

Topic: Dynamics

Days: 45

Subject(s): Science

Grade(s): 10th, 11th, 12th

3.4.12.C - Essential

Apply the principles of motion and force.

- Evaluate wave properties of frequency, wavelength and speed as applied to sound and light through different media.
- Propose and produce modifications to specific mechanical power systems that will improve their efficiency.
- Analyze the principles of translational motion, velocity and acceleration as they relate to free fall and projectile motion.
- Analyze the principles of rotational motion to solve problems relating to angular momentum, and torque.
- Interpret a model that illustrates circular motion and acceleration.
- Describe inertia, motion, equilibrium, and action/reaction concepts through words, models and mathematical symbols.

3.7.12.C - Important

Evaluate computer operations and concepts as to their effectiveness to solve specific problems.

- Describe and demonstrate atypical software installation.
- Analyze and solve hardware and advanced software problems.
- Assess and apply multiple input and output devices to solve specific problems.

Topic: Electricity and Magnetism

Days: 10

Subject(s): Science

Grade(s): 10th, 11th, 12th

3.4.12.C - Essential

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3.4.12.A - Important

Apply concepts about the structure and properties of matter.

- Apply rules of systematic nomenclature and formula writing to chemical substances.
- Classify and describe, in equation form, types of chemical and nuclear reactions.
- Explain how radioactive isotopes that are subject to decay can be used to estimate the age of materials.
- Explain how the forces that bind solids, liquids and gases affect their properties.
- Characterize and identify important classes of compounds (e.g., acids, bases, salts).
- Apply the conservation of energy concept to fields as diverse as mechanics, nuclear particles and studies of the origin of the universe.
- Apply the predictability of nuclear decay to estimate the age of materials that contain radioactive isotopes.
- Quantify the properties of matter (e.g., density, solubility coefficients) by applying mathematical formulas.

Topic: Kinematics- 1 Dimensional

Days: 29

Subject(s): Science

Grade(s): 10th, 11th, 12th

3.4.12.C - Essential

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- Propose and produce modifications to specific mechanical power systems that will improve their efficiency.
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- Analyze the principles of rotational motion to solve problems relating to angular momentum, and torque.
- Interpret a model that illustrates circular motion and acceleration.
- Describe inertia, motion, equilibrium, and action/reaction concepts through words, models and mathematical symbols.

Topic: Kinematics- 2 Dimensional

Days: 25

Subject(s): Science

Grade(s): 10th, 11th, 12th

3.4.12.C - Essential

Apply the principles of motion and force.

- Evaluate wave properties of frequency, wavelength and speed as applied to sound and light through different media.
- Propose and produce modifications to specific mechanical power systems that will improve their efficiency.
- Analyze the principles of translational motion, velocity and acceleration as they relate to free fall and projectile motion.
- Analyze the principles of rotational motion to solve problems relating to angular momentum, and torque.
- Interpret a model that illustrates circular motion and acceleration.
- Describe inertia, motion, equilibrium, and action/reaction concepts through words, models and mathematical symbols.

Topic: Light

Days: 20

Subject(s): Science

Grade(s): 10th, 11th, 12th

3.4.12.C - Essential

Apply the principles of motion and force.

- Evaluate wave properties of frequency, wavelength and speed as applied to sound and light through different media.
- Propose and produce modifications to specific mechanical power systems that will improve their efficiency.
- Analyze the principles of translational motion, velocity and acceleration as they relate to free fall and projectile motion.
- Analyze the principles of rotational motion to solve problems relating to angular momentum, and torque.
- Interpret a model that illustrates circular motion and acceleration.
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Topic: Measurement and Methods I

Days: 13

Subject(s): Science

Grade(s): 10th, 11th, 12th

3.1.12.A - Compact

Apply concepts of systems, subsystems, feedback and control to solve complex technological problems.

- Apply knowledge of control systems concept by designing and modeling control systems that solve specific problems.
- Apply systems analysis to predict results.
- Analyze and describe the function, interaction and relationship among subsystems and the system itself.
- Compare and contrast several systems that could be applied to solve a single problem.
- Evaluate the causes of a system's inefficiency.

3.1.12.C - Compact

Assess and apply patterns in science and technology.

- Assess and apply recurring patterns in natural and technological systems.
- Compare and contrast structure and function relationships as they relate to patterns.
- Assess patterns in nature using mathematical formulas.

3.2.12.D - Essential

Analyze and use the technological design process to solve problems.

- Assess all aspects of the problem, prioritize the necessary information and formulate questions that must be answered.
- Propose, develop and appraise the best solution and develop alternative solutions.
- Implement and assess the solution.
- Evaluate and assess the solution, redesign and improve as necessary.
- Communicate and assess the process and evaluate and present the impacts of the solution.

3.2.12.B - Essential

Evaluate experimental information for appropriateness and adherence to relevant science processes.

- Evaluate experimental data correctly within experimental limits.
- Judge that conclusions are consistent and logical with experimental conditions.
- Interpret results of experimental research to predict new information or improve a solution.

3.7.12.B - Important

Evaluate appropriate instruments and apparatus to accurately measure materials and processes.

- Apply and evaluate the use of appropriate instruments to accurately measure scientific and technologic phenomena within the error limits of the equipment.
- Evaluate the appropriate use of different measurement scales (macro and micro).
- Evaluate the utility and advantages of a variety of absolute and relative measurement scales for their appropriate application.

Topic: Vibrations and Waves

Days: 20

Subject(s): Science

Grade(s): 10th, 11th, 12th

3.4.12.C - Essential

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- Propose and produce modifications to specific mechanical power systems that will improve their efficiency.
- Analyze the principles of translational motion, velocity and acceleration as they relate to free fall and projectile motion.
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- Interpret a model that illustrates circular motion and acceleration.
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Topic: Work and Energy

Days: 17

Subject(s): Science

Grade(s): 10th, 11th, 12th

3.4.12.B - Essential

Apply and analyze energy sources and conversions and their relationship to heat and temperature.

- Determine the heat involved in illustrative chemical reactions.
- Evaluate mathematical formulas that calculate the efficiency of specific chemical and mechanical systems.
- Use knowledge of oxidation and reduction to balance complex reactions.
- Apply appropriate thermodynamic concepts (e.g., conservation, entropy) to solve problems relating to energy and heat.