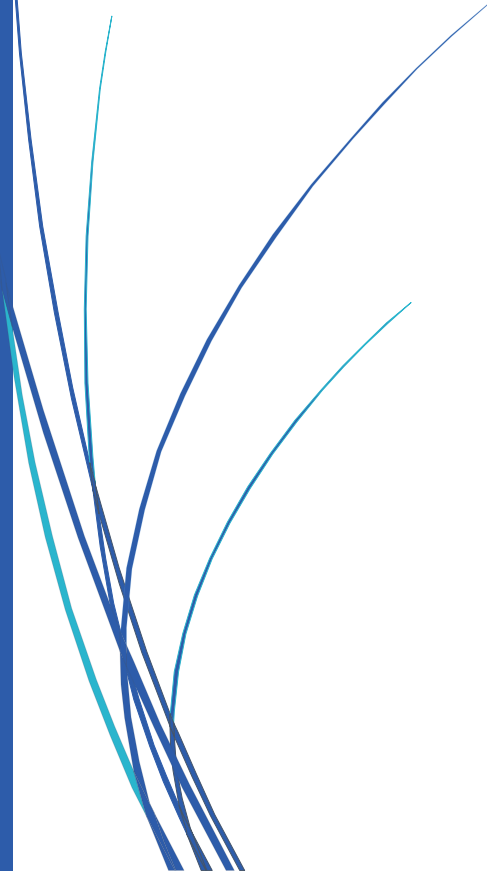




2019-20

# CALVERT HOMESCHOOL™ CURRICULUM CATALOG

Integrated Physics and  
Chemistry



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## Integrated Physics and Chemistry Course Overview

Integrated Physics and Chemistry is a physical science course designed for high school students needing an entry-level science course covering basic concepts found in chemistry and physics. Topics included in this course are matter, motion and forces, work and energy, electricity and magnetism, and waves.

Throughout the course, students will have opportunities to observe simulations, investigate ideas, and solve problems, both online and away from the computer.

- **Explorations in Physical Science:** Students will employ the scientific method, measurements and calculations to conduct experiments.
- **The Structure of Matter:** Students will explore the structure of matter, including atomic structure, elements, compounds, and mixtures.
- **Matter and Change:** Students will explore the chemical changes that matter can go through.
- **States of Matter:** Students will explore the states of matter and the process that matter goes through for its state to change.
- **Motion and Forces:** Students will describe the motion of objects, Newton's laws that predict that motion, and how the motion is measured.
- **Work and Energy:** Students will explore various types of energy, simple machines, and the work that they can do.
- **Heat Flow:** Students will describe heat, heat flow, and the laws of thermodynamics, as well as explore uses of heat flow.
- **Electricity and Magnetism:** Students will explore the relationship between electricity and magnetism.
- **Waves:** Students will explore the properties and characteristics of waves.
- **Chemistry and Physics in Our World:** Students will discuss how chemistry and physics are at work in our daily lives and explore basic astronomical principles.

Unit 1: EXPLORATIONS IN PHYSICAL SCIENCE	
Assignments	
1. Course Overview	10. Mass and Density
2. What is Science?	11. Experiment: Determining Density
3. The Scientific Method	12. Experiment: Density Column*
4. Experiment: Making Observations	13. Quiz 2: Measuring Matter
5. Quiz 1: Nature of Science	14. Special Project*
6. The Metric System	15. Review
7. Scales	16. Test
8. Volume	17. Alternate Test*
9. Experiment: Determining Volume	18. Glossary and Credits

**Unit 2: THE STRUCTURE OF MATTER****Assignments**

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|--|--|
| 1. The History of Atomic Theory<br>2. Experiment: Atomic Structure<br>3. The Atomic Model<br>4. Quiz 1: Atomic Structure<br>5. Elements and Their Properties<br>6. The Periodic Table<br>7. Trends on the Periodic Table<br>8. Experiment: Identifying an Unknown<br>9. Compounds<br>10. Quiz 2: Pure Substances | 11. Mixtures<br>12. Separating Mixtures<br>13. Experiment: Separating a Mixture<br>14. Quiz 3: Mixtures<br>15. Special Project*<br>16. Review<br>17. Test<br>18. Alternate Test*<br>19. Glossary and Credits |
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**Unit 3: MATTER AND CHANGE****Assignments**

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|--|---|
| 1. States of Matter<br>2. Changes of State<br>3. Experiment: Graphing Changes of State<br>4. Solutions—The Dissolving Process<br>5. Acids and Bases<br>6. Experiment: The Cabbage Indicator<br>7. Quiz 1: Physical Changes<br>8. Chemical Bonding<br>9. Atomic Structure and Bonding<br>10. Experiment: Chemical Changes<br>11. Chemical Reactions and Conservation of Mass<br>12. Types of Chemical Reactions | 13. Quiz 2: Chemical Changes<br>14. Radioactivity<br>15. Nuclear Reactions<br>16. Experiment: Half-Life<br>17. Nuclear Energy<br>18. Quiz 3: Nuclear Changes<br>19. Special Project*<br>20. Review<br>21. Test<br>22. Alternate Test*<br>23. Glossary and Credits |
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**Unit 4: STATES OF MATTER****Assignments**

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|---|--|
| 1. Properties of Solids<br>2. Experiment: Comparing Hardness and Density of Solids<br>3. Elasticity and Strength in Solids<br>4. Electrical Conductivity in Solids<br>5. Quiz 1: Solids<br>6. Characteristics of Liquids<br>7. Experiment: Viscosity<br>8. Pressure in Liquids<br>9. Archimedes' Principle and Flotation<br>10. Liquids and Capillary Action<br>11. Quiz 2: Liquids | 12. General Characteristics of Gases<br>13. Pressure and Volume in Gases<br>14. Experiment: Pressure in Gases<br>15. Temperature and Volume Changes in Gases<br>16. Quiz 3: Gases<br>17. Special Project*<br>18. Review<br>19. Test<br>20. Alternate Test*<br>21. Glossary and Credits |
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Unit 5: MOTION AND FORCES	
Assignments	
1. Distance and Displacement	12. Project: Virtual Lab — Newton's Laws
2. Speed and Velocity	13. Experiment: Propulsion
3. Acceleration	14. Centripetal Force
4. Motion Graphs	15. Quiz 2: Forces
5. Experiment: Motion Graphs	16. Project: Virtual Lab — Circular Motion
6. Momentum	17. Special Project*
7. Project: Virtual lab — Conservation of Momentum	18. Review
8. Quiz 1: Motion	19. Test
9. Forces	20. Alternate Test*
10. Friction	21. Glossary and Credits
11. Newton's Laws	

Unit 6: SEMESTER REVIEW AND EXAM	
Assignments	
1. Review	2. Exam
3. Alternate Exam—Form A*	4. Alternate Exam—Form B*

Unit 7: WORK AND ENERGY	
Assignments	
1. Forms of Energy	11. Inclined Planes, Wedges, and Screws
2. Work	12. Project: Virtual Lab — Simple Machines
3. Mechanical Energy	13. Experiment: Inclined Planes
4. Conservation of Energy	14. Quiz 2: Simple Machines
5. Experiment: Potential and Kinetic Energy	15. Project: Virtual Lab — Projectiles
6. Power	16. Special Project*
7. Quiz 1: Work, Energy, and Power	17. Review
8. Simple Machines; Levers	18. Test
9. Mechanical Advantage and Efficiency	19. Alternate Test*
10. Pulleys; Wheels and Axles	20. Glossary and Credits

Unit 8: HEAT FLOW	
Assignments	
1. Thermodynamics and Entropy	9. Heat Engines
2. Specific Heat Capacity	10. Quiz 2: Heat Flow and Technology
3. Heat Flow	11. Special Project*
4. Experiment: Insulators	12. Review
5. Quiz 1: Energy Transfer	13. Test
6. Heating Systems	14. Alternate Test*
7. Experiment: Heat and Expansion	15. Glossary and Credits
8. Cooling and Refrigeration	

Unit 9: ELECTRICITY AND MAGNETISM	
Assignments	
1. Electric Charges	10. Magnetism and Electricity
2. Static Electricity	11. Experiment: Diverting a Magnetic Field
3. Experiment: Electrostatic Investigations	12. Magnetic Fields in Space
4. Electric Current	13. Quiz 2: Magnetism
5. Circuits	14. Special Project*
6. Electrical Energy and Power	15. Review
7. Project: Virtual Lab — Circuits	16. Test
8. Quiz 1: Electricity	17. Alternate Test*
9. Magnetism	18. Glossary and Credits

Unit 10: WAVES	
Assignments	
1. Waves and Energy Transfer	14. Quiz 2: Sound
2. Types of Waves	15. Light and the Electromagnetic Spectrum
3. Properties of Waves	16. Properties of Light
4. Experiment: Changing the Speed of a Wave	17. Reflection and Mirrors
5. The Behavior of Waves	18. Experiment: Law of Reflection
6. Quiz 1: Wave Characteristics and Properties	19. Lenses
7. Sound Vibrations	20. Quiz 3: Light
8. Detecting Sound	21. Project: Virtual Lab — Light
9. Project: Virtual Lab — Sound	22. Special Project*
10. Experiment: Using Vibrations to Produce Sound	23. Review
11. Doppler Effect	24. Test
12. Project: Virtual Lab — Doppler Effect	25. Alternate Test*
13. Beats, Resonance, and Harmonics	26. Glossary and Credits

Unit 11: CHEMISTRY AND PHYSICS IN OUR WORLD	
Assignments	
1. Carbon Dioxide and Global Warming	9. Kepler and the Motion of the Spheres
2. Experiment: Carbon Dioxide and Water Acidity	10. Experiment: Kepler's Second Law
3. Fossil Fuels' Effect on the Environment	11. Quiz 2: Space Physics
4. Media and Science	12. Special Project*
5. Experiment: Water Acidity and the Environment	13. Review
6. Quiz 1: Environmental Chemistry	14. Test
7. Atomic Spectra and Moving Stars	15. Alternate Test*
8. The Temperature of Stars	16. Glossary and Credits

Unit 12: SEMESTER REVIEW AND EXAM	
Assignments	
1. Review	2. Exam
3. Alternate Exam—Form A*	4. Alternate Exam—Form B*

Unit 13: FINAL EXAM	
Assignments	
1. Final Exam	2. Alternate Final Exam—Form A*
3. Alternate Final Exam—Form B*	

(\* ) Indicates alternative assignment