



2019-20

CALVERT HOMESCHOOL™ CURRICULUM CATALOG

Physics



Table of Contents

PHYSICS COURSE OVERVIEW	1
UNIT 1: KINEMATICS	1
UNIT 2: DYNAMICS	2
UNIT 3: WORK AND ENERGY	2
UNIT 4: INTRODUCTION TO WAVES	2
UNIT 5: LIGHT.....	3
UNIT 6: SEMESTER REVIEW AND EXAM	3
UNIT 7: STATIC ELECTRICITY	3
UNIT 8: ELECTRIC CURRENTS	3
UNIT 9: MAGNETISM	3
UNIT 10: ATOMIC AND NUCLEAR PHYSICS.....	4
UNIT 11: SEMESTER REVIEW AND EXAM	4
UNIT 12: FINAL EXAM.....	4

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.

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

Unit 2: Dynamics**Assignments**

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

Unit 3: Work and Energy**Assignments**

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

Unit 4: Introduction to Waves**Assignments**

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

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

Unit 6: Semester Review and Exam		
Assignments		
Physics	1. Review	3. Alternate Exam - Form A
	2. Exam	4. Alternate Exam - Form B

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

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

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

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

Unit 11: Semester Review and Exam		
Assignments		
Physics	1. Review	3. Alternate Exam - Form A
	2. Exam	4. Alternate Exam - Form B

Unit 12: Final Exam		
Assignments		
Physics	1. Exam	3. Alternate Exam - Form B*
	2. Alternate Exam - Form A*	

(*) Indicates alternative assignment