

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

UNIT 2: DYNAMICS				
Assignment Titles				
PHYSICS	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: Collisions*	20.	Reference

UNIT 3: WORK AND ENERGY				
Assignment Titles				
PHYSICS	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				
PHYSICS	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				
PHYSICS	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				
PHYSICS	1.	Review	3..	Alternate Exam—Form A*
	2.	Exam	4.	Alternate Exam—Form B*

UNIT 7: STATIC ELECTRICITY				
PHYSICS	Assignment Titles			
	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		

UNIT 8: ELECTRIC CURRENTS				
PHYSICS	Assignment Titles			
	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				
PHYSICS	Assignment Titles			
	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		

UNIT 10: ATOMIC AND NUCLEAR PHYSICS				
PHYSICS	Assignment Titles			
	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				
PHYSICS	Assignment Titles			
	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			

PHYSICS		UNIT 12: SEMESTER REVIEW AND TEST	
PHYSICS		Assignment Titles	
1.	Review	3.	Alternate Exam—Form A*
2.	Exam	4.	Alternate Exam—Form B*

PHYSICS		UNIT 13: FINAL EXAM	
PHYSICS		Assignment Titles	
1.	Exam	3.	Alternate Exam—Form B*
2.	Alternate Exam—Form A*		

(*) Indicates alternate assignment