Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Organize theoretical and experimental information using analytic and descriptive techniques.**

State Curriculum Standard:
3.1.12C Assess and apply patterns in science and technology.
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
A. Explain how the scientific method is a way of answering questions about the world around us. B. Describe that measurements are uncertain because instruments are never error-free and of the inherent properties of nature. C. Describe that measurements in science must be both precise and accurate. D. Explain that SI is used worldwide in science as a standard of measurement. E. Explain SI units can be combined to form derived units. F. Describe that units can be converted from CGS to MKS and from non-SI to SI.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Organize theoretical and experimental information using analytic and descriptive techniques.**

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3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
G. Calculate unknown variables by using trigonometric function and arc functions. H. Calculate vector quantities using both magnitude and directions. I. Calculate two or more resultant vectors by braking down the vectors into it's x and y components and combining.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Analyze quantitative and qualitative methods of 1 dimensional motion as it relates to velocity and acceleration.**

State Curriculum Standard: **3.1.12C Assess and apply patterns in science and technology.**
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
A. Compare and contrast distance and displacement. B. Compare and contrast speed and velocity. C. Describe acceleration and how it relates to a change of velocity. D. Calculate for velocity and acceleration by algebraic means. E. Explain and calculate for positive and negative acceleration, initial velocity, final velocity, or time by algebraic means. F. Introduce the formulas of kinematics for constant acceleration and show how to derive them.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Analyze quantitative and qualitative methods of 1 dimensional motion as it relates to velocity and acceleration.**

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3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
G. Describe the effects and motions of an object in freefall by the acceleration due to gravity and assume it is constant at small intervals. H. Graphs can be used to describe relationships among time, distance, and velocity. I. Compare and contrast a "best fit" line to the dot-to-dot method of graphing.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Analyze quantitative and qualitative methods of 2 dimensional motion as it relates to velocity and acceleration.**

State Curriculum Standard: **3.1.12C Assess and apply patterns in science and technology.**
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
A. Compare and contrast one dimensional and two dimensional travel. B. Incorporate using a chart of x and y variables to distinguish travel in these dimensions. C. Calculate for variables using kinematics equations and trigonometry. D. Explain and calculate for positive and negative acceleration, initial velocity, final velocity, or time by algebraic means in 2 dimensions.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Analyze Newton's three laws of motion, without friction and introducing static and kinetic friction and Newton's Law of Gravitation and acceleration due to gravity.**

State Curriculum Standard:
3.1.12C Assess and apply patterns in science and technology.
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
A. Compare and contrast Newton's 1st and 2nd Law relating to the acceleration of an object. B. Describe the vector nature of Newton's 2nd Law. C. Demonstrate Newton's 3rd Law by example and calculate the accelerations produced on the two objects. D. Describe the effects and motions of gravity as it relates to Newton's Law of Gravitation. E. Explain how the acceleration of an object can be found by rearranging Newton's formulas and how only the large mass is involved in its magnitude.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Analyze Newton's three laws of motion, without friction and introducing static and kinetic friction and Newton's Law of Gravitation and acceleration due to gravity.**

State Curriculum Standard: **3.1.12C Assess and apply patterns in science and technology.**
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
F. Analyze the effects of freefall in regard to apparent weight and explain why objects in space are not weightless. G. Compare, contrast, and calculate for the effects of static and kinetic friction as it relates to real world situations.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Analyze uniform circular motion in regards to velocity, acceleration and forces. Satellites speed and periods can be found by quantitative measure.**

State Curriculum Standard:
3.1.12C Assess and apply patterns in science and technology.
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
A. Explain the motion of an object as it travels in a circle in regards to speed and the period. B. Find the effect of radius on Centripetal Acceleration. C. Demonstrate how Centripetal Acceleration is caused by a centripetal force. D. Compare how each orbital speed is related to its distance from the earth. E. Calculate artificial gravity on a space station and describe why it's needed because of the effects of weightlessness.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Analyze motion using the Work-Energy Theorem as well as the Law of Conservation of Energy . Power is used to describe work in a given time interval.**

State Curriculum Standard:
3.1.12C Assess and apply patterns in science and technology.
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
A. Analyze and calculate work done by a constant force at different angles. B. Describe the work-energy theorem and show how work will cause a change in velocity. C. Explain that gravity also does work called potential energy and that the change in PE is equal to the change in KE. D. Compare and contrast KE and PE and demonstrate that they are equal by using the Law of Conservation of Energy. E. Compare and contrast work done to the power involved.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Mechanics**

Content Standard: **Analyze velocities in collisions in 1 and 2 dimensions using the Conservation of Linear Momentum.**

State Curriculum Standard: **3.1.12C Assess and apply patterns in science and technology.**
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.

Course Content	Student Performance	Resources	Assessments
A. Define Impulse and show the relation to Newton's 2nd Law. B. Demonstrate that the change of momentum is equal to the change of impulse. C. Calculate final velocity by using the Impulse-Momentum Theorem. D. Explain that by using the Principle of Conservation of Linear Momentum, collisions in 1 dimension can be found. E. Calculate collision in 2 dimensions by using the conservation law. F. Demonstrate and calculate the location and velocity of two particles by using center of mass.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Relativity**

Content Standard: **Analyze Einstein's Theory of Relativity using quantitative and qualitative methods.**

State Curriculum Standard:
3.1.12C Assess and apply patterns in science and technology.
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.
3.4.12D Analyze the essential ideas about the composition and structure of the universe.

Course Content	Student Performance	Resources	Assessments
A. Describe an event and an inertial reference frame using Einstein's Theory of Special Relativity. B. Explain Einstein's two Postulates of SR. C. Describe and calculate the effect of time on an object moving near the speed of light. D. Describe and calculate the effect of length on an object moving near the speed of light. E. Describe and calculate the effect of momentum on an object moving near the speed of light. F. Explain how mass and energy are equivalent to each other by using Einstein's "famous" equation.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

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Unit: **Relativity**

Content Standard: **Analyze Einstein's Theory of Relativity using quantitative and qualitative methods.**

State Curriculum Standard:
3.1.12C Assess and apply patterns in science and technology.
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12C Apply the principles of motion and force.
3.4.12D Analyze the essential ideas about the composition and structure of the universe.

Course Content	Student Performance	Resources	Assessments
G. Describe and calculate the effect of the addition of velocities on an object moving near the speed of light. H. Discuss Einstein's Theory of General Relativity as it relates to gravity.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam

Honors Physics I - Grades 11 & 12

Unit: **Nuclear Physics**

Content Standard: **Analyze the beginning of the universe using qualitative methods and how this theory predicts elementary particles and nuclear decay.**

State Curriculum Standard:
3.1.12C Assess and apply patterns in science and technology.
3.1.12D Analyze scale as a way of relating concepts and ideas to one another by some measure.
3.2.12B Evaluate experimental information for appropriateness and adherence to relevant science processes.
3.2.12C Apply the elements of scientific inquiry to solve multi-step problems.
3.4.12A Apply concepts about the structure and properties of matter.
3.4.12D Analyze the essential ideas about the composition and structure of the universe.

Course Content	Student Performance	Resources	Assessments
A. Describe cosmology using the Theory of Inflation. B. Introduce the 3 fundamental forces and how they react to each other. C. Calculate mass defect of a nucleus and binding energy using a periodic table. D. Explain the three main types of decay using a decay series and calculate the resulting nucleus. E. Calculate the half life of an isotope. F. Explain radioactive dating by using half life. G. Introduce elementary particles and their relation to cosmology.	• Take notes from a variety of instructional presentations • Complete all assigned reading activities • Complete all assigned laboratory activities • Complete all assigned homework activities • Collection and analysis of data • Participate in group activities • Demonstrate critical thinking skills in written and verbal format • Demonstrate usage of PSSA format in answering evaluated questions	• Physics, Wiley, 6th edition, 2005. • Textbook supplementary materials • Teacher supplementary materials • DVDs / Video tapes • Computer programs • Laboratory exercises • Internet • Demonstrations	• Teacher observations • Classwork • Homework check • Quizzes • Lab report using rubric • Exam