TEXAS EDUCATION AGENCY

TEA Science Update

Administrators & Policymakers Institute

CAST 2010 – Houston

Conference for the Advancement of Science Teaching

Kenn Heydrick, Ed.D., Director of Science

November 11, 2010

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CAST 2010 Program – TEA Sessions Scheduled

All TEA Sessions on Friday, November 12 – Ballroom A

8:45-9:30 am	Elementary School Session
10:15-11:00 am	Middle School Session
3:15-4:00 pm	High School Session

1:30-2:15 pm Dr. Carl Wieman

Special Project Share Speaker
Nobel Prize-Winning Physicist
Chair of National Academy of Sciences

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TEA Science Update

- **Science TEKS**
- **Professional Development**
- **Instructional Materials**
- **Graduation Requirements**
- **Educator Certification**
- **Presidential Awards**
- **National Youth Science Camp**
- **Web Resources**
- **TAKS Analysis**
- **STAAR Program**
- **Texas Children in Nature Conference**
- **Contact Information**

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Science TEKS

- Implementation of new science TEKS in 2010-2011 school year
- More clarity and specificity in K-12
- Increased K-12 focus on science equipment
- Time recommendations and requirements for science investigations

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Elementary Investigations

New elementary time recommendations for classroom/outdoor investigations

- Grades K-1: At least 80% of instructional time ("districts are encouraged to facilitate")
- Grades 2-3: At least 60% of instructional time ("districts are encouraged to facilitate")
- Grades 4-5: At least 50% of instructional time ("districts are encouraged to facilitate")

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Middle School Investigations

New middle school time requirements for science investigations

- Grades 6-8
- Student-conducted laboratory/field investigations for at least 40% of the instructional time

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High School Investigations

Continued high school time requirements for science investigations

- Grades 9-12
- Student-conducted laboratory/field investigations for at least 40% of the instructional time

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Scientific Investigations

- Clarified importance in K-12 TEKS
- 3 types
  - Descriptive investigations
  - Comparative investigations
  - Experimental investigations

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Scientific Investigations

- **Descriptive Investigation:** involves collecting qualitative and/or quantitative data to draw conclusions about a natural or man-made system (e.g., rock formation, animal behavior, cloud, bicycle, electrical circuit). Observations are recorded but no comparisons are made and no variables are manipulated.
- **Comparative Investigation:** involves collecting data on different organisms/objects/features/events or collecting data under different conditions to make a comparison. A "fair test" can be designed to measure variables so that the relationship between them is determined.
- **Experimental Investigation:** involves designing a "fair test" in which variables are actively manipulated, controlled, and measured in an effort to gather evidence to support or not support a causal relationship. An experimental investigation must have a control.

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Science TEKS Professional Development

Professional development opportunities

- Summer/fall 2010 and spring 2011
  - K-12 science TEKS (1 day)
  - 5-8 Academies (3 days)
  - Biology EOC Success (3 days)
- Summer 2011
  - Chemistry EOC Success
  - Physics EOC Success

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Science TEKS Professional Development

- Contact the science specialist at your ESC for registration information.
- Contact information for ESCs can be found at http://ritter.tea.state.tx.us/ESC/.

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Science Instructional Materials

- Proclamation 2012 (Science) postponed
- Request for supplemental instructional materials that meet all of the new and expanded TEKS
- Biology, Chemistry, Integrated Physics and Chemistry (IPC), and Physics
- Scheduled to be implemented in schools beginning with the 2011-2012 school year
- Information available at http://www.tea.state.tx.us/index2.aspx?id=2147487077

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Graduation Plans - Science

Minimum Program	Recommended HS Program	Distinguished Achievement Program
Two credits: • Biology • Integrated Physics and Chemistry May substitute Chemistry or Physics for IPC but must use the other as academic elective credit	**Four credits:** • Biology, AP Biology, or IB Biology • Chemistry, AP Chemistry, or IB Chemistry • Physics, Principles of Technology, AP Physics, or IB Physics • The additional credit may be IPC and must be successfully completed prior to chemistry and physics. • The fourth credit may be selected from any of the following: □ Aquatic Science □ Astronomy □ Earth and Space Science □ Environmental Systems □ AP Biology □ AP Chemistry □ AP Physics B □ AP Physics C □ AP Environmental Science □ IB Biology □ IB Chemistry □ IB Physics □ IB Environmental Systems □ Scientific Research and Design (CTE) □ Anatomy and Physiology (CTE) □ Engineering Design and Problem Solving (CTE) □ Medical Microbiology (CTE) □ Pathophysiology (CTE) □ Advanced Animal Science (CTE) □ Advanced Biotechnology (CTE) □ Advanced Plant and Soil Science (CTE) □ Food Science (CTE) □ Forensic Science (CTE)	**Four credits:** • Biology, AP Biology, or IB Biology • Chemistry, AP Chemistry, or IB Chemistry • Physics, AP Physics, or IB Physics • After successful completion of a biology course, a chemistry course, and a physics course, the fourth credit may be selected from any of the following: □ Aquatic Science □ Astronomy □ Earth and Space Science □ Environmental Systems □ AP Biology □ AP Chemistry □ AP Physics B □ AP Physics C □ AP Environmental Science □ IB Biology □ IB Chemistry □ IB Physics □ IB Environmental Systems □ Scientific Research and Design (CTE) □ Anatomy and Physiology (CTE) □ Engineering Design and Problem Solving (CTE) □ Medical Microbiology (CTE) □ Pathophysiology (CTE) □ Advanced Animal Science (CTE) □ Advanced Biotechnology (CTE) □ Advanced Plant and Soil Science (CTE) □ Food Science (CTE) □ Forensic Science (CTE)

Red denotes new courses available that may satisfy the 4th science credit.

Source: http://ritter.tea.state.tx.us/curriculum/SBSGradReqs2010_2011.pdf 14

Amendments to Graduation Requirements

Recommended HS Program

Phase-out of IPC was removed.

- IPC must be completed prior to Chemistry and Physics.
- Biology, Chemistry, and Physics are required for all students.
- *However, those students who completed IPC prior to 2010-2011 may satisfy science requirements in the manner established at the time the credit was earned.*

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Educator Certification and Standards

- State Board for Educator Certification (SBEC) – Administrative Rules

  Texas Administrative Code (TAC) – Consult Chapter 231 for assignments and certificates

  http://info.sos.state.tx.us/pls/pub/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=19&pt=7&ch=231&rl=1

- E-mail TEA Educator Certification and Standards at

  http://www.tea.state.tx.us/index2.aspx?id=5333

- Chat with TEA credentialing staff at

  http://www.tea.state.tx.us/sbecchat.aspx

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Master Science Teacher (MST) Certification

To be eligible for a Master Science Teacher Certificate, you must

- hold a Texas teaching certificate;
- have at least three years of teaching experience;
- satisfactorily complete a knowledge-based course of instruction through an approved educator preparation program on the science of teaching children science;
- satisfactorily complete a field-based practicum prescribed by an approved educator preparation program;
- perform satisfactorily on the appropriate master science teacher certification examination; and
- satisfy any other applicable requirement for the certificate.

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Master Science Teacher (MST) Certification

- MST certification can be obtained for grades EC-4, 4-8, and 8-12.
- Online training will be available soon.
- A state stipend is available when a teacher teaches science, at the grade level for which he/she holds MST certification, on an identified high-need campus.
- The deadline for districts to apply for stipend grant is June 30, 2011.
- A FAQ document is available at http://www.tea.state.tx.us/index3.aspx?id=5676.

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Presidential Awards (PAEMST)

The National Science Foundation, under the direction of the White House, approves the Texas candidates as finalists for the national Presidential Awards for Excellence in Math and Science Teaching (PAEMST) award. If chosen as a national winner, the state finalists will receive $10,000 and an all-expense-paid trip for two to Washington D.C. for ceremonies that include recognition from the President of the United States at the Capital.

- Nominations (7-12) Due April 1, 2011
- Applications (7-12) Due May 1, 2011
- More information at www.PAEMST.org

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Presidential Awards (PAEMST)

Official 2010 PAEMST Recipient for Texas Science

Stef Paramoure

In 2009-2010, Stef was an 8th grade science teacher from Canyon Middle School, New Braunfels, who had 7 years of teaching experience.

She is currently employed as a science specialist at ESC XIII in Austin.

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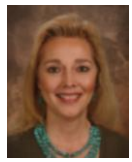
Presidential Awards (PAEMST)

2011 Texas Elementary Science Finalists

- **Nancy Douglas** is a 5th grade teacher at Andrews Elementary School in Austin ISD who has 18 years of teaching experience.
- **Martha McLeod** is a 5th grade teacher at Fulton 4-5 Learning Center in Aransas County ISD who has 18 years of teaching experience.
- **Kent Page** is 5th grade teacher at Carnahan Elementary School in Northside ISD and has 10 years of teaching experience.



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National Youth Science Camp (NYSC) 2011

- Applications to attend the 2011 NYSC are now available.
- Two graduating high school students will be selected to represent Texas at the all-expenses-paid honors program which will be held from June 30 - July 24, 2011.
- Applications are due by January 21, 2011.
- Apply now at http://www.nysc.org/w/2011.html.

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project Share™
Knowledge knows no boundaries

- Project Share provides an elearning platform to support a community of practitioners dedicated to improving teaching and learning through an interactive and engaging environment.
- Information is available from your education service center.
- Project Share website: www.projectsharetexas.org/

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Texas Education on iTunes U

http://www.tea.state.tx.us/itunesu/

http://deimos.apple.com/WebObjects/Core.woa/Browsev2/tea.k12.texas.edu

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TMSDS Texas Mathematics and Science Diagnostic System

- 2010-2011 version based on new science TEKS: Grades 3–8, IPC, Biology, Chemistry, Physics
  - 3 diagnostic tests available for each grade level/course; 30 questions each, English and Spanish
  - 5-question "mini-assessments" available for most student expectations
- Provided at no cost to school districts and charter schools
- Technical assistance provided by ESCs
- www.tmsds.org

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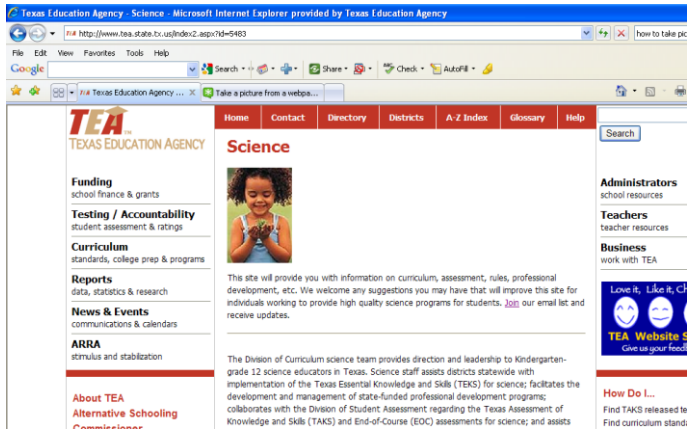
Updated TEA Science Webpage

http://www.tea.state.tx.us/index2.aspx?id=5483



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Updated TEA Science Webpage

Documents

Guidelines for Instructional Field Experiences

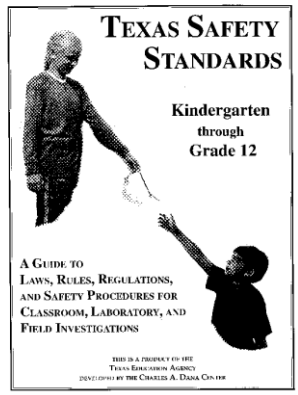
PEIMS Codes for Science Course Numbers, including CTE Courses

Science TEKS Transition Analysis Resource, Grades K-12

Texas Education Agency Safety Laws and Rules

Texas Education Agency Science Facilities Standards

Texas Education Agency Texas Safety Standards



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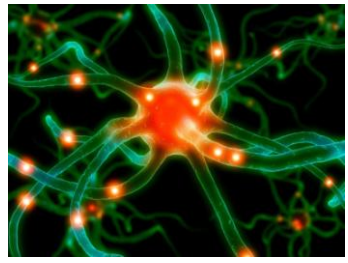
Science TAKS Results



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Science Grade 11

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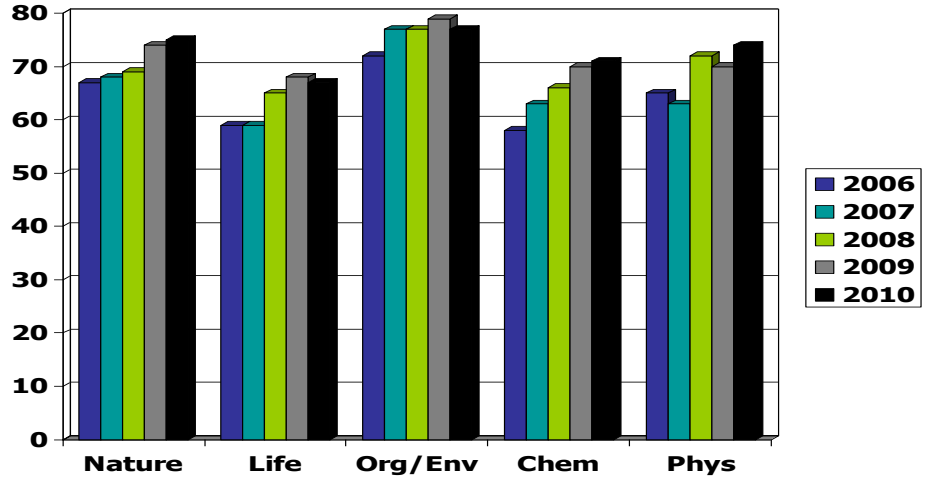
11th Grade TAKS Items - *% Correct by Objectives*

2006 - 2010 (Preliminary)



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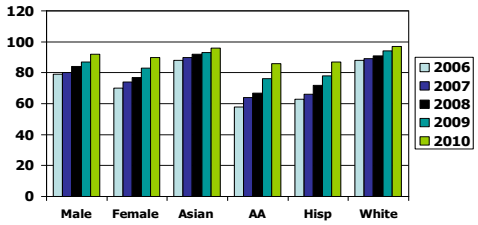
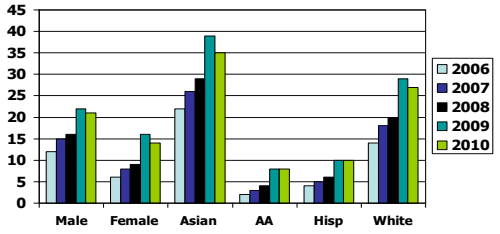
2010 Demographic Summary – Grade 11



Percent Met Standard

Percent Commended



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Science Grade 10

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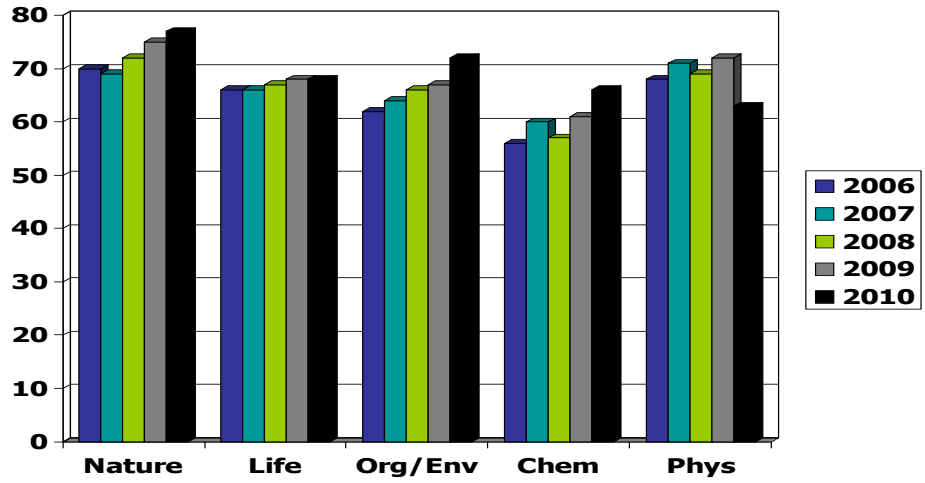
10th Grade TAKS Items - *% Correct by Objectives*

2006 - 2010 (Preliminary)



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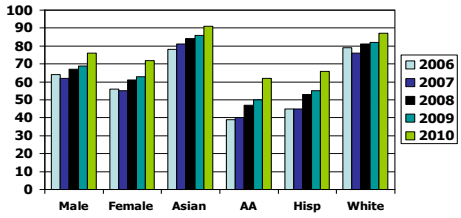
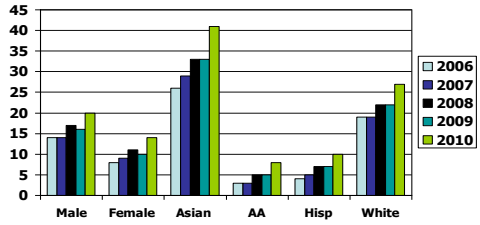
2010 Demographic Summary – Grade 10



Percent Met Standard

Percent Commended



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Science Grade 8

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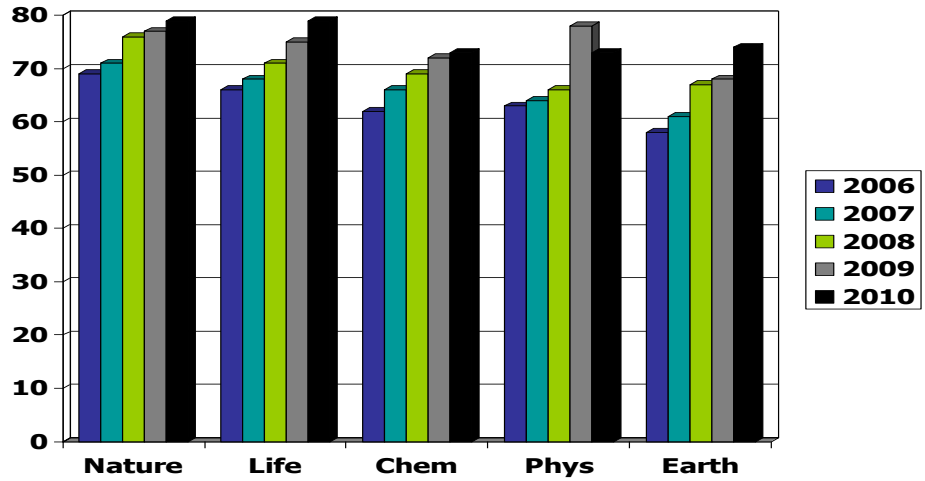
8th Grade TAKS Items - *% Correct by Objectives*

2006 - 2010 (Preliminary)



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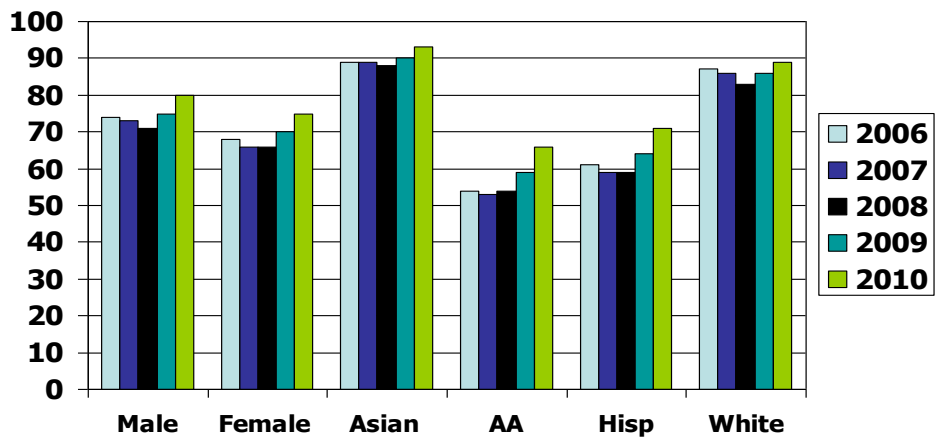
2010 Demographic Summary
Grade 8 - Percent Met Standard
2006-2 SEM Below, 2007-1 SEM Below, 2008-Panel Rec.



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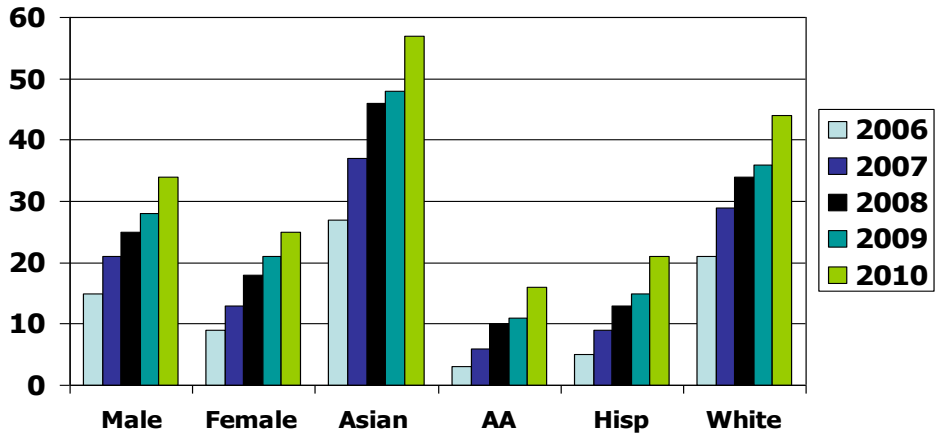
2010 Demographic Summary
Grade 8 - Percent Commended
2006-2 SEM Below, 2007-1 SEM Below, 2008-Panel Rec.



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Science Grade 5

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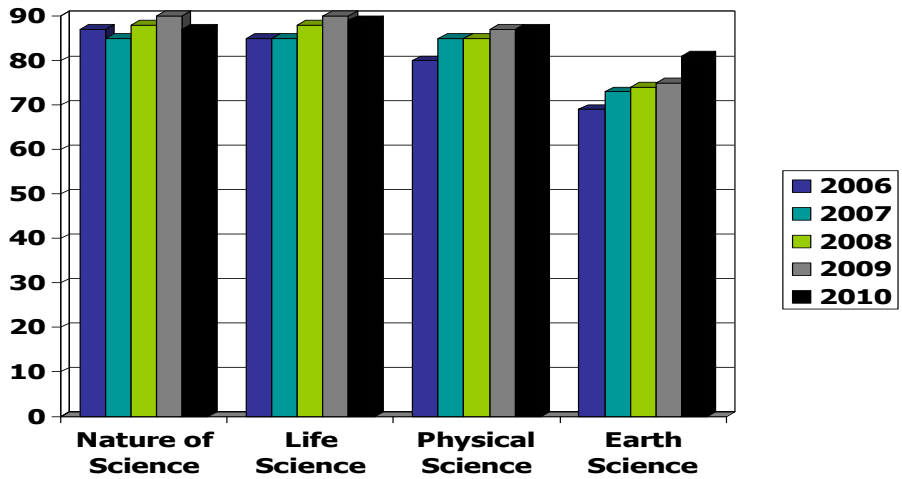
5th Grade TAKS Items - *% Correct by Objectives*

All Students: Spring 2010 (Preliminary)



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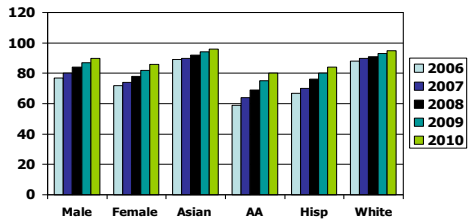
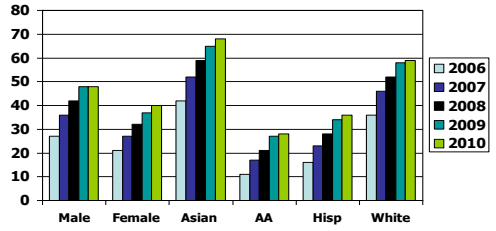
2010 Demographic Summary – Grade 5



Percent Met Standard

Percent Commended



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Science Grade 5 Spanish

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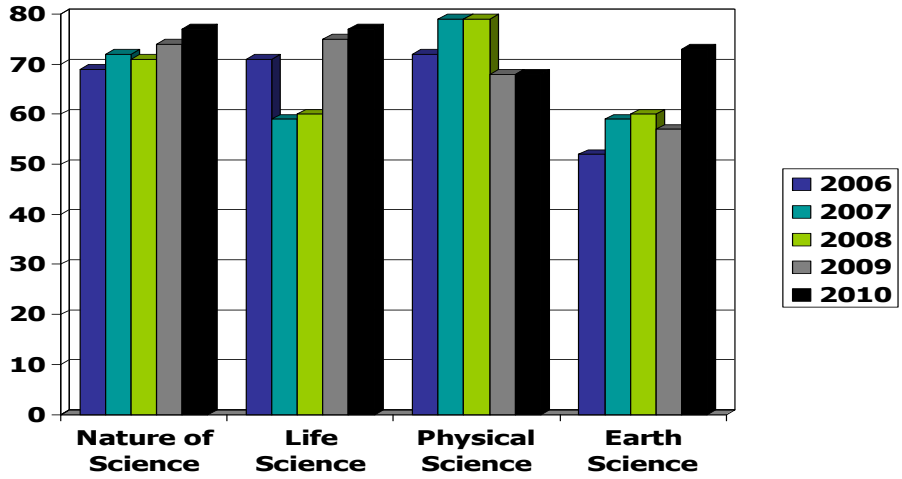
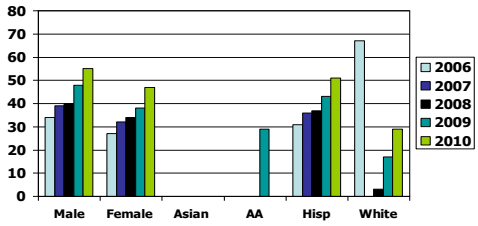
5th Grade Spanish TAKS Items - % Correct by Objectives

All Students: Spring 2010 (Preliminary)

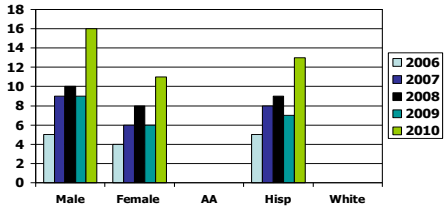


2010 Demographic Summary – Grade 5 Spanish

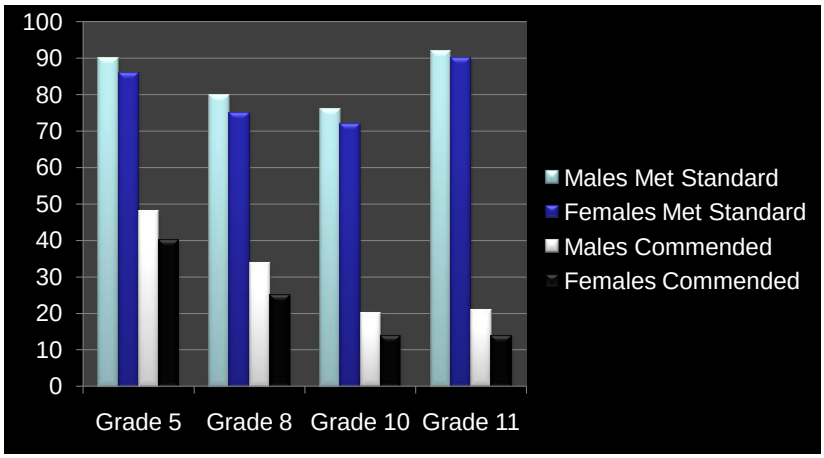


Percent Met Standard

Percent Commended



Comparison of Male and Female Performance on 2010 Science TAKS



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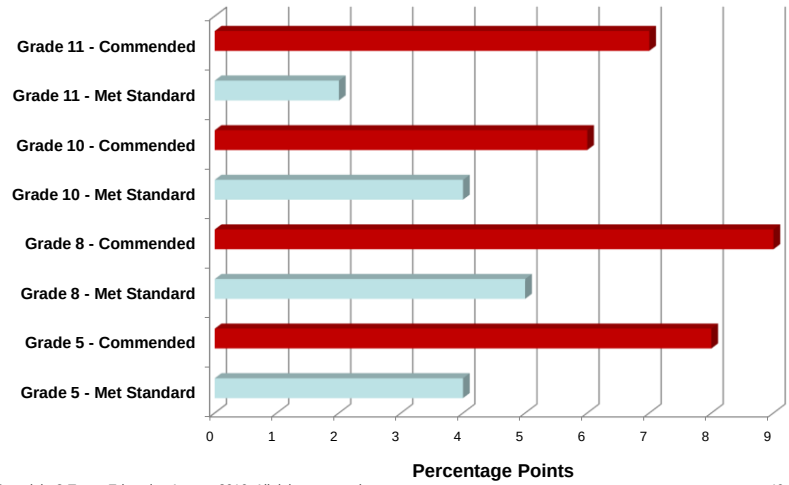
Gap Between Male and Female Performance on 2010 Science TAKS



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Summary

- Need to reduce the achievement gap between genders
- Need to reduce the achievement gaps among African American, Hispanic, and white students
- Need to commit to teach all the TEKS for each grade/course

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2010 SCIENCE TAKS ANALYSIS REPORTS

TAKS Texas Assessment of Knowledge and Skills

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Science TAKS Analysis Reports

2010 TAKS results for grades 5, 8, and 11

- Highlights the specific Student Expectations from the 2010 TAKS results that indicate a less than 75% correct response statewide (80% for grade 5 results)
- Provides correlation with each Student Expectation

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2010 Elementary TAKS Results

- **ENGLISH: Lowest Statewide Objective – Earth Science (81%)**
- **Other Objectives**
  - **Nature of Science (87%)**
  - **Physical Science (87%)**
  - **Life Science (89%)**
- **SPANISH: Lowest Statewide Objective – Physical Science (68%)**
- **Other Objectives**
  - **Earth Science (73%)**
  - **Nature of Science (77%)**
  - **Life Science (77%)**

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2010 Elementary TAKS Results

Objective 4 – Lowest Statewide Objective (English) – Earth Science (81%)

SE	%	Description
Grade 3, 11C	77%	identify the planets in our solar system and their position in relation to the Sun
Grade 4, 6A	71%	identify patterns of change such as in weather, metamorphosis, and objects in the sky
Grade 5, 6A	80%	identify events and describe changes that occur on a regular basis such as in daily, weekly, lunar, and seasonal cycles
Grade 5, 1C	79%	identify the physical characteristics of the Earth and compare them to the physical characteristics of the moon

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2010 Elementary TAKS Results

Objective 1 – Next Lowest Statewide Objective – Nature of Science (87%)

SE	%	Description
Grade 5, 2B	69%	collect information by observing and measuring
Grade 5, 2E	77%	construct simple graphs, tables, maps, and charts using tools including computers to organize, examine, and evaluate information

Objective 3 – Next Lowest Statewide Objective – Physical Science (87%)

SE	%	Description
Grade 5, 8C	68%	demonstrate that electricity can flow in a circuit and can produce heat, light, sound, and magnetic effects

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2010 Middle School TAKS Results

- **Lowest Statewide Objectives**
  - **Structures/Properties of Matter (73%)**
  - **Motion, Forces, & Energy (73%)**
- **Other Objectives**
  - **Earth and Space Systems (74%)**
  - **Nature of Science (79%)**
  - **Living Systems/Environments (79%)**

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2010 Middle School TAKS Results

Objective 3 – Lowest Statewide Objective:
Structures/Properties of Matter (73%)

SE	%	Description
Grade 6, 7B	64%	classify substances by their physical and chemical properties
Grade 8, 8B	54%	identify the properties of an atom including mass and electrical charge
Grade 8, 9B	72%	interpret information on the periodic table to understand that physical properties are used to group elements

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2010 Middle School TAKS Results

Objective 4 – Next Lowest Statewide Objective:

Motion, Forces, & Energy (73%)

SE	%	Description
Grade 6, 9A	72%	identify energy transformations occurring during the production of energy for human use such as electrical energy to heat energy or heat energy to electrical energy
Grade 7, 6C	56%	relate forces to basic processes in living organisms including the flow of blood and the emergence of seedlings
Grade 7, 8A	62%	illustrate examples of potential and kinetic energy in everyday life such as objects at rest, movement of geologic faults, and falling water

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2010 Middle School TAKS Results

Objective 5 – Next Lowest Statewide Objective:

Earth and Space Systems (74%)

SE	%	Description
Grade 6, 8B	63%	explain and illustrate the interactions between matter and energy in the water cycle and in the decay of biomass such as in a compost bin (question 19 on test)
Grade 6, 8B	69%	explain and illustrate the interactions between matter and energy in the water cycle and in the decay of biomass such as in a compost bin (question 31 on test)
Grade 6, 14B	53%	identify relationships between groundwater and surface water in a watershed
Grade 8, 14C	54%	describe how human activities have modified soil, water, and air quality

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2010 11th Grade TAKS Results

- **Lowest Statewide Objective**
  Organization of Living Systems (67%)

- **Other Objectives**
  - **Structures/Properties of Matter (71%)**
  - **Motion, Forces, and Energy (74%)**
  - **Nature of Science (75%)**
  - **Interdependence of Organisms/Environment (77%)**

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2010 11th Grade TAKS Results

Objective 2 – Lowest Statewide Objective:
Organization of Living Systems (67%)

SE	%	Description
Biology 4B	64%	investigate and identify cellular processes including homeostasis, permeability, energy production, transportation of molecules, disposal of wastes, function of cellular parts, and synthesis of new molecules
Biology 10B	54%	compare the interrelationships of organ systems to each other and to the body as a whole
Biology 6A	53%	describe components of deoxyribonucleic acid (DNA), and illustrate how information for specifying the traits of an organism is carried in the DNA
Biology 6B	48%	explain replication, transcription, and translation using models of DNA and ribonucleic acid (RNA)

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2010 11th Grade TAKS Results

Objective 4 – Next Lowest Statewide Objective:
Structures/Properties of Matter (71%)

SE	%	Description
IPC 7D	55%	relate the chemical behavior of an element including bonding, to its placement on the periodic table
IPC 8A	69%	distinguish between physical and chemical changes in matter such as oxidation, digestion, changes in states, and stages in the rock cycle
IPC 8C	69%	investigate and identify the law of conservation of mass (from question 41)
IPC 9A	61%	relate the structure of water to its function as the universal solvent
IPC 9D	54%	demonstrate how various factors influence solubility including temperature, pressure, and nature of the solute and solvent

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Assessment Program

- Tests will focus on “fewer, clearer, deeper” content.
- New assessments will address the “readiness standards” TEKS annually, with other eligible “supporting standards” TEKS being assessed across years.

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Blueprint

STAAR Grade 8 Science Blueprint

Scientific Investigation and Reasoning Skills is not a separate reporting category. These skills will be incorporated into at least 40% of the test questions from reporting categories 1–4 and will be identified along with the content standards.

Reporting Categories	Number of Standards		Number of Questions	
Reporting Category 1: Matter and Energy	Readiness Standards	5	14	
	Supporting Standards	7		
	Total	12		
Reporting Category 2: Force, Motion, and Energy	Readiness Standards	2	12	
	Supporting Standards	6		
	Total	8		
Reporting Category 3: Earth and Space	Readiness Standards	5	14	
	Supporting Standards	10		
	Total	15		
Reporting Category 4: Organisms and Environments	Readiness Standards	3	14	
	Supporting Standards	11		
	Total	14		
Readiness Standards	Total Number of Standards	15	60%–65%	32–35
Supporting Standards	Total Number of Standards	34	35%–40%	19–22
Total Number of Questions on Test			50 Multiple Choice 4 Griddable 54 Total	

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Assessed Curriculum

STAAR Grade 8 Science Assessment

Reporting Category 1:
Matter and Energy

The student will demonstrate an understanding of the properties of matter and energy and their interactions.

Grade 8

(8.5) **Matter and energy.** The student knows that matter is composed of atoms and has chemical and physical properties. The student is expected to

(A) describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud; ***Readiness Standard***

(B) identify that protons determine an element's identity and valence electrons determine its chemical properties, including reactivity; ***Readiness Standard***

(C) interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements; ***Readiness Standard***

(D) recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts; ***Readiness Standard***

(E) investigate how evidence of chemical reactions indicate that new substances with different properties are formed; and ***Readiness Standard***

(F) recognize whether a chemical equation containing coefficients is balanced or not and how that relates to the law of conservation of mass. ***Supporting Standard***

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TEXAS EDUCATION AGENCY

STAAR State of Texas Assessments of Academic Readiness

Hybrid Document

STAAR Grade 8 Science Assessment

Reporting Category 1: Matter and Energy – Student Expectations (14 questions of 54 total)

Readiness Standards	Supporting Standards
8.5A	8.5F
8.5B	7.5C
8.5C	7.6A
8.5D	7.6B
8.5E	6.5C
	6.6A
	6.6B

Reporting Category 2: Force, Motion, and Energy – Student Expectations (12 questions of 54 total)

Readiness Standards	Supporting Standards
8.6A	8.6B
8.6C	7.7A
	6.8A
	6.8C
	6.8D
	6.9C

Scientific Investigation and Reasoning Skills

These skills will not be listed under a separate reporting category. Instead, they will be incorporated into at least 40% of the test questions in reporting categories 1–4 and will be identified along with content standards.

Grade 8 Student Expectations
8.1A, 8.1B
8.2A, 8.2B, 8.2C, 8.2D, 8.2E
8.3A, 8.3B, 8.3C, 8.3D
8.4A, 8.4B

Total Number of Readiness Standards = 15	60%–65% of Test (between 32-35 questions on test)
Total Number of Supporting Standards = 34	35%–40% of Test (between 19-22 questions on test)

Total Number of Questions = 54 (50 Multiple Choice and 4 Griddable)

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All Pieces of the TEKS Puzzle are Important.

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For More Information on STAAR

- Visit the Student Assessment webpage http://www.tea.state.tx.us/index3.aspx?id=3534&menu_id=793
- Join the Student Assessment listserv http://miller.tea.state.tx.us/list

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Texas Children in Nature Conference, Dec. 3-4

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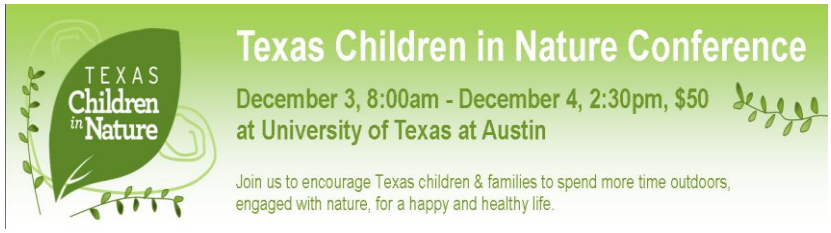
For more information on the Texas Children in Nature Conference:

www.texaschildreninnature.org



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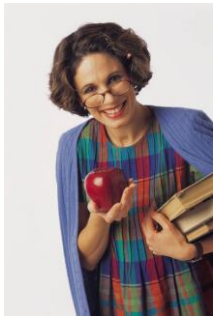
We Need You!



Sign up for the Science and Assessment Listservs

http://miller.tea.state.tx.us/list/

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Thank you.

We appreciate your service to children.

We strive to provide leadership, guidance, and resources to help schools meet the educational needs of all students.

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