



Switched-On

SCHOOLHOUSE® 2012 EDITION

Curriculum Catalog

Physics

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Course Overview

Physics is intended to expose students to the design and order in the world that God has created. In preceding years, students should have developed a basic understanding of 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, sound and light waves, 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 the student and actively engage the student. The continued exposure of science concepts and scientific inquiry will serve to improve the student's skill and understanding.

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

Upon completion of the course, students should be able to do the following:

- Use scalars and vectors to visualize and calculate concepts of motion.
- Articulate Newton's and Kepler's laws of motion.
- Demonstrate an understanding of how energy is transferred and changed from one form to another.
- Describe how sound and light waves act and react.
- Differentiate between static and current electricity and describe each one.
- Know the relationship between magnetism and electricity.
- Have a general understanding of atomic theory, including fusion and fission.

UNIT 1: KINEMATICS	
Assignment Titles	
1. Course Overview	12. Acceleration and Acceleration Due to Gravity
2. Introduction to the Language of Physics	13. Experiment: Determining Reaction Time
3. Experiment: Making a Soda Straw Balance	14. Quiz 4: Acceleration and Acceleration Due to Gravity
4. Experiment: Making a Simple Model of the Solar System	15. Vectors
5. Quiz 1: Measurements	16. Projectiles
6. Scalars and Vectors	17. Quiz 5: Review
7. Experiment: Oleic Acid	18. Special Project
8. Quiz 2: Scalars and Vectors	19. Review Game
9. Speed and Velocity	20. Test
10. Project: Tutorial for Making a Scatter Plot Using an Electronic Spreadsheet Program	21. Alternate Test
11. Quiz 3: Speed and Velocity	22. Reference

UNIT 2: DYNAMICS	
Assignment Titles	
1. Newton's First and Second Laws	11. Quiz 4
2. Report: Isaac Newton	12. Kepler's Laws of Planetary Motion
3. Quiz 1	13. Report: Solar System
4. Gravity	14. Experiment: Kepler's Law
5. Quiz 2	15. Quiz 5
6. Uniform Circular Motion	16. Special Project
7. Experiment: Circular Motion	17. Review Game
8. Quiz 3	18. Test
9. Newton's Third Law and Conservation of Momentum	19. Alternate Test
10. Experiment: Explosion	20. Reference

UNIT 3: WORK AND ENERGY
Assignment Titles

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|--|-----------------------------|
| 1. Work, Kinetic, and Potential Energy | 10. Experiment: Latent Heat |
| 2. Report: Nuclear Energy | 11. Laws of Thermodynamics |
| 3. Quiz 1 | 12. Quiz 3 |
| 4. Conservation of Energy | 13. Special Project |
| 5. Power and Efficiency | 14. Review Game |
| 6. Experiment: Simple Machines | 15. Test |
| 7. Quiz 2 | 16. Alternate Test |
| 8. Heat Energy | 17. Reference |
| 9. Latent Heat | |

UNIT 4: INTRODUCTION TO WAVES
Assignment Titles

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|------------------------------|--------------------------------|
| 1. Characteristics of Waves | 9. Sound Waves |
| 2. Experiment: Wave Speeds | 10. Experiment: Doppler Effect |
| 3. Experiment: Pulses | 11. Quiz 3 |
| 4. Quiz 1 | 12. Special Project |
| 5. Wave Phenomena | 13. Review Game |
| 6. Experiment: Waves | 14. Test |
| 7. Experiment: Bending Waves | 15. Alternate Test |
| 8. Quiz 2 | 16. Reference |

UNIT 5: LIGHT
Assignment Titles

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|--|---|
| 1. Speed of Light: Historical Calculations | 10. Light Phenomena and Models of Light |
| 2. Properties of Light | 11. Experiment: Light Observations |
| 3. Experiment: Light Angles | 12. Quiz 3 |
| 4. Experiment: Water Refraction | 13. Special Project |
| 5. Quiz 1 | 14. Review Game |
| 6. Mirrors | 15. Test |
| 7. Experiment: Convergence | 16. Alternate Test |
| 8. Lenses | 17. Reference |
| 9. Quiz 2 | |

UNIT 6: SEMESTER REVIEW AND EXAM
Assignment Titles

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

UNIT 7: STATIC ELECTRICITY
Assignment Titles

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|-----------------------------------|-------------------------|
| 1. Electric Charges | 9. Potential and Energy |
| 2. Coulomb's Law | 10. Quiz 3 |
| 3. Experiment: Static Electricity | 11. Special Project |
| 4. The Transfer of Charges | 12. Review Game |
| 5. Quiz 1 | 13. Test |
| 6. Electric Fields | 14. Alternate Test |
| 7. Quiz 2 | 15. Reference |
| 8. Electric Potential | 16. |

UNIT 8: ELECTRIC CURRENTS
Assignment Titles

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|---------------------------------|---------------------|
| 1. Sources of EMF | 8. Circuits |
| 2. Project: Research and Report | 9. Quiz 3 |
| 3. Fluid Flow | 10. Special Project |
| 4. Quiz 1 | 11. Review Game |
| 5. Resistance | 12. Test |
| 6. Quiz 2 | 13. Alternate Test |
| 7. Ohm's Law | 14. Reference |

UNIT 9: MAGNETISM
Assignment Titles

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|--------------------------------|---------------------|
| 1. Fields and Forces | 9. Electron Beams |
| 2. Experiment: Magnetic Fields | 10. Quiz 3 |
| 3. Forces | 11. Special Project |
| 4. Quiz 1 | 12. Review Game |
| 5. Electromagnetism | 13. Test |
| 6. Experiment: Magnetic Fields | 14. Alternate Test |
| 7. Electromagnetic Induction | 15. Reference |
| 8. Quiz 2 | |

UNIT 10: ATOMIC AND NUCLEAR PHYSICS
Assignment Titles

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|--|---|
| 1. Quantum Theory | 9. Nuclear Reactions |
| 2. X-Rays, Matter Waves, and the Uncertainty Principle | 10. Fusion and Applications of Nuclear Energy |
| 3. Quiz 1 | 11. Quiz 3 |
| 4. Early Atomic Models | 12. Special Project |
| 5. Report: Early Atomic Physics | 13. Review Game |
| 6. Bohr Model | 14. Test |
| 7. Nuclear Theory | 15. Alternate Test |
| 8. Quiz 2 | 16. Reference |

UNIT 11: REVIEW
Assignment Titles

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|------------------------------|---------------------|
| 1. Mechanics | 12. Modern Physics |
| 2. Dynamics | 13. The Bohr Atom |
| 3. Energy | 14. Duality |
| 4. Quiz 1 | 15. Nuclear Energy |
| 5. Wave Motion | 16. Quiz 4 |
| 6. Light and Sound | 17. Special Project |
| 7. Quiz 2 | 18. Review Game |
| 8. Electricity and Magnetism | 19. Test |
| 9. Fields and Forces | 20. Alternate Test |
| 10. Circuits | 21. Reference |
| 11. Quiz 3 | |

UNIT 12: SEMESTER REVIEW AND EXAM
Assignment Titles

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

UNIT 13: FINAL EXAM
Assignment Titles

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|--------------------------|--------------------------|
| 1. Exam | 3. Alternate Exam—Form B |
| 2. Alternate Exam—Form A | |