

Topic: Aqueous Solutions

Subject(s): Science

Days: 15

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

3.1.12.B - Compact

Apply concepts of models as a method to predict and understand science and technology.

- Evaluate technological processes by collecting data and applying mathematical models (e.g., process control).
- Apply knowledge of complex physical models to interpret data and apply mathematical models.
- Appraise the importance of computer models in interpreting science and technological systems.

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: Chemical Bonding

Days: 15

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.

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## Topic: Chemical Equations and Reactions

Days: 10

Subject(s): Science

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

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- Appraise the importance of computer models in interpreting science and technological systems.

## 3.1.12.C - Compact

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- Assess patterns in nature using mathematical formulas.

Topic: Energy Transfers

Days: 5

Subject(s): Science

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

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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.

Topic: Gas Laws

Days: 10

Subject(s): Science

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

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3.1.12.D - Essential

Analyze scale as a way of relating concepts and ideas to one another by some measure.

- Compare and contrast various forms of dimensional analysis.
- Assess the use of several units of measurement to the same problem.
- Analyze and apply appropriate measurement scales when collecting data.

## Topic: Introduction to Matter

Days: 10

Subject(s): Science

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

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## 3.1.12.C - Compact

Assess and apply patterns in science and technology.

- Assess and apply recurring patterns in natural and technological systems.
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- Assess patterns in nature using mathematical formulas.

## 3.4.12.A - Important

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- Apply rules of systematic nomenclature and formula writing to chemical substances.
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Topic: Lab Technique and Safety

Days: 5

Subject(s): Science

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

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.

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.

3.2.12.C - Important

Apply the elements of scientific inquiry to solve multi-step problems.

- Generate questions about objects, organisms and/or events that can be answered through scientific investigations.
- Evaluate the appropriateness of questions.
- Design an investigation with adequate control and limited variables to investigate a question.
- Organize experimental information using analytic and descriptive techniques.
- Evaluate the significance of experimental information in answering the question.
- Project additional questions from a research study that could be studied.

Topic: Measurement

Days: 5

Subject(s): Science

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

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- 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.D - Essential

Analyze scale as a way of relating concepts and ideas to one another by some measure.

- Compare and contrast various forms of dimensional analysis.
- Assess the use of several units of measurement to the same problem.
- Analyze and apply appropriate measurement scales when collecting data.

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

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## Topic: Nomenclature

Days: 10

Subject(s): Science

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

## 3.4.12.A - Important

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- 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.
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- Quantify the properties of matter (e.g., density, solubility coefficients) by applying mathematical formulas.

## 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.

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## Topic: Periodic Table

Days: 10

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## Topic: Stoichiometry and Quantitative Chemistry

Days: 20

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

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