2018 - 2019 Curriculum Catalog

Physics

Table of Contents

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.

- **Kinematics:** Students will learn to use scalars and vectors to visualize and calculate concepts of motion.
- **Dynamics:** Students will articulate Newton's and Kepler's laws 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.

Physics

Unit 1: Kinematics

Assignments

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

Physics

Unit 2: Dynamics

Assignments

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

Physics

Unit 3: Work and Energy

Assignments

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

Physics

Unit 4: Introduction to Waves

Assignments

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

Physics

Unit 5: Light

Assignments

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

Physics

Unit 6: Semester Review and Exam

Assignments

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

Physics

Unit 7: Static Electricity

Assignments

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

Physics

Unit 8: Electric Currents

Assignments

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

Physics

Unit 9: Magnetism

Assignments

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

Physics

Unit 10: Atomic and Nuclear Physics

Assignments

1. Quantum Theory
2. X-Rays, Matter Waves, and the Uncertainty Principle
3. Quiz 1
4. Early Atomic Models
5. Report: Early Atomic Physics*
6. Bohr Model
7. Nuclear Theory
8. Quiz 2
9. Nuclear Reactions
10. Fusion and Applications of Nuclear Energy
11. Quiz 3
12. Special Project*
13. Review Game
14. Test
15. Alternate Test*
16. Reference

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

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

(*) Indicates alternative assignment