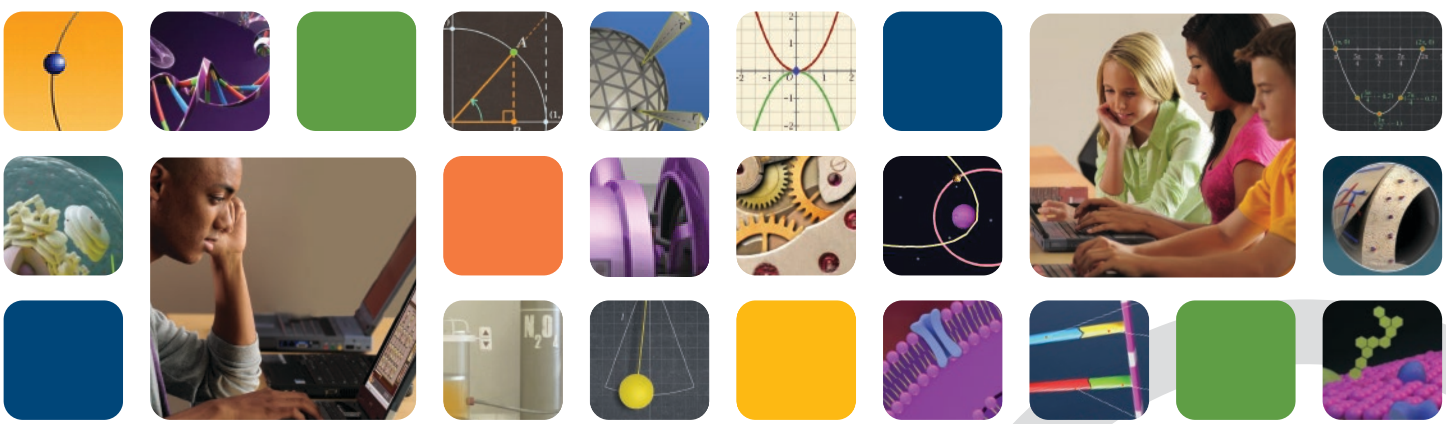
adaptive curriculum™

# ac / TEKS Alignment

Dynamic, Interactive Learning



## Readiness and Supporting Standards

### Readiness Standards

These standards are considered essential for success in the current grade or course. They support college and career readiness as well as address broad, deep ideas with in-depth instruction.

### Supporting Standards

These standards play a role in preparing students for the next grade though not a central role. They address more narrowly defined ideas and may be emphasized in a subsequent or previous year.

## AC Science Activity Objects consist of five different types:

### 1. Concept Development

These activities introduce concepts through engaging, real-world scenarios and develop these concepts using an inquiry-based approach.

### 2. Experiment

These activities engage learners in a virtual lab environment to develop inquiry skills.

### 3. Skills Application

These activities help learners apply rules and procedures to strengthen computational skills.

### 4. Problem Solving

These activities engage learners with a guided problem-solving process to apply and enhance their science understanding.

### 5. Dynamic Modeling

These activities provide learners the opportunity to manipulate variables and observe dynamic changes with interactive 3D objects.

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# ac / TEKS Physics Alignment

## High School Physics - Introduction

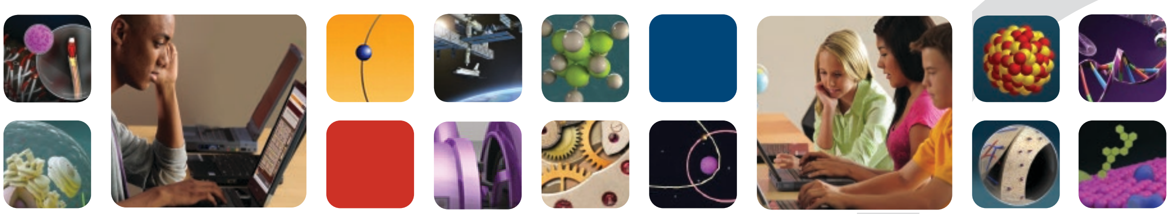
(1) Physics. In Physics, students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students study a variety of topics that include: laws of motion; changes within physical systems and conservation of energy and momentum; forces; thermodynamics; characteristics and behavior of waves; and atomic, nuclear, and quantum physics. Students who successfully complete Physics will acquire factual knowledge within a conceptual framework, practice experimental design and interpretation, work collaboratively with colleagues, and develop critical thinking skills.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

(3) Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation can be experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.

(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods and ethical and social decisions that involve the application of scientific information.

(5) Scientific systems. A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.



# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 1.A | (1) Scientific processes. The student conducts investigations, for at least 40% of instructional time, using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to: | (A) demonstrate safe practices during laboratory and field investigations; and | Laboratory Safety | ● | |
| 1.B | (1) Scientific processes. The student conducts investigations, for at least 40% of instructional time, using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to: | (B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials. | Laboratory Safety | ● | |
| 2.A | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section; | What is Science? | | ● |
| 2.B | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories; | Scientific Hypotheses and Theories | | ● |
| | | | What is Science? | | ● |

Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 2.C | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed; | Scientific Hypotheses and Theories | | ● |
| | | | Newton's Law of Universal Gravitation | ● | |
| | | | What is Science? | | ● |
| | | | Particle Nature of Light | | ● |
| 2.D | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (D) distinguish between scientific hypotheses and scientific theories; | Scientific Hypotheses and Theories | | ● |
| 2.E | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (E) design and implement investigative procedures, including making observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness; | Free Fall | ● | |
| | | | Period of a Pendulum | ● | |
| | | | Newton's Law of Universal Gravitation | ● | |
| | | | Projectiles Launched Horizontally | ● | |
| | | | Projectiles Launched Vertically | ● | |
| | | | Photoelectric Effect | ● | |
| | | | Motion of Charged Particles In an Electric Field | ● | |
| | | | Designing an Electric Motor | ● | |
| | | | Newton's Second Law of Motion | ● | |

Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 2.F | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (F) demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), triple beam balances, batteries, clamps, dynamics demonstration equipment, collision apparatus, data acquisition probes, discharge tubes with power supply (H, He, Ne, Ar), hand-held visual spectroscopes, hot plates, slotted and hooked lab masses, bar magnets, horseshoe magnets, plane mirrors, convex lenses, pendulum support, power supply, ring clamps, ring stands, stopwatches, trajectory apparatus, tuning forks, carbon paper, graph paper, magnetic compasses, polarized film, prisms, protractors, resistors, friction blocks, mini lamps (bulbs) and sockets, electrostatics kits, 90-degree rod clamps, metric rulers, spring scales, knife blade switches, Celsius thermometers, meter sticks, scientific calculators, graphing technology, computers, cathode ray tubes with horseshoe magnets, ballistic carts or equivalent, resonance tubes, spools of nylon thread or string, containers of iron filings, rolls of white craft paper, copper wire, Periodic Table, electromagnetic spectrum charts, slinky springs, wave motion ropes, and laser pointers | Flying Using Vector Addition | ● | |
| | | | Balanced and Unbalanced Forces | ● | |
| | | | Coulomb's Law | ● | |
| | | | Historical Development of the Weak and Strong Nuclear Forces | | ● |
| | | | Basic Acceptances of the Special Theory of Relativity | | ● |
| | | | Atomic Model History: From Ancient Greece to Thomson | ● | |
| | | | Electromagnetic Spectrum | ● | |
| | | | Beam Types in Electromagnetic Spectrum | | ● |
| | | | Friction | ● | |
| | | | Buoyancy and Archimedes' Principle | ● | |
| | | | Exploring Friction | ● | |
| | | | Springs Stretch with Force: Hooke's Law | ● | |
| | | | Lab Equipment: Mechanics | | ● |
| | | | Relative Motion | ● | |
| | | | Period of a Pendulum | ● | |
| | | | Projectile Motion | ● | |
| | | | Newton's Law of Universal Gravitation | ● | |
| | | | Reflection of Light from Plane Mirrors | ● | |
| | | | Light Reflection Puzzle | ● | |
| | | | Refraction of Light | ● | |
| | | | Image Formation on Plane Mirror | | ● |
| | | | The Wave Nature of Light | | ● |
| | | | Solving Problems with Newton's Second Law | ● | |
| | | | SI Units and Dimensional Analysis | ● | |
| | | | Projectiles Launched Vertically | ● | |
| | | | Projectiles Launched Horizontally | ● | |
| | | | Concept of Inertia | ● | |
| | | | Graphs of Projectile Motion | ● | |
| | | | Lab Equipment: Electrics | | ● |
| | | | Using Electrostatic Kits | | ● |
| | | | Application of Ohm's Law on Closed Circuits | ● | |
| | | | Building Circuits: Light Bulbs in Series | ● | |

Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 2.F cont. | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (F) demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), triple beam balances, batteries, clamps, dynamics demonstration equipment, collision apparatus, data acquisition probes, discharge tubes with power supply (H, He, Ne, Ar), hand-held visual spectroscopes, hot plates, slotted and hooked lab masses, bar magnets, horseshoe magnets, plane mirrors, convex lenses, pendulum support, power supply, ring clamps, ring stands, stopwatches, trajectory apparatus, tuning forks, carbon paper, graph paper, magnetic compasses, polarized film, prisms, protractors, resistors, friction blocks, mini lamps (bulbs) and sockets, electrostatics kits, 90-degree rod clamps, metric rulers, spring scales, knife blade switches, Celsius thermometers, meter sticks, scientific calculators, graphing technology, computers, cathode ray tubes with horseshoe magnets, ballistic carts or equivalent, resonance tubes, spools of nylon thread or string, containers of iron filings, rolls of white craft paper, copper wire, Periodic Table, electromagnetic spectrum charts, slinky springs, wave motion ropes, and laser pointers | Building Circuits: Light Bulbs in Parallel | ● | |
| | | | Designing an Electric Motor | ● | |
| | | | Electric Motor | ● | |
| | | | Photoelectricity and the Particle Nature of Light | | ● |
| | | | Frequency, Wavelength, and Energy | | ● |
| | | | Specific Heat | ● | |
| | | | Separation Methods: Density Differences | ● | |
| | | | Graphing Calculators | | ● |
| | | | Conservation of Mechanical Energy | ● | |
| | | | Conservation of Momentum in One Dimension | ● | |
| | | | Kinetic Energy: How It Changes with Mass and Speed | ● | |
| | | | Gravitational Potential Energy: Seeing the Impact in the Sand | ● | |
| | | | Magnetic Field of a Current-Carrying Infinity Wire | ● | |
| | | | Magnetic Force on a Current-Carrying Wire | ● | |
| | | | Induced Current | | ● |
| | | | Properties of d-Block Elements | | ● |
| | | | Separation of Mixtures | ● | |
| | | | Motion Under Constant Acceleration | ● | |
| | | | Uniform Linear Motion | ● | |
| | | | Newton's Second Law of Motion | ● | |
| | | | Velocity-Time Graph of One Dimensional Motion and Displacement | | ● |
| | | | Uniform Circular Motion | | ● |
| | | | Impulse | | ● |
| | | | Lab Equipment: Waves | | ● |
| | | | Refraction of Water Waves | ● | |
| | | | Lab Equipment: Optics | | ● |
| | | | Refraction of Light and Snell's Law | ● | |
| | | | Image Formation on Concave Mirrors | ● | |
| | | | Image Formation on Convex Lenses | ● | |
| | | | Physical Properties of Substances | ● | |
| | | | Atomic Radius in the Periodic Table | ● | |

Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 2.F cont. | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (F) demonstrate the use of course apparatus, equipment, techniques, and procedures, including multimeters (current, voltage, resistance), triple beam balances, batteries, clamps, dynamics demonstration equipment, collision apparatus, data acquisition probes, discharge tubes with power supply (H, He, Ne, Ar), hand-held visual spectroscopes, hot plates, slotted and hooked lab masses, bar magnets, horseshoe magnets, plane mirrors, convex lenses, pendulum support, power supply, ring clamps, ring stands, stopwatches, trajectory apparatus, tuning forks, carbon paper, graph paper, magnetic compasses, polarized film, prisms, protractors, resistors, friction blocks, mini lamps (bulbs) and sockets, electrostatics kits, 90-degree rod clamps, metric rulers, spring scales, knife blade switches, Celsius thermometers, meter sticks, scientific calculators, graphing technology, computers, cathode ray tubes with horseshoe magnets, ballistic carts or equivalent, resonance tubes, spools of nylon thread or string, containers of iron filings, rolls of white craft paper, copper wire, Periodic Table, electromagnetic spectrum charts, slinky springs, wave motion ropes, and laser pointers | Electronegativity on the Periodic Table | ● | |
| | | | Ionization Energy on the Periodic Table | ● | |
| | | | History of the Periodic Table | | ● |
| | | | Trends in Metallic and Nonmetallic Properties in the Periodic Table | | ● |
| | | | Investigating Photosynthesis with Van Helmont | ● | |

Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 2.G | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (G) use a wide variety of additional course apparatus, equipment, techniques, materials, and procedures as appropriate such as ripple tank with wave generator, wave motion rope, micrometer, caliper, radiation monitor, computer, ballistic pendulum, electroscope, inclined plane, optics bench, optics kit, pulley with table clamp, resonance tube, ring stand screen, four inch ring, stroboscope, graduated cylinders, and ticker timer | Newton's Law of Universal Gravitation | ● | |
| | | | Designing an Electric Motor | ● | |
| | | | Solar Energy: Design a Solar Car | ● | |
| | | | Superposition: Crossing Pulses | ● | |
| | | | Flying Using Vector Addition | ● | |
| | | | Instantaneous Velocity and Acceleration | | ● |
| | | | Exercise on Wave Properties | ● | |
| | | | Solving Problems with Newton's Second Law | ● | |
| | | | Scientific Notation and Significant Figures | | ● |
| | | | Reflection of Light from Plane Mirrors | ● | |
| | | | Concept of Inertia | ● | |
| | | | Coulomb's Law | ● | |
| | | | Refraction of Water Waves | ● | |
| | | | Image Formation on Concave Mirrors | ● | |
| | | | Image Formation on Convex Lenses | ● | |
| 2.H | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (H) make measurements with accuracy and precision and record data using scientific notation and International System (SI) units; | Flying Using Vector Addition | ● | |
| | | | Relative Motion | ● | |
| | | | Newton's Law of Universal Gravitation | ● | |
| | | | Experimental Error | | ● |
| | | | Solving Problems with Newton's Second Law | ● | |
| | | | Metric System and Dimensional Analysis | ● | |
| | | | SI Units and Dimensional Analysis | ● | |
| | | | Concept of Inertia | ● | |
| | | | Lab Equipment: Electrics | | ● |
| | | | Applications of Ohm's Law on Closed Circuits | ● | |
| | | | Building Circuits: Light Bulbs in Series | ● | |
| | | | Designing an Electric Motor | ● | |
| | | | Electric Motor | ● | |
| | | | Conservation of Mechanical Energy | ● | |
| | | | Accuracy and Precision | | ● |
| | | | Scientific Notation and Significant Figures | | ● |
| | | | Motion Under Constant Acceleration | ● | |



Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 2.H cont. | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (H) make measurements with accuracy and precision and record data using scientific notation and International System (SI) units; | Newton's Second Law of Motion | ● | |
| | | | Lab Equipment: Waves | | ● |
| | | | Coulomb's Law | ● | |
| 2.I | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (I) identify and quantify causes and effects of uncertainties in measured data; | Experimental Error | | ● |
| | | | Accuracy and Precision | | ● |
| 2.J | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (J) organize and evaluate data and make inferences from data, including the use of tables, charts, and graphs; | Heating Curves | ● | |
| | | | Physical Properties | ● | |
| | | | Period of a Pendulum | ● | |
| | | | Newton's Law of Universal Gravitation | ● | |
| | | | Motion Under Constant Acceleration | ● | |
| | | | Conservation of Mechanical Energy | ● | |
| 2.K | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (K) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports. | Scientific Hypotheses and Theories | | ● |
| | | | Period of a Pendulum | ● | |
| | | | Free Fall | ● | |
| 2.L | (2) Scientific processes. The student uses a systematic approach to answer scientific laboratory and field investigative questions. The student is expected to: | (L) Express and manipulate relationships among physical variables quantitatively, including the use of graphs, charts, and equations. | Period of a Pendulum | ● | |
| | | | Newton's Second Law of Motion | ● | |
| | | | Conservation of Mechanical Energy | ● | |
| | | | Motion with Constant Acceleration | ● | |
| | | | Solving Problems with Newton's Second Law | ● | |
| | | | Newton's Law of Universal Gravitation | ● | |
| | | | Magnetic Force on Current-Carrying Wire | ● | |
| | | | Conservation of Momentum in One Dimension | ● | |
| | | | Metric System and Dimensional Analysis | ● | |
| | | | SI Units and Dimensional Analysis | ● | |

Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 3.A | (3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: | (A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student; | Newton's Second Law of Motion | ● | |
| | | | Newton's Law of Universal Gravitation | ● | |
| | | | Application of Ohm's Law on Closed Circuits | ● | |
| | | | Concept of Inertia | ● | |
| | | | Photoelectric Effect | ● | |
| | | | Bohr's Atomic Model | | ● |
| | | | Particle Nature of Light | | ● |
| | | | History of the Atomic Model: From Rutherford to Bohr | ● | |
| | | | Flying Using Vector Addition | ● | |
| | | | Coulomb's Law | ● | |
| | | | Relative Motion | ● | |
| | | | Solving Problems with Newton's Second Law | ● | |
| | | | Designing an Electric Motor | ● | |
| | | | Electric Motor | ● | |
| | | | Conservation of Mechanical Energy | ● | |
| | | | Motion Under Constant Acceleration | ● | |
| 3.B | (3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: | (B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials; | Applying and Communicating Scientific Information | | ● |
| 3.C | (3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: | (C) draw inferences based on data related to promotional materials for products and services; | Evaluating Products and Services | | ● |
| | | | Photoelectric Effect | ● | |
| 3.D | (3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: | (D) explain the impacts of the scientific contributions of a variety of historical and contemporary scientists on scientific thought and society | The Impact of Scientific Advances on Science and Society | | ● |

Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 3.E | (3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: | (E) research and describe the connections between physics and future careers; and | Physics and Future Carriers | | ● |
| 3.F | (3) Scientific processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: | (F) express and interpret relationships symbolically in accordance with accepted theories to make predictions and solve<br><br>problems mathematically, including problems requiring proportional reasoning and graphical vector addition. | Newton's Law of Universal Gravitation | ● | |
| | | | Solving Problems with Newton's Second Law | ● | |
| | | | Coulomb's Law | ● | |
| | | | Flying Using Vector Addition | ● | |
| | | | Combining Parallel and Perpendicular Forces | ● | |
| | | | Combining Non-Perpendicular Forces | ● | |
| | | | Balanced and Unbalanced Forces | ● | |
| | | | Image Formation on Concave Mirrors | ● | |
| 4.A | (4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to: | (A) generate and interpret graphs and charts describing different types of motion, including the use of real-time technology such as motion detectors or photogates; | Motion Under Constant Acceleration | ● | |
| | | | Graphs of Projectile Motion | ● | |
| | | | Position-Time Graph of Uniform One Dimensional Motion | | ● |
| | | | Conservation of Mechanical Energy | ● | |
| 4.B | (4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to: | (B) describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, average velocity, instantaneous velocity, and acceleration | Position, Displacement , and Average Velocity | | ● |
| | | | Velocity-Time Graphs of One-Dimensional Motion and Displacement | | ● |
| | | | Uniform Linear Motion | ● | |
| | | | Instantaneous Velocity and Acceleration | | ● |
| | | | Motion Under Constant Acceleration | ● | |
| | | | Projectiles Launched Vertically | ● | |
| | | | Graphs of Projectile Motion | ● | |
| | | | Graphs of Accelerated Motion: Projectiles Launched Vertically | ● | |
| 4.C | (4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to: | (C) analyze and describe accelerated motion in two dimensions using equations, including projectile and circular examples; | Graphs of Projectile Motion | ▼ | |
| | | | Uniform Circular Motion II | | ▼ |





Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 4.D | (4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to: | (D) calculate the effect of forces on objects, including the law of inertia, the relationship between force and acceleration, and the nature of force pairs between objects; | Friction | ● | |
| | | | Newton's Second Law of Motion | ● | |
| | | | Concept of Inertia | ● | |
| | | | Solving Problems with Newton's Second Law | ● | |
| | | | Calculation of Coulomb's Law | | ● |
| | | | Newton's Third Law of Motion: The Physics of Rockets | ● | |
| | | | Newton's Third Law of Motion | ● | |
| 4.E | (4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to: | (E) develop and interpret free-body force diagrams; and | Identifying Forces | ▼ | |
| | | | Solving Problems with Newton's Second Law | ▼ | |
| 4.F | (4) Science concepts. The student knows and applies the laws governing motion in a variety of situations. The student is expected to: | (F) identify and describe motion relative to different frames of reference. | Relative Motion | ▼ | |
| | | | Flying Using Vector Addition | ▼ | |
| | | | Analyzing Motion in a Medium | ▼ | |
| 5.A | (5) Science concepts. The student knows the nature of forces in the physical world. The student is expected to: | (A) research and describe the historical development of the concepts of gravitational, electromagnetic, weak nuclear, and strong nuclear forces; | Newton's Law of Universal Gravitation | ▼ | |
| | | | Historical Development of Electromagnetic Forces | | ▼ |
| | | | Historical Development of the Weak and Strong Nuclear Forces | | ▼ |
| | | | Basic Forces in Nature | | ▼ |
| 5.B | (5) Science concepts. The student knows the nature of forces in the physical world. The student is expected to: | (B) describe and calculate how the magnitude of the gravitational force between two objects depends on their masses and the distance between their centers; | Newton's Law of Universal Gravitation | ● | |
| 5.C | (5) Science concepts. The student knows the nature of forces in the physical world. The student is expected to: | (C) describe and calculate how the magnitude of the electrical force between two objects depends on their charges and the distance between them; | Forces Between Charges: Coulomb's Law | | ▼ |
| | | | Calculation of Coulomb's Law | | ▼ |
| | | | Coulomb's Law | ▼ | |

Readiness Standard ●
Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 5.D | (5) Science concepts. The student knows the nature of forces in the physical world. The student is expected to: | (D) identify examples of electric and magnetic forces in everyday life; | Magnetic Field of a Current-Carrying Infinity Wire | ▼ | |
| | | | Designing an Electric Motor | ▼ | |
| | | | Magnetic Force on a Current-Carrying Wire | ▼ | |
| 5.E | (5) Science concepts. The student knows the nature of forces in the physical world. The student is expected to: | (E) characterize materials as conductors or insulators based on their electrical properties; | Conductivity and Insulation | | ▼ |
| | | | The Purpose of the Utilization of Conduction and Insulation | | ▼ |
| | | | Lab Equipment: Electrics | | ▼ |
| 5.F | (5) Science concepts. The student knows the nature of forces in the physical world. The student is expected to: | (F) design, construct, and calculate in terms of current through, potential difference across, resistance of, and power used by electric circuit elements connected in both series and parallel combinations; | Building Circuits: Light Bulbs in Series | ● | |
| | | | Building Circuits: Light Bulbs in Parallel | ● | |
| | | | Applications of Ohm's Law on Closed Circuits | ● | |
| | | | Calculating Electric Power | | ● |
| | | | Electric Motor | ● | |
| 5.G | (5) Science concepts. The student knows the nature of forces in the physical world. The student is expected to: | (G) investigate and describe the relationship between electric and magnetic fields in applications such as generators, motors, and transformers; and | Magnetic Force on a Current-Carrying Wire | ▼ | |
| | | | Magnetic Field of a Current-Carrying Infinite Wire | ▼ | |
| | | | Production of Electromagnetic Waves | | ▼ |
| | | | Transformers | | ▼ |
| | | | Designing an Electric Motor | ▼ | |
| | | | Electric Motor | ▼ | |
| | | | Induced Current | | ▼ |
| | | | Capacitors | | ▼ |
| | | | Electric Field | ▼ | |
| | | | Motion of Charged Particles in an Electric Field | ▼ | |
| 5.H | (5) Science concepts. The student knows the nature of forces in the physical world. The student is expected to: | (H) describe evidence for and effects of the strong and weak nuclear forces in nature. | Basic Forces in Nature | | ▼ |
| | | | Historical Development of the Weak and Strong Nuclear Forces | | ▼ |

Readiness Standard ●

Supporting Standard ▼

# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 6.A | (6) Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum. The student is expected to: | (A) investigate and calculate quantities using the work-energy theorem in various situations; | Work | ● | |
| | | | Work-Energy Theorem | ● | |
| 6.B | (6) Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum. The student is expected to: | (B) investigate examples of kinetic and potential energy and their transformations; | Kinetic Energy: How It Changes with Mass and Speed | ● | |
| | | | Gravitational Potential Energy: Seeing the Impact in the Sand | ● | |
| | | | Elastic Potential Energy | | ● |
| | | | Electrical Potential Energy | ● | |
| | | | Conservation of Mechanical Energy | ● | |
| | | | Roller Coaster Design: Gravitational Potential and Kinetic Energy | ● | |
| | | | Why Does Kinetic Energy Change? | | ● |
| 6.C | (6) Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum. The student is expected to: | (C) calculate the mechanical energy of, power generated within, impulse applied to, and momentum of a physical system; | Conservation of Mechanical Energy | ● | |
| | | | Power | | ● |
| | | | Calculating Power | | ● |
| | | | Impulse | | ● |
| | | | Conservation of Momentum in One Dimension | ● | |
| 6.D | (6) Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum. The student is expected to: | (D) demonstrate and apply the laws of conservation of energy and conservation of momentum in one dimension; | Conservation of Mechanical Energy | ● | |
| | | | Conservation of Momentum in One Dimension | ● | |
| | | | Law of Conservation of Energy | | ● |
| 6.E | (6) Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum. The student is expected to: | (E) describe how the macroscopic properties of a thermodynamic system such as temperature, specific heat, and pressure are related to the molecular level of matter, including kinetic or potential energy of atoms; | Thermal and Kinetic Energy | | ▼ |
| | | | Macroscopic Properties of Thermodynamic Systems | | ▼ |
| | | | Temperature Measurements | | ▼ |

Readiness Standard ●

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# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 6.F | (6) Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum. The student is expected to: | (F) contrast and give examples of different processes of thermal energy transfer, including conduction, convection, and radiation; and | Conduction, Convection, and Radiation | | ▼ |
| | | | Radiation | | ▼ |
| 7.A | (7) Science concepts. The student knows the characteristics and behavior of waves. The student is expected to: | (A) examine and describe oscillatory motion and wave propagation in various types of media; | Properties of Waves | ▼ | |
| | | | Transverse and Longitudinal Waves | | ▼ |
| | | | Effect of the Medium on the Speed of Wave | | ▼ |
| | | | Refraction of Water Waves | ▼ | |
| 7.B | (7) Science concepts. The student knows the characteristics and behavior of waves. The student is expected to: | (B) investigate and analyze characteristics of waves, including velocity, frequency, amplitude, and wavelength, and calculate using the relationship between wavespeed, frequency, and wavelength; | Properties of Waves | ● | |
| | | | Exercise on Wave Properties | ● | |
| 7.C | (7) Science concepts. The student knows the characteristics and behavior of waves. The student is expected to: | (C) compare characteristics and behaviors of transverse waves, including electromagnetic waves and the electromagnetic spectrum, and characteristics and behaviors of longitudinal waves, including sound waves; | Transverse and Longitudinal Waves | | ▼ |
| | | | Electromagnetic and Mechanical Waves | | ▼ |
| | | | Wave Properties of Electromagnetic Radiation | | ▼ |
| 7.D | (7) Science concepts. The student knows the characteristics and behavior of waves. The student is expected to: | (D) investigate behaviors of waves, including reflection, refraction, diffraction, interference, resonance, and the Doppler effect; | Reflection of Light from Plane Mirrors | ● | |
| | | | Listing Reflection Laws | | ● |
| | | | Light Reflection Puzzle | ● | |
| | | | Diffraction of Water Waves | | ● |
| | | | Reflection of Water Waves from Different Obstacles | | ● |
| | | | Refraction of Light and Snell's Law | ● | |
| | | | Interference of Water Waves | ● | |
| | | | Superposition: Crossing Pulses | ● | |
| | | | Light Interference | | ● |
| | | | Resonance | | ● |
| | | | Doppler Effect | | ● |

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# HIGH SCHOOL PHYSICS
## Texas Knowledge and Skills (TEKS)

| State ID | TEKS | Student Expectation | Content | Activity Object | Animation |
|---|---|---|---|---|---|
| 7.E | (7) Science concepts. The student knows the characteristics and behavior of waves. The student is expected to: | (E) describe and predict image formation as a consequence of reflection from a plane mirror and refraction through a thin convex lens; and | Reflection of Light from Plane Mirror | ▼ | |
| | | | Image Formation on Plane Mirror | | ▼ |
| | | | Defect in Sensory Organs and Technology | | ▼ |
| | | | Lab Equipment: Optics | | ▼ |
| | | | Light Reflection Puzzles | ▼ | |
| | | | Image Formation on Convex Lenses | ▼ | |
| | | | Image Formation on Concave Mirrors | ▼ | |
| | | | Image Formation on Convex Mirrors | ▼ | |
| | | | Image Formation on Concave Lenses | ▼ | |
| 7.F | (7) Science concepts. The student knows the characteristics and behavior of waves. The student is expected to: | (F) describe the role of wave characteristics and behaviors in medical and industrial applications. | Applications of the Reflection of Sound | | ▼ |
| | | | | | |
| 8.A | (8) Science concepts. The student knows simple examples of atomic, nuclear, and quantum phenomena. The student is expected to: | (A) describe the photoelectric effect and the dual nature of light; | Photoelectric Effect | ● | |
| | | | Particle Nature of Light | | ● |
| | | | Wave Nature of Subatomic Particles | | ● |
| | | | Optical Events Explained by the Wave Model | | ● |
| 8.B | (8) Science concepts. The student knows simple examples of atomic, nuclear, and quantum phenomena. The student is expected to: | (B) compare and explain the emission spectra produced by various atoms; | Experiments Showing the Wave Nature of Subatomic Particles | | ▼ |
| | | | Radiation and Absorption Spectra of a Hydrogen Atom | | ▼ |
| | | | Black-Body Radiation and Light Quantas | | ▼ |
| | | | Bohr's Atomic Model | | ▼ |
| 8.C | (8) Science concepts. The student knows simple examples of atomic, nuclear, and quantum phenomena. The student is expected to: | (C) describe the significance of mass-energy equivalence and apply it in explanations of phenomena such as nuclear stability, fission, and fusion; and | Energy-Mass Relationship According to the Special Theory of Relativity | | ▼ |
| | | | Can an Object Accelerate Infinitely? | | ▼ |
| | | | Basic Acceptances of the Special Theory of Relativity | | ▼ |
| | | | Nuclear Energy: Fission | ▼ | |
| 8.D | (8) Science concepts. The student knows simple examples of atomic, nuclear, and quantum phenomena. The student is expected to: | (D) give examples of applications of atomic and nuclear phenomena such as radiation therapy, diagnostic imaging, and nuclear power and examples of applications of quantum phenomena such as digital cameras. | Examples of Atomic and Nuclear Phenomena | | ▼ |
| | | | Nuclear Energy: Fission | ▼ | |
| | | | Cancer Treatment | ▼ | |
| | | | Examples of Quantum Phenomena | | ▼ |
| | | | Photoelectric Effect | ▼ | |

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