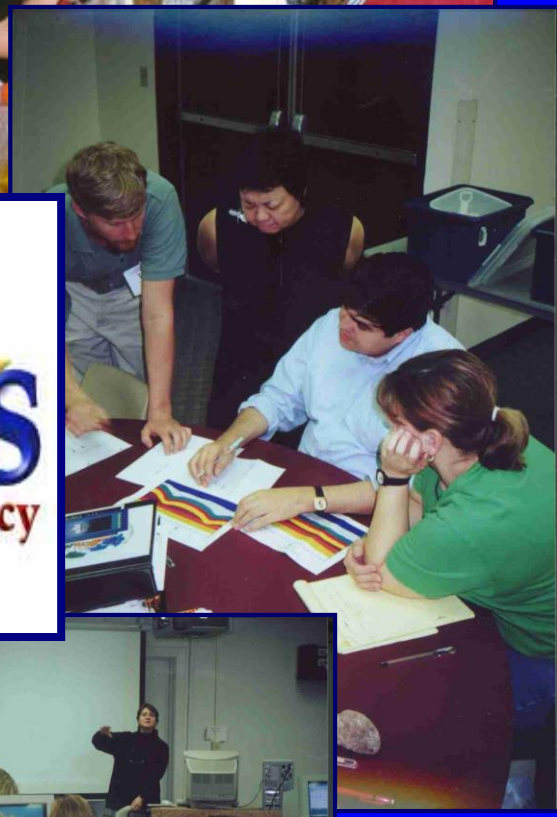
Toyota Regional Collaboratives
Partnership Leadership Academy
Austin, Texas
September 20, 2002

"Preparing Children, Promoting Excellence"



TEXAS
Education Agency

Presented by:
Chris Castillo Comer
Director of Science

The Need for Science Literacy…

On most brands of Christmas lights:

"For indoor or outdoor use only"

(As opposed to…what?)

On American Airlines package of nuts:

"Instructions: Step 1. Open packet. Step2. Eat nuts."

(Step 3: maybe, uh…fly Delta?)

On Children's Cough Medication:

"Do not drive a car or operate machinery"

(We could do a lot to reduce the rate of construction accidents if we could just get those 5 year olds with head colds off those forklifts.)

On a child's Superman costume:

"Wearing of this garment does not enable you to fly."

(Okay, I don't blame the company.

I blame the parents for this one.)

Objectives for today…

- Develop an understanding of the changes in the state assessment system for science.
- Illustrate the content, cognitive level, and context of the new assessments
- Understand the Instructional Implications of the TEKS and the TAKS
- Review science resources and professional development opportunities

Understanding the changes in the state assessment system for science

Legislative Highlights

SB 4: Student Success Initiative

HB1144: Three credits of Science mandated by law!

- Beginning freshmen ’04-’05 (Class of ’08)
- Recommended High School Graduation Plan becomes the minimum requirement for students

Federal Legislation: “No Child Left Behind”
Includes science requirements

Accountability System…

- In 2003, no rating are planned to be issued; however all scores will be released
- Beginning in 2004, ratings will be based on TAKS (including the new assessments) and the completion rate
- Districts and campuses will be classified as exemplary, recognized, acceptable, and low performing

What's changing?

- Accountability System
  - New ratings and standards
- Assessment System
  - Standards for passing
  - TAKS
- Student Success Initiative
  - Promotion standards
  - Linking TAKS to grade level promotion

Student Success Initiative

Students must pass part(s) of the TAKS in order to be promoted :

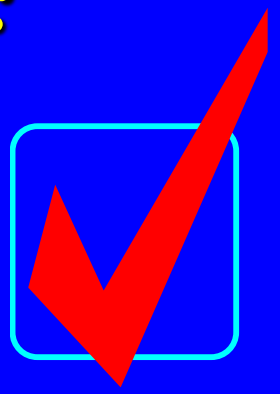
- **2002-03 - 3rd graders - Reading**
- **2004-05 - 5th graders - Reading & Math**
- **2007-08 - 8th graders - Reading & Math**

Remember it this way:

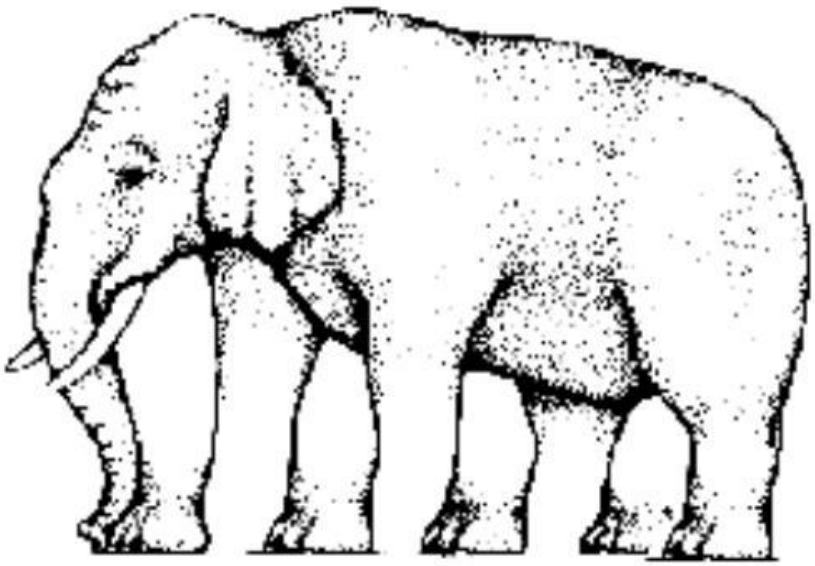
3rd Graders-- ’03

5th Graders-- ’05

8th Graders-- ’08



TAAS and the Courts and you…



How many legs does this elephant have?

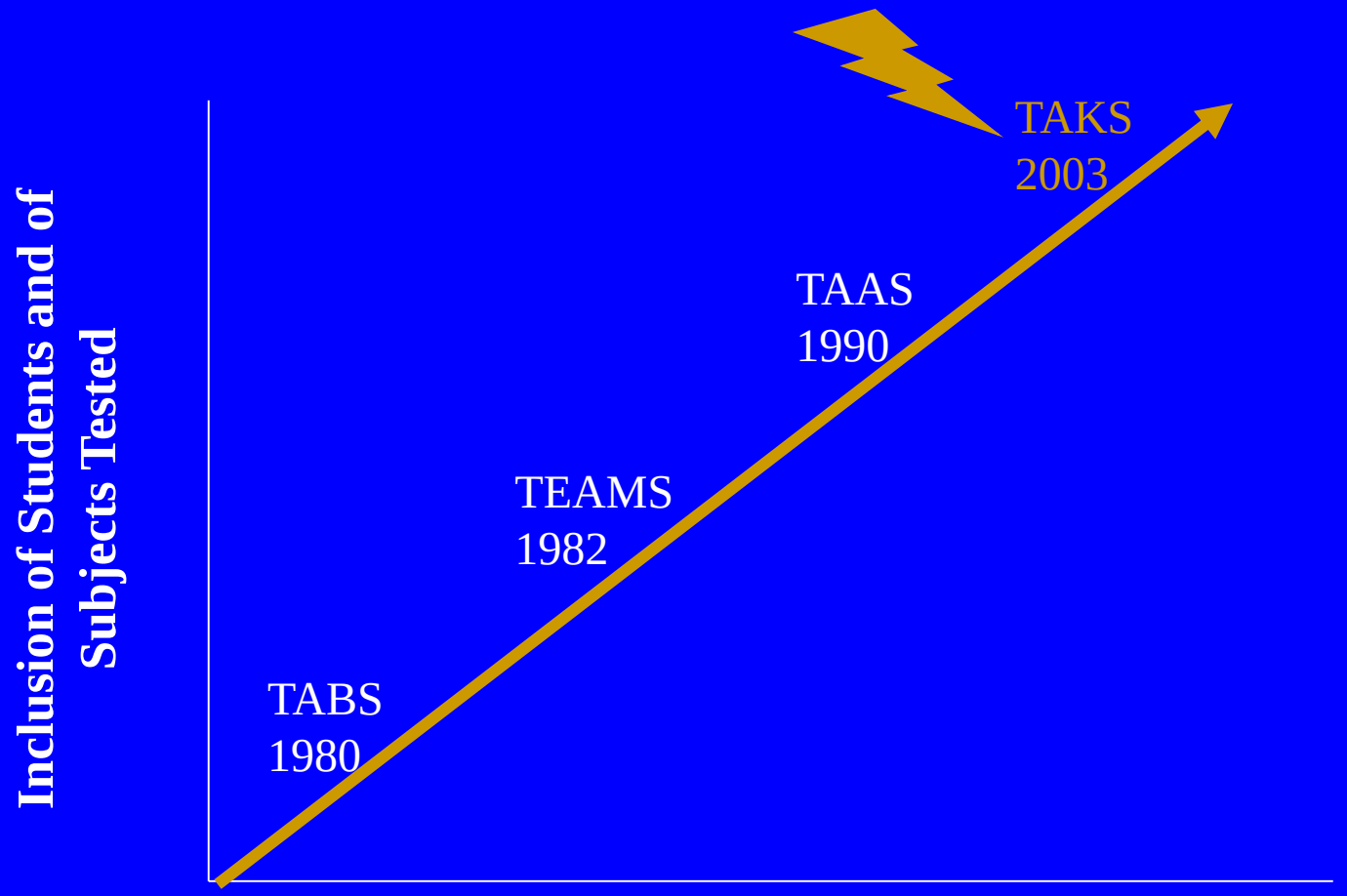
Assessment System – What's New?

- A more rigorous and comprehensive test with a new standard for passing
- Three Science High Stakes Assessments:
  - Grade 5 (English and Spanish)
  - Grade 10 (Predictor Test)
  - Grade 11 (Exit Level)
- TEKS-based assessment

More "Rigorous"…?

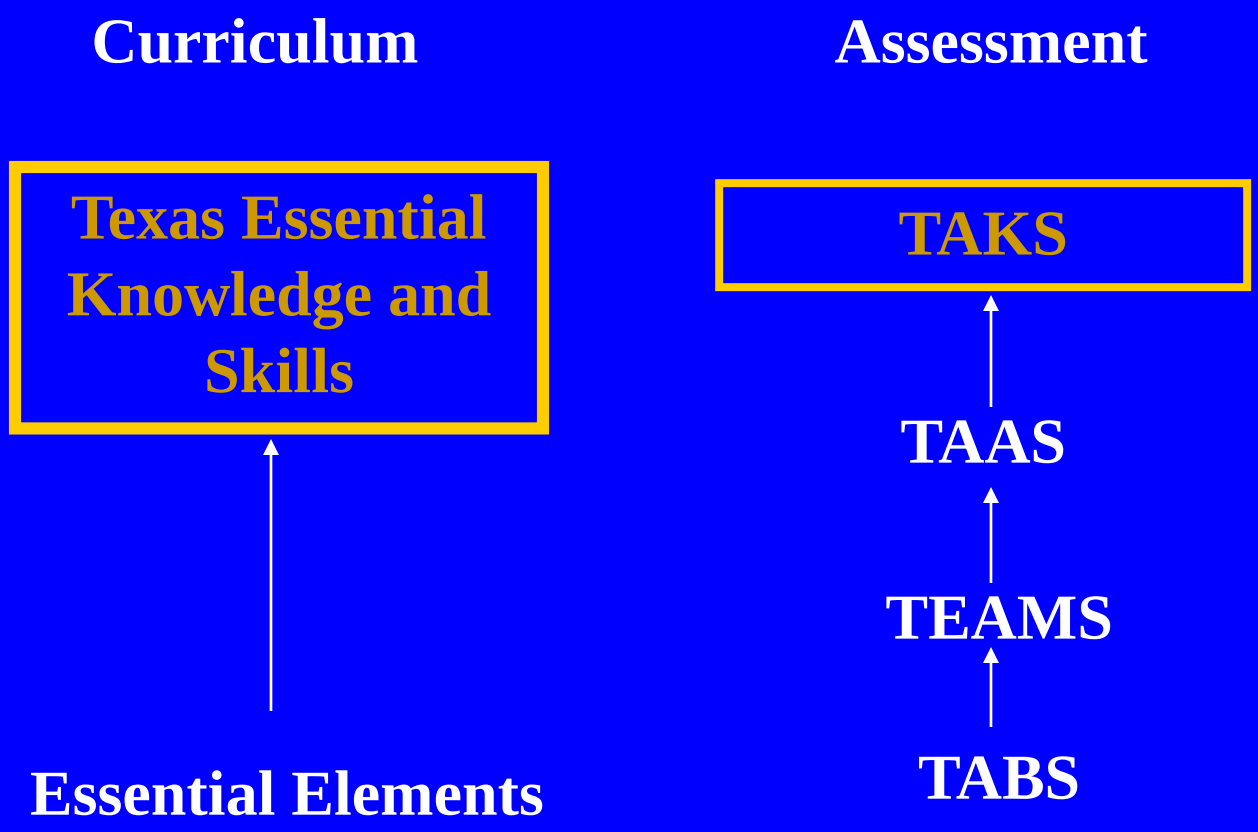
TABS → TEAMS → TAAS → TAKS	
Essential Elements	The TEKS
Isolated, Minimum Skills	Integrated Knowledge
One-Step Solutions	Multiple-Step Problems
Broad Statements	Specific content

Development of the State Assessment System

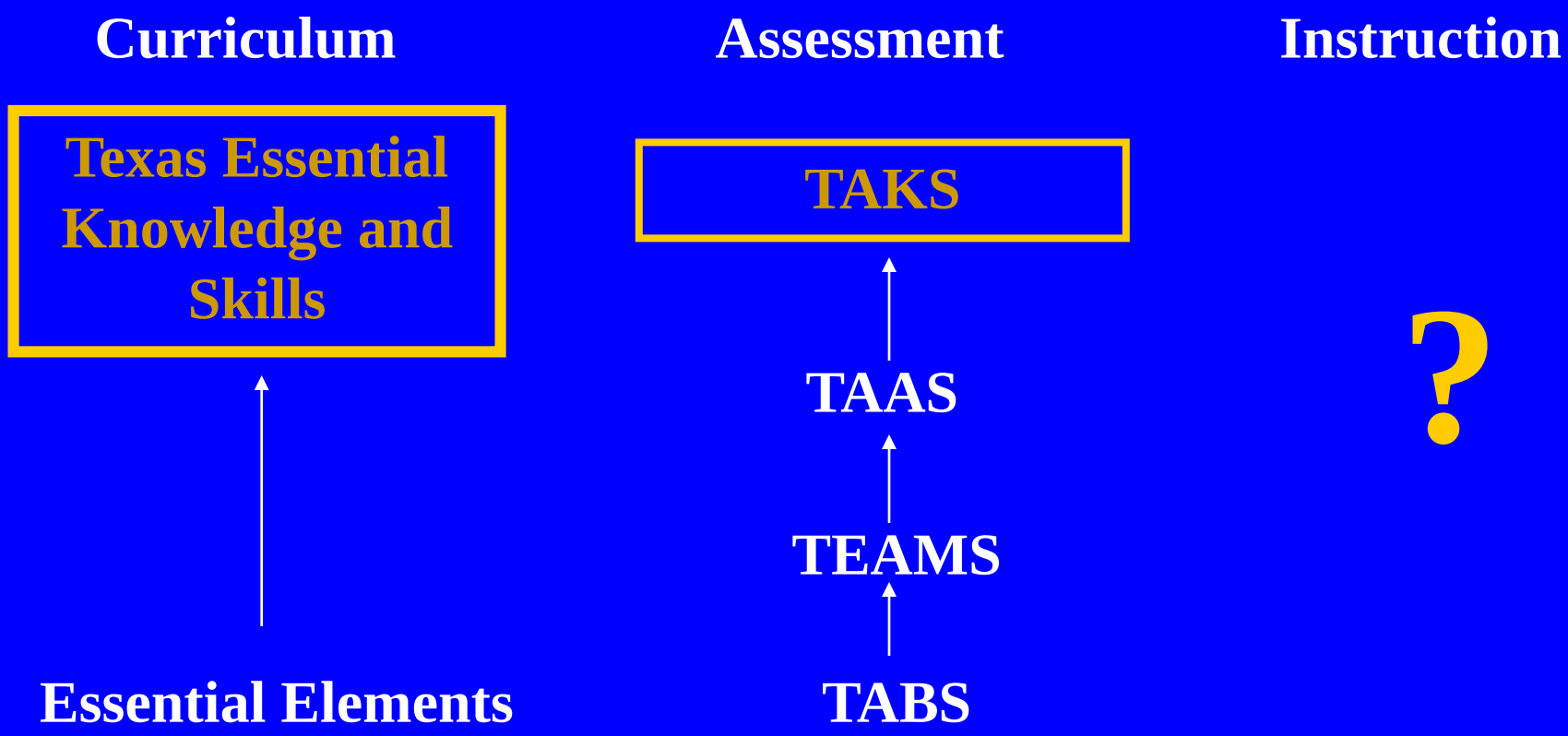


From ILT to ILD, Moving Texas Forward 2002

Continuous Improvement



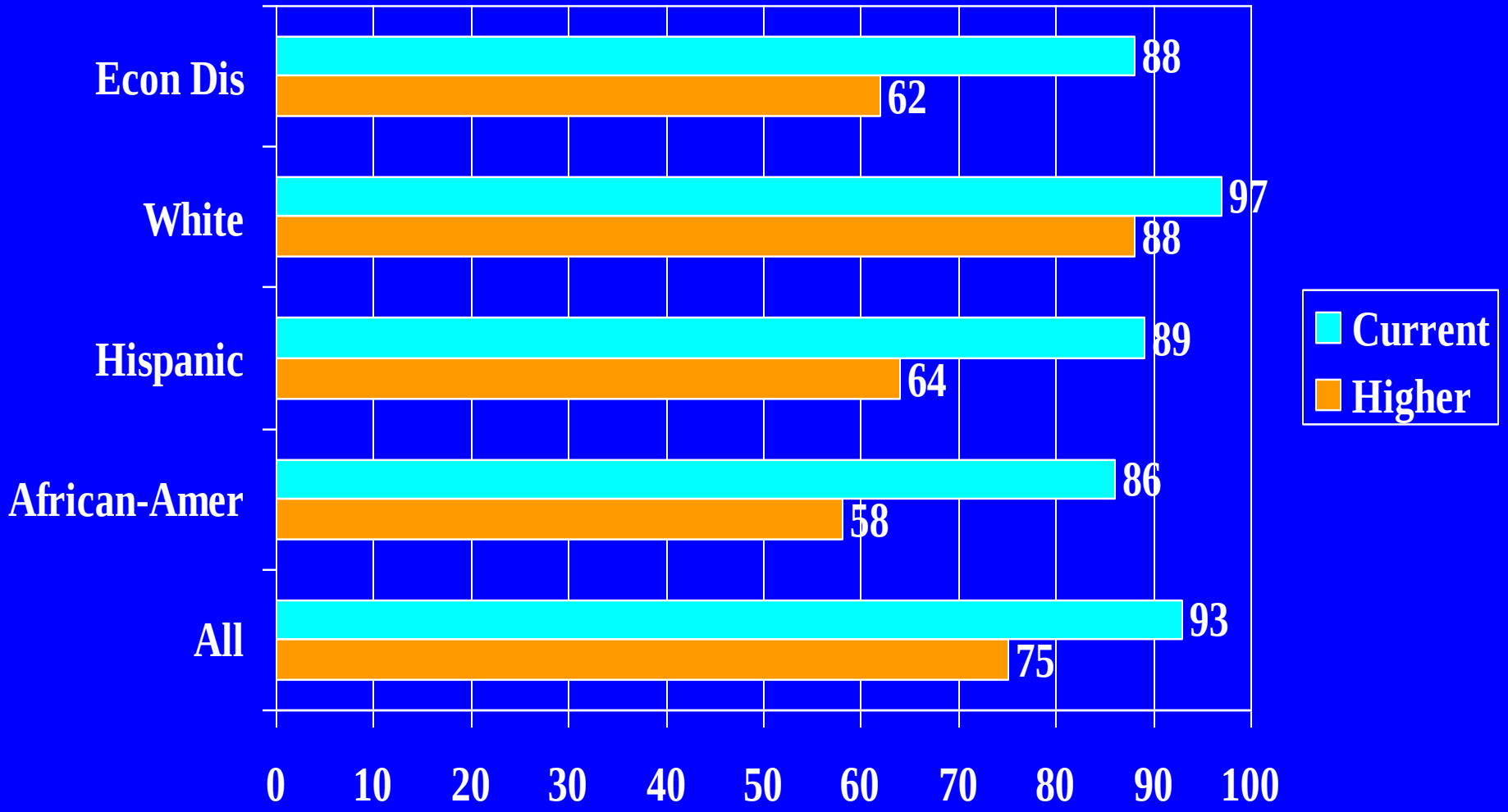
Continuous Improvement



From ILT to ILD, Moving Texas Forward 2002

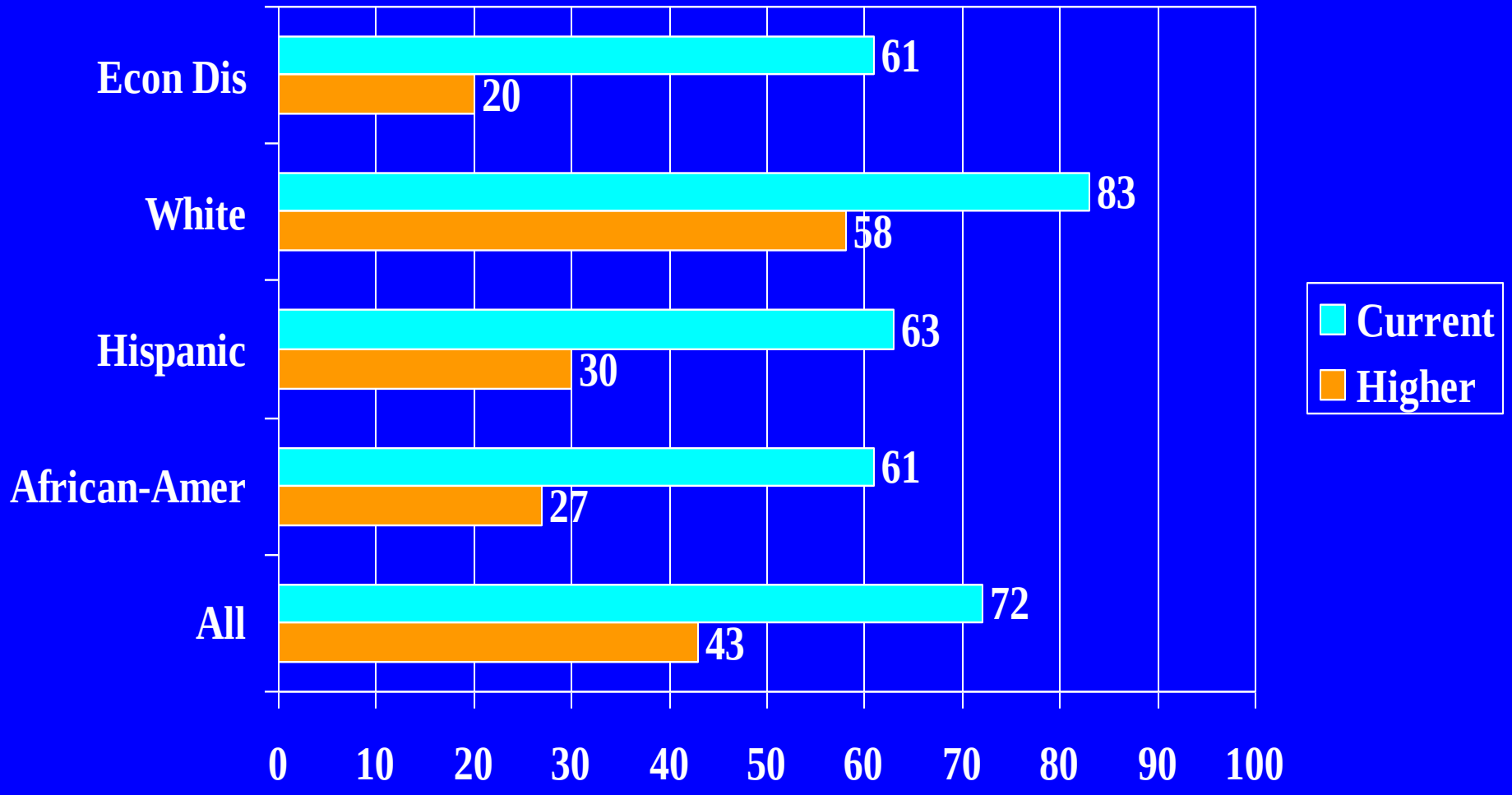
Comparison of TAAS Spring 2002 Results

at Current and Higher Standards on TEKS-Based Tests Grade 8 Science

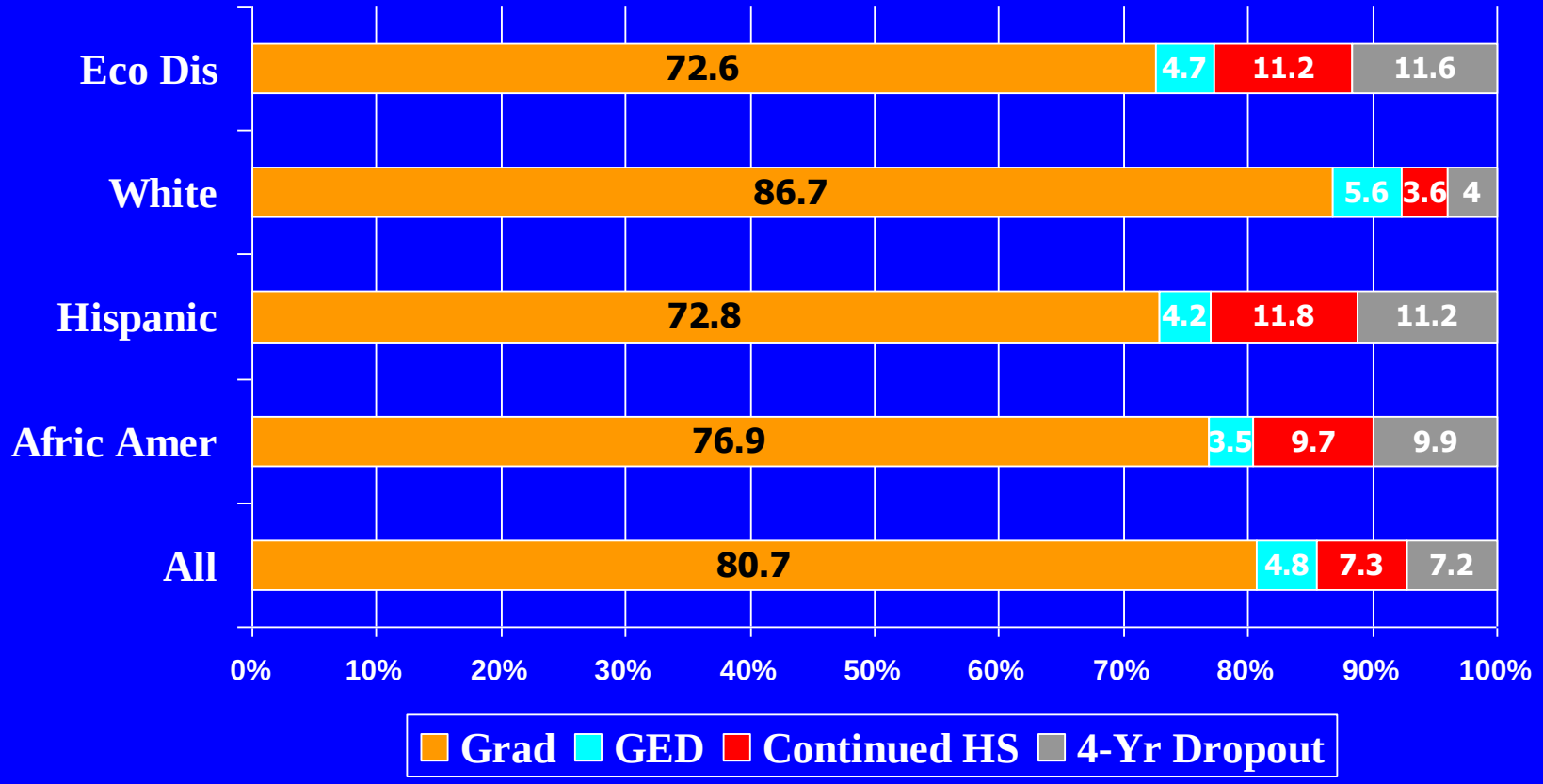


Comparison of TAAS Spring 2002 Results

at Current and Higher Standards on TEKS-Based Tests Grade 8 ALL TESTS



State Class of 2000 Completion Rates



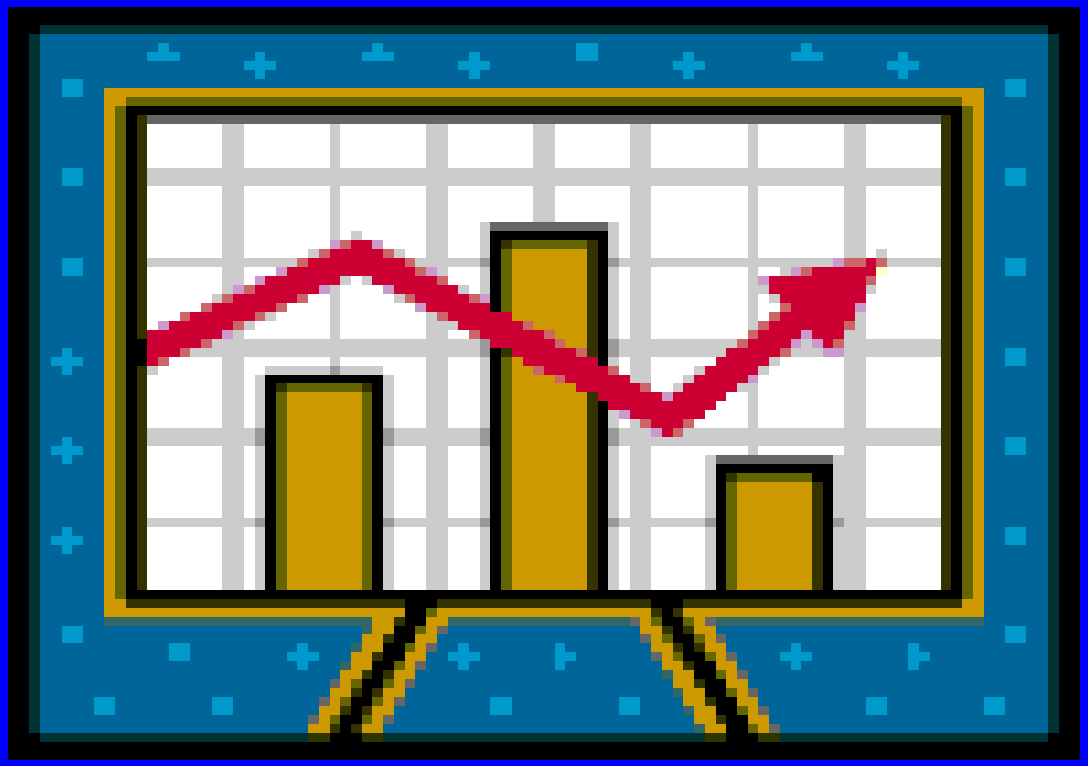
Testing calendar:

February 25	**Gr. 4 & 7 Writing** **Gr. 9 Reading** **Gr. 10 & 11 English Language Arts**
March 4	**Gr. 3 Reading**
April 29	**Gr. 3-8 Mathematics** **Gr. 11 Mathematics**
April 30	**Gr. 3 Reading (Retest)** **Gr. 4-8 Reading** **Gr. 10 Mathematics**
May 1 (Thursday)	**Gr. 9 Mathematics** **Gr. 8, 10, 11 Social Studies** **Gr. 5 Science**
May 2	**Gr. 10, 11 Science**
July 8	**Gr. 3 Reading (Retest)**

A New Standard

- Determined by SBOE
- Three cut scores for all grades and all subjects
- No TLI in science

The content, cognitive level, and context of the new Science Assessments



How were the TAKS Objectives chosen?

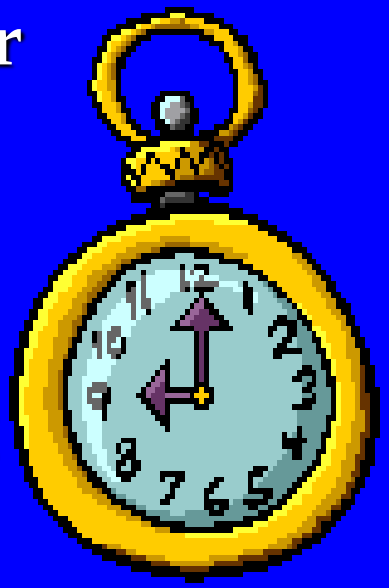
- TEKS: Non-negotiable!
  - Adopted by State Board of Education
  - Part of a three year process that had extensive teacher input and review of thousands
- National, statewide, educator and science expert Committees
  - Chose “most essential” TEKS
- Survey results
  - Sent to every educator
  - Sent to every campus
  - Went through extensive revision and review

TAKS Objective Statements

- Umbrella statements that serve as headings where student expectations from the TEKS can be grouped
- Broad statements useful in reporting to parents and educators
- NOT translations or rewordings of the TEKS

All TEKS are Required

- The TEKS outline what all students must know and be able to do K-8 and for high school science courses
- Minimize the teaching of what is no longer important
- Maximize the opportunities for teaching the TEKS in varied contexts
- Some Student Expectations are not tested, yet they may be critical for student understanding



The Role of Untested TEKS in Student Understanding

Knowledge and Skill Statement

- **The student knows the significance of plants in the environment. The student is expected to:**

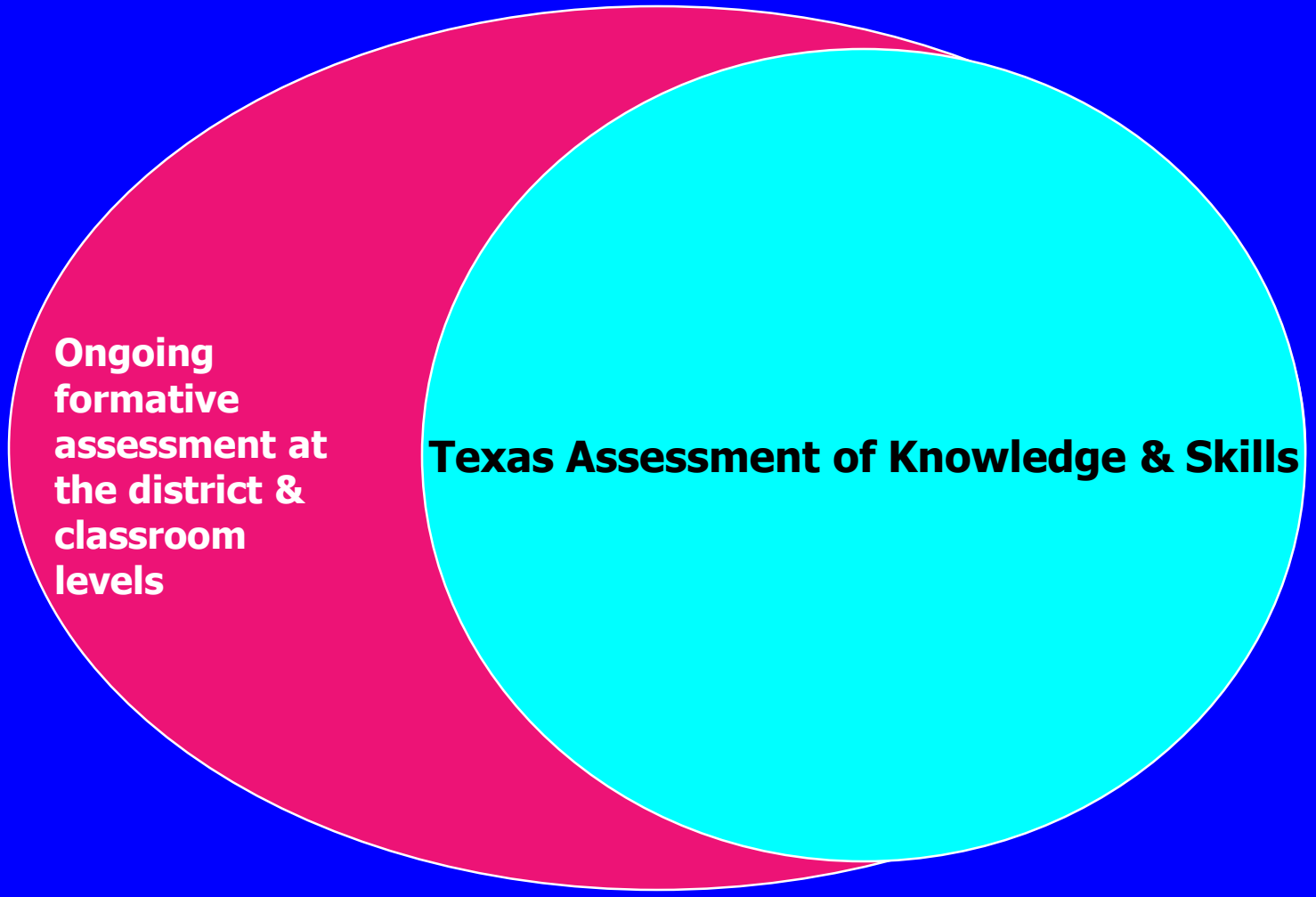
Not Tested

- **13 (B) "survey and identify methods of reproduction,growth, and development of various types of plants"**
- **…But students must know this to understand this:**

Tested

- **13(A) "evaluate the significance of structural and physiological adaptations of plants to their environments."**

Texas Essential Knowledge & Skills



←----------Student learning----------→

The Texas Essential Knowledge and Skills (TEKS) provide the framework for teaching and learning.

Classroom Instruction aligned to the TEKS

Curriculum: Aligned with the TEKS

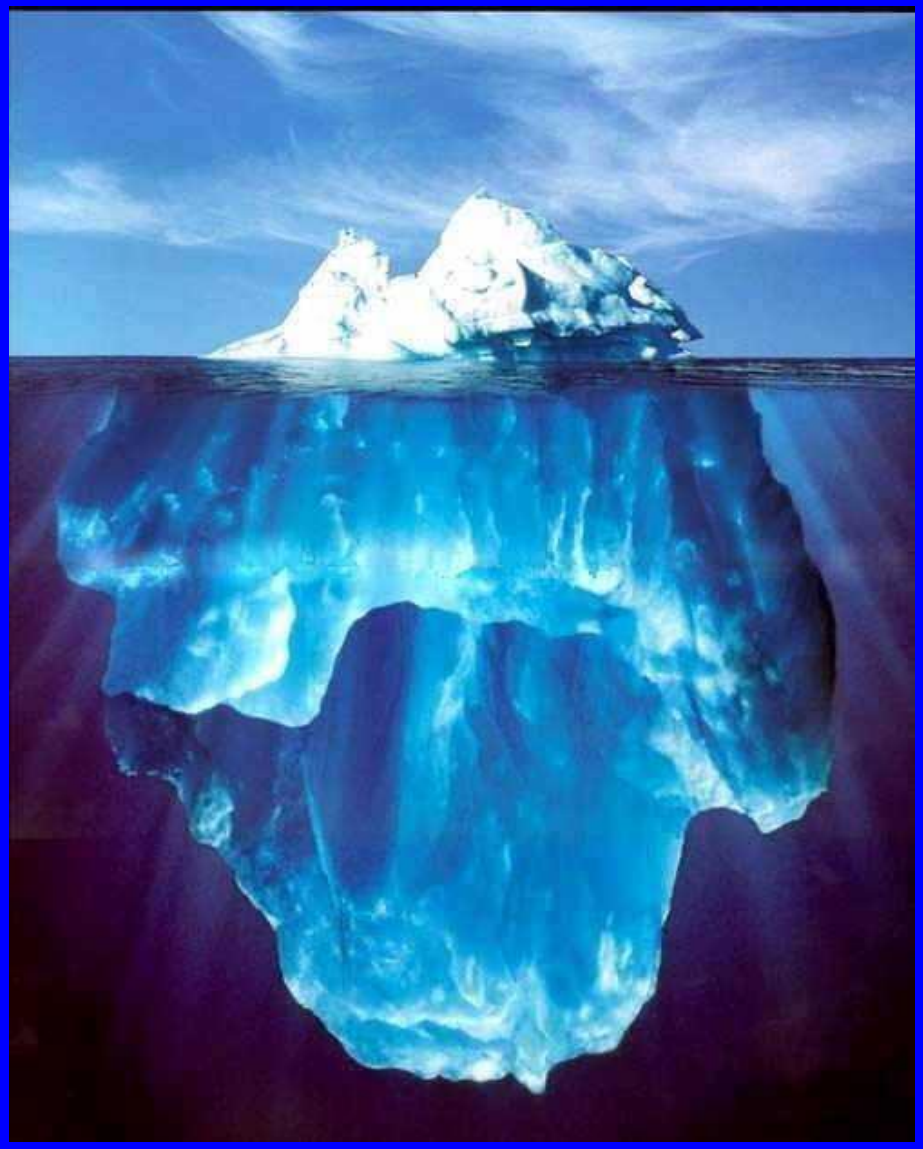
Textbooks And Instructional Materials aligned to the TEKS

PDAS and ExCET aligned with TEKS

Assessment: Aligned with the TEKS

The Elementary Science TAKS Test given at Grade 5

- Given at Grade Five
- Not just a 5th grade science test: includes TEKS from the 2nd, 3rd, 4th, and 5th grades
- Integrates life, earth and physical sciences

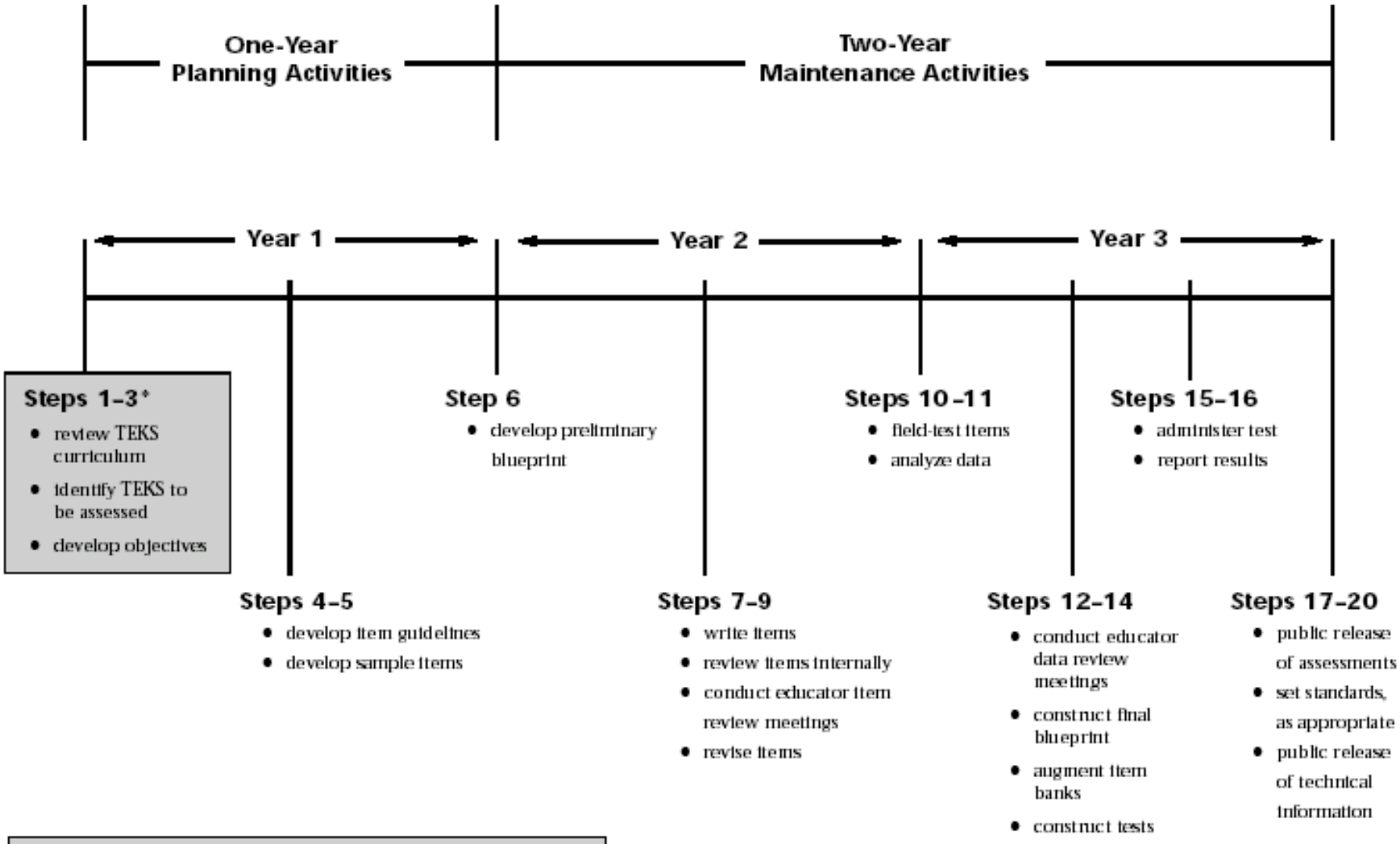


*Page 7 of Information booklet

Elementary Science TAKS Blueprint

- 40 Item Test
- 4 Objectives
- Objective 1: Nature of Science—13 items
- Objective 2, 3, 4 (Life, Earth and Physical Science:
  - 9 items each

Test Development Process



* Focus of Development Activities from January–August, 2000

Secondary Science TAKS Blueprints

- Grade 10: 55 Items
- 5 Objectives
- Objective 1: Nature of Science—17 Items
- Objective 2&3: Biology—11 Items each
- Objective 4&5:

Chemistry and Physics

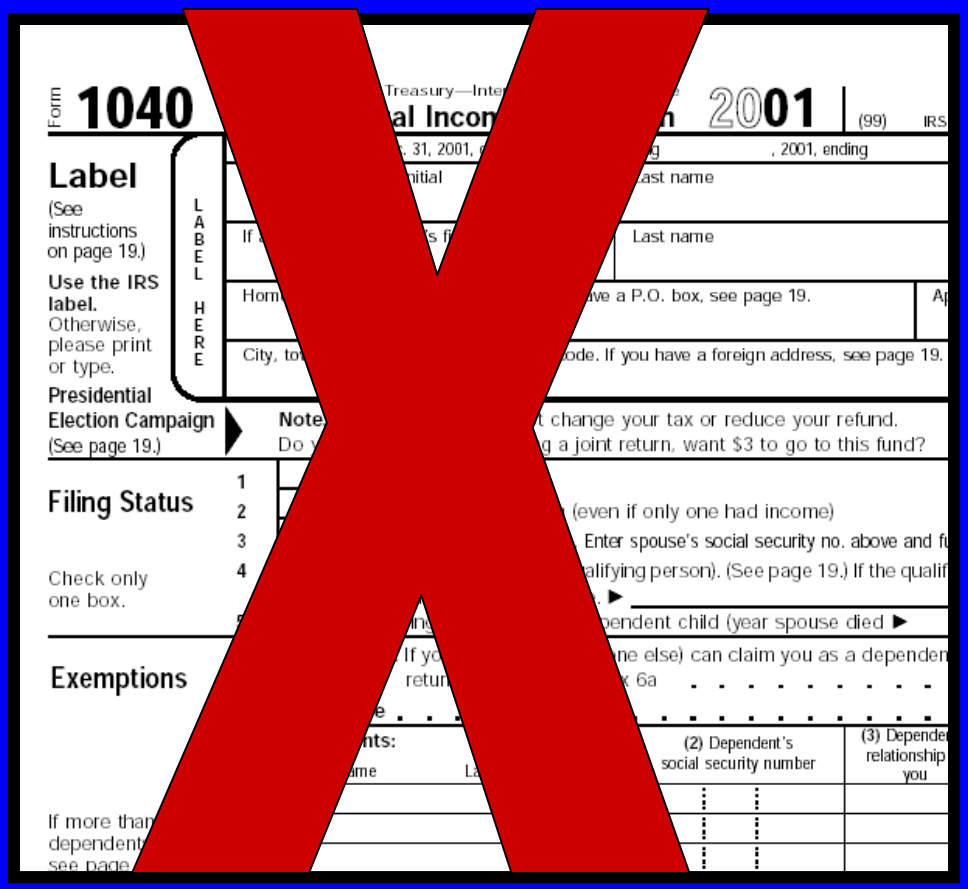
8 items each

- Grade 11: 55 Items
- 5 Objectives
- Objective 1: Nature of Science—17 Items
- Objective 2&3: Biology—8 Items each
- Objective 4&5:

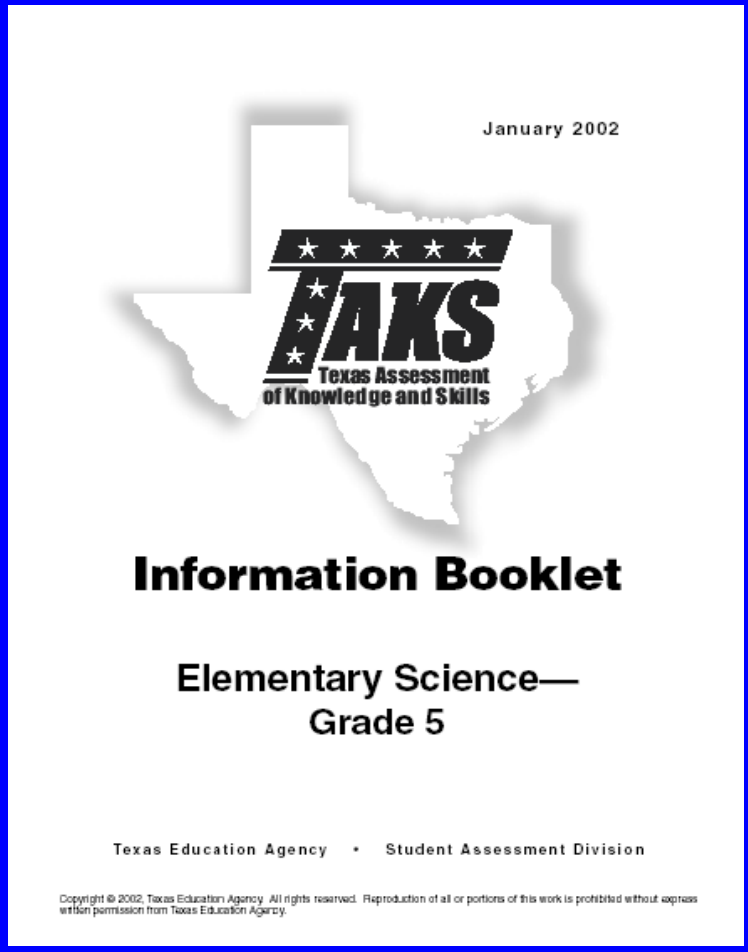
Chemistry and Physics

11 items each

Tax Prep



TAKS Prep



TAKS Information Booklets

Provide Critical Information:

- ✓ Clarification about how to read the TEKS
- ✓ Overview of the subject area in context of the TEKS
- ✓ Objectives and TEKS student expectations
- ✓ Reasons each objective and TEKS student expectation are critical to student success
- ✓ Additional information about an objective to understand how it might be assessed
- ✓ Sample items, reading selections, and writing prompts showing how objectives might be assessed

SCIENCE TAKS—

Students will be provided with:

At all levels:

- **Metric Ruler: a 20 cm cardboard ruler will be provided for metric measurement**

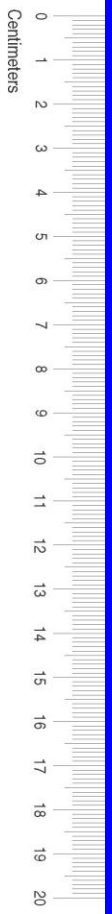
At Grade 10 and Grade 11 Exit Level :

- **Periodic Table: a standard periodic table will be included with test materials**
- **Formula Chart: a chart with standard formulas will be included**

FORMULA CHART
for Grades 10–11 Science Assessment

Density = $\frac{\text{mass}}{\text{volume}}$	$D = \frac{m}{v}$
$\left(\begin{matrix}\text{heat gained or}\\ \text{lost by water}\end{matrix}\right) = \left(\begin{matrix}\text{mass in}\\ \text{grams}\end{matrix}\right)\left(\begin{matrix}\text{change in}\\ \text{temperature}\end{matrix}\right)\left(\begin{matrix}\text{specific}\\ \text{heat}\end{matrix}\right)$	$Q = (m)(\Delta T)(C_p)$
Speed = $\frac{\text{distance}}{\text{time}}$	$s = \frac{d}{t}$
Acceleration = $\frac{\text{final velocity} - \text{initial velocity}}{\text{change in time}}$	$a = \frac{v_f - v_i}{\Delta t}$
Momentum = mass × velocity	$p = mv$
Force = mass × acceleration	$F = ma$
Work = force × distance	$W = Fd$
Power = $\frac{\text{work}}{\text{time}}$	$P = \frac{W}{t}$
% efficiency = $\frac{\text{work output}}{\text{work input}} \times 100$	$\% = \frac{W_O}{W_I} \times 100$
Kinetic energy = $\frac{1}{2}$(mass × velocity^2)	$KE = \frac{mv^2}{2}$
Gravitational potential energy = mass × acceleration due to gravity × height	$GPE = mgh$
Energy = mass × (speed of light)^2	$E = mc^2$
Velocity of a wave = frequency × wavelength	$v = f\lambda$
Current = $\frac{\text{voltage}}{\text{resistance}}$	$I = \frac{V}{R}$
Electrical power = voltage × current	$P = VI$
Electrical energy = power × time	$E = Pt$

Constants/Conversions
g = acceleration due to gravity = 9.8 m/s^2
c = speed of light = 3×10^8 m/s
speed of sound = 343 m/s at 20°C
1 wave/second = 1 hertz (Hz)
1 calorie (cal) = 4.18 joules
1000 calories (cal) = 1 Calorie (Cal) = 1 kilocalorie (kcal)
newton (N) = kg m/s^2
joule (J) = Nm
watt (W) = J/s = Nm/s

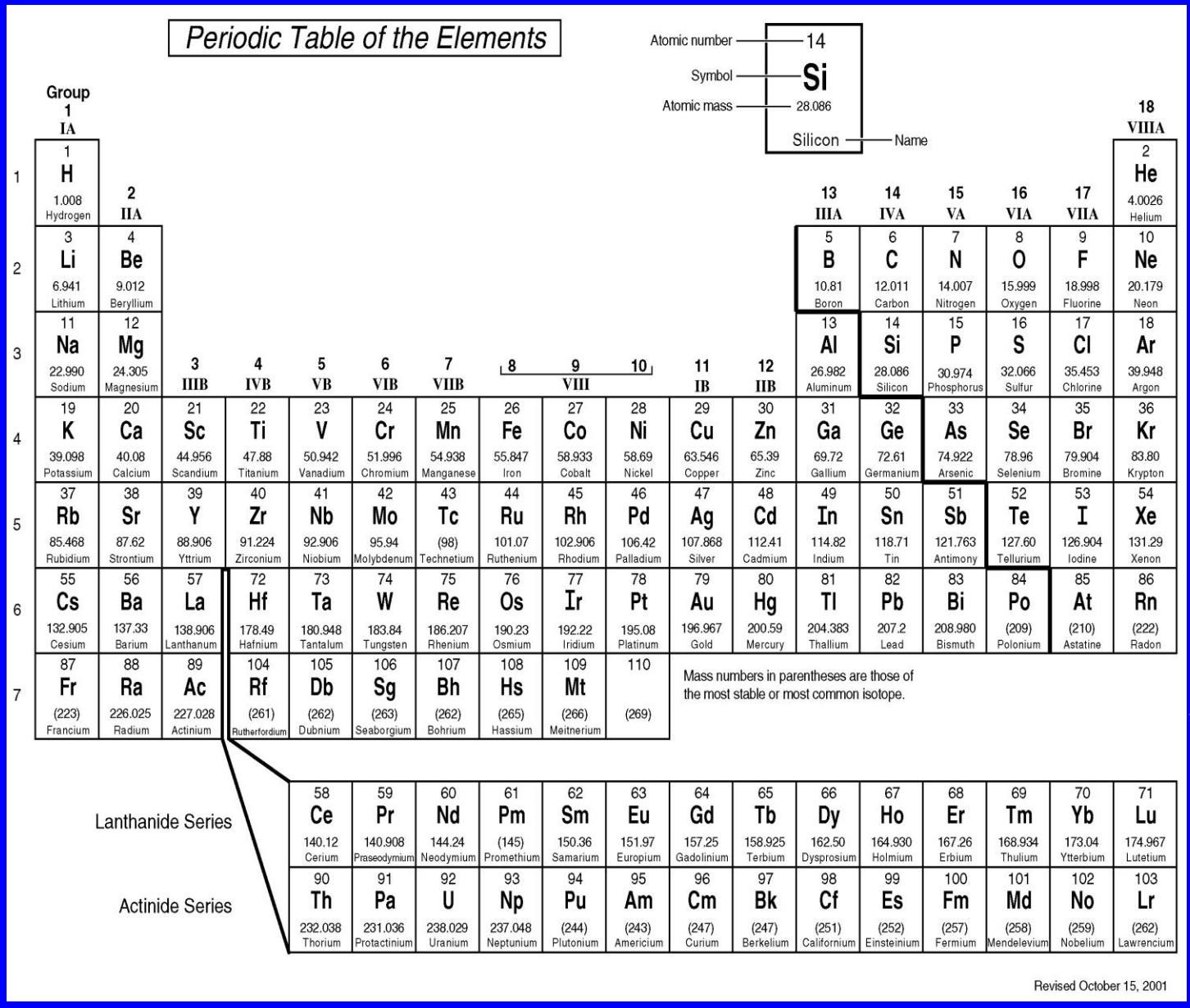


Science TAKS Assesses In metric measurement

Formulas Must be Applied Not just memorized

Measurement Skills

- SI Metric measurement is used on the science assessments (Systeme Internationale)
- Students will be provided with a metric ruler for the science TAKS assessments at all levels
- Use metric rulers that do not begin with “0” at the edge of the ruler but rather begin with “0” indented into the ruler.
- Do not copy the rulers since the calibration may be distorted



The Importance Of The Periodic Table And How it is Arranged Will be Stressed

Calculators on the Science TAKS

- **The purchase of calculators is a local decision.**
- **Science teachers need to be included in school committees that make decisions on the purchase of calculators.**
- **Science students must have access to <u>at least</u> a four function calculator with a square root key.**
- **BEST Practice: Students should use calculators that are compatible with probe ware (Computer Enhanced Labs).**
- **BEST Practice: Students should be using calculators that are consistent with daily instruction for science TAKS at grades 10 &11.**

Texas Education Agency
Mathematics Department
Suggests:

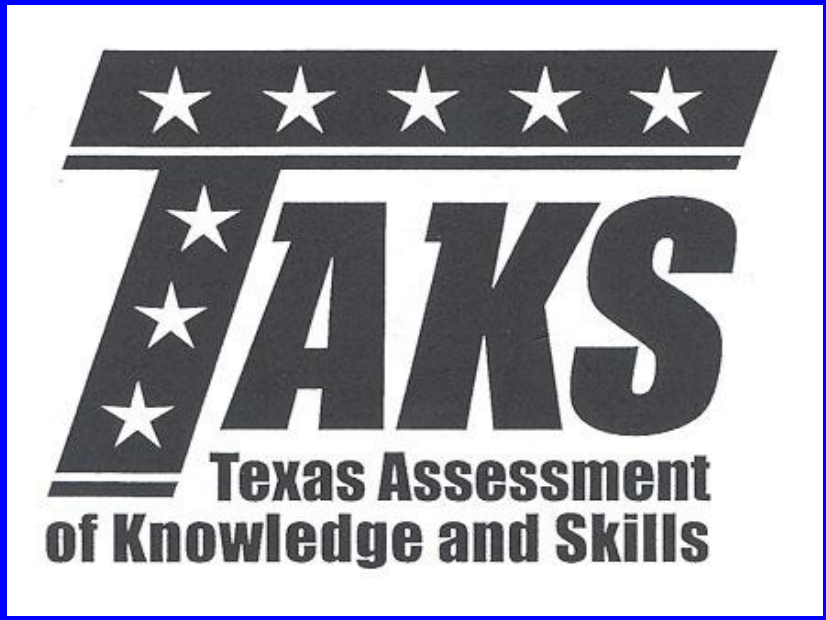
TAKS specifications

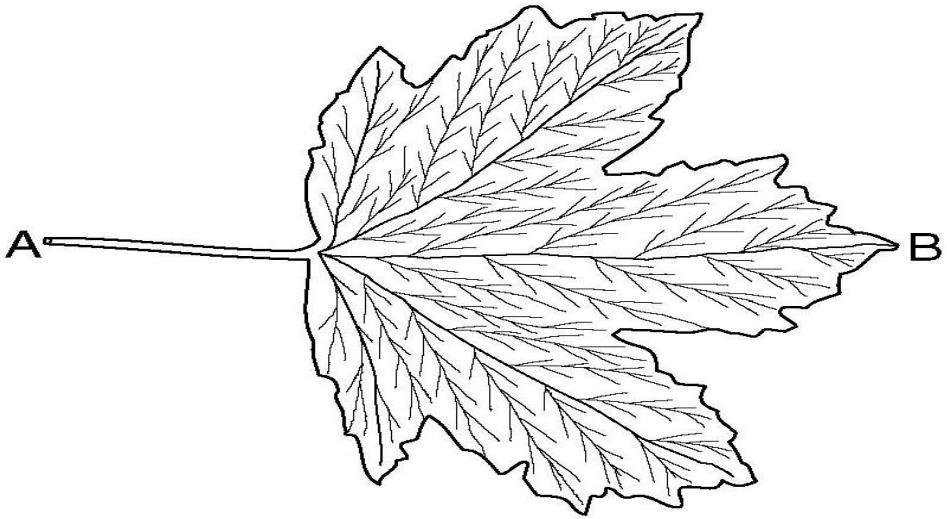
- **Each student must have a graphing calculator during testing. Students may use any graphing calculator except those with typewriter-style keypads (known as QWERTY) or those that can't be erased or deleted prior to assessment.**
- **Hand-held microcomputers or laptop computers may not be used.**

Science and mathematics
Teachers need to coordinate
Calculator Instruction!

TAKS Science Test Format:

- Clear illustrations when needed
- Items aligned with TEKS
- Types of questions:
  - Multiple Choice
  - Cluster Items
  - Griddable Items



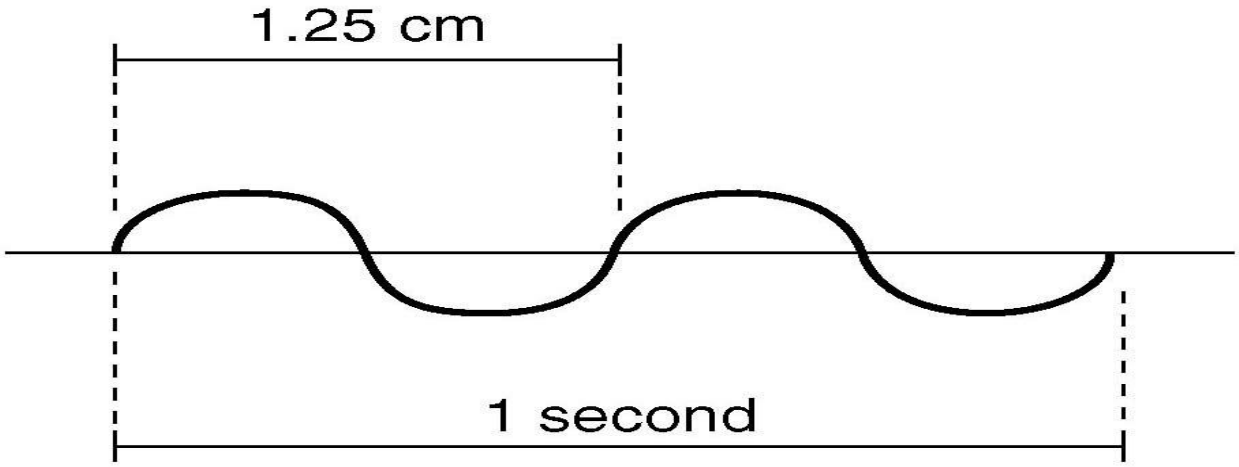


2 Using the centimeter ruler, measure the length of this leaf from Point A to Point B to the nearest centimeter. Record and bubble in your answer on the answer document.

		6	.
0	0	0	
1	1	1	
2	2	2	
3	3	3	
4	4	4	
5	5	5	
6	6	●	
7	7	7	
8	8	8	
9	9	9	

Science TAKS Grade 5 Griddable Item

Grade 10 Science TAKS Griddable Item

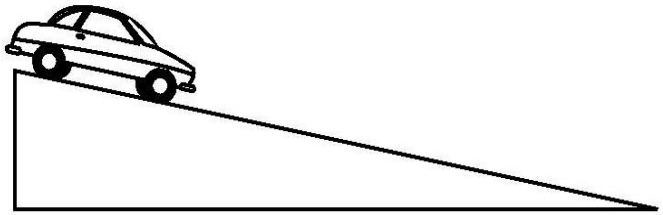


13 What would be the wavelength in centimeters of this wave if its frequency were doubled? Record and bubble in your answer on the answer document.

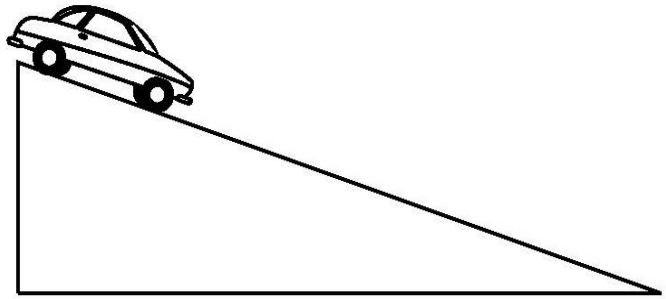
				.	6	2	5
0	0	0	0		0	0	0
1	1	1	1		1	1	1
2	2	2	2		2	●	2
3	3	3	3		3	3	3
4	4	4	4		4	4	4
5	5	5	5		5	5	●
6	6	6	6		●	6	6
7	7	7	7		7	7	7
8	8	8	8		8	8	8
9	9	9	9		9	9	9

Use the information below and your knowledge of science to help you answer questions 17–18.

Science TAKS Grade 5 Cluster Item



Ramp 1



Ramp 2

Students placed two identical toy cars on these wooden ramps. The students let the cars roll down the ramps.

17 This experiment most likely tests the hypothesis that —

A ramps made of wood make cars roll faster

B* the height of the ramp affects the speed of the car

C the speed of the car is determined by tire size

D plastic cars travel faster than metal cars

18 What causes these cars to move down the ramps?

A Electricity

B* A force that pulls

C Magnets

D A force that lifts

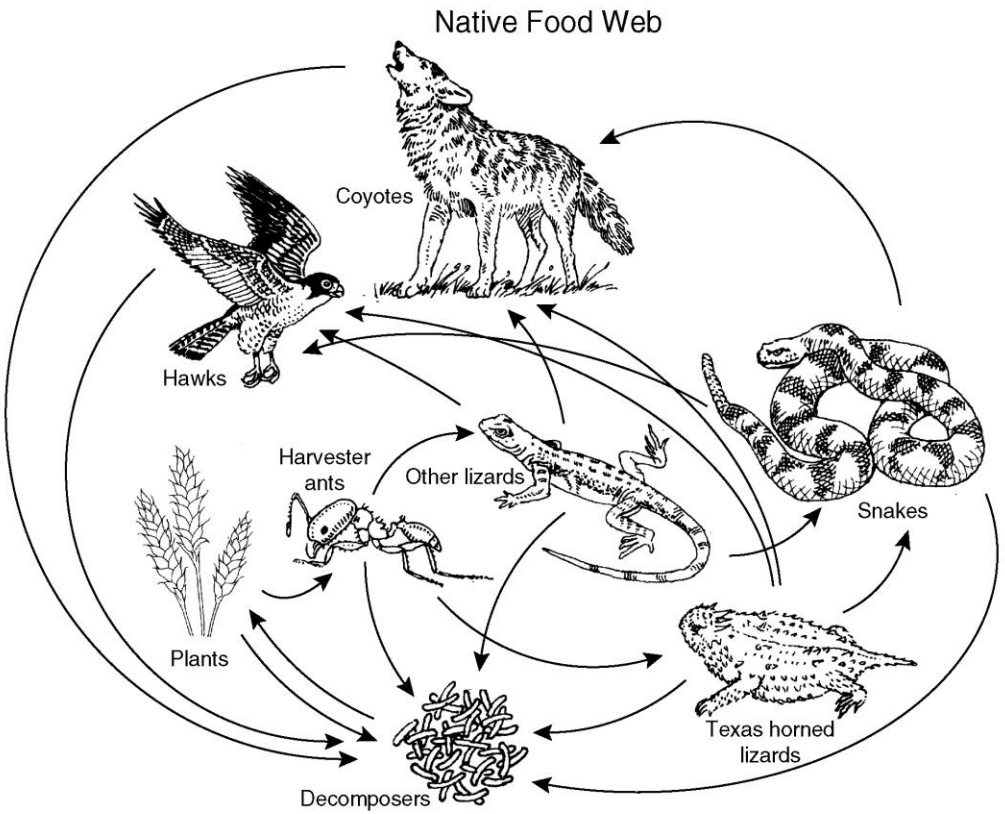
Use the information below and your knowledge of science to answer questions 16–18.

The Texas Horned Lizard

From the 1950s to the 1970s, the Texas horned lizard population decreased dramatically. Three possible reasons have been given for this decline. First, Texas horned lizards became popular pets in Texas and Oklahoma and were overharvested. Second, expansion of Texas and Oklahoma cities led to the loss of the lizard's habitat. Third, there was a decline in the number of harvester ants, the horned lizard's main food source.

The decline of the harvester ants is due in part to the arrival of fire ant populations into the United States from South America in the early 1900s. The aggressive, omnivorous fire ants migrated west and harmed many native populations in their path, including harvester ants. As the harvester ant population decreased, it became more difficult for the Texas horned lizard to find adequate food.

The Texas horned lizard does not feed on fire ants. It is possible that the Texas horned lizard does not recognize the fire ants as a food source. Fire ants do not provide the nutrients that the native harvester ants provide. The Texas horned lizard requires formic acid from harvester ants to help neutralize a base that the horned lizard produces.



16 According to this food web, the relationship between Texas horned lizards and other lizards would be described best as —

A* competitive

B predatory

C parasitic

D mutualistic

Grade 10 Science TAKS Cluster Item

17 Like most invasive species, fire ants have successfully migrated into new territories because of —

A genetic drift

B advantageous coloration

C* lack of population control

D mutation of genes

18 Texas horned lizards must eat a large number of harvester ants each day. The formic acid in the harvester ants helps neutralize a base that the lizard produces. The products from this reaction would be —

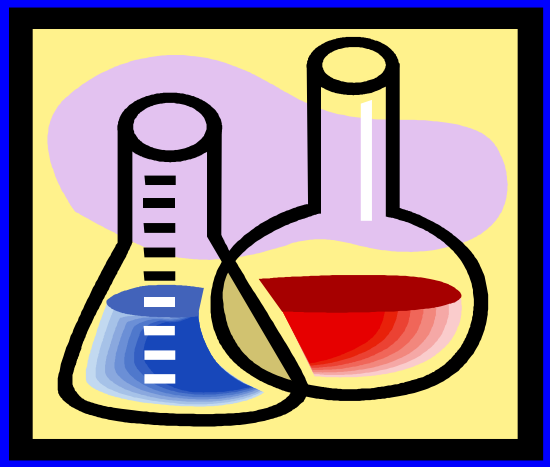
A an acid and a base

B* a salt and water

C an acid and water

D a salt and a base

Please Note, TAKS will:



- Be Totally based on the TEKS
- Not use proper names
- Employ cognitively appropriate vocabulary
- Be written in “active” voice
- Not use bolded words such as:
  - Not, But, Except

The Nature of Science*

- Students actually do some of the activities of a scientist
  - Use safe practices in the classroom and in the field (3.1, 4.1,5.1)
  - Scientific Methods 5.2
    - Inquiry learning - observations, collect data, draw conclusions (5.2b)
    - Construct graphs (5.2e)
    - Communicate findings (5.2d)
  - Critical thinking (3.3 – 5.3)
  - Use scientific tools (5.4)

*Page 11-12 of Information booklet

Science TAKS
Grade 5
Objective 1
Nature of Science

Models and
Earth Science Connection

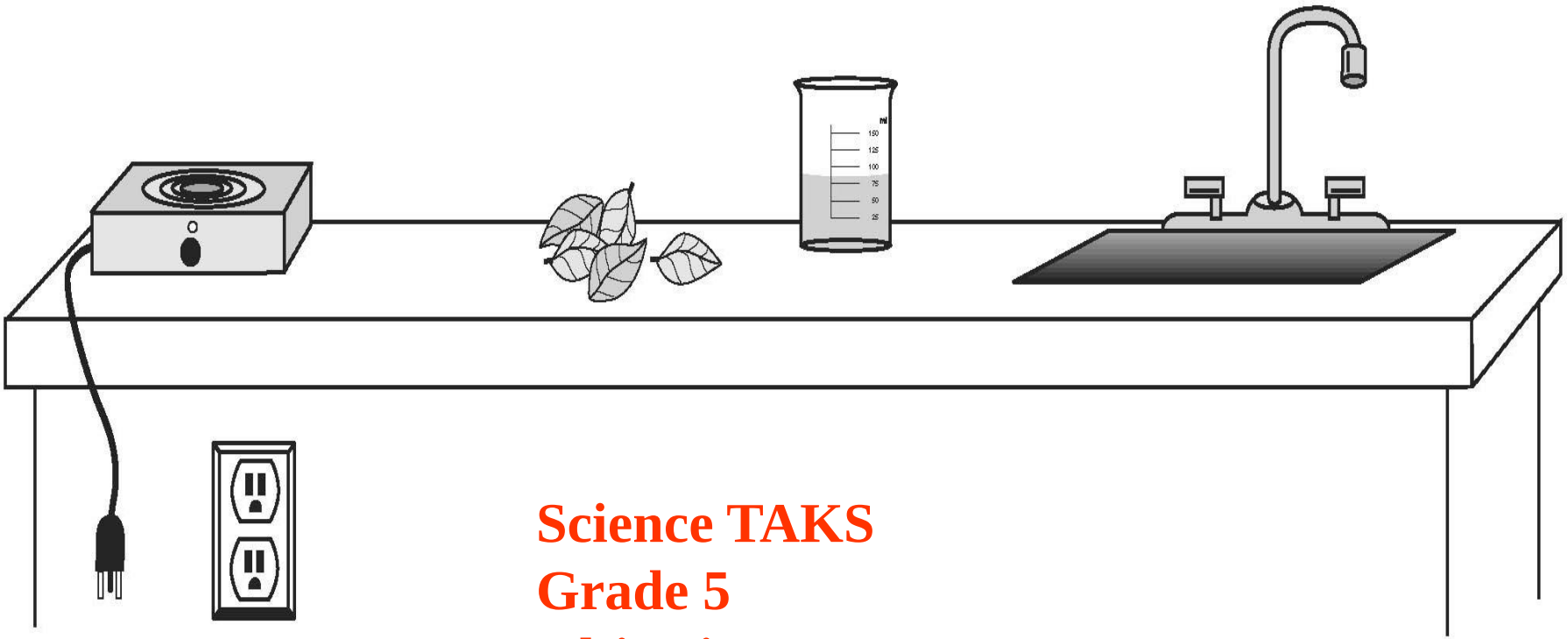
3 The drawing shows a model of the Earth, moon, and sun system made from foam balls. What is one way to make this model more accurate?

A Use wooden blocks instead of foam balls

B* Make the sun larger than the Earth and the moon smaller

C Move the sun closer to the Earth

D Change the order of the foam balls to be moon, sun, Earth



Science TAKS
Grade 5
Objective 1

1 When entering the classroom, a student sees a lab setup. What should the student do next?

A Turn on the water faucet

B Cut the leaves into small pieces to prepare for the experiment

C Organize the lab equipment so everything is ready to begin

D* Wait for the teacher to give instructions

Theories for Review and Critique (3.3a)

- Interdependence of Living Things
- Germ Theory
- Extinction of Dinosaurs
- Humans as Only Species using Tools
- Gravity

Promotional Materials (4.3b)

- Draw inferences based on promotional materials for products or services
- Intent: students will apply their critical thinking skills to real-world situations
- Example: ads for toys-take measurements given and draw actual size; the effect of sugar on teeth, etc.

Charts and Graphs and Tables

- **Table**
  numerical display

- **Chart**
  a diagram or pictorial representation of information

- **Graph**
  contains an x and y axis; shows relationship between two variables (young grades may use pictographs)

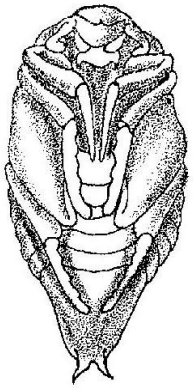
Objective 2

- The student will demonstrate an understanding of the life sciences.
  - 5.10-inherited and learned likenesses
  - 5.9-adaptations may increase survival
  - 5.6-change may occur in cycles
  - 3.8 & 2.9-basic needs of organisms
  - 5.5-a system is a collection of cycles
  - 4.6-change can create patterns

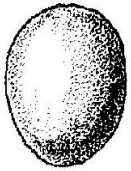
Highlights of Objective 2

- ✓ Inherited vs. learned traits
- ✓ Adaptations and the survival of a species
- ✓ Interactions within ecosystems
- ✓ Unique niche

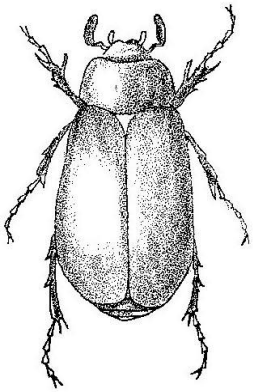
*Page 17-18 of Information booklet



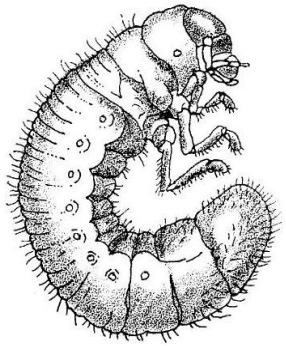
Q



R



S



T

(Pictures not drawn to scale)

5 The pictures show the stages in the life cycle of a beetle. What would be the correct sequence for the development of the beetle?

A Q, S, R, T

B* R, T, Q, S

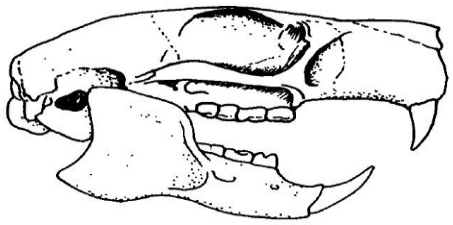
C S, R, Q, T

D T, S, R, Q

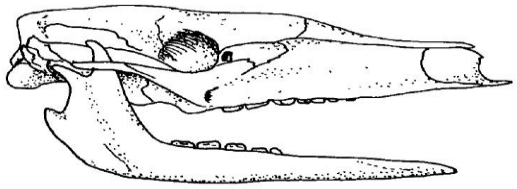
Science TAKS
Grade 5
Objective 2
Life Science

6 Which skull belongs to an animal best adapted for catching and eating fish?

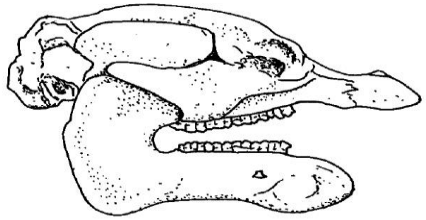
A



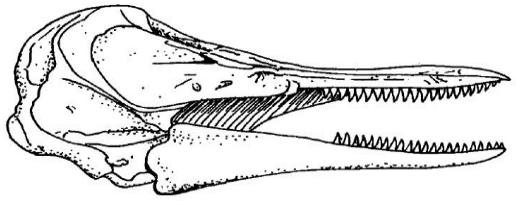
B



C



D*

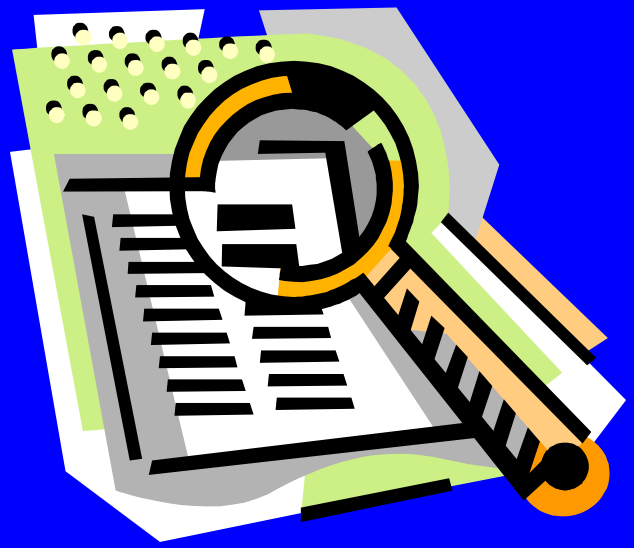


Science TAKS
Grade 5
Objective 2
Life Science

Concept Tested: Adaptations

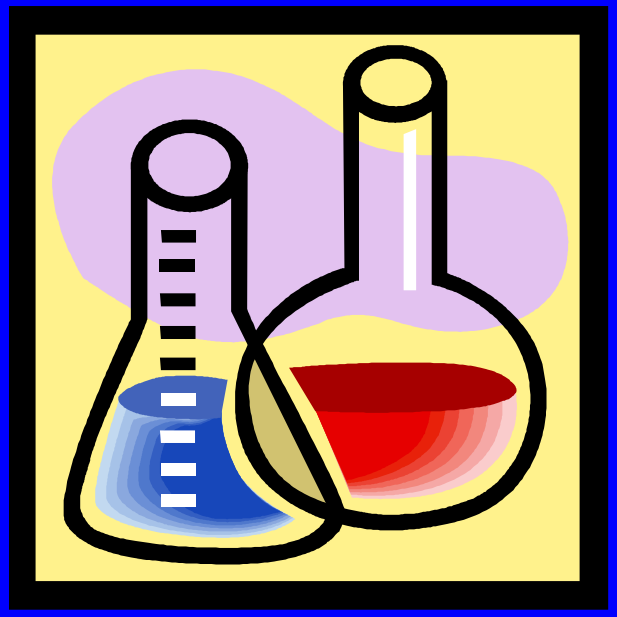
Carnivores have Sharp teeth compared to Herbivores which have Smooth teeth

Objective 3



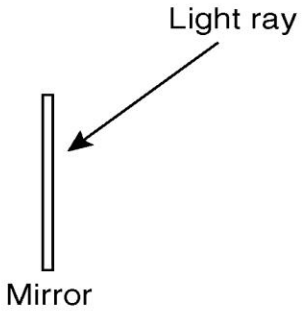
- **The student will demonstrate an understanding of the physical sciences.**
  - **5.8-forms of energy**
  - **5.7-properties of matter**
  - **3.6-force causes change**
  - **5.5-a system is a collection of cycles**
  - **4.6-change can create patterns**

Highlights of Objective 3



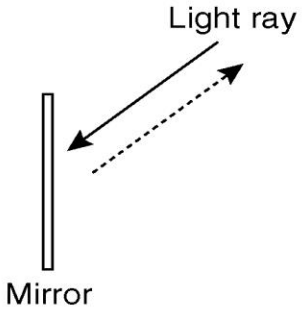
- Experiment with a variety of energy forms:
  - Light
  - Electricity
  - Solar
  - Heat
- Classification & investigation of the various forms of matter
  - Solid, liquid, gas
  - Mixtures
- Forces cause change

*Page 22 of Information booklet

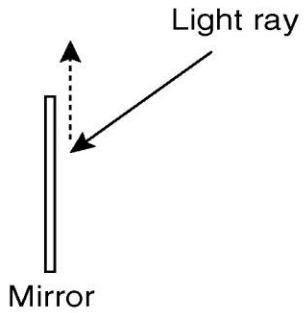


7 The diagram above shows a light ray approaching a mirror. Which of the diagrams below shows how the light travels after striking the mirror?

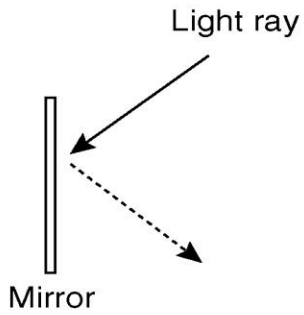
A



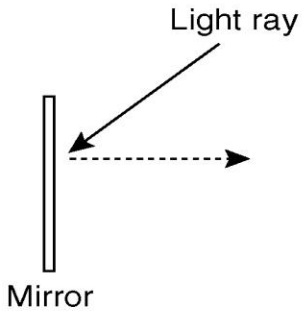
C



B*

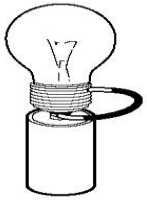


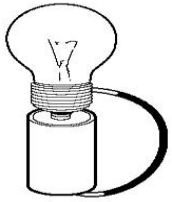
D

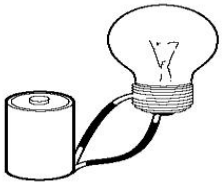


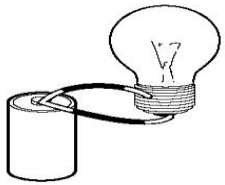
Science TAKS Grade 5 Objective 3 Physical Science

8 Which of these pictures shows the way to use a battery to light a bulb?

A 

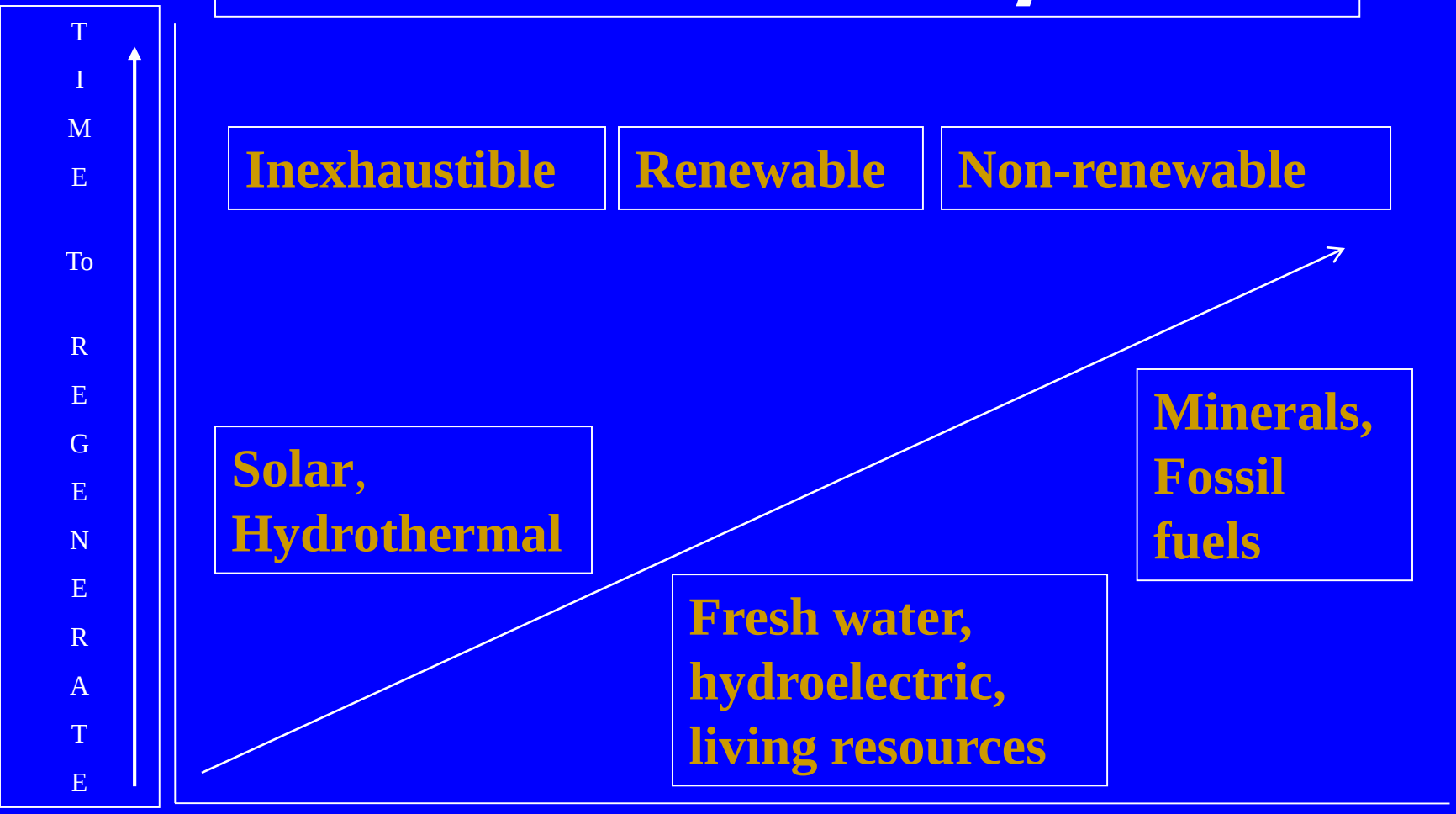
B* 

C 

D 

Science TAKS
Grade 5
Objective 3
Physical Science

Resource Examples



Objective 4

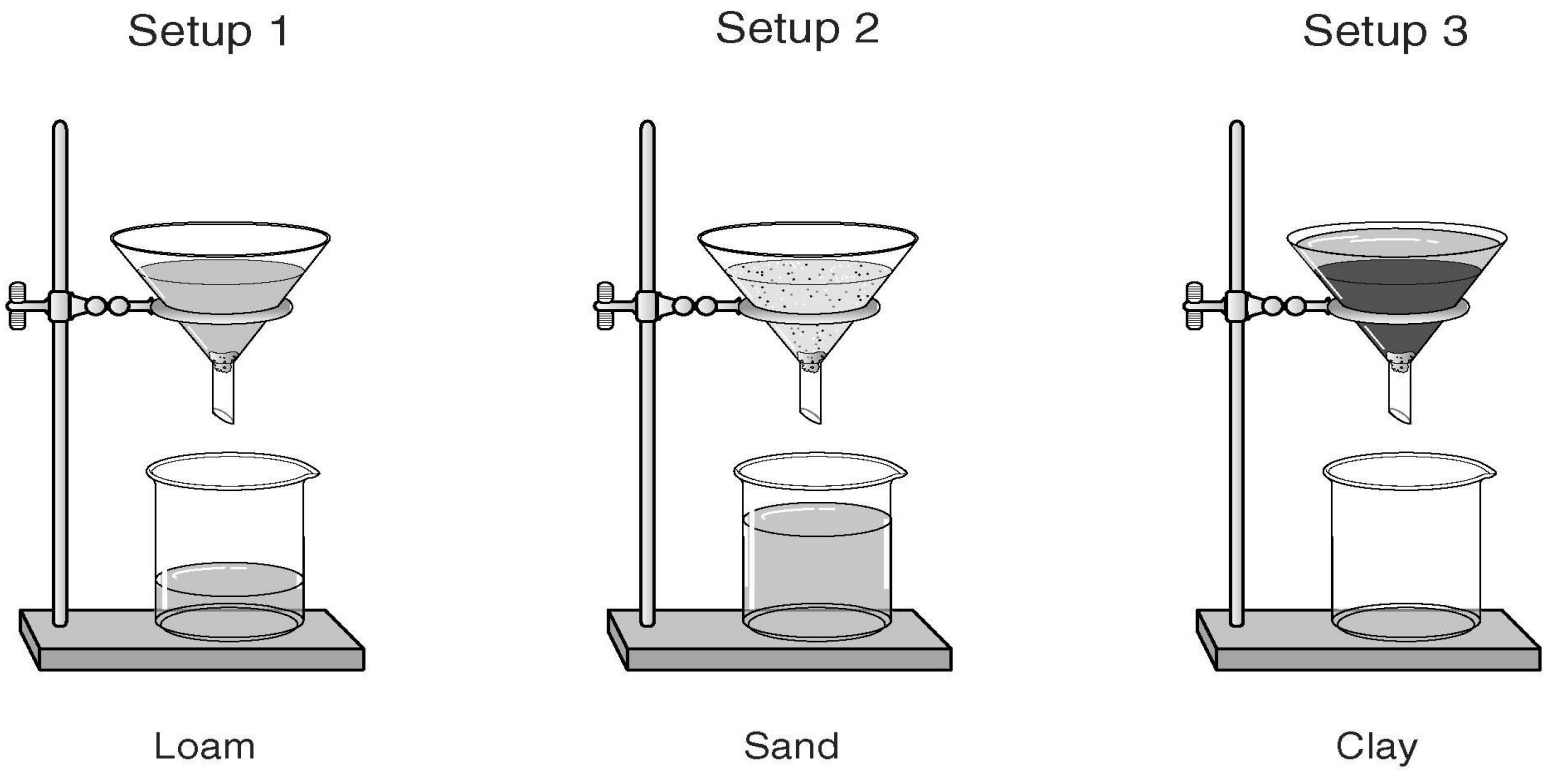
- **The student will demonstrate an understanding of the earth sciences.**
  - **5.12-what makes land forms, earth & moon characteristics**
  - **4.11-soil property, oceans/land,suns energy**
  - **3.11-inexhaustible,non&renewable resources, sun characteristics**
  - **5.11-the past affects the present and future**
  - **5.6-some change occurs in cycles**
  - **5.5-a system is a collection of cycles**
  - **4.6-change can create patterns**

Natural World

Highlights of Objective 4

- ✓ The importance of the nitrogen, water, and carbon cycles and how the influence living things
- ✓ Properties of earth materials
- ✓ Renewable, nonrenewable, & inexhaustible resources

*Page 27 of Information booklet



12 Three soil samples were tested to see how much water each could hold. The same amount of water was added to each funnel of soil. Very few plants would probably grow in the clay because the water would —

A* fail to reach the roots of the plants

B become too cloudy

C run through the soil too quickly

D become poisonous to the plants

Science TAKS—Grade 5
Objective 4: Earth Science

GRADE 10 SCIENCE TAKS

TAKS OBJECTIVES:	KS's	SE's
Science Processes:		
• 1. The Nature of Science	3	7
Science Concepts:		
• 2. Biological Concepts	4	6
• 3. Biology Ecological Concepts	4	6
• 4. IPC Chemistry Concepts	3	6
• 5. IPC Physics Concepts	3	6
» TOTAL	17	31

Bracketed items: Critique, promotional materials

Grade 10 Science TAKS Objective 1--Nature of Science (Biology and IPC process skills)

- 40% field and Lab
  - TEXAS SAFETY HANDBOOK
- Scientific methods
- Critical thinking skills and scientific problem solving

Grade 10 Science TAKS

Objective 2—Organization of Living Systems (Biology Concepts)

- **Bio 4(B) Cellular processes**
- **Bio 6(A,C,D) Genetics**

  DNA, traits, mutations, genetic variations
- **Bio 8 (c) Classification**
- **Biology 10(A)Living Systems**

  systems in organisms

Grade 10 Science TAKS

Objective 3—Interdependence of Organisms and the Environment (Biology)

- **Bio 4 (C,D) Cell structure and function**

  Diseases caused by viruses, diseases, bacteria
- **Bio 7 (B) Biological evolution**
- **Bio 12 (B,E) Ecosystems**
  - **Predation, parasitism, commensalism, and mutualism**
  - **Food chains, food webs, and food pyramids**
- **Bio 13 (A) Plants**

Grade 10 Science TAKS
Objective 4 (IPC)--Structures and Properties of Matter

- **IPC 7 (A,E) matter and its components**
  - **Fluids, density, viscosity, and buoyancy**
  - **Classify matter as elements, compounds, or mixtures***
- **IPC 8 (A,C) changes in matter**
  - **Physical and chemical changes**
  - **Law of conservation of mass**
- **IPC 9 (A,D) Solution chemistry**
  - **Water structure and function**
  - **Solubility factors, temperature, pressure, nature of solute and solvent**

Only in TAKS Grade 10 Science

Grade 10 Science TAKS Objective 5--Motion, Forces, and Energy (IPC)

- **IPC 4 (A,B) Force and Motion**
  - **Calculate speed, momentum, acceleration, work and power**
  - **Newton's Laws and their application**
- **IPC 5 (A) Effects of waves***
- **IPC 6 (A,B,F*) Energy Transformations**
  - **Law of Conservation of Energy**
  - **Movement of heat through solids, liquids, and gases, by convection, conduction and radiation**
  - **Series and parallel circuits***

Only in TAKS Grade 10 Science

GRADE 11 SCIENCE TAKS

TAKS OBJECTIVES:	*KS's*	*SE's*
Science Processes:		
1. The Nature of Science	3	7
Science Concepts:		
2. Biology Concepts	4	7
3. Biology Ecological Concepts	5	8
4. IPC Chemistry Concepts	3	7
5. IPC Physics Concepts	3	7
» *TOTAL*	*18*	*36*

- ***Bracketed Items in grade 11: water as a universal solvent and mechanical advantage changed to input/output***

Grade 11 Exit Level Science TAKS: Objective 1—Nature of Science (IPC and Biology Process Skills)

- 40% field and Lab
  - TEXAS SAFETY HANDBOOK
- Scientific methods-Inquiry
- Critical thinking skills and scientific problem solving

2 Science can be divided into three broad groups: life science, physical science, and Earth science. Which of these topics would most likely involve a knowledge of concepts from all three branches of science?

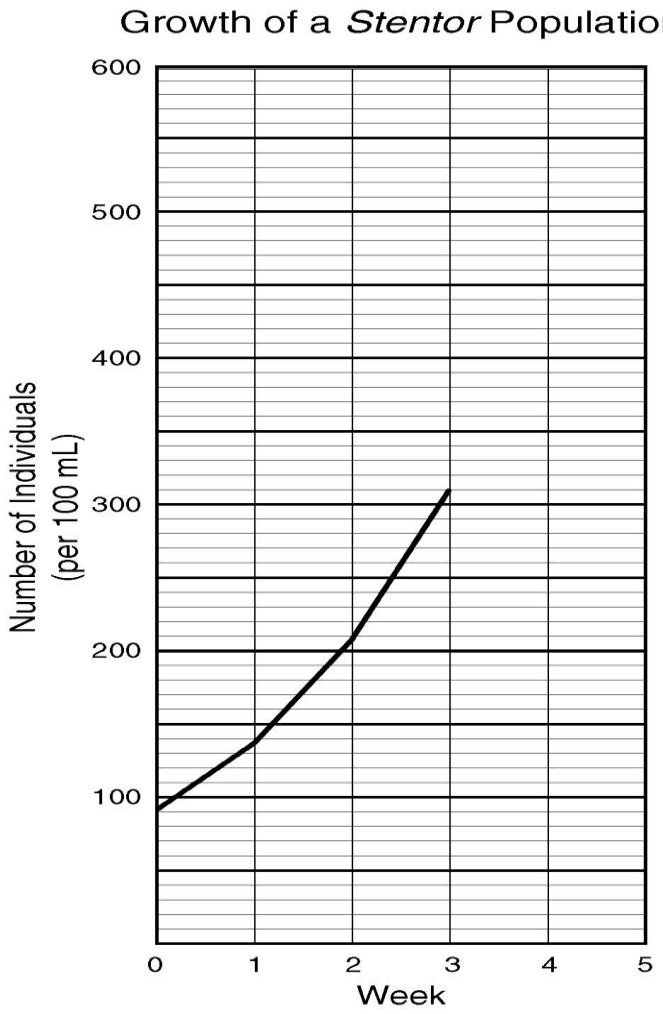
A Patterns of earthquakes

B Aging of stars

C* Weathering of rocks

D Structure of water molecules

Science TAKS
Grade 11
Objective 1
Nature of Science



1 The graph shows the increase in a *Stentor* population. If this trend continues, what will be the approximate size of the *Stentor* population after 4 weeks?

A 325 per 100 mL

B 348 per 100 mL

C 401 per 100 mL

D* 454 per 100 mL

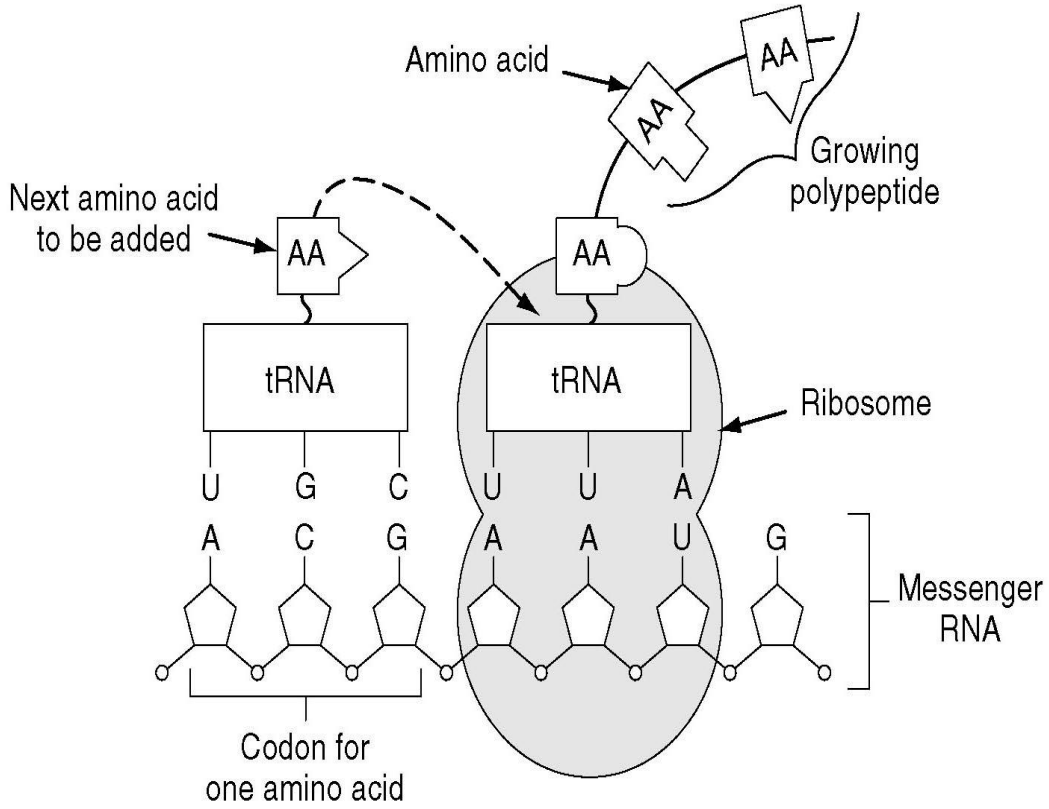
Science TAKS
Grade 11
Objective 1
Nature of Science

Skill: Ability to gain information From graphs

Grade 11 Exit Level Science TAKS: Objective 2—Organization of Living Systems (Biology Concepts)

- Bio 4 (B) Cell Parts and processes
- Bio 6 (A,B,C) Genetics
  - DNA, traits
  - Replication, transcription, and translation*
  - Mutations, genetic variations
- Bio 8 (C) Current Classification
- Bio 10 (A,B*)Living Systems
  - Systems in organisms
  - Interrelationships of organ systems*

**Only in Grade 11 Exit Level TAKS Science*



4 Which cellular function does this model represent?

A Respiration

B* Protein synthesis

C DNA replication

D Photosynthesis

Biology 6(b) Understanding models, Structures, and Molecules involved in A physiological Process (protein synthesis)

Science TAKS

Grade 11

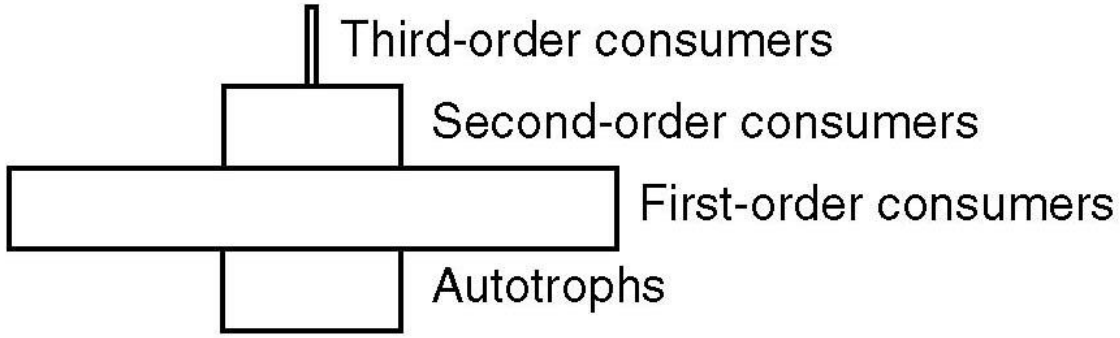
Objective 2

Grade 11 Exit Level Science TAKS:
Objective 3—Organization of Living Systems (Biology)

- Bio 4 (C,D) Cellular processes
- Bio 7 (A*,B) Evolution
  - Evidence of change*
  - Natural selection
- Bio 9 (D) Metabolic processes and energy transfers
  - Flow of matter and energy*
- Bio 12 (B,E) Ecosystems
  - Predation, parasitism, commensalism, and mutualism
  - Food chains, food webs, and food pyramids
- Bio 13 (A) Plants

**Only in Grade 11 Exit Level TAKS Science*

Science TAKS
Grade 11
Objective 3



9 The marine ecosystem represented above is able to thrive with a small autotroph biomass because —

A* autotrophs reproduce rapidly

B first-order consumers are small

C second-order consumers are rare

D third-order consumers eat very little

Students need To see different Examples of Pyramids

Ecosystems remain stable if lower trophic levels are smaller than higher levels

Grade 11 Exit Level Science TAKS:

Objective 4 Structures and Properties of Matter (IPC)

- IPC 7 (A,D*) matter and its components
  - Fluids, density, viscosity, and buoyancy
  - Chemical behavior, bonding, periodic table*
- IPC 8 (A,C) changes in matter
  - Physical and chemical changes
  - Law of conservation of mass
- IPC 9 (A,B*,D) Solution chemistry
  - Water structure and function
  - Concentration of ions in solutions*
  - Solubility factors, temperature, pressure, nature of solute and solvent

**Only in Grade 11 Exit Level TAKS Science*

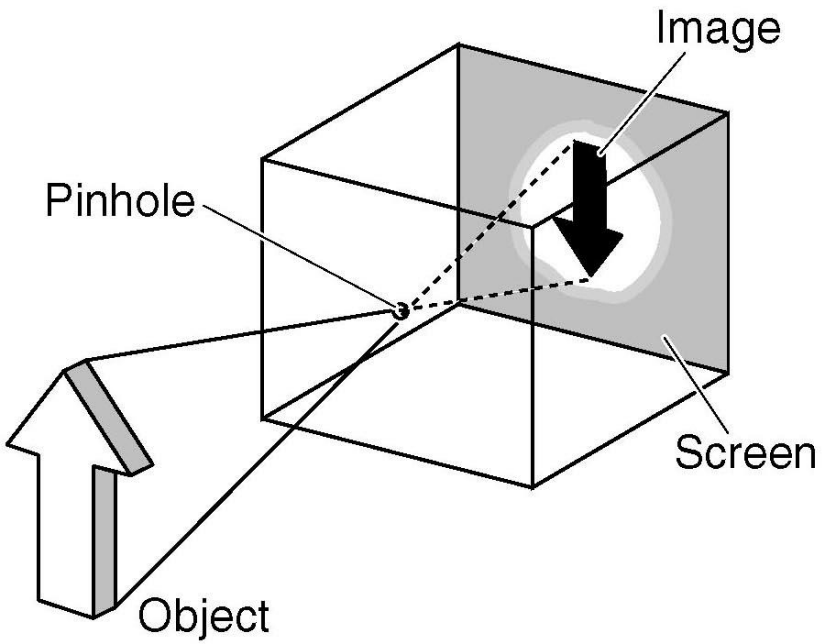
Grade 11 Exit Level Science TAKS

Objective 5--Motion, Forces, and Energy

- IPC 4 (A,B,D*) Force and Motion
  - Calculate speed, momentum, acceleration, work and power
  - Newton's Laws and their application
  - Machine efficiency*
- IPC 5 (B*) Effects of waves
  - Interactions: interference, polarization, reflection, refraction, and resonance within various materials*
- IPC 6 (A,B,D*) Energy Transformations
  - Law of Conservation of Energy
  - Movement of heat through solids, liquids, and gases, by convection, conduction and radiation
  - Economic and environmental impact

Only in Grade 11 Exit Level Science TAKS

Pinhole Camera



15 The image on the screen is inverted because light rays —

A condense as they pass through the pinhole

B* travel through the opening in straight lines

C refract as they strike the screen

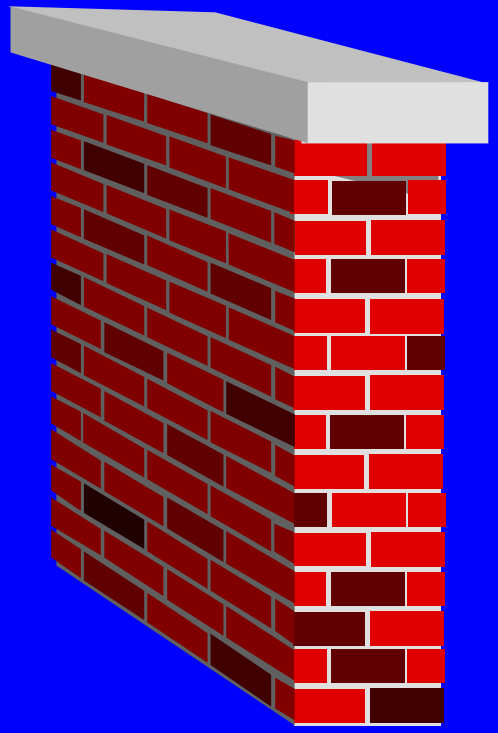
D are polarized by the materials of the screen

Science TAKS
Grade 11
Objective 5

IPC 5(B)
Concept:
How images are Formed and Light travels in a Straight line.

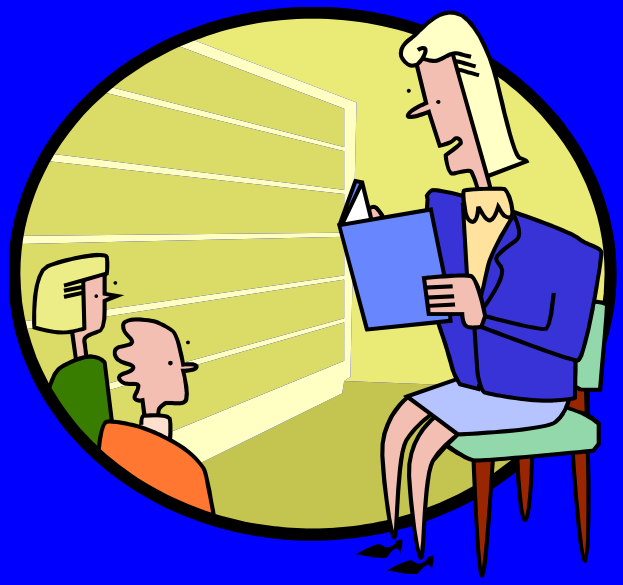
The Instructional Implications of the TEKS and the TAKS

Elementary Teachers Need to Know:



The teaching and learning of science at the elementary grades builds the foundation for Biology, Chemistry, and Physics concepts to be tested in 10th and 11th grade exit level TAKS.

Middle School Educators need to know:



- **Based on SB 103—**

  after spring 2002, there will not be an 8th grade science assessment
- **This does not mean that science at grades 6-8 is no longer important! In fact, it will be even more important to strengthen the the 6-8 program, to ensure success at grade 10 and exit level grade 11 science assessments.**

Instructional Implications for Middle School Teachers

- Middle school teachers must be aware of the middle school science concepts and their connections to the TEKS tested at grade 10 and exit level grade 11 assessments.
- The strength of the 6-8 science program has a direct effect on the student course selections.

Science Course Sequence…

- Students in the minimum high school program typically take IPC and Biology.
- Students in either the minimum or recommended program may choose to take the separate chemistry and physics courses instead of IPC.
- The student expectations in the grade 10 and grade 11 exit level science assessments are from the IPC and biology courses; however,
- Students will be prepared to be successful on the test whether they take the IPC course or the separate chemistry and physics courses.

Science Graduation Requirements: Recommended High School Plan

THREE CREDITS

- **ONE CREDIT from Biology, AP Biology, or IB Biology; and**
- **TWO CREDITS from the following areas, with no more than one credit chosen from each of the areas:**
  - **Integrated Physics and Chemistry;**
  - **Chemistry, AP Chemistry, or IB Chemistry; or**
  - **Physics, Principles of Technology I, AP Physics, or IB Physics.**

Students are encouraged to take courses in Biology, Chemistry and Physics

What's new for Biology teachers?

- Biology is now a required course for all Texas students
- Districts are considering the maturity level of students taking Biology
- The natural integration of chemistry, physics, and Earth science concepts will be assessed—Biology teachers need to integrate concepts
- More emphasis on biological concepts:
  - Content is balanced with process
  - Remember plants, evolution and ecology are part of the Biology TEKS and will be assessed!
  - NEW!! *BIO*TECH*ED* PROJECT

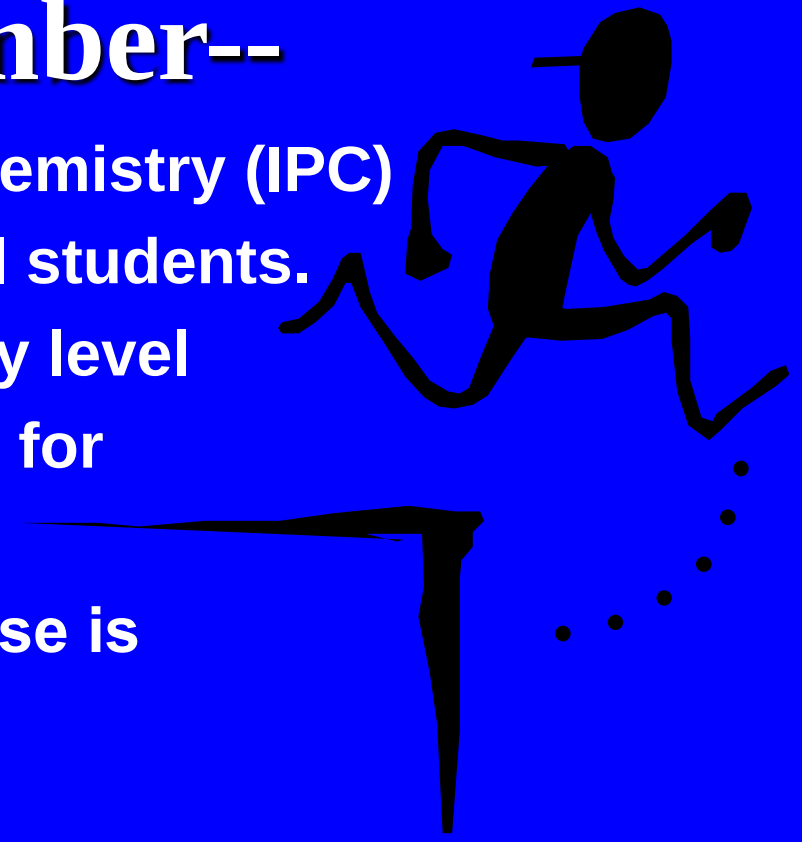
    Biotechnology Institutes

What's new for IPC Teachers?

- IPC has taken on a new importance! It is part of the assessments at 10th and 11th Exit Level assessments.
- The integration of Chemistry and Physics (as well as natural integrations of Biology and Earth Science) needs to be incorporated by IPC teachers.
- IPC teachers need to be well prepared for the IPC curriculum—THE TEKS
  - Remember: Mathematics is the language of IPC…
  - The application of the Periodic Table is important!
- Lab and field experiences take on greater emphasis…kids need to retain content for 10th and 11th Exit Level assessments!
- NEW: Instructional materials will be available in the 2002-2003 school year.

Please Remember--

- The Integrated Physics and Chemistry (IPC) course is not mandatory for all students.
- IPC was intended to be an entry level course. It is not recommended for 11th or 12th grade students.
- "Prerequisite: none. This course is recommended for students in grades 9 and 10."



What's new for Chemistry and Physics Teachers?

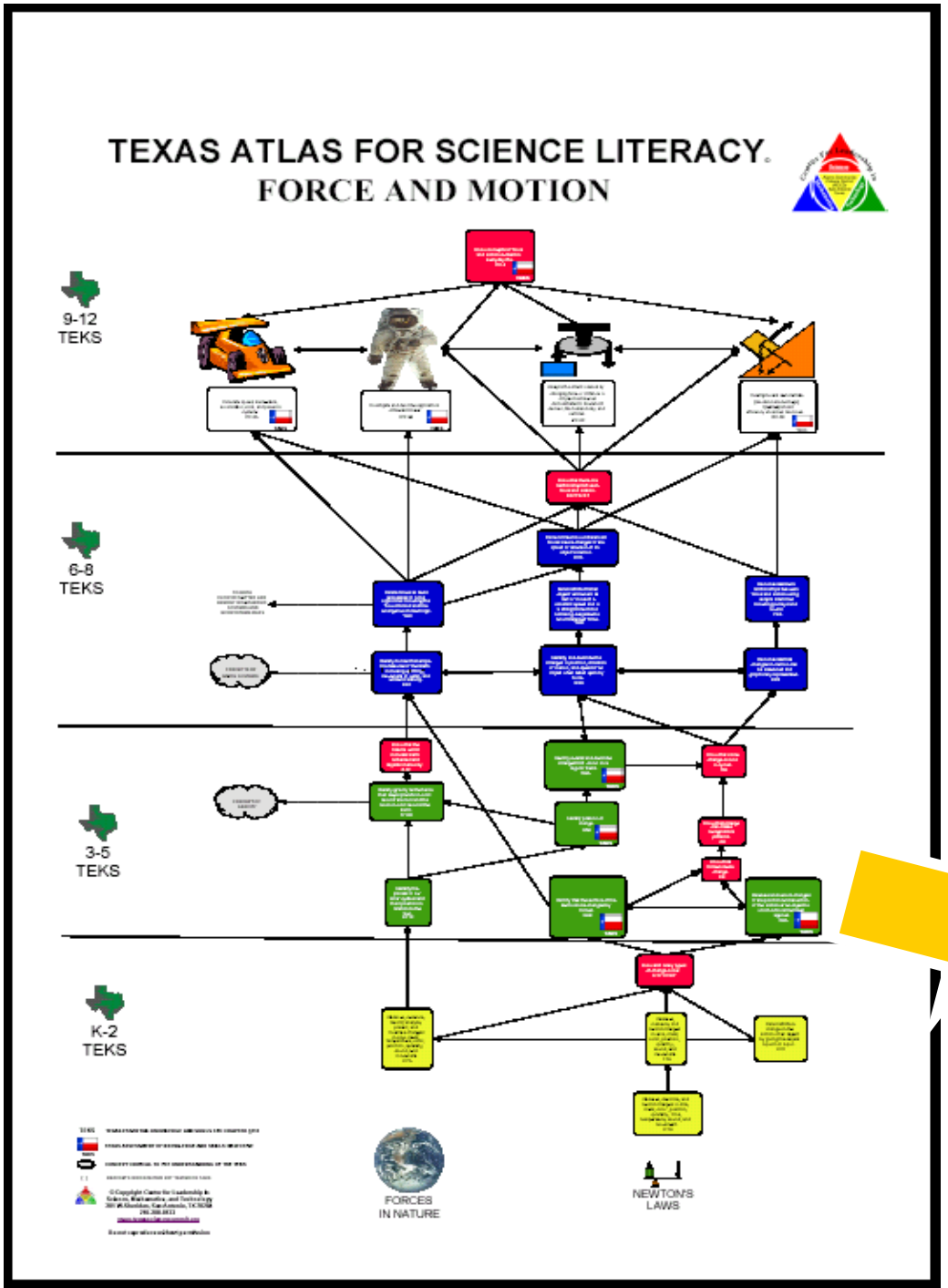
- Chemistry and Physics educators must be aware of concepts taught K-IPC!
  - IPC is not a mandatory course for all students.
- More students will be enrolling in 3rd and 4th years of science.
- Natural integration of biological, physical and earth science concepts is needed.
- A huge increase in numbers of students will be enrolled in Chemistry and Physics.
  - More diverse students will be enrolled in conceptual chemistry and physics courses.
- Lab and Field experiences are critical—students learn best what they experience.
- There will be new textbooks (AP, IB too!) in 2000-2003 school year.

NEW PRODUCTS!!!

- Chemistry: *Chemistry That Applies* online
- New Chart: Best Practices for Teaching Science Formulas
- Physics: Physics Tutorial online
- Elective Sciences Chart: TAKS and the Earth-Based Science Electives
- ATLAS Maps: Charts and guides

Sample Atlas Map

Force and Motion



Measure and record changes in the position and direction of the motion of an object to which a force has been applied.
3.6A

TAKS

What's new for Environmental Science Teachers?

- Environmental Systems will have increased enrollment as students enroll in 3rd and 4th years of science.
- Environmental Science AP is an excellent course for all types of students.
- The GLOBE Initiative will enhance Environmental Science.
- The natural integration of biological, physical, and earth science concepts in Environmental Science courses is vital.
- New textbooks will be available in the 2002-2003 school year.

What's new for GMO, Aquatic Science, and Astronomy Teachers?

- Courses that integrate biological, physical, and earth science concepts will see enrollment increases!
- More students will be enrolling in 3rd and 4th years of science!
- The GLOBE Initiative will enhance these courses.
- Astronomy textbooks are part of Proclamation '99—to order books go to the waiver section of the textbook website.

Research tells us that…

- Lecturing often overloads/overwhelms students
- Hands on learning helps students retain skills and concepts that will give students an advantage on most standardized tests
- Varied instructional strategies help struggling students learn best
- Teachers and Parents must set & communicate high expectations

Educators Will Need To:

- Know and understand the depth and complexity of the TEKS.
- Learn the knowledge statements and student expectations and what they mean.
- ALWAYS read and judge the presence of the student expectation as it relates to the knowledge statement.

Prepare by:

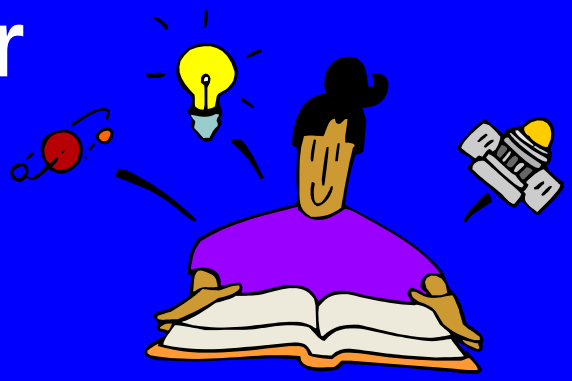
- Critically reading and reflecting on TEKS statements
  - Individually
  - With colleagues
  - With students
  - With parents

How to Prepare

- TEACH THE TEKS
- Develop a variety of ways to explore each Student Expectation
- Stay away from “test prep” materials
- Use technology often
- Attend staff development in identified areas of need

Review all TEKS statements

- Interpret each into learning experiences for student
- Determine what mastery would “look like” in the classroom
- Think about interventions that might be used with struggling students



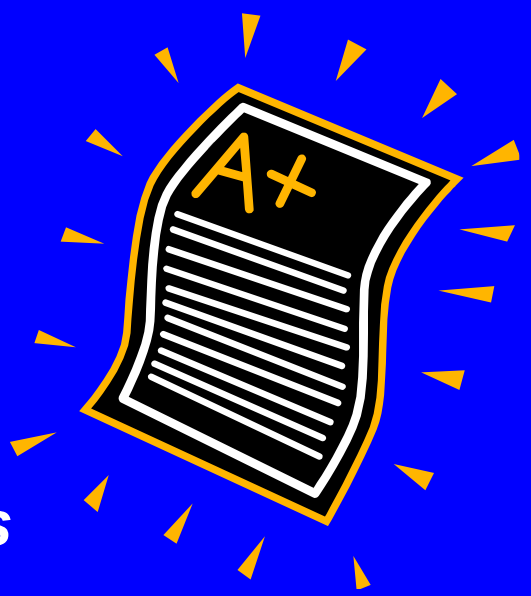
Curricular Alignment

- At a minimum, study the TEKS statements for the grade above and below your level
- Use curriculum that "matches" the intent of the TEKS:

CLOSE is not acceptable!

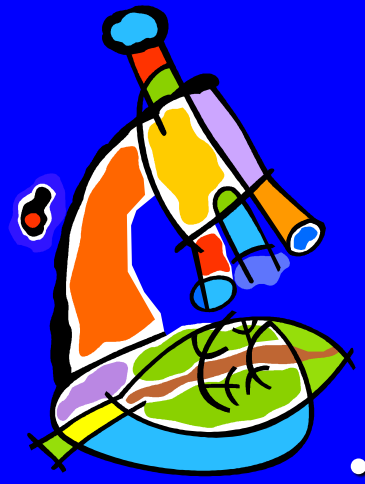
Educators must select and use instructional materials that meet the spirit of the TEKS.

Instructional Implications for the Elementary Science TAKS



- **Teachers must understand the depth and complexity of the TEKS…*TAKS assesses student understanding of the TEKS***
- **Teachers must teach the TEKS: *TEKS are the curriculum framework…textbooks and instructional materials are only resources***
- **Students must use the tools of science: *Equipment listed in K-5 TEKS #4 will be referenced on TAKS***
- **Science must be taught at all elementary grades:**

TAKS includes K-5 strand content



Policy Implications for Elementary Schools

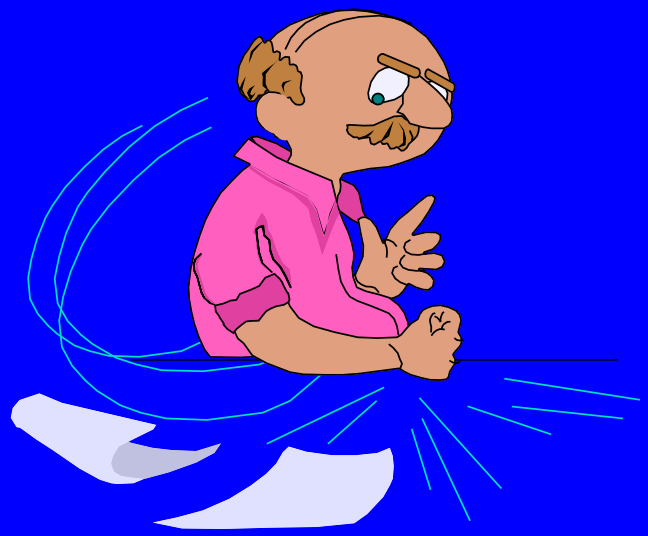
- K-5 should be aligned; separating grade 5 from the elementary school is not wise
- Equipment and a budget for consumables for science needs to be planned and in place
- Professional development in areas of need is essential
- Interventions for struggling students are crucial
- Reviewing important data-Early Indicator Reports should be a part of school activities
- Bilingual classrooms should have materials in Spanish such as the TEKS and Information booklets

Policy Implications for Secondary Schools

- Many high schools have implemented a policy for 3 years of science so that students are enrolled in science during the 11th grade.
- Conceptual science courses as well as Honors courses should be instituted to serve diverse learners especially in Chemistry and Physics
- Safety in the Labs should be paramount…crowding of students in science is dangerous!
- Science safety training is crucial
- Plan for more students taking more science

Science Is Moving Away From:

- "Cookbook" labs to "Inquiry Labs"
- "Details, details, details" to "big ideas"
- "The scientific method" to "a variety of methods to solve problems";
- "Do the questions" to "Pose the questions";
- "Only one answer" to "multiple ways to explain a problem"; and
- "Science Corners" or just reading about science to "Doing Science"



Checklist of Things To Do:

1) **Run a list of students passing last year's TAAS (70 TLI) but NOT passing at the higher TEKS standard (70%)**

2) **Distribute and TALK ABOUT/PLAN WITH the "Information Booklets"- campus copy and released on TEA's website**

Checklist of Things To Do:

4) Deliver "TAKS" info to students, parents, community, and school boards
5) Develop model for curriculum revision
6) Understand the TEKS
7) Plan for Professional Development

Science Resources and Professional Development Opportunities

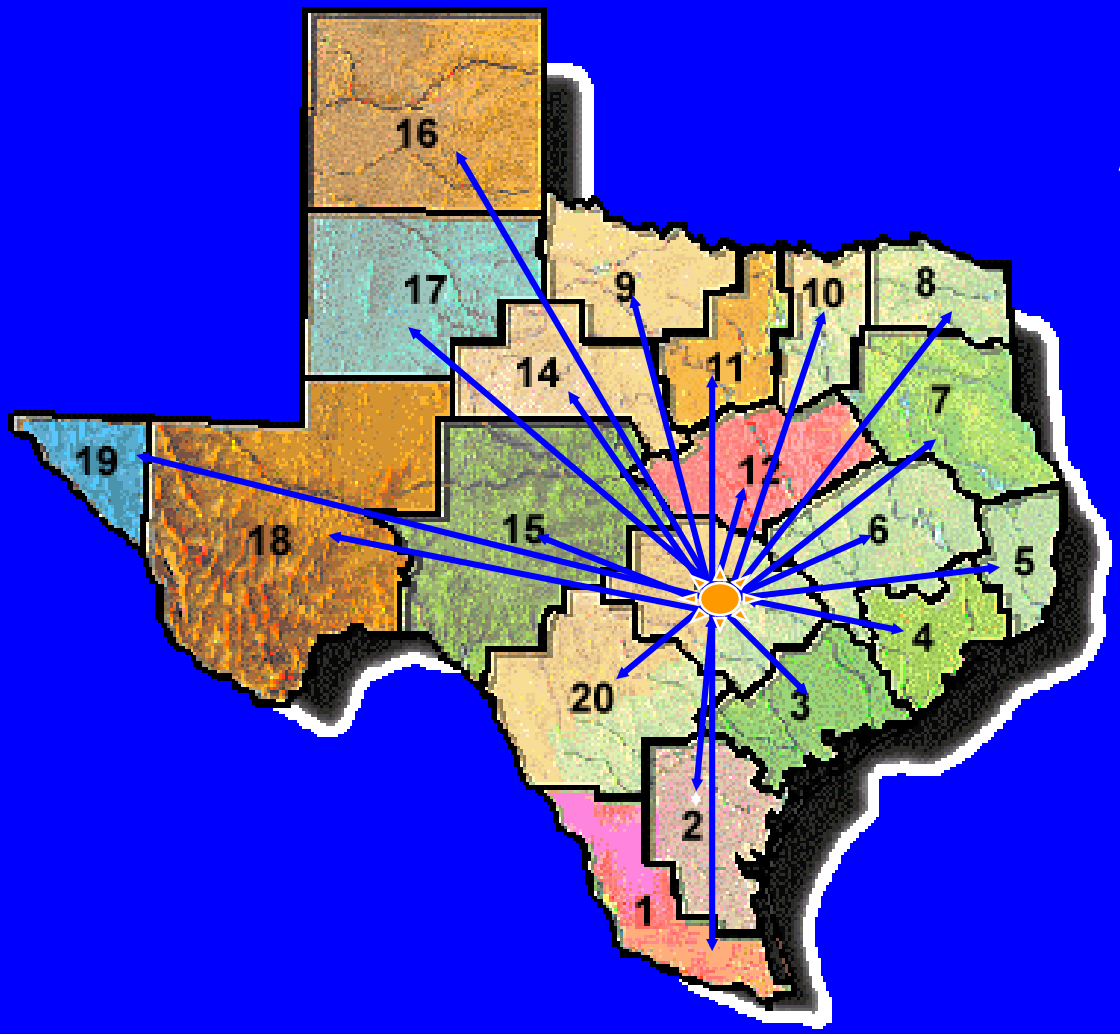
TELEVISED TETN SESSIONS

- **October 2nd** **Pre K-12 TAKS and Science Overview**
  - **1:00-2:00** **for Superintendents, Principals, interested educators**

- **October 16th** **Grade 10 and Grade 11 Exit Level --**
- **4:15-5:15** **for Secondary Science Educators**
  --4:00-5:00
- **October 29th** **Elementary Science TAKS**
- **3:00-4:00** **for Elementary Educators**

At your Education Service Center…

Texas Science Education Service Center Network



ESC Region Service Centers

Provide Updates, Information, Workshops To help science educators

Staff Development Ideas:

Regional Collaboratives- PDA's

Bridging II TAKS- TAKS information

- **K-1 Dec. 11** ***PASS Charts***
- **2-3 Jan. 15** ***Fold out TEKS Charts***
- **4-5 Mar. 26** ***Website Tutorial for Physics***

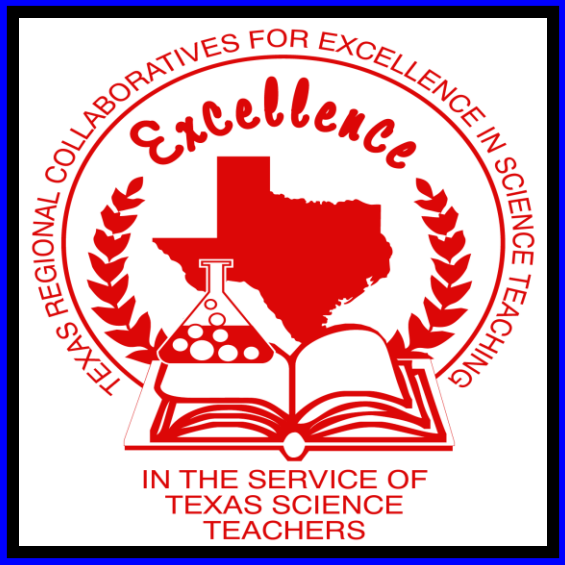
TEXTEAMS-Content information

- **K-2 May 7** ***Formula Chart***
- **3-5 Apr. 8** ***Science Safety Standards***

CATS PROJECT-Technology Training

- **Marco Polo Training**
- **Jason Project Training** ***Signature Experiences***
- **GLOBE Training** ***ATLAS Charts***
- **Probeware Training** ***Texas Science Summit***

Texas Regional Collaboratives for Excellence in Science Teaching



- High quality, sustained professional development in 21 sites around the state
- Teacher centered science content training
- Collaborates with ESC's, Universities, K-12 schools and districts
- Each of the 750 teachers involved in the program receive 105 to 150 hours of professional development

Professional Development

BRIDGING II TAKS

Region IV, Houston

Texas Science Center for Professional Development

MODEL: Trainer of Trainer Model

COMPONENTS: Bridging II TAKS 2 day Institutes, Administrator Overview

Presented in five sites: Austin, Corpus Christi, Dallas, Houston, and San Antonio and a service center near you!

Products: PASS CHARTS, FUNdamental labs, IPC Physic Online Tutorial

Professional Development

CATS PROJECT:

Comprehensive Assessment Training In Science

MODEL: Teachers as Leaders Model

COMPONENTS: Administrator Symposia, Parent Nights, 3 Day Training workshops for Educators

PRESENTED in ten sites: Edinburg, Waco, Richardson,Lubbock, Corpus Christi, El Paso, Houston, Kilgore, San Angelo, and San Antonio

PRODUCTS: Lesson Templates, A Guide to the TEKS, TEXAS ATLAS CHARTS, and Coherent Assessment techniques, Equity Training, Evolution in the classroom, Technology Training and support

Professional Development

University of Texas Charles A. Dana Center

TEXTEAMS: Content Professional Development

SCIENCE TEKS TOOLKIT: Web Based Resources

www.tenet.edu/teks/science

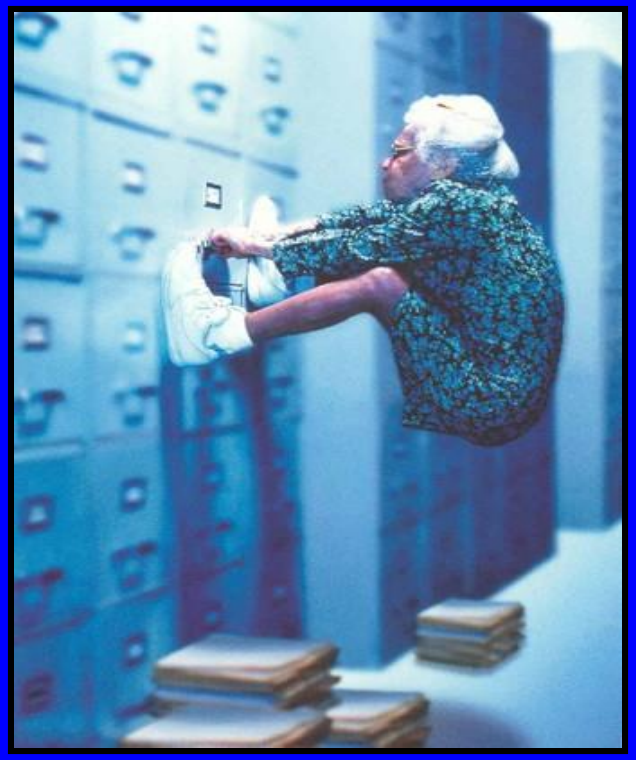
TEXAS SAFETY STANDARDS: Training and Manual

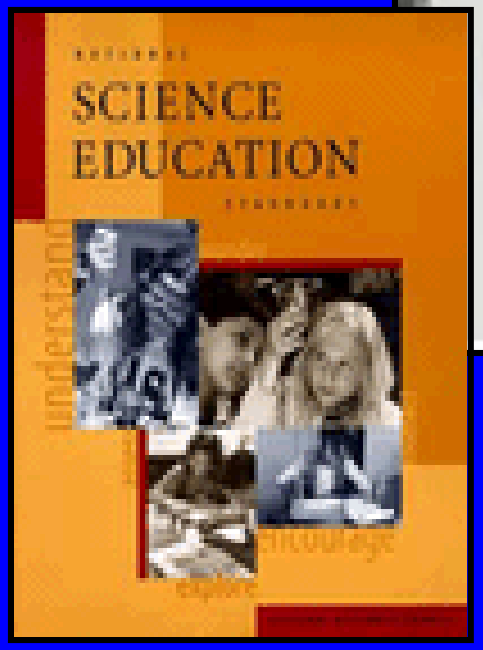
SCIENCE FACILITIES STANDARDS: Training and Manual

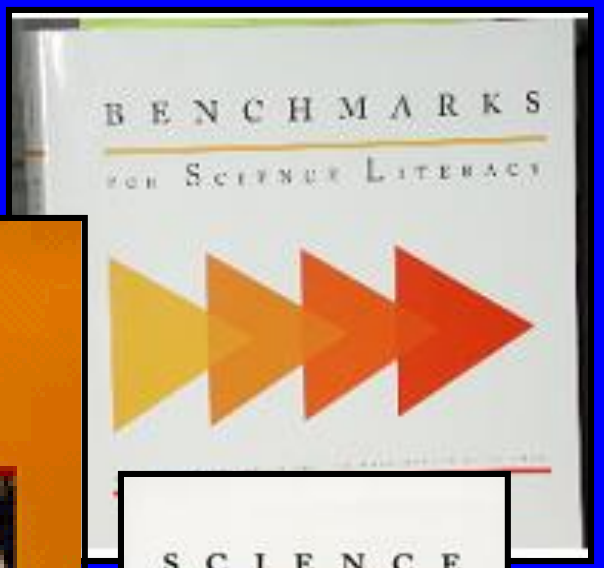
Presented at two sites: Dallas/Fort Worth, Houston

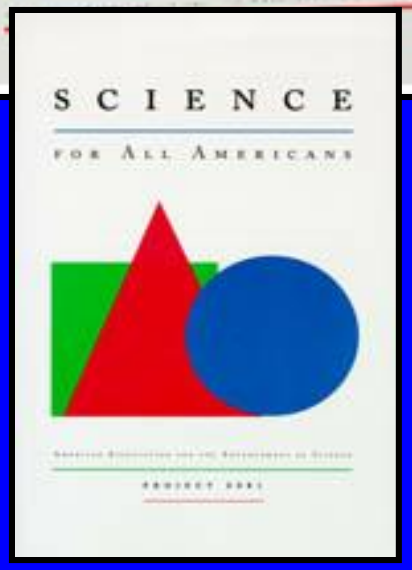
Products to prepare for TAKS: TEKS/TAKS Charts, Professional Development Academies, Elementary Assessments

www.nsta.org









Library Resources:

These National Science Documents help to understand the content that is contained in the TEKS

www.aaas.org

Conventions:

Science Teachers Association of Texas (STAT)
Convention: El Paso, Texas
November 6-10, 2002
www.statweb.org
TEXAS SCIENCE SUMMIT
Adams Mark Hotel
San Antonio, Texas
Jan. 21-22 '03
www.texassciencesummit.org
National Science Teachers Association
Philadelphia, PA
www.nsta.org

Texas Education Agency Homepage

www.tea.state.tx.us

Who To Contact:

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  210-208-8133
- **DANA CENTER**
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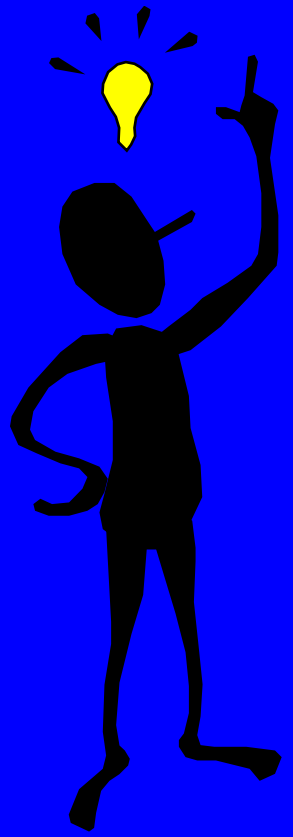
  szigrossi@mail.utexas.edu

Texas Science Teachers Association
www.statweb.org



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Phyllis Kirkpatrick
pkirkpat@tea.state.tx.us
Assessment Division

Believe

- That each student has an ability for science
- That science is the best avenue for teaching problem solving and analytical thinking
- That you are an educator who can prepare all students for the rigor of the TAKS assessments
- In a vision of science literacy for all Texas students

Above All, Teachers should…

Motivate and involve all students, even those struggling with content, in science problem solving on a daily basis.

All students should be required to communicate and process science concepts from hands-on to abstract levels.

The children of Texas are counting on you to help them meet the new graduation requirements in science.