SCIENCE CURRICULUM FRAMEWORK

PHYSICS

2004-2005

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Brownsville Independent School District
MISSION STATEMENT

The mission of the Brownsville Independent School District, an international community respected for its rich cultural heritage is to produce responsible, well-rounded graduates

who

- have the ability to pursue a post-secondary education and/or career
- possess a capability for independent learning and thinking with a competitive edge in a multi-cultural, multi-lingual world

by

- identifying and maximizing physical, financial, and human resources and
- unifying community and school commitment to excellence in education and equal educational opportunity.

Brownsville Independent School District
BELIEF STATEMENT

- Excellence is our common goal.
- Parental responsibility is an integral factor in student success.
- Belief in self is fundamental to success.
- Everyone deserves respect as a human being.
- Perseverance and hard work are essential for success.
- Change creates opportunities for growth.
- Truthfulness is important for effective communication.
- Public schools are an extension of the community.
- Sensitivity is essential for understanding the needs of others.
- Great achievements follow high expectations.
- Cooperation is necessary to get things done.
- Active listening is essential for effective communication.
- Successful students are active participants in the learning process.

Acknowledgment

The Brownsville Independent School District gratefully acknowledges the contributions given by the Science teachers who participated in the development of this secondary Science curriculum framework. Science teachers from the following campuses assisted in the development of the framework:

- Hanna High School
- Lopez High School
- Pace High School
- Porter High School
- Rivera High School
- Lincoln Park School
- BUSP Secondary Science Mentors
- Secondary Science Curriculum Specialist

Introduction

Texas Legislation requires that all Texas school districts develop, implement, and evaluate a comprehensive educational program aimed at student mastery of the Texas Essential Knowledge and Skills as defined in Chapter 112.

The purpose of this Secondary Science Curriculum Framework is to match learning experiences to the Texas Essential Knowledge and Skills and provide a sequence of objectives and lab activities that are also aligned, including the 40% lab requirement for all High School Science courses. Brownsville ISD also requires the 40% lab minimum curriculum requirement for all Middle School Science courses.

In addition, this document includes sample activities and **required "EXEMPLAR" labs** to be taught in each course. EXEMPLAR labs are not intended to be the only labs taught in each course, but are provided to ensure consistency in high-quality instruction throughout the district. They should further serve to avoid overemphasis in one area while neglecting another, and thus, focus on student needs.

Pre-AP accommodations are indicated throughout the document, either as additional TEKS added to the course to meet the needs of the Pre-AP course sequence, or emphasized TEKS that need to be taught with added depth to the Pre-AP student in order to prepare them for the AP or Dual Enrollment course. Adaptations for other special populations will be made as needed, but the basic curriculum is the same for all students.

The **textbook** provided by the state **is a resource** for teaching the course, **not the curriculum**. Although the textbook "covers" all TEKS for the course, it does not necessarily provide instructional support for teaching the TEKS to the level of depth necessary to fulfill the TEKS intention. Therefore, it is highly recommended that teachers use a variety of additional resources from multiple sources in order to meet the TEKS requirements. Some of these resources may include, but are not limited to required Exemplar Labs, FOSS kits (which should be taught in their entirety as a unit), TEXTEAMS activities, Calculator Based Labs, Snapshot Activities and Vistas provided through the Charles A. Dana Center Science Toolkit.

This curriculum framework is primarily a working document that prescribes what is to be taught in a given subject or area of study. It gives both structure and direction to the educational program. As a formal document, it is an official statement of the curriculum and a teacher's guide to instruction.

Student Participation in TEKS-Based Inquiry and the BISD Science Fairs

Research, inquiry and invention are essential skills successful students must develop as they grow academically. Students must be able to discuss and evaluate social, technological and scientific issues evident today and trends influencing the future. A challenge for educators is to exploit the natural curiosity all students possess. Allowing time, opportunity and support during school hours for student-based inquiry permits learners to expose their misconceptions and pursue the "why" questions they have. Students should plan investigations and conduct research that can help them test their ideas, interpret differing points of view and justify consequent discoveries. Students are much more likely to internalize and remember concepts learned if they are actively involved with them, rather than passively observing them take place.

TEKS-based investigations enable students to effectively learn and use content-area concepts and skills. Through these types of direct investigations students are able to "maximize their ability to make sense of the world and to learn more about it." (*Science for All Americans)* Therefore, it is a **BISD requirement that all students participate in a research-based inquiry project at the sixth, eighth, and ninth grades**. Participation at other grades or courses is highly recommended. When students are engaged in research-based inquiry, they are involved in using a rich variety of primary and secondary source materials and the Science Process Skills as required by law in the Science TEKS.

A successful classroom science investigation **may be** developed into a research-based inquiry project and **entered in the Science Fair**. Students who choose to enter the fair will be able to create investigations from among fifteen different categories. The Science Fair will be held annually in the fall, allowing teachers and students to prepare for one science competition per year following the rules of the Intel International Science and Engineering Fair, (www.sciserv.org/isef). Individual campuses, teachers and students will be able to choose which projects to enter in the Science Fair, but **all students will have the opportunity to complete an original investigation, whether they are enrolled in a fall or spring science course**.

SECONDARY SCIENCE PHYSICS
SCOPE AND SEQUENCE

Six-Week Unit Themes	Unit Exemplar Labs	Content	Concepts TEKS	Processes TEKS
1st Six Weeks Chapters: 1-3	Mechanics/Kinematics "The Domino Effect" "Marble Lab" CPO Linear Motion Labs CBL/CBR Motion Labs	About Science, Linear uniform motion, Linear accelerated motion, Projectile motion	4A, 4B	1A, 1B, 2A, 2B, 2C, 2D, 2E, 3A, 3B, 3C, 3D, 3E
2nd Six Weeks Chapters: 4-7,& 9	Mechanics/Dynamics "Getting Pushy" Lab Prob Force censors	Newton's Laws, Momentum, Circular motion	4A, 4B, 4C, 4D, 4E	1A, 1B, 2A, 2C, 2D, 2E, 2F, 3B, 3C, 3D, 3E
3rd Six Weeks Chapters: 8, 10,12, 13, 17, 18, 19, 20, 21, 22, 23, and 24	Energy Conservation, Properties of Matter , Heat "Conserving Energy" "Hock's Law-Mass on a Spring" "Density Labs" "Newton's law of cooling"	Energy, Energy Conservation, Universal Gravitation, Satellite Motion, **Properties of Matter** Atomic Nature of Matter, Solids, Liquids, Gases **Heat** Temperature, Heat, Expansion, Heat Transfer, Change of Phase, Thermodynamics	4A, 4B, 4C, 5B, 5C, 5D, 6A, 6B 7A, 7B, 8C	1A, 1B, 2A, 2B, 2C, 2D, 2E, 3A, 3B, 3C, 3D, 3E 2F3B, 3C, 3D, 3E 1A, 1B, 2A, 2B, 2C, 2D, 2E,2F, 3B, 3C, 3D, 3E
4th Six Weeks Chapters: 25-31	Vibration and Waves, Sound and Light "Tick-Toc" "Speed of Sound- Tuning fork Lab" "CPO Standing Wave Lab"	Vibrations and Waves, Reflection, Refraction, Diffraction, Interference, Sound, Light, Color, Optics	4A, 4B, 8A, 8B, 8C, 9B,	1A, 1B, 2A, 2C, 2D, 2E, 3B, 3C, 3D
5th Six Weeks Chapters: 32-37	Electricity and Magnetism "CPO Circuit Lab"	Electrostatics, Electrical fields, Electric current, Electric circuits, Magnetism, Electromagnetic Induction	4A, 5B, 6C, 6E, 6D, 6F,	1A, 1B, 2A, 2D, 3A, 3B, 3C, 3D
6th Six Weeks Chapters: 11, 15, 16, 38, 39, & 40.	Atomic and nuclear physics, Special Topics	Rotational mechanics, Atomic and Nuclear Physics, Special Relativity	4C, 4E, 5B, 5C, 5D, 8A, 8B, 8C	1A, 1B, 2A, 2B, 2D, 3A, 3B, 3C, 3D, 3F, 3E

*Required Lab as part of 40% TEKS Lab Requirement

Physics

Time Frame: 1st Six Weeks—*weeks 1-6* (page 1 of 3)

Unit Concepts:	Unit Theme:	Notes:
Laws Governing Motion: Graphing motion, Uniform and accelerated motion—linear, projectile, circular.	Constancy & Change	

TAKS Objective(s)	Concept and Process TEKS 4 A, B 1 - 3	Required Exemplar Labs, "The Domino Effect", "Marble Lab" and Suggested Instructional Activities Integrating Concepts & Processes	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1 5 5	**Scientific Processes:** **1 A, B** **2 A, B, C, D, E, F** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(4)** The student knows the laws governing motion. The student is expected to: (A) generate and interpret graphs describing motion including the use of real time technology; and (B) analyze examples of uniform and accelerated motion including linear, projectile, and circular.	**Activities:** **4A**. The student will be able to generate displacement-time graphs and interpret their data as to acceleration using stopwatches and CBRs. **4B.** The student will discuss and understand the various components of linear, projectile and circular motion by construction objects which demonstrate these motions and calculating various components of their motion. **Science Project: (optional)** • Choose a limited subject, ask a question; identify or originate/define a problem to study. • Review published materials related to problem or question. • Evaluate possible solutions and make hypothesis.	Prentice Hall Conceptual Physics textbook. Chapters: 1-3, 14 ISEF Science Fair: http://www.sciserve.org/isef/teachers/index.asp Snapshot Activities: 4A, 4B http://www.tenet.edu/teks/science/instruction/teksperts.html TEXTEAMS Physics Institute Activities. "Physics 2E" Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html

1st Six Weeks Unit continued on next page

Physics

Time Frame: 1st Six Weeks—*weeks 1-6* (page 2 of 3)

T A K S Objective(s)	**Concept and Process TEKS 4 A, B 1 - 3**	**Required Exemplar Labs,** "The Domino Effect", "Marble Lab" **and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
		Exemplar Labs: "The Domino Effect"—investigate the ways distance, time and average speed are interrelated, and to become familiar with graphing techniques. "Marble Lab"—discover how fast a rolling marble moves in relation to time and calculate change in speed.	Vista: "Can You Find Kinna Matix?" http://www.tenet.edu/teks/science/instruction/vistas/index.html?hi "The Domino Effect": Prentice Hall Conceptual Physics Lab Manual. Lab 3, pages 5-8.

STUDENT PRODUCTS may include (but are not limited to): ● Models ● Projects ● Labs ● Research Papers ● Presentations

1st Six Weeks Unit continued on next page

Exemplar Labs located in Conceptual Physics Lab Manual.

Physics
Alignment and Correlations Charts

Time Frame: 1st Six Weeks (page 3 of 3)

TEKS/TAKS Correlations*

Physics TEKS	Prior Knowledge (IPC, Biology & Chemistry) TEKS	Exit level TAKS Correlation
Concepts: 4 a, b	IPC: 4 a, b	Objective 5
Processes: 1a, b 2 a, b, c, d, e, f 3 a, b, c, d, e	IPC: 1 a-b, 2 a-d, 3 a-e Biology: 1 a-b, 2 a-d, 3 a-f Chemistry: 1 a-b, 2 a-e, 3 a-e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

Pre-AP Course Curricular Requirements**

See Appendix for Pre-AP/AP Alignment Chart

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts: 4 a, b	Physical Science Standard B
Processes: 1 a, b 2 a, b, c, d, e, f 3 a 3 b 3 c, d, e	Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F Science as Inquiry Standard A Science and Technology Standard E Science as Inquiry Standard A History and Nature of Science Standard G Science as Inquiry Standard A Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Physics

Time Frame: 2nd Six Weeks—*weeks 7-12* (page 1 of 4)

Unit Concepts:	Unit Theme:	Notes:
Laws Governing Motion: Effects of forces on motion, Free-body diagram for force analysis, Motion relative to different frames of reference.	Constancy & Change	

TAKS Objective(s)	Concept and Process TEKS 4 C, D, E 1-3	Required Exemplar Labs, "Net Force Dynamics", "Getting Pushy" **and** Suggested Instructional Activities Integrating Concepts & Processes	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1 5	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E, F** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(4)** The student knows the laws governing motion. The student is expected to: (C) demonstrate the effects of force on the motion of objects; (D) develop and interpret a free-body diagram for force analyses; and	**4C.** The students will understand the effects of forces on objects at rest and in motion by applying forces to objects to see the results of unbalanced forces. **4E.** The students will use a regular 12" ruler and demonstrate its motion in 2 cases. Case 1: An applied force is given at the ruler's center of mass (COM) from a given initial height.	Prentice Hall Conceptual Physics textbook. Chapters: 4-6, 9-11, 15-20 ISEF Science Fair: http://www.sciserve.org/isef/teachers/index.asp Snapshot Activities: 4C, 4D, 4E http://www.tenet.edu/teks/science/instruction/teksperts.html TEXTEAMS Physics Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html

2nd Six Weeks Unit continued on next page

Physics

Time Frame: 2nd Six Weeks—*weeks 7-12* (page 2 of 4)

T A K S Objective(s)	**Concept and Process TEKS 4 C, D, E 1-3**	**Required Exemplar Labs,** "Net Force Dynamics", "Getting Pushy"**and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
5	(E) identify and describe motion relative to different frames of reference.	Case 2: An applied force is given at some other point besides the ruler's COM. Given the applied force and its time of duration the student should be able to solve the following: a) torque applied to the ruler; b) ruler's COM velocity; c) ruler's angular velocity; d) ruler's horizontal displacement; and e) ruler rotations before it hits the floor. (Note both cases could be modeled in the computer simulation software Interactive Physics) **Science Project:** (continued from 1st 6 weeks) • Create a plan for an experiment. • Complete ISEF Required paperwork; before beginning experimentation; consult with project sponsors. • Challenge and test hypothesis through experimentation (data collection) and analysis. • Evaluate the results of experiment and reach conclusions based on data.	Exemplar Labs provided by BISD Physics teachers. (*Located in Appendix.)*

2nd Six Weeks Unit continued on next page

Physics

Time Frame: 2nd Six Weeks—*weeks 7-12* (page 3 of 4)

T A K S Objective(s)	**Concept and Process TEKS 4 C, D, E 1-3**	**Required Exemplar Labs,** "Net Force Dynamics", "Getting Pushy", **and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
		Exemplar Labs: "Net Force Dynamics"—solve the coefficient of sliding friction (usl) and net acceleration (net) of a wooden block. "Getting Pushy"—investigate the relationship between mass, force and acceleration.	"Getting Pushy": Prentice Hall Conceptual Physics Lab Manual. Lab 11, pages 35-38.

STUDENT PRODUCTS may include (but are not limited to): ● Models ● Projects ● Labs ● Research Papers ● Presentations

2nd Six Weeks Unit continued on next page

Copies of exemplar Labs located in Appendix.

Physics
Alignment and Correlations Charts

Time Frame: 2nd Six Weeks (page 4 of 4)

TEKS/TAKS Correlations*

Physics TEKS	Prior Knowledge (IPC, Biology & Chemistry) TEKS	Exit level TAKS Correlation
Concepts: 4 c, d, e	IPC: 4 a, b	Objective 5
Processes: 1a, b 2 a, b, c, d, e, f 3 a, b, c, d, e	IPC: 1 a-b, 2 a-d, 3 a-e Biology: 1 a-b, 2 a-d, 3 a-f Chemistry: 1 a-b, 2 a-e, 3 a-e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

Pre-AP Course Curricular Requirements**

See Appendix for Pre-AP/AP Alignment Chart

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts: 4 c, d, e	Physical Science Standard B
Processes: 1 a, b 2 a, b, c, d, e, f 3 a 3 b 3 c, d, e	Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F Science as Inquiry Standard A Science and Technology Standard E Science as Inquiry Standard A History and Nature of Science Standard G Science as Inquiry Standard A Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Physics

Time Frame: 3rd Six Weeks—*weeks 13-18* (page 1 of 3)

Unit Concepts:	Unit Theme:	Notes:
Energy and Momentum Conservation.	Systems	

TAKS Objective(s)	Concept and Process TEKS 5 A, B, C, D 1 - 3	Required Exemplar Labs, "Conserving Your Energy", "Hooke's Law-Mass on a spring" , "Density Labs", "Newton's Law of Cooling"**and** Suggested Instructional Activities Integrating Concepts & Processes	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1 5	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E, F** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(5)** The student knows that changes occur within a physical system and recognizes that energy and momentum are conserved. The student is expected to: (A) interpret evidence for the work-energy theorem; (B) observe and describe examples of kinetic and potential energy and their transformations;	**5A.** The student will understand the relationship of work and energy in everyday life. **5B.** The students will understand and be able to discuss the relationships between kinetic and potential energy in a falling object. **5C.** The students will understand and be able to discuss the relationship between the mechanical energy and momentum of a moving object. **5D.** The student will be able to discuss the relationships between the results of two or more moving objects colliding on a frictionless surface and the conservation of momentum theory.	Prentice Hall Conceptual Physics textbook. Chapters: 7, 8, 11, 14, 16, 40. ISEF Science Fair: http://www.sciserve.org/isef/teachers/index.asp Snapshot Activities: 5A, 5B, 5C, 5D http://www.tenet.edu/teks/science/instruction/teksperts.html TEXTEAMS Physics Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html

3rd Six Weeks Unit continued on next page

Physics

Time Frame: 3rd Three Weeks—*weeks 7-12* (page 2 of 3)

T A K S Objective(s)	Concept and Process TEKS 5 A, B, C, D 1 - 3	Required Exemplar Labs, "Conserving Your Energy", "Hooke's Law-Mass on a spring" , "Density Labs", "Newton's Law of Cooling"**and** Suggested Instructional Activities Integrating Concepts & Processes	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
5	(C) calculate the mechanical energy and momentum in a physical system such as billiards, cars, and trains; and	**Science Project:** (continued) • Prepare report and exhibit. **Exemplar Labs:**	"Conserving Your Energy": Prentice Hall Conceptual Physics Lab Manual. Lab 24 , pages 79-82.
5	(D) demonstrate the conservation of energy and momentum.	"Conserving Your Energy"— measure the potential and kinetic energies of a pendulum to see if energy is conserved. "Hooke's Law-Mass on a spring" "Density Labs"	
5	**(6)** The student knows forces in nature. The student is expected to: (A) identify the influence of mass and distance on gravitational forces;	"Newton's Law of Cooling"	

STUDENT PRODUCTS may include (but are not limited to): ● Models ● Projects ● Labs ● Research Papers ● Presentations

3rd Three Weeks Unit continued on next page

Exemplar Labs located in Conceptual Physics Lab Manual.

Physics

Time Frame: 5th Three Weeks—*weeks 13-18* (page 1 of 4)

T A K S Objective(s)	**Concept and Process TEKS** **7 A, B** **8 A, B, C** **1 - 3**	**Required Exemplar Labs,** "Heat Mixes-Part I", "Stay Tuned", "Catch A Wave" **and** **Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E, F** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit.	**7A.** The student will be able to explain the laws of thermodynamics as it applies to melting ice, global warming, cooking food, and refrigeration. **7B.** The students will be able to discuss the different methods of heat energy transfer such as radiation, conduction, and convection and how they effect the molecules they influence in areas such as food preparation, home temperature regulation, and microwave oven cooking.	Prentice Hall Conceptual Physics textbook. Chapters: 21-24, 25-31, 38-39 Snapshot Activities: 7A, 7B, 8A, 8B, 8C http://www.tenet.edu/teks/science/instruction/teksperts.html TEXTEAMS Physics Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html
5 5	**(7)** The student knows the laws of thermodynamics. The student is expected to: (A) analyze and explain everyday examples that illustrate the laws of thermodynamics; and B) evaluate different methods of heat energy transfer that result in an increasing amount of disorder.		

5th Three Weeks Unit continued on next page

Physics
Alignment and Correlations Charts

Time Frame: 3rd Three Weeks (page 3 of 3)

TEKS/TAKS Correlations*

Physics TEKS	Prior Knowledge (IPC, Biology & Chemistry) TEKS	Exit level TAKS Correlation
Concepts: 5 a, b, c, d	IPC: 4 a, 4d, 6a Chem: 15 a	Objective 5
Processes: 1a, b 2 a, b, c, d, e, f 3 a, b, c, d, e	IPC: 1 a-b, 2 a-d, 3 a-e Biology: 1 a-b, 2 a-d, 3 a-f Chemistry: 1 a-b, 2 a-e, 3 a-e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

Pre-AP Course Curricular Requirements**

See Appendix for Pre-AP/AP Alignment Chart

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts: 5 a, b, c, d	Physical Science Standard B
Processes: 1 a, b	Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F
2 a, b, c, d, e, f	Science as Inquiry Standard A Science and Technology Standard E
3 a	Science as Inquiry Standard A History and Nature of Science Standard G
3 b	Science as Inquiry Standard A
3 c, d, e	Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Physics

Time Frame: 4th Six Weeks—*weeks 19-24* (page 1 of 4)

Unit Concepts:	**Unit Theme:**	**Notes:**
Laws of Thermodynamics Characteristics and Behavior of Waves	Systems Properties, Patterns & Models	

T A K S Objective(s)	**Concept and Process TEKS** **7 A, B** **8 A, B, C** **1 - 3**	**Required Exemplar Labs,** "Heat Mixes-Part I", "Stay Tuned", "Catch A Wave" **and** **Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E, F** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit.	**7A.** The student will be able to explain the laws of thermodynamics as it applies to melting ice, global warming, cooking food, and refrigeration. **7B.** The students will be able to discuss the different methods of heat energy transfer such as radiation, conduction, and convection and how they effect the molecules they influence in areas such as food preparation, home temperature regulation, and microwave oven cooking.	Prentice Hall Conceptual Physics textbook. Chapters: 21-24, 25-31, 38-39 Snapshot Activities: 7A, 7B, 8A, 8B, 8C http://www.tenet.edu/teks/science/instruction/teksperts.html TEXTEAMS Physics Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html
5	**(7)** The student knows the laws of thermodynamics. The student is expected to: (A) analyze and explain everyday examples that illustrate the laws of thermodynamics; and		
5	B) evaluate different methods of heat energy transfer that result in an increasing amount of disorder.		

4th Six Weeks Unit continued on next page

Physics

Time Frame: 4th Six Weeks—*weeks 19- 24* (page 2 of 4)

T A K S Objective(s)	**Concept and Process TEKS** **7 A, B** **8 A, B, C** **1 - 3**	**Required Exemplar Labs,** "Heat Mixes-Part I", "Stay Tuned", "Catch A Wave" **and** **Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
	(8) The student knows the characteristics and behavior of waves. The student is expected to:	**8A.** The students will draw and label a complete transverse and longitudinal wave to demonstrate their understanding of the parts of a wave and will demonstrate with a rope or slinky spring the concepts of reflection of a wave, the refraction of a wave, and wave interference. **8B.** The student will understand that sound is composed of compression or longitudinal waves and requires a medium to travel through; AND the student will understand the characteristics and behaviors of these waves by experiencing demonstrations which demonstrate these characteristics and behaviors. **8C.** The student will be able to interpret characteristics of waves when it comes to telecommunications, medicine, and sound equipment.	"Heat Mixes-Part I": Prentice Hall Conceptual Physics Lab Manual. Lab 49, pages 167-170. "Stay Tuned": Prentice Hall Conceptual Physics Lab Manual. Lab 23, pages 139-143. "Catch A Wave": Prentice Hall Conceptual Physics Lab Manual. Lab 66, pages 225-228.
5	(A) examine and describe a variety of waves propagated in various types of media and describe wave characteristics such as velocity, frequency, amplitude, and behaviors such as reflection, refraction, and interference;		
5	(B) identify the characteristics and behaviors of sound and electromagnetic waves; and		
5	(C) interpret the role of wave characteristics and behaviors found in mechanical and industrial applications.		

4th Six Weeks Unit continued on next page

Physics

Time Frame: 4th Six Weeks—*weeks 19-24* (page 3 of 4)

T A K S Objective(s)	**Concept and Process TEKS** **7 A, B** **8 A, B, C** **1 - 3**	**Required Exemplar Labs,** "Heat Mixes-Part I", "Stay Tuned", "Catch A Wave" **and** **Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
		Exemplar Labs: "Heat Mixes-Part I"—predict final temperature of a mixture of cups of water at different temperatures. "Stay Tuned"—estimate diameter of BB's. "Catch A Wave"—observe important wave properties.	

STUDENT PRODUCTS may include (but are not limited to): ● Models ● Projects ● Labs ● Research Papers ● Presentations

4th Six Weeks Unit continued on next page

Exemplar Labs located in Conceptual Physics Lab Manual.

Physics
Alignment and Correlations Charts

Time Frame: 4th Six Weeks (page 4 of 4)

TEKS/TAKS Correlations*

Physics TEKS	Prior Knowledge (IPC, Biology & Chemistry) TEKS	Exit level TAKS Correlation
Concepts: 7 a, b 8 a, b, c	IPC: 6 b, d Chem: 5 c, 9 c, d	Objective 5
Processes: 1a, b 2 a, b, c, d, e, f 3 a, b, c, d, e	IPC: 1 a-b, 2 a-d, 3 a-e Biology: 1 a-b, 2 a-d, 3 a-f Chemistry: 1 a-b, 2 a-e, 3 a-e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

Pre-AP Course Curricular Requirements**

See Appendix for Pre-AP/AP Alignment Chart

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts:	
7 a, b	Physical Science Standard B
8 a, b, c	Physical Science Standard B
Processes:	
1 a, b	Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F
2 a, b, c, d, e, f	Science as Inquiry Standard A Science and Technology Standard E
3 a	Science as Inquiry Standard A History and Nature of Science Standard G
3 b	Science as Inquiry Standard A
3 c, d, e	Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Physics

Time Frame: 5th Weeks—*weeks25-30* (page 1 of 3)

Unit Concepts:	Unit Theme:	Notes:
Forces in Nature	Systems	

TAKS Objective(s)	Concept and Process TEKS 6 A, B, C, D, E, F 1 - 3	Required Exemplar Labs, "Weighing an Elephant", "Getting Wired" and Suggested Instructional Activities Integrating Concepts & Processes	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E, F** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(6)** The student knows forces in nature. The student is expected to: (A) identify the influence of mass and distance on gravitational forces; (B) research and describe historical development of the concepts of gravitational, electrical and magnetic force; (C) identify and analyze influences of change and distance on electrical forces;	**6A.** The students will understand and identify the relationship between the forces of attraction between two objects and their distance apart. **6B**. The students will research and report on the development of the theories of gravitational, electrical, and magnetic forces and the key scientists which contributed to their understandings. **6C.** The students will be able to understand and measure the differences in electrical forces which occur when there is a change in the distance the electricity will travel and the distance which changes from the electrical field of a current. **6D.** The students will be able to understand and communicate the relationship between electric current and magnetic field strength.	Prentice Hall Conceptual Physics textbook. Chapters: 12, 13, 32-37. ISEF Science Fair: http://www.sciserve.org/isef/teachers/index.asp Snapshot Activities: 6A, 6B, 6C, 6D, 6E, 6F http://www.tenet.edu/teks/science/instruction/teksperts.html TEXTEAMS Physics Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html
5			

5th Six Weeks Unit continued on next page

Physics

Time Frame: 5th Six Weeks—*weeks25-30* (page 2 of 3)

T A K S Objective(s)	**Concept and Process TEKS 6 A, B, C, D, E, F 1 - 3**	**Required Exemplar Labs,** "Weighing an Elephant", "Getting Wired" **and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
5	(D) demonstrate the relationship between electricity and magnetism; (E) design and analyze electric circuits; and (F) identify examples of electrical and magnetic forces in everyday life.	**6E.** The students will know the symbols used on an electrical schematic and be able to calculate current going through a complex circuit. The student will also be able to design a simple electric circuit for known output and resistance. **6F.** The students will be able to identify and discuss the uses of electrical and magnetic forces in their everyday lives in devices such as radios, speakers, cat-scans and devices with electric motors. **Exemplar Labs:** "Weighing an Elephant"—determine relationship between masses and distances from the fulcrum for a balanced seesaw. "Getting Wired"—build a model illustrating electric current.	"Weighing An Elephant": Prentice Hall Conceptual Physics Lab Manual. Lab 33, pages 113-116. "Getting Wired": Prentice Hall Conceptual Physics Lab Manual. Lab 90, pages 285-288.

STUDENT PRODUCTS may include (but are not limited to): ● Models ● Projects ● Labs ● Research Papers ● Presentations

5th Six Weeks Unit continued on next page

Exemplar Labs located in Conceptual Physics Lab Manual.

Physics
Alignment and Correlations Charts

Time Frame: 5th Six Weeks (page 3 of 3)

TEKS/TAKS Correlations*

Physics TEKS	Prior Knowledge (IPC, Biology & Chemistry) TEKS	Exit level TAKS Correlation
Concepts: 6 a, b, c, d, e, f	IPC: 6 f	Objective 5
Processes: 1a, b 2 a, b, c, d, e, f 3 a, b, c, d, e	IPC: 1 a-b, 2 a-d, 3 a-e Biology: 1 a-b, 2 a-d, 3 a-f Chemistry: 1 a-b, 2 a-e, 3 a-e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

Pre-AP Course Curricular Requirements**

See Appendix for Pre-AP/AP Alignment Chart

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts:	
6 a, b	Physical Science Standard B Earth and Space Science Standard D
6 c, d, e, f	Physical Science Standard B
Processes:	
1 a, b	Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F
2 a, b, c, d, e, f	Science as Inquiry Standard A Science and Technology Standard E
3 a	Science as Inquiry Standard A History and Nature of Science Standard G
3 b	Science as Inquiry Standard A
3 c, d, e	Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Physics

Time Frame: 6th Three Weeks—*weeks 16-18* (page 1 of 3)

Unit Concepts:	Unit Theme:	Notes:
Simple Examples of Quantum Physics.	Properties, Patterns & Models	

TAKS Objective(s)	Concept and Process TEKS 9 A, B 1 - 3	Required Exemplar Labs, "Particular Waves", "Flaming Out" and Suggested Instructional Activities Integrating Concepts & Processes	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E, F** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(9)** The student knows examples of quantum physics. The student is expected to: (A) describe the photoelectric effect; and (B) explain the line spectra from different gas discharge tubes.	**9A.** The students will understand the photoelectric effect by diagrams and examples supplied by the instructor and be able to describe the propagation of electricity from light energy. **9A.** The student will analyze the photoelectric effect by reporting on the physics of how a photoelectric cell works. **9B.** The students will be able to explain and interpret a line spectra by observing spectra of different elements and comparing them to unknown spectra to identify unknown spectral prints from unknown elements. The students will be able to see the relationship of line spectra to elemental identification in astronomical applications. **9B.** The students will explain the different line spectra given off from different gas-charged tubes in a report.	Prentice Hall Conceptual Physics textbook. Chapters: 38, 28 Snapshot Activities: 9A, 9B http://www.tenet.edu/teks/science/instruction/teksperts.html TEXTEAMS Physics Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html

6th Three Weeks Unit continued on next page

Physics

Time Frame: 6th Three Weeks—*weeks 16-18* (page 2 of 3)

T A K S Objective(s)	**Concept and Process TEKS 9 A, B 1 - 3**	**Required Exemplar Labs,** "Particular Waves", "Flaming Out" **and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
		Exemplar Labs: "Particular Waves"—observe photoelectric effect. "Flaming Out"—observe spectra of some metal atoms.	"Particular Waves": Prentice Hall Conceptual Physics Lab Manual. Lab 96, page 307-310. "Flaming Out": Prentice Hall Conceptual Physics Lab Manual. Lab 73, page 247-248.

STUDENT PRODUCTS may include (but are not limited to): ● Models ● Projects ● Labs ● Research Papers ● Presentations

6th Three Weeks Unit continued on next page

Exemplar Labs located in Conceptual Physics Lab Manual.

Physics
Alignment and Correlations Charts

Time Frame: 6th Three Weeks (page 3 of 3)

TEKS/TAKS Correlations*

Physics TEKS	Prior Knowledge (IPC, Biology & Chemistry) TEKS	Exit level TAKS Correlation
Concepts: 9 a, b	--	--
Processes: 1a, b 2 a, b, c, d, e, f 3 a, b, c, d, e	IPC: 1 a-b, 2 a-d, 3 a-e Biology: 1 a-b, 2 a-d, 3 a-f Chemistry: 1 a-b, 2 a-e, 3 a-e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

Pre-AP Course Curricular Requirements**

See Appendix for Pre-AP/AP Alignment Chart

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts: 9 a, b	Physical Science Standard B
Processes: 1 a, b 2 a, b, c, d, e, f 3 a 3 b 3 c, d, e	Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F Science as Inquiry Standard A Science and Technology Standard E Science as Inquiry Standard A History and Nature of Science Standard G Science as Inquiry Standard A Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

APPENDIX

Texas Essential Knowledge and Skills (http://www.tea.state.tx.us/teks/index.html)
- Integrated Physics and Chemistry
- Biology
- Chemistry
- Physics

Texas Assessment of Knowledge and Skills Objectives (http://www.tea.state.tx.us/student.assessment/taks/booklets/index.html)
- Tenth Grade and Exit Level (10^{th} and 11^{th} Grade)

National Science Education Standards

Science TEKS Toolkit Excerpts (http://www.tenet.edu/teks/science/instruction/index.html)
- Materials and Safety Equipment List
- Checklist for Science Field Investigations
- Science Facility Safety Checklist
- Laboratory Safety Survey
- Assessment Methods
- Web-Based Resources

Texas Environmental Education Advisory Committee Contact Information (http://www.tea.state.tx.us/curriculum/teeac.html)

Pre-AP and AP Science Scope and Sequence Grades 6-12

Required Exemplar Labs:
- "The Domino Effect"
- "Getting Pushy"
- "Cut Short"
- ***"Mousetrap Car Design"
- ***"Net Force Dynamics"
- ***"Marble Lab"
- "Conserving Your Energy"
- "Tick-Toc"
- "Weighing An Elephant"
- "Getting Wired"
- "Heat Mixes-Part I"
- "Stay Tuned"
- "Catch A Wave"
- "Particular Waves"
- "Flaming Out"

***Custom BISD labs located in Appendix. All other exemplar labs located in Conceptual Physics Lab Manual.

Physics Exemplar Labs

Number	TEKS	Exemplar Lab	Source
1.	4 1st three weeks	"The Domino Effect"	Prentice Hall Conceptual Physics Lab Manual, Lab 3, p. 5-8. (copy not included)
2.	4B 1st three weeks	"Getting Pushy"	Prentice Hall Conceptual Physics Lab Manual, Lab 11, p. 35-38. (copy not included)
3.	4C 1st three weeks	"Cut Short"	Prentice Hall Conceptual Physics Lab Manual, Lab 23, p. 77-78. (copy not included)
4.	4C 2nd three weeks	"Mousetrap Car Design"	BISD local lab
5.	4C 2nd three weeks	"Net Force Dynamics"	BISD local lab
6.	4E 2nd three weeks	"Marble Lab"	BISD local lab
7.	5B 3rd three weeks	"Conserving Your Energy"	Prentice Hall Conceptual Physics Lab Manual, Lab 24, p. 79-82. (copy not included)
8.	5C 3rd three weeks	"Tick-Toc"	Prentice Hall Conceptual Physics Lab Manual, Lab 64, p. 221-222. (copy not included)
9.	6A 4th three weeks	"Weighing An Elephant"	Prentice Hall Conceptual Physics Lab Manual, Lab 33, p. 113-116. (copy not included)
10.	6E 4th three weeks	"Getting Wired"	Prentice Hall Conceptual Physics Lab Manual, Lab 90, p. 285-288. (copy not included)
11.	7A 5th three weeks	"Heat Mixes-Part I"	Prentice Hall Conceptual Physics Lab Manual, Lab 49, p. 167-170. (copy not included)
12.	8 5th three weeks	"Stay Tuned"	Explorations: Real-World Math with the CBL™ System. © 1999. Activity 23, p. 139-143.
13.	8B 5th three weeks	"Catch A Wave"	Prentice Hall Conceptual Physics Lab Manual, Lab 66, p. 225-228. (copy not included)
15.	9A 6th three weeks	"Particular Waves"	Prentice Hall Conceptual Physics Lab Manual, Lab 96, p. 307-310. (copy not included)
16.	9B 6th three weeks	"Flaming Out"	Prentice Hall Conceptual Physics Lab Manual, Lab 73, p. 247-248. (copy not included)

National Science Education Content Standards for Grades 9 - 12

Content Standard	
A: Science As Inquiry	Abilities to do scientific inquiry Understandings about scientific inquiry
B: Physical Science	Structure of atoms Structure and properties of matter Chemical reactions Motions and forces Conservation of energy and increase in disorder Interactions of energy and matter
C: Life Science	The cell Molecular basis of heredity Biological evolution Interdependence of organisms Matter, energy, and organization in living systems Behavior of organisms
D: Earth and Space Science	Energy in the earth system Geochemical cycles Origin and evolution of the earth system Origin and evolution of the universe
E: Science and Technology	Abilities of technological design Understandings about science and technology
F: Science in Personal and Social Perspectives	Personal and community health Population growth Natural resources Environmental quality Natural and human-induced hazards Science and technology in local, national, and global challenges
G: History and Nature of Science	Science as a human endeavor Nature of scientific knowledge Historical perspectives