tangent function be used to calculate the magnitude and direction of a resultant vector?
- How can vectors be resolved into components using the sine and cosine function?
- How can vectors and kinematic equations be used to solve problems involving projectile motion?

**Suggested Time Frame:** Approximately 4 week

**Common Core Standards Covered:** N/A

**Corresponding HSCEs:**

P2.1 Position — Time

- P2.1E Describe and classify various motions in a plane as one dimensional, two dimensional, circular, or periodic.
- P2.1h Identify the changes in speed and direction in everyday examples of circular (rotation and revolution), periodic, and projectile motions.

P2.2 Velocity — Time

- P2.2g Apply the independence of the vertical and horizontal initial velocities to solve projectile motion problems.

P3.4 Forces and Acceleration

- P3.4e Solve problems involving force, mass, and acceleration in two-dimensional projectile motion restricted to an initial horizontal velocity with no initial vertical velocity (e.g., ball rolling off a table).

**Materials Used:**

- Holt Physics or Conceptual Physics textbook, Unit 3 Two Dimensional Motion and Vectors PowerPoint Presentation, vector lab, projectile motion lab

**Major Themes/ Concepts:**

- Vectors and scalars
- Pythagorean Theorem and trigonometry functions
- Resolving vectors
- Projectile motion

**Assessments:**

- Pre-Test, Section Quizzes, Post-Test, Two Dimensional Motion and Vectors Unit 3 Test

## THS Physics Curriculum Unit Coversheet

Course: Physics/Physics CP

Grades: 10-12

Unit Name: Unit 2: Motion in One Dimension

### Essential Questions/ Focus Questions:

- How can you describe motion in terms of frame of reference, displacement, time, and velocity?
- How can position versus time, velocity versus time, and acceleration versus time graphs be used to interpret motion?
- How can you apply the kinematic equations to calculate distance, time, velocity, and acceleration?
- How does gravity affect the motion of a freely falling object?

Suggested Time Frame: Approximately 4 weeks

Common Core Standards Covered: N/A

### Corresponding HSCEs:

#### Standard P2: Motion of Objects

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- P2.1B Represent the velocities for linear and circular motion using motion diagrams (arrows on strobe pictures).
- P2.1C Create line graphs using measured values of position and elapsed time.
- P2.1D Describe and analyze the motion that a position-time graph represents, given the graph.
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- P2.2A Distinguish between the variables of distance, displacement, speed, velocity, and acceleration.
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- P2.2C Describe and analyze the motion that a velocity-time graph represents, given the graph.
- P2.2e Use the area under a velocity-time graph to calculate the distance traveled and the slope to calculate the acceleration.
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### Major Themes/ Concepts:

- Displacement and velocity
- Acceleration
- Interpreting and constructing graphs
- Frames of reference
- Gravity and falling objects

### Assessments:

- Pre-Test, Section Quizzes, Post-Test, Motion in One Dimension Unit 2 Test

## THS Physics Curriculum Unit Coversheet

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Grades: 10-12

Unit Name: Unit 1: The Science of Physics

### Essential Questions/ Focus Questions:

- Why is the scientific method important in science?
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- How can measurements be converted into scientific notation?
- How can dimensional analysis be used to convert and check the validity of expressions?

Suggested Time Frame: Approximately 1 week

Common Core Standards Covered: N/A

### Corresponding HSCEs:

#### P1.1 Scientific Inquiry

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- P1.1B Evaluate the uncertainties or validity of scientific conclusions using an understanding of sources of measurement error, the challenges of controlling variables, accuracy of data analysis, logic of argument, logic of experimental design, and/or the dependence on underlying assumptions.
- P1.1C Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity—length, volume, weight, time interval, temperature—with the appropriate level of precision).
- P1.1D Identify patterns in data and relate them to theoretical models.
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#### P1.2 Scientific Reflection and Social Implications

- P1.2A Critique whether or not specific questions can be answered through scientific investigations.
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- P1.2D Evaluate scientific explanations in a peer review process or discussion format.
- P1.2E Evaluate the future career and occupational prospects of science fields.

### Materials Used:

- Holt Physics or Conceptual Physics textbook, Unit 1 Science of Physics PowerPoint Presentation., measurement lab, scientific method activity

### Major Themes/ Concepts:

- Scientific notation
- Significant figures
- Accuracy and precision
- Scientific method

### Assessments:

- Pre-Test, Section Quiz, Post-Test, Science of Physics Unit 1 Test

## THS Physics Curriculum Unit Coversheet

Course: Physics/Physics CP

Grades: 10-12

Unit Name: Unit 3: Two Dimensional Motion and Vectors

### Essential Questions/ Focus Questions:

- How can vectors be added, subtracted, multiplied, and divided?
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Common Core Standards Covered: N/A

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#### P2.2 Velocity — Time

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#### P3.4 Forces and Acceleration

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### Major Themes/ Concepts:

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- Pythagorean Theorem and trigonometry functions
- Resolving vectors
- Projectile motion

### Assessments:

- Pre-Test, Section Quizzes, Post-Test, Two Dimensional Motion and Vectors Unit 3 Test