

IPC

Calendar: 1st Semester

Target Group: High School

First Six Weeks

Unit 1: Energy & Motion

Chapter 1: The Nature of Science

Timeframe: 1.5 Weeks

| Section/Name | Objectives | Possible Labs/Activities | | TEKS | TAKS Objective |
|--|---|---|--|------------------------------|--|
| Section 1 The Methods of Science | Identify steps scientists use to solve problems Describe why scientists use variables Compare/Contrast science and technology | Measurement Lab Lab Safety Relationships lab | | 1, 2A, 2B, 2C, 2D, 3, 3A, 3C | §112.42.c.1.A demonstrate safe practices during field and laboratory investigations |
| Section 2 Standards of Measurement | SI units and symbols, length, volume, mass, density, time and temperature. Conversion of SI units. | Standards of measurement labs. | | 1, 1A, 2A, 2B, 2C, 2D, 3A | §112.42.c.1.A demonstrate safe practices during field and laboratory investigations |
| Section 3 Communicating with Graphs | Identify three types of graphs and explain the ways they are used. Distinguish between dependent and independent variables. Analyze data using the various types of graphs. | Calculating speed, velocity, acceleration, net force, balanced force Newton's 1 st Law Identifying displacement, inertia | | 1, 1A, 2, 2A, 2B, 2C, 2D | §112.42.c.1.A demonstrate safe practices during field and laboratory investigations |

Unit 1: Energy & Motion
 Chapter 2: Motion and Speed
 Timeframe: 1.5 Weeks

| Section/Name | Objectives | Possible Labs/Activites | TEKS | TAKS Objective |
|-----------------------------------|---|-------------------------|----------------------------|---|
| Section 1 Describing Motion | Distinguish between distance and displacement. Explain the difference between speed and velocity. Interpret motion graphs. | | 1, 2, 2B, 2C, 2D, 3, 4, 4A | TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 2 Acceleration | Identify how acceleration, time, and velocity are related. Explain how positive and negative acceleration affect motion. Describe how to calculate the acceleration of an object. | | 2C, 2D, 3A, 4, 4A, 4C | TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 3 Motion and Forces | Explain how force and velocity are related. Describe what inertia is and how it is related to Newton's first law of motion. Identify the forces and motion that are present during a car crash. | | 2D, 3A, 3B, 4, 4A, 4B, 4C | TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |

Unit 1: Energy & Motion

Chapter 3: Forces

Timeframe: 2 Weeks

| Section/Name | Objectives | Possible Labs/ Activities | TEKS | TAKS Objective |
|---|---|------------------------------|------------------------------------|---|
| Section 1 Newton's Second Law | <p>Explain how force, mass and acceleration are related.</p> <p>Describe the three different types of friction.</p> <p>Observe the effects of air resistance on falling objects.</p> | | 1, 1A, 2, 2B, 2C, 2D, 3, 3A, 4, 4A | <p>TAKS Objective 1: The student will demonstrate an understanding of the nature of science.</p> <p>TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.</p> |
| Section 2 Gravity | <p>Describe gravitation force.</p> <p>Distinguish between mass and weight.</p> <p>Explain why objects that are thrown or shot will follow a curved path.</p> <p>Compare motion in a straight line with circular motion.</p> | | 1, 1A, 2, 2B, 2C, 2D, 3, 3A, 4, 4B | <p>TAKS Objective 1: The student will demonstrate an understanding of the nature of science.</p> <p>TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.</p> |
| Section 3 The Third Law of Motion | <p>Identify when action and reaction forces occur.</p> <p>Calculate momentum.</p> <p>Demonstrate how momentum is conserved.</p> | | 2A, 2D, 3, 3A, 3E, 4, 4A, 4B, 4C | <p>TAKS Objective 1: The student will demonstrate an understanding of the nature of science.</p> <p>TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.</p> |

Unit 1: Energy & Motion

Chapter 4: Energy

Timeframe: 1.5 Weeks

| Section/Name | Objectives | Possible Labs/ Activities | TEKS | TAKS Objective |
|--|--|------------------------------|--|--|
| Section 1 The Nature of Energy | Distinguish between kinetic and potential energy. Recognize different ways that energy can be stored. | | 1, 1A, 2, 2A, 2B, 2C, 2D, 3, 3A, 4, 4B, 6, 6A, 6B | TAKS Objective 1: The student will demonstrate an understanding of the nature of science. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 2 Conservation of Energy | Describe how energy is conserved when changing from one form to another. Apply the law of conservation of energy to familiar situations. | | 1, 1A, 2B, 2C, 2D, 3, 3A, 3C, 3E, 4, 6, 6A, 6H, 8, 8A, 8D | TAKS Objective 1: The student will demonstrate an understanding of the nature of science. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |

Second Six Weeks
 Unit 1: Energy & Motion
 Chapter 5: Work and Machines
 Timeframe: 2 Weeks

| Section/Name | Objectives | Possible Labs/ Activities | TEKS | TAKS Objective |
|---------------------------------|---|------------------------------|--|---|
| Section 1 Work | <p>Explain the meaning of work.</p> <p>Explain how work and energy are related.</p> <p>Calculate work.</p> <p>Calculate power.</p> | | 1, 1A, 2, 2B, 2C, 2D, 3, 3A, 4, 4A, 4D, 6 | TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 2 Using Machines | <p>Explain how machines make work easier.</p> <p>Calculate mechanical advantage.</p> <p>Calculate efficiency.</p> | | 2C, 3, 3A, 3C, 4, 4C, 4D | TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 3 Simple Machines | <p>Describe the six types of simple machines.</p> <p>Calculate the ideal mechanical advantage for different types of simple machines.</p> | | 1, 1A, 2, 2A, 2B, 2C, 2D, 3, 3A, 3D, 4, 4A, 4C, 4D | TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |

Unit 1: Energy & Motion
 Chapter 6: Thermal Energy
 Timeframe: 1.5 Weeks

| Section/Name | Objectives | Possible Labs/ Activities | TEKS | TAKS Objective |
|--|--|------------------------------|--|--|
| Section 1 Temperature and Heat | Explain the difference between heat and temperature. Define thermal energy. Explain the meaning of specific heat. | | 1, 1A, 2B, 2C, 2D, 3A, 6, 6B | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 2 Transferring Thermal Energy | Compare and contrast thermal energy transfer by conduction, convection and radiation. Compare and contrast conductors and insulators. Explain how insulation affects the transfer of energy. | | 1, 1A, 2, 2A, 2B, 2C, 2D, 3, 3A, 6, 6B, 6H | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 3 Using Heat | Compare and contrast three types of conventional heating systems. Distinguish between solar passive and active heating systems. | | 2C, 2D, 6, 6B, 6H | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |

Unit 2: Electricity and Energy Resources

Chapter 7: Electricity

Timeframe: 1.5 Weeks

| Section/Name | Objectives | Possible Labs/ Activities | TEKS | TAKS Objective |
|--------------------------------|--|------------------------------|-------------------------------|--|
| Section 1 Electric Charge | Describe the properties of static electricity. | | 1A, 2A, 2C, 2D, 6, 6B, 6E, 6H | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 2 Electric Current | Describe how electric current is different from static electricity. Explain how a dry cell provides a source of voltage difference. Describe the relationship among voltage difference, resistance, and current. | | 1, 2, 2B, 2C, 2D, 3, 6, 6B | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 3 Electrical Energy | Describe the differences between series and parallel circuits. Recognize the function of circuit breakers and fuses. Explain and calculate electrical power. | | 2C, 2D, 3, 6, 6B, 6D, 6F | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |

Unit 2: Electricity and Energy Resources

Chapter 8: Magnetism and its Uses

Timeframe: 1 Week

| Section/Name | Objectives | Possible Labs/ Activities | TEKS | TAKS Objective |
|---|--|------------------------------|-------------------------------------|--|
| Section 1 Magnetism | Describe the properties of temporary and permanent magnets. Explain how a magnet exerts a force on an object. Explain why some materials are magnetic and others are not. Model magnetic behavior using magnetic domains. | | 1, 1A, 2, 2A, 2B, 2C, 2D, 3, 3C, 3E | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 2 Electricity and Magnetism | Understand the relationship between electric current and magnetism. Explain how electric magnets are constructed. Describe how electromagnets are used. Describe how an electric motor operates. | | 5D, 6, 6G | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 3 Producing Electric Current | Describe how a generator produces an electric current. Distinguish between | | 6, 6C, 6E, 6F, 6G | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. |

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| | alternating current and direct current. Explain how a transformer can change the voltage of an alternating current. | | | TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
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Unit 3: Energy on the Move

Chapter 11: Waves

Timeframe: 1.5 Weeks

| Section/Name | Objectives | Possible Labs/ Activities | TEKS | TAKS Objective |
|-------------------------------------|---|------------------------------|----------------------------|--|
| Section 1 The Nature of Waves | Recognize that waves carry energy but not matter. Define mechanical waves. Distinguish between transverse waves and compressional waves. | | 3, 5, 5A | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 2 Wave Properties | Compare and contrast transverse and compressional waves. Describe the relationship between frequency and wavelength. Explain how a wave's amplitude is related to the wave's energy. Calculate the wave's speed. | | 1, 1A, 2B, 2C, 3, 5, 5A | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 3 Behavior of Waves | Identify the law of reflection. Recognize what makes waves bend. Explain how waves combine. | | 3, 5, 5A, 5B, 5D | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |

Unit 3: Energy on the Move

Chapter 12: Sound

Timeframe: 1 Week

| Section/Name | Objectives | Possible Labs/ Activities | TEKS | TAKS Objective |
|-------------------------------------|---|------------------------------|------------------------------------|--|
| Section 1 The Nature of Sound | Explain how sound travels through different mediums. Identify what influences the speed of sound. | | 1, 1A, 2, 2B, 2C, 2D, 5, 5A, 5D, 6 | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 2 Properties of Sound | Recognize how amplitude intensity and loudness are related. Describe how sound intensity is measured and what levels can damage hearing. Explain relationship between frequency and pitch. Discuss the Doppler Effect. | | 1, 2C, 2D, 5, 5A, 5B, 6 | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 3 Music | Distinguish between noise and music. Describe why different instruments have different sound qualities. | | 2D, 5, 5A, 5B, 5D, 6 | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student |

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| | <p>Explain how string, wind, and percussion instruments produce music. Describe the formation of beats.</p> | | | <p>will demonstrate an understanding of motion, forces and energy.</p> |
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Unit 3: Energy on the Move

Chapter 14: Light

Timeframe: 1 Week

| Section/Name | Objectives | Possible Labs/ Activities | TEKS | TAKS Objective |
|-----------------------------------|---|------------------------------|------------------------------|--|
| Section 1 Behavior of Light | Describe the differences among opaque, transparent and translucent materials. Explain how light is reflected. Discuss how refraction separates white light. | | 1, 2, 2B, 2C, 2D, 5, 5B | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 2 Light and Color | Explain how you see color. Describe the differences between light color and pigment color. Predict what happens when different colors are mixed. | | 5, 5B | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |
| Section 3 Producing Light | Explain how incandescent and fluorescent lightbulbs work. Analyze the advantages and disadvantages of different lighting devices. Explain how a laser | | 1, 1A, 2B, 2C, 5, 5B, 5C, 7D | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |

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| | produces coherent light. Describe various uses of lasers. | | | |
| Section 4 Using Light | Describe polarized light and the uses of polarizing filters. Apply the concept of total internal reflection to the uses of optical fibers. | | 5, 5A, 5B, 5C | TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy. |

§112.42. Integrated Physics and Chemistry.

(a) General requirements. Students shall be awarded one credit for successful completion of this course. Prerequisites: none. This course is recommended for students in Grades 9 or 10.

(b) Introduction.

(1) In Integrated Physics and Chemistry, students conduct field and laboratory investigations, use scientific methods during investigations, and make informed decisions using critical-thinking and scientific problem-solving. This course integrates the disciplines of physics and chemistry in the following topics: motion, waves, energy transformations, properties of matter, changes in matter, and solution chemistry.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.

(c) Knowledge and skills.

(1) Scientific processes. The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during field and laboratory investigations; and

(B) make wise choices in the use and conservation of resources and the disposal or recycling of materials.

(2) Scientific processes. The student uses scientific methods during field and laboratory investigations. The student is expected to:

(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology;

- (B) collect data and make measurements with precision;
- (C) organize, analyze, evaluate, make inferences, and predict trends from data; and
- (D) communicate valid conclusions.

(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

- (A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;
- (B) draw inferences based on data related to promotional materials for products and services;
- (C) evaluate the impact of research on scientific thought, society, and the environment;
- (D) describe connections between physics and chemistry, and future careers; and
- (E) research and describe the history of physics, chemistry, and contributions of scientists.

(4) Science concepts. The student knows concepts of force and motion evident in everyday life. The student is expected to:

- (A) calculate speed, momentum, acceleration, work, and power in systems such as in the human body, moving toys, and machines;
- (B) investigate and describe applications of Newton's laws such as in vehicle restraints, sports activities, geological processes, and satellite orbits;
- (C) analyze the effects caused by changing force or distance in simple machines as demonstrated in household devices, the human body, and vehicles; and
- (D) investigate and demonstrate mechanical advantage and efficiency of various machines such as levers, motors, wheels and axles, pulleys, and ramps.

(5) Science concepts. The student knows the effects of waves on everyday life. The student is expected to:

- (A) demonstrate wave types and their characteristics through a variety of activities such as modeling with ropes and coils, activating tuning forks, and interpreting data on seismic waves;
- (B) demonstrate wave interactions including interference, polarization, reflection, refraction, and resonance within various materials;

(C) identify uses of electromagnetic waves in various technological applications such as fiber optics, optical scanners, and microwaves; and

(D) demonstrate the application of acoustic principles such as in echolocation, musical instruments, noise pollution, and sonograms.

(6) Science concepts. The student knows the impact of energy transformations in everyday life. The student is expected to:

(A) describe the law of conservation of energy;

(B) investigate and demonstrate the movement of heat through solids, liquids, and gases by convection, conduction, and radiation;

(C) analyze the efficiency of energy conversions that are responsible for the production of electricity such as from radiant, nuclear, and geothermal sources, fossil fuels such as coal, gas, oil, and the movement of water or wind;

(D) investigate and compare economic and environmental impacts of using various energy sources such as rechargeable or disposable batteries and solar cells;

(E) measure the thermal and electrical conductivity of various materials and explain results;

(F) investigate and compare series and parallel circuits;

(G) analyze the relationship between an electric current and the strength of its magnetic field using simple electromagnets; and

(H) analyze the effects of heating and cooling processes in systems such as weather, living, and mechanical.

(7) Science concepts. The student knows relationships exist between properties of matter and its components. The student is expected to:

(A) investigate and identify properties of fluids including density, viscosity, and buoyancy;

(B) research and describe the historical development of the atomic theory;

(C) identify constituents of various materials or objects such as metal salts, light sources, fireworks displays, and stars using spectral-analysis techniques;

(D) relate the chemical behavior of an element including bonding, to its placement on the periodic table; and

(E) classify samples of matter from everyday life as being elements, compounds, or mixtures.

(8) Science concepts. The student knows that changes in matter affect everyday life. The student is expected to:

- (A) distinguish between physical and chemical changes in matter such as oxidation, digestion, changes in states, and stages in the rock cycle;
- (B) analyze energy changes that accompany chemical reactions such as those occurring in heat packs, cold packs, and glow sticks to classify them as endergonic or exergonic reactions;
- (C) investigate and identify the law of conservation of mass;
- (D) describe types of nuclear reactions such as fission and fusion and their roles in applications such as medicine and energy production; and
- (E) research and describe the environmental and economic impact of the end-products of chemical reactions.

(9) Science concepts. The student knows how solution chemistry is a part of everyday life. The student is expected to:

- (A) relate the structure of water to its function as the universal solvent;
- (B) relate the concentration of ions in a solution to physical and chemical properties such as pH, electrolytic behavior, and reactivity;
- (C) simulate the effects of acid rain on soil, buildings, statues, or microorganisms;
- (D) demonstrate how various factors influence solubility including temperature, pressure, and nature of the solute and solvent; and
- (E) demonstrate how factors such as particle size, influence the rate of dissolving.

Source: The provisions of this §112.42 adopted to be effective September 1, 1998, 22 TexReg 7647.