Odysseyware®

CURRICULUM OVERVIEW

Physics

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Physics Course Overview

Physics is intended to provide a more in-depth study of the physical universe. In preceding years students should have developed a basic understanding for the macroscopic and microscopic world of forces, motion, waves, light, and electricity. The physics course will expand upon that prior knowledge and further develop both. The curriculum will also seek to teach the symbolic and mathematical world of formulas and symbols used in physics. The major concepts covered are kinematics, forces and motion, work and energy, waves, sound and light, electricity and magnetism, and nuclear physics.

Students at this level should show development in their ability and understanding of scientific inquiry. The units contain experiments and projects that seek to develop a deeper conceptual meaning for students and actively engage them. The continued exposure to science concepts and scientific inquiry will serve to improve the students' skill and understanding.

Physics should be preceded by Algebra I and II courses and geometry.

- **Kinematics:** Students will learn to use scalars and vectors to visualize and calculate concepts of motion.
- **Work and Energy:** Students will demonstrate an understanding of how energy is transferred and changed from one form to another.
- **Introduction to Waves:** Students will describe wave characteristics such as amplitude, velocity, wavelength, and frequency.
- **Light:** Students will describe phenomena that characterize light as a wave and phenomena that characterize it as a particle.
- **Static Electricity:** Students will understand that all electric charges produce an electric field around them
- **Electric Currents:** Students will apply and solve problems using Ohm's Law and Watt's Law for both series and parallel circuits.
- **Magnetism:** Students will describe the relationship between magnetism and electricity.
- **Atomic and Nuclear Physics:** Students will acquire a general understanding of atomic theory, including fusion and fission.

Physics

Unit 1: Kinematics

Assignments

1. Course Overview
2. Introduction to the Language of Physics
3. The Scientific Method
4. Lab Safety
5. Experiment: Making a Soda Straw Balance
6. Experiment: Making a Simple Model of the Solar System
7. Quiz 1: Measurements
8. Scalars and Vectors
9. Experiment: Domino Lab
10. Quiz 2: Scalars and Vectors
11. Speed and Velocity
12. Project: Tutorial for Making a Scatter Plot Using an Electronic Spreadsheet Program*
13. Quiz 3: Speed and Velocity
14. Acceleration and Acceleration Due to Gravity
15. Experiment: Determining Reaction Time
16. Quiz 4: Acceleration and Acceleration Due to Gravity
17. Vectors
18. Projectiles
19. Project: Virtual Lab - Projectiles
20. Mechanics
21. Quiz 5: Review
22. Project: Research Branches of Physics
23. Special Project*
24. Test
25. Alternate Test*
26. Glossary and Credits

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Unit 2: Dynamics

Assignments

1. Newton's First and Second Laws
2. Newton's Laws and Free Body Diagrams
3. The Problems of Newton's Laws
4. Report: Isaac Newton*
5. Quiz 1: Newton's First and Second Laws of Motion
6. Project: Virtual Lab - Newton's Laws
7. Gravity
8. Quiz 2: Gravity
9. Uniform Circular Motion
10. Project: Virtual Labs - Circular Motion
11. Experiment: Circular Motion
12. Quiz 3: Uniform Circular Motion
13. Newton's Third Law and Conservation of Momentum
14. Project: Virtual Lab - Conservation of Momentum
15. Experiment: Explosion*
16. Project: Car Racing Collision
17. Quiz 4: Newton's Third Law and Conservation of Momentum
18. Kepler's Laws of Planetary Motion
19. Report: Solar System*
20. Experiment: Kepler's Law*
21. Dynamics
22. Quiz 5: Unit Review
23. Special Project*
24. Test
25. Alternate Test*
26. Glossary and Credits

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Unit 3: Work and Energy

Assignments

1. Work, Kinetic, and Potential Energy
2. Report: Nuclear Energy*
3. Quiz 1: Work, Kinetic and Potential Energy
4. Conservation of Energy
5. Power and Efficiency
6. Simple Machines
7. Machine Efficiency
8. Project: Virtual Lab - Simple Machines
9. Experiment: Simple Machines
10. Quiz 2: Work and Energy to Power and Efficiency
11. Heat Energy
12. Latent Heat
13. Experiment: Latent Heat*
14. Laws of Thermodynamics
15. Energy
16. Quiz 3: Chapter Review
17. Project: Classifying forms of Energy
18. Special Project*
19. Test
20. Alternate Test*
21. Glossary and Credits

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Unit 4: Introduction to Waves

Assignments

1. Characteristics of Waves
2. Experiment: Wave Speeds
3. Experiment: Pulses*
4. Quiz 1: Characteristics of Waves
5. Wave Phenomena
6. Experiment: Waves
7. Experiment: Bending Waves*
8. Quiz 2: Characteristics of Waves to Wave Phenomena
9. Sound Waves
10. Project: Virtual Lab - Sound
11. Project: Virtual Lab - Doppler Effect
12. Experiment: Doppler Effect*
13. Project: Sound Resonance
14. Wave Motion
15. Quiz 3: Chapter Review
16. Special Project*
17. Test
18. Alternate Test*
19. Glossary and Credits

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Unit 5: Light

Assignments

1. Speed of Light: Historical Calculations
2. Properties of Light
3. Experiment: Light Angles
4. Experiment: Water Refraction*
5. Quiz 1: Speed of Light to Properties of Light
6. Mirrors
7. Experiment: Convergence
8. Lenses
9. Project: Virtual Lab - Light
10. Quiz 2: Speed of Light to Lenses
11. Light Phenomena and Models of Light
12. Project: Digital Transmissions
13. Experiment: Light Observations*
14. Light and Sound
15. Quiz 3: Chapter Review
16. Special Project*
17. Test
18. Alternate Test*
19. Glossary and Credits

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Unit 6: Semester Review and Exam

Assignments

1. Review
2. Exam
3. Alternate Exam - Form A
4. Alternate Exam - Form B

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Unit 7: Static Electricity

Assignments

1. Electric Charges
2. Coulomb's Law
3. Experiment: Static Electricity*
4. The Transfer of Charges
5. Quiz 1: Electric Charges to Transfer of Charges
6. Electric Fields
7. Quiz 2: Electric Charges to Electric Fields
8. Electric Potential
9. Potential and Energy
10. Electric Fields and Forces
11. Quiz 3: Chapter Review
12. Special Project*
13. Test
14. Alternate Test*
15. Glossary and Credits

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Unit 8: Electric Currents

Assignments

1. Sources of EMF
2. Project: Research and Report*
3. Fluid Flow
4. Quiz 1: Sources of EMF to Fluid Flow
5. Resistance
6. Quiz 2: Sources of EMF to Resistance
7. Ohm's Law
8. Circuits
9. Quiz 3: Chapter Review
10. Project: Virtual Labs - Circuits
11. Special Project*
12. Test
13. Alternate Test*
14. Glossary and Credits

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Unit 9: Magnetism

Assignments

1. Fields and Forces
2. Experiment: Magnetic Fields*
3. Forces
4. Quiz 1: Fields and Forces to Forces
5. Electromagnetism
6. Experiment: Induced Magnetic Fields*
7. Electromagnetic Induction
8. Applications of Electromagnetic Induction
9. Project: Electromagnetism
10. Quiz 2: Fields and Forces to Electromagnetism
11. Electron Beams
12. Magnetic Fields and Forces
13. Quiz 3: Chapter Review
14. Special Project*
15. Test
16. Alternate Test*
17. Glossary and Credits

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Unit 10: Atomic and Nuclear Physics

Assignments

1. Quantum Theory
2. X-Rays, Matter Waves, and the Uncertainty Principle
3. Quiz 1: Quantum Theory to X-rays, Matter Waves, and the Uncertainty Principle
4. Early Atomic Models
5. Report: Early Atomic Physics*
6. Bohr Model
7. Modern Physics
8. Project: Radiowaves
9. Nuclear Forces
10. Nuclear Theory
11. Quiz 2: Quantum Theory to Nuclear Theory
12. Radioactive Decay
13. Nuclear Reactions
14. Fusion and Applications of Nuclear Energy
15. Quiz 3: Chapter Review
16. Research Physicists
17. Special Project*
18. Test
19. Alternate Test*
20. Glossary and Credits

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Unit 11: Semester Review and Exam

Assignments

1. Review
2. Exam
3. Alternate Exam - Form A
4. Alternate Exam - Form B

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Unit 12: Final Exam

Assignments

1. Exam
2. Alternate Exam - Form A*
3. Alternate Exam - Form B*

(*) Indicates alternative assignment