

ACADEMIC INSTRUCTIONAL LIBRARY



Physics

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.

HOME TEACHER LABS

Labs for the Homeschool Edition program are those contained in the Ignitia Online Curriculum. No expensive equipment is required with only several requiring the purchase of small items or household items to conduct the experiments.

It is always advisable to be familiar with your surroundings and wear protective equipment when conducting any experiment. Never allow yourself to be distracted when completing an experiment.

UNIT 1 – KINEMATICS

1. **Course Overview**
2. **Introduction to the Language of Physics**
3. **Experiment: Making a Paper Airplane**
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. **Tutorial for Making a Scatter Plot Using an Electronic Spreadsheet Program** *(In this project you will be designing a scatter plot (a type of line graph) based on information given to you in a data table. You must organize the data into a graph and make it clear and understandable. The advantage of using the Microsoft® Excel® application over paper and pencil is that you will have a neat and professional graph that may be saved electronically and shared with your instructor. Before starting the project view the tutorial.)*
10. **Quiz 3: Speed and Velocity**
11. **Acceleration and Acceleration Due to Gravity**
12. **Quiz 4: Acceleration and Acceleration Due to Gravity**
13. **Vectors**
14. **Projectiles**
15. **Quiz 5: Review**
16. **Review Game**
17. **Test**
18. **Alternate Test**

19. Reference

UNIT 2 – DYNAMICS

1. **Newton's First and Second Laws**
2. **Report: Isaac Newton** (*Newton stated that if he had made any strides in science, he had done so by standing on the shoulders of a giant named Galileo Galilei. This statement was modest, coming from a man who made discoveries in so many different areas of physics. Prepare a report on the life of Sir Isaac Newton, his accomplishments, discoveries, books written, and honors received.*)
3. **Quiz 1**
4. **Project: Virtual Lab – Newton’s Laws**
5. **Gravity**
6. **Quiz 2**
7. **Uniform Circular Motion**
8. **Project: Virtual Lab - Circular Motion**
9. **Quiz 3**
10. **Newton's Third Law and Conservation of Momentum**
11. **Project: Virtual Lab - Conservation of Momentum**
12. **Quiz 4**
13. **Kepler's Laws of Planetary Motion**
14. **Report: Solar System** (*The development of a model for our earth-sun-planet system spanned more than two thousand years. Briefly outline the chronological development of the theory and dates of the men who proposed the models of the system. Also prepare an 800-word detailed report of the life and times of Johannes Kepler and the steps taken that led him to each of his planetary laws of motion.*)

15. **Experiment: Kepler's Law**
16. **Quiz 5**
17. **Review Game**
18. **Test**
19. **Alternate Test**
20. **Reference**

UNIT 3 – WORK AND ENERGY

1. **Work, Kinetic, and Potential Energy**
2. **Report: Nuclear Energy (*Arguments for and against nuclear energy are frequently in the headlines. Research both sides of the question and present an unbiased report of 500 words on the pros and cons of nuclear power plants. Your sources may include science and environmental textbooks, magazine and newspaper articles, and literature distributed by activist organizations. Your report must be balanced and objective.*)**
3. **Quiz 1**
4. **Conservation of Energy**
5. **Power and Efficiency**
6. **Project: Virtual Lab – Simple Machines**
7. **Quiz 2**
8. **Project: Virtual Lab - Projectiles**
9. **Heat Energy**
10. **Latent Heat**
11. **Laws of Thermodynamics**
12. **Quiz 3**
13. **Review Game**

14. **Test**
15. **Alternate Test**
16. **Reference**

UNIT 4 - INTRODUCTION TO WAVES

1. **Characteristics of Waves**
2. **Experiment: Wave Speeds**
3. **Quiz 1**
4. **Wave Phenomena**
5. **Quiz 2**
6. **Sound Waves**
7. **Project: Virtual Lab – Sound**
8. **Project: Ignitia Virtual Lab – Doppler Effect**
9. **Quiz 3**
10. **Review Game**
11. **Test**
12. **Alternate Test**
13. **Reference**

UNIT 5 – LIGHT

1. **Speed of Light: Historical Calculations**
2. **Properties of Light**
3. **Experiment: Light Angles**
4. **Quiz 1**

5. **Mirrors**
6. **Lenses**
7. **Quiz 2**
8. **Light Phenomena and Models of Light**
9. **Project: Virtual Lab - Light**
10. **Quiz 3**
11. **Review Game**
12. **Test**
13. **Alternate Test**
14. **Reference**

UNIT 6 – SEMESTER REVIEW AND EXAM

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

UNIT 7 – STATIC ELECTRICITY

1. **Electric Charges**
2. **Coulomb's Law**
3. **The Transfer of Charges**
4. **Quiz 1**
5. **Electric Fields**
6. **Quiz 2**

7. **Electric Potential**
8. **Potential and Energy**
9. **Quiz 3**
10. **Review Game**
11. **Test**
12. **Alternate Test**
13. **Reference**

UNIT 8 – ELECTRIC CURRENTS

1. **Sources of EMF**
2. **Project: Research and Report** (*The men on this list contributed to the development of electrical theory. Write a 600-word report integrating their contributions in a historical perspective. The report should be 600 words and double-spaced. Charles Coulomb, Andre Ampere, Alessandro Volta, Georg Ohm.*)
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. **Review Game**
12. **Test**
13. **Alternate Test**

14. Reference

UNIT 9 – MAGNETISM

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

UNIT 10 - ATOMIC AND NUCLEAR PHYSICS

1. Quantum Theory
2. X-Rays, Matter Waves, and the Uncertainty Principle
3. Quiz 1
4. Early Atomic Models
5. Report: Early Atomic Physics (*Research and describe the impact of early atomic theorists on the development of society, economics and technology. Some of the men involved in the development of early atomic*

physics worked in the same laboratory. Look up the following men: Ernest Rutherford, J. J. Thomson, and Neils Bohr. Type a double-spaced 750-word report on the men and their contributions to atomic theory.)

6. **Bohr Model**
7. **Nuclear Theory**
8. **Quiz 2**
9. **Nuclear Reactions**
10. **Fusion and Applications of Nuclear Energy**
11. **Quiz 3**
12. **Review Game**
13. **Test**
14. **Alternate Test**
15. **Reference**

UNIT 11 – REVIEW

1. **Mechanics**
2. **Dynamics**
3. **Energy**
4. **Quiz 1**
5. **Wave Motion**
6. **Light and Sound**
7. **Quiz 2**
8. **Electricity and Magnetism**
9. **Fields and Forces**
10. **Circuits**

11. **Quiz 3**
12. **Modern Physics**
13. **The Bohr Atom**
14. **Duality**
15. **Nuclear Energy**
16. **Quiz 4**
17. **Review Game**
18. **Test**
19. **Alternate Test**
20. **Reference**

UNIT 12- SEMESTER REVIEW AND EXAM

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

UNIT 13 – FINAL EXAM

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