



# 2017-2018 Curriculum Catalog

Physics

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

**Unit 2: Dynamics****Assignments**

Physics	1. Newton's First and Second Laws	13. Experiment: Collisions
	2. Report: Isaac Newton	14. Quiz 4
	3. Quiz 1	15. Kepler's Laws of Planetary Motion
	4. Project: Virtual Lab - Newton's Laws	16. Report: Solar System
	5. Gravity	17. Experiment: Kepler's Law
	6. Quiz 2	18. Quiz 5
	7. Uniform Circular Motion	19. Special Project
	8. Project: Virtual Lab - Circular Motion	20. Review Game
	9. Experiment: Circular Motion	21. Test
	10. Quiz 3	22. Alternate Test
	11. Newton's Third Law and Conservation of Momentum	23. Reference
	12. Project: Virtual Lab - Conservation of Momentum	

**Unit 3: Work and Energy****Assignments**

Physics	1. Work, Kinetic, and Potential Energy	11. Latent Heat
	2. Report: Nuclear Energy*	12. Experiment: Latent Heat*
	3. Quiz 1	13. Laws of Thermodynamics
	4. Conservation of Energy	14. Quiz 3
	5. Power and Efficiency	15. Special Project*
	6. Project: Virtual Lab- Simple Machines	16. Review Game
	7. Experiment: Simple Machines	17. Test
	8. Quiz 2	18. Alternate Test*
	9. Project: Virtual Lab- Projectiles	19. Reference
	10. Heat Energy	

**Unit 4: Introduction to Waves****Assignments**

Physics	1. Characteristics of Waves	10. Project: Virtual Lab- Sound
	2. Experiment: Wave Speeds	11. Project: Virtual Lab- Doppler Effect
	3. Experiment: Pulses*	12. Experiment: Doppler Effect*
	4. Quiz 1	13. Quiz 3
	5. Wave Phenomena	14. Special Project*
	6. Experiment: Waves	15. Review Game
	7. Experiment: Bending Waves*	16. Test
	8. Quiz 2	17. Alternate Test*
	9. Sound Waves	18. Reference

<b>Unit 5: Light</b>	
<b>Assignments</b>	
Physics	1. Speed of Light: Historical Calculations
	2. Properties of Light
	3. Experiment: Light Angles
	4. Experiment: Water Refraction*
	5. Quiz 1
	6. Mirrors
	7. Experiment: Convergence
	8. Lenses
	9. Quiz 2
	10. Light Phenomena and Models of Light
	11. Project: Virtual Lab- Light
	12. Experiment: Light Observations*
	13. Quiz 3
	14. Special Project*
	15. Review Game
	16. Test
	17. Alternate Test*
	18. Reference

<b>Unit 6: Semester Review and Exam</b>	
<b>Assignments</b>	
Physics	1. Review
	2. Exam
	3. Alternate Exam- Form A*
	4. Alternate Exam- Form B*

<b>Unit 7: Static Electricity</b>	
<b>Assignments</b>	
Physics	1. Electric Charges
	2. Coulomb's Law
	3. Experiment: Static Electricity*
	4. The Transfer of Charges
	5. Quiz 1
	6. Electric Fields
	7. Quiz 2
	8. Electric Potential
	9. Potential and Energy
	10. Quiz 3
	11. Special Project*
	12. Review Game
	13. Test
	14. Alternate Test*
	15. Reference

<b>Unit 8: Electric Currents</b>	
<b>Assignments</b>	
Physics	1. Sources of EMF
	2. Project: Research and Report*
	3. Fluid Flow
	4. Quiz 1
	5. Resistance
	6. Quiz 2
	7. Ohm's Law
	8. Circuits
	9. Project: Virtual Lab- Circuits
	10. Quiz 3
	11. Special Project*
	12. Review Game
	13. Test
	14. Alternate Test*
	15. Reference

<b>Unit 9: Magnetism</b>		
<b>Assignments</b>		
Physics	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: Induced Magnetic Fields*	14. Alternate Test*
	7. Electromagnetic Induction	15. Reference
	8. Quiz 2	

<b>Unit 10: Atomic and Nuclear Physics</b>		
<b>Assignments</b>		
Physics	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

<b>Unit 11: Review</b>		
<b>Assignments</b>		
Physics	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	

<b>Unit 12: Semester Review And Exam</b>		
<b>Assignments</b>		
Physics	1. Review	3. Alternate Exam: Form A*
	2. Exam	4. Alternate Exam: Form B*

<b>Unit 13: Final Exam</b>		
<b>Assignments</b>		
Physics	1. Exam	3. Alternate Exam: Form B*
	2. Alternate Exam: Form A*	

(\*) Indicates alternative assignment