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Pass the TExES Generalist

EC-6

FOR TEXAS TEACHERS.
*A test prep manual for the TExES Generalist
exam #191 for grades EC-6.
Seminar and tutoring available.*

First Edition

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1. Oral Language

Competency 1:

The teacher understands the importance of oral language, knows the developmental processes of oral language, and provides children with varied opportunities to develop listening and speaking skills.

A. Linguistic Concepts

- The teacher must understand each developmental concept of oral language. Basic linguistic concepts and structures, as they relate to development of oral language, form the basis of instruction that addresses the oral language developmental needs and individual variances within and across languages. The concepts include:
 - Phonemes, speech sound, target sound, utterance: smallest unit of speech in a language.
 - Phonology, producing the basic sound units of language.
 - Morphology, word formation in a language including segmentation, inflection, derivation, and compounding.
 - Syntax, the way in which words are put together to form phrases, clauses, or sentences.
 - Semantics, relating to meaning in language.
 - Pragmatics, the appropriate use of language; rules for communicating effectively and responding to the needs of one's listeners.
 - Rules of politeness (Language registers, speaker must determine which register to use, i.e., speaking to the president of the United States, speaking to an old friend, or speaking to a stranger, hence, different registers of politeness).
 - Conversational skills.
 - Extended discourse.

B. Assessment

- The assessment of strengths, needs, and interests of the students are what drive curricular decisions.

- Strengths are what the teacher should focus on with all students in order to build confidence and motivation in oral development.
- Needs dictate what and how to teach students; they are diagnosed by both formal and informal means.
- Interests of students should be as closely aligned with teacher objectives as possible in order to promote ownership of learning.

C. Language Delays

Recognition of speech and oral language delays should be made early and the necessary steps taken to provide:

- Warranted in-depth evaluations (i.e., physical, developmental, intellectual, emotional, etc.).
- Additional help inside and outside of school.
- Interventions needed for diagnosed problems, areas of weakness, etc.

D. Pair and Group Activities

Meaningful and purposeful conversation, dramatic play, language play, stories, songs, rhymes, games, discussions, questioning, etc. are used by the bilingual teacher to promote oral language usage. After students have had lessons modeled correctly, they must practice these skills which will relate to easier connections of spoken language to print.

E. Materials/Strategies

Promote language development and cultural diversity for all English Language Learners by responding to student strengths, needs, interests, and cultural diversity.

continued

1. Oral Language, cont'd.

F. Home Language

The home language is used by the bilingual teacher to celebrate and respect cultural, linguistic, and home backgrounds for oral language development. By doing so, the teacher becomes more biliterate and bicultural.

G. Oral and Written Language

Interrelate oral language and literacy development with instruction that promotes students' reading and writing proficiencies. Instructional methodologies may include preview-review, discussion, and questioning. Explicitly discuss and preview different types of speech and written dialogues.

H. Speech and Print

Connect spoken and printed language with instructional techniques and resources that tie the printed word to the spoken word. For example, engaging students in "read-alouds" encourages learning to read while also modeling spoken text.

I. Various Audiences

Oral language should be used for various audiences, purposes, and occasions (i.e., register of language, informing others of a variety of information, persuading others to act, or listening critical for point of view).

J. Purposeful Listening

Listening should be taught in a variety of active, purposeful contexts.

K. Learner Self-Evaluation

Students evaluate their spoken messages and those of others.

L. Technology

Technology can be used to develop children's communication skills.

Students need to interact frequently with native speakers in a supportive social and emotional setting to develop greater facility with oral language which will lead directly to cognitive-academic language proficiency.

16. Geometry and Measurement

Competency 16:

The teacher understands concepts and principles of geometry and measurement.

A. Spatial Concepts

Direction, shape and structure all describe the characteristics or the position of shapes or objects. In the early grades, students begin to name flat or two-dimensional shapes such as *circles, squares, triangles and rectangles*. Solids, or three-dimensional objects, may be referred to as balls, boxes, cans or cones in the beginning. As students progress to second grade and up, more correct mathematical terminology is used: a ball is a sphere, a box is a cube or rectangular prism, and a can is a cylinder.

A *line* is a straight one-dimensional figure that has no thickness and extends forever on both ends. A *ray* is a line that starts at one endpoint and goes on forever. Two rays that

share the same endpoint make an angle. Intersecting lines cross one another, just as streets do at an intersection. *Parallel lines* go in the same direction and never intersect. *Perpendicular lines* intersect at 90-degree angles.

B. What Makes A Square A Square?

Students should be aware of the critical attributes, or characteristics that make each shape what it is, and be able to compare shapes to one another.

Why is a square a square and not a rectangle?

| Figure (Shape) | Critical Attributes | | |
|----------------|------------------------------|-----------------|---------------------|
| | Number of Vertices (corners) | Number of Sides | Lengths of Sides |
| Square | 4 | 4 | All equal |
| Rectangle | 4 | 4 | Opposites equal |
| Triangle | 3 | 3 | Can be equal or not |

Squares have four *vertices* (corners) and four sides. Each vertex is a 90 degree angle, and all four sides are of equal length. Rectangles, however, though they have four vertices and four sides like squares, have opposite sides of equal length. A square is a rectangle, but not all rectangles are squares.

Solids also have *faces*, such as each of the six flat sides of a cube.

continued

16. Geometry and Measurement

C. Formulas

Several formulas are provided on page 28 in the Math 4-8 SBEC test prep manual available for download on the SBEC website. The formulas included below are those you might need, but are not provided in the SBEC manual.

Perimeters:

The distance around a polygon that is determined by adding the length of all sides together.

Circles:

$$\text{Circumference} = 2 \pi r$$

Area:

Parallelogram, Rectangle, Square:
Area = (base)(height) or $A = bh$

• Proportional Reasoning Used with the Following:

Similar Figures

Scaled Representations

Area Effects:

The ratio of corresponding sides is squared to get the ratio of corresponding areas.

Volume Effects:

The ratio of corresponding sides is cubed to get the ratio of corresponding volumes.

D. Multiple Representations to Solve Problems

Be familiar with the below figures and be able to use their formulas verbally, numerically, graphically and symbolically in the problem solving process.

| | | |
|-----------|-----------|----------|
| Circles | Triangles | Polygons |
| Cylinders | Prisms | Spheres |

E. Nets, Cross-Sections, and Projections

Projections

Think movie theater here. When the movie is projected on a screen, the size of the image depends on how far the projector is from the screen. The same principle holds for the overhead projector. This will involve proportional reasoning.

For instance, the projection of a coordinate of a point A (3, 7) on the x -axis is $x=3$, the projection of the point on the y -axis is $y=7$. Projection of a segment parallel to the x -axis is its length, whereas projection of the same segment of the y -axis is zero.

Nets

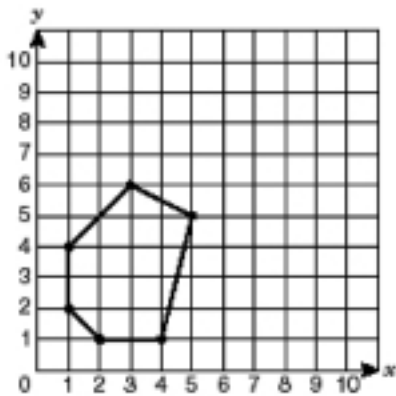
These are the patterns for constructing solid figures. It is easier to determine the surface area of a three-dimensional figure if you use a net.

Cross-Sections

These are created when a plane is passed horizontally or vertically through a solid figure. The cross-section of a sphere will result in a circle. A cross-section of a cube cut by a plane parallel to any of its sides produces a square.

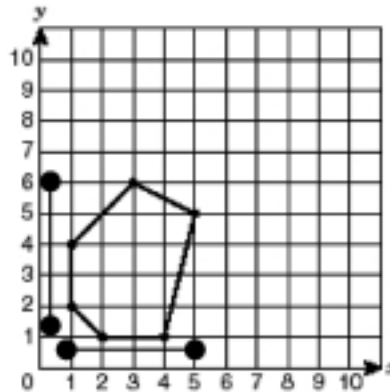
16. Geometry and Measurement

Examples:



Example 1:

What is the projection of the given figure on the x and y -axis?



Answer:

The projection on the x -axis is a segment between the points $x = 1$ and $x = 5$, of length 4 units.

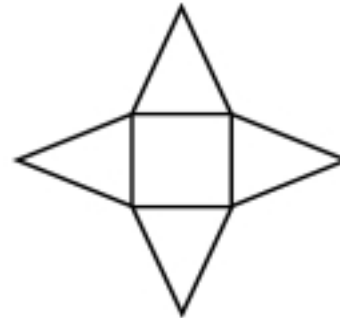
Projection of the figure on the y -axis is a segment between the points $y = 1$ and $y = 6$, of length 5 units.

Example 2:

The slant height of the square pyramid given below is 5 cm and the length of the base is 2 cm. Calculate the total surface area (use the net to solve).



The net is show to the right



Answer:

The total surface area of the pyramid is the sum of the areas of the 4 triangle sides and one square base.

$$S.A. = A_{\text{square}} + 4 \cdot (A_{\text{triangle}})$$

$$A_{\text{square}} = s^2 = (2 \text{ cm})^2 = 4 \text{ cm}^2$$

$$A_{\text{triangle}} = 1/2 \cdot b \cdot h = 1/2 (2\text{cm})(5\text{cm}) = 5 \text{ cm}^2$$

$$S.A. = 4 \text{ cm}^2 + 4 \cdot (5 \text{ cm}^2)$$

$$S.A. = 4 \text{ cm}^2 + 20 \text{ cm}^2$$

$$S.A. = 24 \text{ cm}^2$$

continued

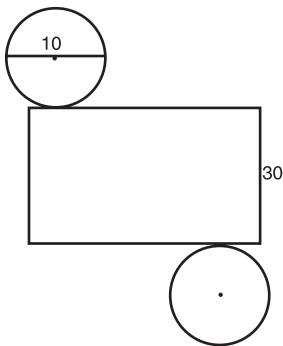
16. Geometry and Measurement

Example 3:

A net of a solid is shown below. The diameter of each circle is 10 cm and the height of the rectangle is 30 cm.

- What type of solid does the following net form?
- Calculate the volume of the solid.

Answer:



- The net forms a cylinder.
- $V = (\text{Area of base})(\text{Height})$

Example 4:

A block made of balsa wood is the basic model for a cast being built to construct a solid copper base for a statue. The dimensions of the model are $2\text{ ft} \times 2\text{ ft} \times 2.5\text{ ft}$.

The actual base is to be $16\text{ ft} \times 16\text{ ft} \times 20\text{ ft}$.

How does the volume of the actual base compare to the volume of the model?

- The volume of the actual base is 8 times the volume of the model.
- The volume of the actual base is 64 times the volume of the model.
- The volume of the actual base is 512 times the volume of the model.
- The volume of the actual base is 256 times the volume of the model.

Answer:

The ratio of the corresponding linear dimensions of the actual base to the model is

$$\frac{8}{1}$$

Since volume is a cubic measurement, the ratio of the volume of the actual base to the volume of the model is

$$\left(\frac{8}{1}\right)^3$$

This means the volume of the actual base is 512 times the volume of the model.

Example 5:

A seventh grade class was building an herb garden as part of an interdisciplinary unit. The unit required that they plant 12 herb sections in a circular shape. Each of the 12 herb sections was to be congruent and have its own distinctive edging.

If the radius of the garden was 18 inches, how long would the edging be for each section?

- The border needed would be about 9 inches.
- The border needed would be about 19 inches.
- The border needed would be about 89 inches.
- The border needed would be about 1018 inches.

Answer:

There are 360 degrees in a circle. If there are 12 equal sections, each of the sections has a central angle of 30 degrees. You then need to do the following:

16. Geometry and Measurement

$$\frac{30}{360} \text{circumference} = \frac{30}{360}(2\pi 18) = \frac{1080\pi}{360} = 3\pi \approx 9.42 \approx 9.4 \text{ inches}$$

The correct answer is (a) about 9 inches.

F. Basic Terms and Concepts in Geometry

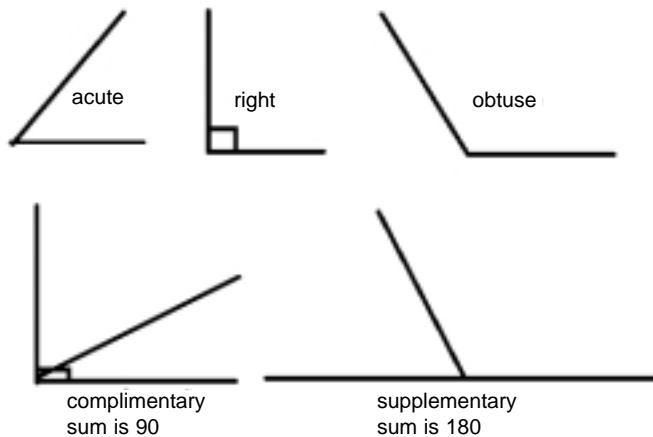
1. Basic Units

Point: 

Line: 

Plane: 

Angles:



Length or Distance: Finding the distance between two points on the coordinate plane is accomplished by using the distance formula.

$$d = \sqrt{(\text{change in } x - \text{coord})^2 + (\text{change in } y - \text{coord})^2} \text{ or } \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

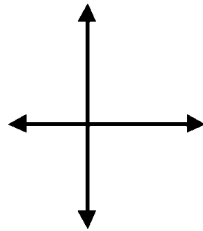
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16. Geometry and Measurement

2. Perpendicular and Parallel Lines

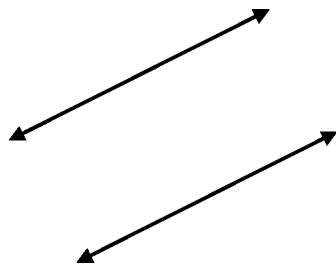
Perpendicular: Lines that intersect and form right angles

Slopes of perpendicular lines are negative reciprocals of each other.



Parallel: Lines that never intersect but are in the same plane

Slopes of parallel lines are equal.



3. Triangles

Types:

Acute: all angles acute

Scalene: no sides are equal

Right: one right angle

Isosceles: two sides, two angles are equal

Obtuse: one obtuse angle

Equilateral: all sides and angles are equal

Similar: all corresponding angles are equal
corresponding sides are proportional, that is they are in the same ratio

Congruent: all corresponding angles are equal
all corresponding sides are equal

Can show triangles are congruent by:

SSS: all sides congruent

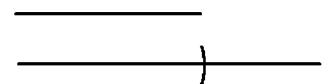
SAS: two sides and the angle between them are congruent

ASA: two angles and the side between them are congruent

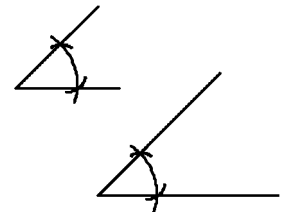
AAS: any two angles and a side are congruent

4. Constructions: Done with Compass and Straight Edge or Technology

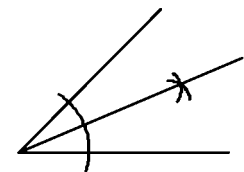
Copying a segment



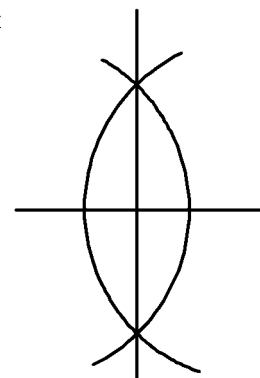
Copying an angle



Bisecting an Angle



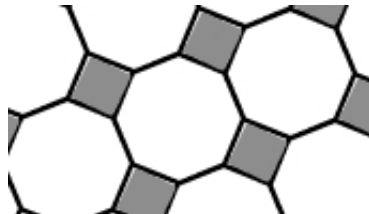
Perpendicular Bisecto.



16. Geometry and Measurement

G. How are These Shapes the Same?

A *tessellation*: Two shapes that can overlap each other completely with no gaps or extra pieces have **symmetry**.



- A valentine heart cut from a piece of paper folded in half has two halves with symmetry. The two halves are mirror images and are therefore symmetrical. Symmetry exists in many places in nature: leaves, flowers, and faces of people and animals.



Congruent shapes are exactly the same size and same shape.

- Two dimes are congruent. A dime and a quarter, though they are the same shape, are not congruent because they are different sizes. If shapes are congruent, they remain congruent no matter how they are placed. Two one-dollar bills are still congruent, even if one is placed horizontally and the other is vertical.

H. Concepts of Direct Measurement

1. Basic Units

Mass: tons, pounds, ounces
kilograms, grams, milligrams

1 Ton=2000 lb

1 kg=1000 g

1 lb=16 oz

1 gram=1000 mg

Area: Square units

Volume: Cubic units

Capacity: What it can hold

1 gallon= 4 quarts

1 liter = 1000 cm³

1 quart = 2 pints

1 pint = 2 cups

1 cup = 8 ounces

Speed: $\frac{\text{distance}}{\text{time}}$

Density: Mass per unit volume

2. Measurement Prefixes

milli .001

centi .01

deci .1

deka 10

hecto 100

kilo 1000

3. Percent of Error

$$\text{Percent error} = \left| \frac{\text{measured value} - \text{accepted value}}{\text{accepted value}} \right| \times 100$$

Example: A student measures the angles of a quadrilateral with a protractor and finds that the sum of the angles is 354°. His percent of error can be found by doing the following.

$$\left| \frac{354-360}{360} \right| \cdot 100 = \left| \frac{-6}{360} \right| \cdot 100 = \frac{6}{360} \cdot 100 = .0167 \cdot 100 = 1.67\%$$

continued

16. Geometry and Measurement



4. Dimensional Analysis

This is a technique used to convert measures by using forms of the number 1.

$$\frac{21 \text{ years}}{1} \cdot \frac{365 \text{ days}}{1 \text{ year}} \cdot \frac{24 \text{ hours}}{1 \text{ day}} \cdot \frac{60 \text{ min}}{1 \text{ hour}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} = 662,256,000 \text{ seconds}$$

Example: Convert the age of a 21 year old to seconds. (example above)

Notice that each fraction is a form of the number one. Also notice that the units “cancel” out just like numbers will do when multiplying fractions.

I. Turn, Turn, Turn

- Slides, flips and turns are more simple ways of describing translations, reflections and rotations.
- To make a translation of a shape, we slide it from one position to another. Moving a checker from one square on the checkerboard to another is making a translation.
- A reflection of a shape is flipping it across a real or imaginary line. Any object seen in a mirror shows a reflection of itself.
- A rotation is moving a shape so that it turns on a point away from its original position. Clock hands going around are rotating shapes.

J. Axiomatic Structure

Undefined Terms:

Used to define all other terms in the system.

Defined Terms:

Written in terms of the undefined terms or on other words defined using the undefined terms.

Postulates–Axioms:

Statements and relationships assumed to be true.

Theorems:

Statements and relationships deduced from definitions and postulates.

19. Social Science Instruction

Competency 19:

The teacher understands and applies social science knowledge and skills to plan, organize, and implement instruction and assess learning.

A. Social Studies Content and Performance TEKS Standards

Texas teachers must have comprehensive knowledge of the **Texas Essential Knowledge and Skills (TEKS)** for social studies, and must use this knowledge to plan, implement, and assess effective social studies instruction. The TEKS provide clear goals that both teachers and students can understand, assess, and achieve. Be familiar with the vertical alignment and focus for each grade level, as clearly defined at the beginning of each subchapter of the TEKS. The social studies TEKS can be downloaded from: <http://www.tea.state.tx.us/rules/tac/chapter113/index.html>

- Social studies TEKS are integrated and focus on eight strands: history, geography, economics, government, citizenship, culture, social studies skills, and technology.
- Social studies TEKS are vertically and horizontally aligned to promote cumulative knowledge and skills across grade levels.

B. TEKS Vertical/Horizontal Alignment of the Social Sciences

1. Vertical Alignment

Vertical alignment involves objectives that build upon each other to assure that prerequisite skills are mastered and there are no gaps in student learning. Skills, processes, and concepts increase in difficulty as students move up in grade level, while vocabulary and content remains constant.

- Common goals are made for all students across grade levels.
- Common vocabulary is used throughout all grade levels.
- Content, concepts, processes, and skills progressively increase in difficulty.
- Subject-area teachers from all grade levels

confer to identify gaps, clarify processes, build common vocabulary, plan programming, and implement remedial teaching.

2. Horizontal Alignment

Horizontal alignment is the insurance that curricular objectives, instruction, and assessment (whether local or high-stakes) are matched across each grade level, throughout your district

- Common goals are made for all students within a grade level.
- All tests are aligned to measure the same objectives and goals. For example, the **Texas Assessment of Knowledge and Skills (TAKS)**, a state mandated, standardized test given to all Texas students, directly assessed the objectives presented in the TEKS.

C. Social Studies Terminology

Instruction for Social Studies encompasses terminology and vocabulary that is particular to the content. Effective teachers constructively model the correct usage of the terminology and implement lesson plans that give learners experiences with the concepts and terminology.

D. Instruction Matches Development Stages of Students

Effective lesson design should consider students' developmental stages to provide successful learning experiences.

As students age, their awareness shifts from **concrete** to **abstract**, allowing for expansion of civic concepts for older students.

Younger students are **egocentric**; therefore, education for younger students is based

continued

19. Social Science Instruction, cont'd.

upon their personal perspectives and relationships within their communities.

Older students are increasingly able to grasp concepts like **civic duty**, **diversity**, and **culture**. Older students are more able to view events from multiple perspectives, allowing them to evaluate events from several diverse points of view. **Spatial awareness** - the knowledge of our position in relation to other things—develops with age. Older students should become increasingly adept with maps, mapping, and global positioning. As students age their base of information increases and they gain competence, allowing for inquiry-based instruction that is student-driven.

EXAMPLES:

1. In **Kindergarten**, concepts are concrete and student-centered, focused on self, home, family, and classroom. Students explore:

- Patriotic holidays
- Family customs and traditions
- American customs, symbols, and celebrations
- The concept of chronology
- The contributions of historical people
- Geographic concepts - location and physical and human characteristics of places
- Basic human needs (food, clothing, and shelter) and the ways that people meet these needs, and
- The purpose of rules and the role of authority figures in the home and school.

2. In **Grade 4**, the focus shifts to include abstract concepts and evaluative studies that require students to use critical thinking skills (comparing and contrasting, making inferences and predictions, identifying cause and effect relationships). Students examine the history of Texas, focusing on:

- Important events in Texas history

- The contributions of people from a diversity of cultural and religious backgrounds
- The lifestyles, culture, government, and historical impact of Native Americans in Texas
- The impact of science and technology on life in the state
- The physical features of Texas regions and how these affected human migration and settlement
- Economic activities and motivations for European exploration and colonization
- Reasons for the establishment of Spanish missions
- Spanish and Mexican colonial governments in Texas, and
- The meaning of the Pledge to the Texas Flag.

E. Developmentally Appropriate Social Studies Instruction

Providing students with a variety of materials and hands-on activities is not only highly engaging; it will help them analyze, synthesize, and interpret social studies issues. Effective instruction should include opportunities to work collaboratively and explore concepts such as cooperating and sharing; respect for self and others; and responsible membership in one's family and community.

- Students should experience social studies through a variety of activities such as:
 - plays
 - dramatizations
 - videos
 - field trips
 - hands-on activities
 - simulations
 - guest speakers
- Students should obtain information from a variety of oral and visual sources including:

19. Social Science Instruction, cont'd.

- primary and secondary resources
- interviews and conversations
- culturally diverse texts
- biographies
- folktales
- legends
- pictures
- maps
- poetry
- songs
- dances
- artworks

Motivating resources are also available from:

- museums
- historical sites
- presidential libraries
- local and state preservation societies.

- Students should create and interpret visual representations such as illustrations and maps.

F. Employs Appropriate Technology

Students should explore a variety of technologies and should identify how these technologies meet needs and affect their lives. They should be able to identify examples of technology used in the home and school and describe how technology helps accomplish specific tasks. Technology includes:

- overhead images
- computer software
- the Internet
- video programs
- audio programs and music, and
- human resources (such as guest speakers).

Using technology to learn and practice helps students gain real-world abilities while providing highly engaging instruction that captivates their interest and drives them toward self-directed learning.

G. Teaching Relates Content Across Social Science Disciplines

Effective social studies instruction integrates concepts and skills across the eight strands:

- history
- geography
- economics
- government
- citizenship
- culture
- social studies skills
- technology

Using a thematic approach (thematic units) allows teachers to cover a variety of topics related to a major topic or unit and are an excellent method of designing lessons that meet this objective.

1. Hands-on Activities

Providing students with a variety of materials and hands-on activities is not only highly engaging; it will help them analyze, synthesize, and interpret social studies issues. Effective instruction should include opportunities to work collaboratively and explore concepts such as cooperating and sharing; respect for self and others; and responsible membership in one's family and community.

- Students should experience social studies through a variety of activities such as plays, dramatizations, videos, field trips, hands-on activities, simulations, and guest speakers.
- Students should obtain information from a variety of oral and visual sources including primary and secondary resources, interviews, and conversations; culturally diverse texts, biographies, folk tales, and legends; pictures and maps; and poetry, songs, dances, and artworks. Motivating resources are also available from museums, historical sites, presidential libraries, and local and state preservation societies.

- Students should create and interpret visual representations such as illustrations and maps.

19. Social Science Instruction, cont'd.

2. *Appropriate Technology*

Effective social studies instruction utilizes a variety of visual and oral tools and technologies to help students gain social studies and research skills as well as use the skills they have learned in a real-world setting. Students should explore a variety of technologies and should identify how these technologies meet needs and affect their lives. They should be able to identify examples of technology used in the home and school and describe how technology helps accomplish specific tasks.

Technology includes:

- overhead images
- computer software
- the Internet
- video programs
- audio programs and music, and
- human resources (such as guest speakers).

For example, a unit on African art could include historical and cultural traditions, investigations of the landforms and geography of Africa, and a video presentation (technology) that depicts how African art is used.

H. **Promote Students' Use of Social Science**

Teaching with current information and resources allows students to develop the skills needed to research social science issues. Highlighting problem-solving, source bias, and other issues build learner abilities in social science.

- ask questions
- collect information
- organize information
- analyze information
- answer questions

Research questions are formulated through the study of:

- textbooks, scholarly books, and articles
- autobiographies
- eyewitness accounts

- letters, diaries, and journals
- news reports
- official documents
- historic sites and artifacts
- works of art

Fieldwork

Student fieldwork engages students, makes real world connections for geographic studies, and fosters active learning. Students can conduct research in their community by

- distributing questionnaires
- taking photographs
- recording observations
- interviewing citizens
- collecting samples

Primary and Secondary Sources

It is important to create an accurate picture of events using primary and secondary sources.

- Primary sources – actual records and first-hand accounts of historical events
- Secondary sources – retellings, descriptions, and explanations created after the event, usually based on primary sources.

Bias, Point-of-View, Propaganda

Information is rarely neutral. Writers use information selectively to prove their point of view. It is therefore important to examine who is providing information and what might be their point of view or bias. You need to determine whether the information is fact, opinion, or propaganda. Remember that the Internet is a perfect vehicle for commercial and sociopolitical publishing and these areas are open to highly “interpretive” uses of data.

I. **Make Connections across the Curriculum**

Linking subject areas provides meaningful learning experiences that develop skills and knowledge, while leading to an understanding of conceptual relationships. Effective

19. Social Science Instruction, cont'd.

social studies instruction creates interdisciplinary connections between core and enrichment curriculums. With integrated curriculum, skills and knowledge are developed and applied in more than one area of study.

Educational programming is focused on the learner. Make multiple links among:

- the humanities
- communication arts
- natural sciences
- mathematics
- social studies
- music, and
- art

J. Utilize Assessment to Adapt for All Learners

Social studies instructors should use a variety of formal and informal assessments to monitor student progress. Using data gathered from these assessments, teachers should:

- Design and implement lessons to re-teach missing concepts
- Adapt for cultural differences to reach a diversity of learners, and
- Accommodations for limited language speakers.

Performance assessments can include:

- projects
- portfolios
- tests (both teacher-created and standardized)
- performances, and
- demonstrations.

K. Practical Applications of Social Sciences

A number of TExES test questions are interdisciplinary, reflecting the complex relationships among the social studies fields in their real-world applications. Answering the questions correctly requires knowing, interpreting, and integrating history and social science facts and concepts. Texas teachers must understand and apply social studies knowledge, concepts, methodologies, and skills across the fields of:

- United States history

- world history
- Texas history
- government/civics/political science
- geography
- economics, and
- technology.

Higher-order thinking questions are based on interpreting material such as

- written passages
- maps
- charts
- graphs
- tables
- cartoons
- diagrams, and
- photographs.

In addition, there are questions relating to the diverse experiences of people in the United States as related to

- gender
- culture, and/or
- race.

L. Geographic Graphical Sources

Teaching with current information and resources allows students to develop the skills needed to research social science issues. Activities with the use of newspapers, journals, interviews, and technology as sources of information promote learners' ability to locate and analyze information.

M. Communicates the Value of Social Studies Education

Collaboration with community resources, caregivers, and colleagues demonstrates the value of social studies to the wider community. Student activities that reinforce social science skills via research activities in the community assist learners and members of the community in appreciating the value of social studies education.

22. Economics

Competency 22:

The teacher understands and applies knowledge of geographic relationships involving people, places, and environments in Texas, the United States, and the world; and also understands and applies knowledge of cultural development, adaptation, diversity, and interactions among science, technology, and society as defined by the Texas essential knowledge and skills (TEKS).

A. Meeting Basic Human Needs

Instruct students on the basic necessities of life from a cultural, geographic, and historical perspective.

B. Basic Economic Concepts

1. *Texas teachers must understand*

- how the government and the economy interrelate through regulations, incentives, and taxation
- economic systems - how resources are used to produce and distribute goods and services
- economic resources - land, labor, capital, and entrepreneurship
- alternative economic systems

2. *Supply and Demand*

In a free enterprise system, every product has a price. Price is based on consumer desire or need for the product. As the demand for the product rises, its price rises, too. When the supply of a product exceeds the demand for the product, the product's price goes down.

C. Economic Systems Around the World

Teachers implement activities that instruct students about economics in other countries. Allowing students to interview staff or community members from other countries to discover information is a valuable strategy. Learners can explore topics such as the benefits of voluntary trade among countries and the basis for trade.

D. Operating Businesses in the U.S. Free Enterprise System

Brainstorm with students, the types of businesses that are operated in the Texas community and other areas of the state and nation. Assign team projects to research specific businesses related to results of the brainstorming session. Encourage research tools from newspapers, interviews, the Internet, and local chapters of the Chamber of Commerce.

The Free Enterprise System

- a kind of economy in which people can own and run their own business
- the government has limited control over how businesses are run
- private citizens can own land, factories, and other resources
- private citizens can employ workers
- gives citizens the right to buy and make goods

E. Effects of Supply and Demand

Discuss and delineate, with students, the impact of United States' production, distribution and consumption of goods and utilities on the economic development of their local community, Texas and the United States.

F. Measuring Economic Level

The Texas Economy (Important Facts)

- Texas is one of the nation's fastest growing economies.
- There are many jobs in Texas, most in the service industry.

continued

22. Economics

- Tourism is one of Texas' biggest industries.
- Texas industry depends on natural resources.
- Texas is a center for manufacturing.
- Texas makes more goods than can be used and has many exports.

G. Issues in Economic History

Review historical chronology of the Great Depression with students and ask them to research the impact of that on their community and state by interviewing people who lived during that time.

The Great Depression

Following the industrial boom of the 1920s, many companies had produced more goods than they could sell. The stock market crashed in 1929, leaving many businesses and people bankrupt. This was the starting point of the Great Depression, a time of extreme poverty and hardship. The economy began to recover with the inception of President Franklin Roosevelt's New Deal, though it did not fully come to an end until World War II. The New Deal created Federal Agencies to fund and manage:

- emergency relief (FEMA)
- the elderly, orphans, and the disabled (Social Security)
- excess farm production (Agricultural Adjustment Act)
- the development of the Tennessee Valley Authority (TVA)
- environmental improvement (Civilian Conservation Corps)
- labor unions (National Labor Relations Board)

H. Interdependence of the Texas Economy

Teaching of economics allows utilization of many local experts and resources as all communities have some level of economy in operation. Assign students to research the impact of United States' production, distribution, and consumption of goods and utilities on the economic development of their community, Texas, the United States and non-Western societies. Draw comparisons as students report their findings. Topics may include North American Free Trade Alliance (NAFTA), the international Texas film industry, global energy corporations headquartered in Texas, and Texas art and museum alliances with museums in other countries.

30. Forces and Motion

Competency 30:

The teacher understands forces and motion and their relationships.

A. Forces of Nature

Force is energy applied to do work. Forces often act against each other. If two or more forces are acting on the same object, the forces added together result in the net force. If a force pushing or pulling on an object is greater in one direction, this is an unbalanced force (push or pull) and results in motion of the object. There are several familiar types and applications of forces. Within the elementary science classroom, these forces should be explored within investigations of common situations and objects, such as those suggested below.

- A push is a force used to move something away from the force, such as pushing a shopping cart.
- A pull is a force used to move something towards the force, such as pulling a wagon down the sidewalk.
- Friction is force acting in the opposite direction of the motion of an object. A car being stopped by its tires against the road is stopped by friction.
- Gravity is the force that pulls objects towards the Earth. If you drop a pencil, gravity is the reason it falls down.
- Electric force is the force of positive or negative attraction between atomic particles such as electrons, protons and neutrons. An electric force of static electricity can be created by rubbing an air-filled balloon onto the head on top of your hair. The invisible attractions between particles cause your hair to be pulled up and to stick to the balloon.
- Magnetic force is the force that pulls objects toward or away from a magnetic field. A magnet exerts a magnetic force onto magnetite rocks, or anything made of iron or steel. You can see this force in action when you use a magnet to pick up paper clips.
- Inertia is the tendency of an object to resist changes in its motion. It is hard to move a heavy refrigerator because of inertia.

B. Scientific Process, Data Collection, Tools

Teachers should incorporate the scientific method **Questioning, Hypothesizing, Observation, Data Collection and Drawing Conclusions** as a systematic process by which students investigate physical science questions. Students should understand that any conclusions drawn must be done as a result of evidence gathered in the investigation.

Accurate recording of observed data should be emphasized, and students should understand that if possible, data should be put into easily understandable formats such as tables, graphs or charts so that it can be shared with others. Appropriate technology and tools should be used to collect, record, and process data.

Science fair projects are a good example of the process of scientific investigation in action.

- Students would begin with a question: Will different colors of crayons lose mass if heat is applied? Students would form a hypothesis, explaining whether or not they believe the crayons would lose mass, or have less wax, if they were heated.

continued

30. Forces and Motion, cont'd.

- To find out, they would need materials (crayons of different colors) and several tools: a digital camera, a scale to measure the mass of the crayons, a hot plate, a non-stick pan, and a plastic utensil for scraping the pan. As the crayons were being melted, students could use the camera to document the melting and weighing of each crayon both before and after heating.
- To better be able to share their data, the teacher might guide them in using a computer to create a bar graph showing the mass of each colored crayon before and after melting.
- Finally, after gathering their data, the students would draw a conclusion about what happened and why, comparing their data to their hypotheses and answering the original question. To complete the project, students could type up each part of the investigation and attach it to a display board along with the pictures, data collection, and graph, and share their results with their fellow student scientists.

a large distance, but if it ends up in the same place where it started, its displacement is 0.

- **Velocity.** The speed of an object in a particular direction. Since speed (a scalar quantity) and direction are both important in determining velocity, it is a vector quantity. Graphs 1 and 2 below have

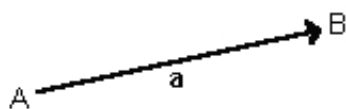


constant velocity because the slope of the line is unchanging, while Graph 3 illustrates a particle with changing velocity.

- **Acceleration.** This is a vector quantity defined as the rate of change of velocity. It is measured in meters/second². Graph 2 above shows a particle with 0 acceleration, because there is no change in velocity, while graphs 1 and 3 both show particles which are accelerating.

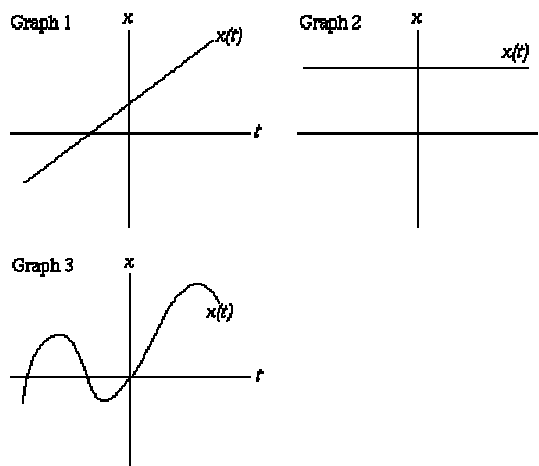
C. Motion

Scientists use the term **motion** to refer to a continuous change in the position of a body relative to a reference point, as measured by a particular observer in a particular frame of reference.



There are many ways of measuring, graphing, and describing changes in motion; most of these ways involve analyzing the **displacement**, **acceleration**, and **velocity** of an object.

- **Displacement.** A vector quantity that describes the position of a particle in reference to an origin, or that particle's change in position. An object can cover



D. Force and Motion

Sir Isaac Newton was most probably the first

30. Forces and Motion, cont'd.

to give a mathematical definition of force; more importantly, Newton came up with three laws which defined motion in relation to forces acting upon objects and the reaction of objects to those forces.

- **Newton's First Law of Motion.** This law states that an object at rest will remain at rest, while an object in motion at constant velocity will remain in motion at constant velocity, unless there is a net force acting on it. This law is also called The Law of Inertia.
- **Newton's Second Law of Motion.** When the net force acting on an object is not zero, then the object will move in the direction of the force; in this case, the acceleration is directly proportional to the net force and inversely proportional to the mass of the object. From this relationship, we can derive a very important equation:

F = net force (measured in N)
 m = mass of the object (measured in kilograms)
 a = acceleration m/s^2

$$a = \frac{F}{m} \text{ or } F = ma$$

- **Newton's Third Law of Motion.** When one object exerts a force on another object, the second object will exert a force on the first object that is equal in magnitude but opposite in direction. From this law, we get the famous phrase, "For every action, there is an equal and opposite reaction." This is an example of action-reaction forces.

E. Force and Motion in Everyday Life

- Human beings have been putting the knowledge of the relationship between force and motion to use long before Sir Isaac Newton formalized his laws. Indeed, with this relationship in mind, humans were able to build simple machines that aided them in building houses, religious

continued

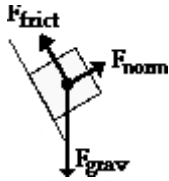
Data about the physical properties of objects can be compiled by putting them into a graphic form such as a table to help explore how they are related to one another. Given the table, students can then discuss and record how objects compare to one another with respect to various physical properties. Early elementary students can complete the table as a whole-class activity, while students in second grade and up can likely complete the grid independently. To the right is an example that could be used in a fourth grade classroom.

| Object | Size | Shape | Temperature | Hardness | Mass | Conduction |
|----------------------|--------------------|-----------------------------|------------------|-------------------------|-------|------------|
| Ice cube | 2 cm | Rectangular prism | 32° F | Hard | 5 g | No |
| Cotton ball | 3 cm | sphere | 70° F | Soft | 1 g | No |
| Metal spoon | 12 cm | Bowl on one end with handle | 90° F (in cocoa) | Very hard | 45 g | Yes |
| Hot cocoa (prepared) | 50 cm ³ | Liquid (shape of container) | 100° F | Liquid | 150 g | No |
| Crayon | 6 cm | Cylindrical with point | 70° F | Soft (easily scratched) | 7 g | No |

30. Forces and Motion, cont'd.

structures, etc. An example of a simple machine is an inclined plane.

- The phenomenon of **continental drift** is based on the interaction of forces among the layers of the earth.
- Blood flow in the human body is depen-



dent on forces; indeed, the velocity of blood flow can be influenced by frictional forces within your blood vessels. One example of this is found in the disease atherosclerosis. Eating an over-abundance of foods rich in cholesterol can lead to a build up of fatty substances in your arteries; these fatty substances can cause resistance to blood flow, thereby dangerously decreasing its velocity.

- The relationship between force and motion can help you understand why it is that when you hit your head against a wall, it hurts (Look at Newton's Third Law of Motion).

The teacher must understand the properties of the four universal forces and of forces in general. The teacher must be clear on the difference between scalar quantities and vector quantities and must be able to describe the vector nature of a force and its relationship to motion. Furthermore, the teacher must understand how to graphically communicate various aspects of motion and the fundamental meaning of each of Newton's Laws of Motion. Finally, the teacher must be able to relate the interactions between force and motion to situations familiar to students.

31. Physical and Chemical Properties of Matter

Competency 31:

The teacher understands the physical and chemical properties of and changes in matter.

A. Physical Properties of Matter

There are certain properties that characterize matter, just as there are properties that characterize human beings, and they can be either physical or chemical. The first has to do with properties that do not change the basic nature of matter when measured, while the second properties do. An example of a chemical property is reactivity with water. Some common examples of physical properties are:

- **Mass.** How much matter and energy an object contains.
- **Weight.** A measure of the gravitational force acting on an object.
- **Density.** The mass of a substance divided by its **volume**, which is the amount of space an object occupies.
- **Boiling point.** The temperature at which a liquid changes into a gas; a more technical definition can be stated as “the temperature at which the vapor pressure of the liquid equals the pressure of the surroundings.”
- **Melting point.** The temperature at which a solid changes into a liquid.
- **Solubility.** The amount of **solute** that will dissolve in a specific **solvent** under given conditions. The dissolved substance is the **solute**, while the dissolving fluid is the **solvent**.
- **Thermal Conductivity.** A measure of a substance’s ability to conduct heat.
- **Electrical Conductivity.** A measure of a substance’s ability to conduct an electric current.

In general terms, physical properties of materials are governed by their molecular structure; crystals, for example, are rigid structures and thus form many solids. Getting a bit more technical, matter is made of elements

(which are made of atoms). A scientist by the name of Dimitri Mendeleev organized elements according to their physical and chemical properties into a grid called the periodic table. The rows are called periods; all elements in a period have something in common. The columns are called groups and usually all the elements in a group have similar chemical properties. On the basis of physical properties, the periodic table can be divided into three main sections.

- **Metals.** Metals make up more than 75% of the periodic table. They are

The image shows a standard periodic table of elements. It is color-coded to show different groups of elements. The main groups are labeled as s-block (groups 1 and 2) and p-block (groups 13-18). The transition metals are labeled as d-block (groups 3-10). The inner transition metals are labeled as f-block (lanthanides and actinides). A legend at the top indicates that the atomic number is shown in the top left of each element's box, the symbol is in the top right, and the valence shell configuration is in the bottom right. The table is organized into periods (rows) and groups (columns).

characterized by the fact that they have a metallic shine or luster and they are usually solids at room temperature. Furthermore, they are **malleable**, which means they can be hammered, pounded, or pressed into different shapes without being broken. They are also **ductile**, which means that they can be drawn into thin sheets or wires without breaking. Finally, they are good conductors of heat and electricity.

- **Nonmetals.** There are 17 nonmetals. They are characterized by the fact that they rarely have metallic luster, they are usually gases at room temperature, and those that are solids are neither mal-

continued

31. Physical and Chemical Properties of Matter, cont'd.

leable nor ductile, and they are poor conductors of electricity.

- **Metalloids.** There are six metalloids and their characteristics fall in between those of the metals and nonmetals. For example, they conduct heat and electricity better than nonmetals but not as good as metals.

B. Matter and States of Matter

Matter is anything that has mass and takes up space; it is made of atoms and molecules, which are often generally called particles. Whatever you see when you look around you is made of matter, including your own body. Physicists have a difficult time coming up with a completely accurate definition of matter and are constantly researching what matter is and its properties. Though they have found that there are at least five states of matter, the majority of information has been collected on three.

- **Gas.** Particles that make up gases are well separated from each other and have no real organization; they are constantly moving past each other at high speeds, besides vibrating themselves. Gases assume the shape of their container, are highly compressible, and flow easily.
- **Liquid.** Particles that make up liquids are packed more tightly together, but have no real arrangement. The particles are able to slide past one another, giving this state the property of flowing easily, though liquids are not easily compressible. Liquids assume the shape of the part of the container that they occupy.
- **Solid.** Particles that make up solids are packed tightly together in a very regular pattern. These particles vibrate slightly but have no space to move freely about; in fact, solids neither flow easily nor are they easily compressed. Since the particles are rigid and locked into place, solids retain a fixed volume and shape.

C. Elements, Compounds, Mixtures

Atoms can differ in the number of subatomic particles they contain. The **atomic number** of an atom is the number of protons in that atom, and this number determines the **element** of the atom. An element cannot be decomposed or transformed into other chemical substances by ordinary chemical processes. Within the same element, the number of protons is always the same, though the number of neutrons may vary, creating **isotopes** of that element.

A **compound**, on the other hand, is a substance that consists of two or more different chemically bonded elements in a fixed ratio. Compounds can exist in different states and can be decomposed to smaller compounds or individual atoms if heated to a certain temperature.

A **mixture** is produced by mixing chemical substances, such as elements or compounds, without creating new chemical bonds or causing any chemical change; in this way, each substance in the mixture retains its own chemical properties and structure. Physical properties of the mixture, however, may be different than those of the component substances. Mixtures can be mechanically separated.

A **solution** is made up of two parts—a solute, a type of a compound, and a solvent. The solute dissolves by spreading out evenly throughout the solvent. For example, salt (a solute) and water (a solvent). The combination of a solute and a solvent produces a liquid solution. When no more solute will dissolve the solution is considered **saturated**. Rate of dissolving is affected by temperature and motion. Going back to the example, salt will dissolve more quickly in hot water or when the water is stirred.

31. Physical and Chemical Properties of Matter, cont'd.

D. When do physical and chemical changes happen?

- **Crushing a can.** Before recycling an aluminum can, you put it on the floor and crush it. In doing this, you caused a physical change in the can; the shape of the can was the only thing to change.
- **A pond freezing over.** This is a change in the state of matter. The liquid form of water changes into the solid form; therefore, this is a physical change.
- **Burning sugar.** Burning a substance changes the bonds that hold the atoms together. Because the arrangement of atoms has changed, this is a chemical change.
- **Rust.** When iron comes into contact with oxygen (in the presence of water), the two combine and a new compound, rust, is formed. This is a chemical change.

E. Chemical Bonds and Chemical Reactions

Chemical bonding (when two or more chemical substances are linked together) is dependent on interactions between electrons in the outermost orbitals of atoms. Some atoms have extra electrons, and so are looking to get rid of them, while other atoms are a few electrons short and so are looking to acquire some. When the electrons of atoms interact, bonds are formed; there are two main ways that electrons can interact, giving rise to two different types of bonds.

Covalent bonds. This is when two or more atoms share electrons.

Ionic bonds. This is when electrons are borrowed. In this case, one atom partly gives up electrons, becoming positively charged, while another atom partly accepts electrons, becoming negatively charged. The atoms are held together by the attractive forces between negative and positive charges.

A **chemical symbol** is a short representation of the name of a chemical element, usually made of one or two letters. Ex.: oxygen = O^2

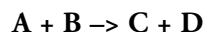
A **chemical formula** is a shortened way of expressing information about the atoms that make up a chemical compound. The formula identifies each constituent element by its chemical symbol and also indicates the number of atoms of each element. Ex.: glucose = $C_6H_{12}O_6$. A chemical formula may also supply information about the types and spatial arrangement of bonds in the compound.

A **chemical reaction** occurs when two or more molecules, atoms, ions, etc. interact and something happens. Within a chemical reaction, a chemical change (not a physical change) occurs; often one chemical reaction is part of a larger series of reactions. Some reactions happen quickly, occurring in a matter of seconds, while others take incredibly long periods of time, such as thousands of years. The underlying idea behind why reactions take place has to do with the **collision theory**. If you were able to observe individual particles like atoms or molecules, you would see that they vibrate and move around. Some are more "excited" than others and so move around more and faster (the state of excitement of particles is dependent in a large part on environmental conditions); when these molecules move around, they often collide with one another and this is when the possibility for a chemical change occurs (something sticks together, something breaks, etc.). The collision theory states that the more collisions in a system, the more likely combinations of molecules will happen; concentration, temperature, pressure, and the presence of a catalyst are also factors that affect the rate of collision of molecules and so affect the speed of reactions. Chemical reactions can either release energy (**exothermic reactions**) or require energy (**endothermic reactions**).

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31. Physical and Chemical Properties of Matter, cont'd.

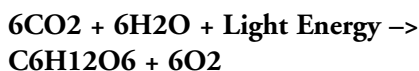
Chemical reactions can be expressed as **chemical equations**.



A chemical equation is like a written recipe. On one side of the arrow, you have the ingredients that go into the recipe, like milk, eggs, and flour. In chemistry, these ingredients are called **reactants** (A and B in the example above). The arrow represents the reaction. On the other side of the arrow (the pointy side), there is what comes out of the recipe after you mix everything together, cook it and let it cool, like a cake (a very simple cake); in chemistry, what comes out of a reaction is called the **products** (C and D in the example above). These are the newly rearranged atoms; a chemical equation must always be **balanced**, i.e., there must always be the same number of atoms on both sides of the arrow.

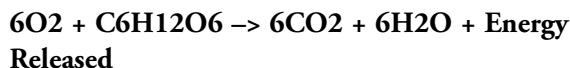
Some examples of important chemical reactions:

- **Photosynthesis.**



This reaction happens only in plants, algae, and certain bacteria. It is an extremely important reaction for two reasons. The $\text{C}_6\text{H}_{12}\text{O}_6$ product of photosynthesis is glucose, a **carbohydrate** (an energy-storing nutrient); indeed, it is only through photosynthesis that nutrients consumable by all animals enter the food chain. 6O_2 stands for six molecules of oxygen; plants are responsible for releasing a large quantity of oxygen into our atmosphere and without them, the composition of the earth would be very different!

- **Cellular Respiration.**



This reaction happens in all organisms that use oxygen (not all organisms need oxygen to live and some are even poisoned by it!). It is important because it is the reason why we breathe and eat food in the first place; combining oxygen and the nutrients we take into our body, we release the energy stored in those nutrients and that energy allows our body to function.

The teacher must understand the structure of the atom and how this relates to things such as elements, isotopes, ions, molecules, and compounds. The teacher must have knowledge of how the periodic table is organized according to the chemical properties of elements, and must be aware of the general characteristics of the major families of elements. Finally, the teacher must understand chemical bonding and chemical reactions, being aware of some of the more important chemical reactions, and must be able to use chemical formulas and equations to convey this information.

42. Visual Arts

Competency 42:

The teacher understands the concepts, processes, and skills involved in the creation, appreciation, and evaluation of art and uses that knowledge to plan and implement effective and engaging visual arts instruction.

A. The Value of Art

All children need a variety of experiences to assist them in exploring their environment. Through art, children learn to value their own uniqueness and to appreciate the individuality of others. Art allows us to communicate powerful ideas creatively, on many levels. Art promotes

- Personal Development - creative expression, self-discovery, self-esteem and self-concept
- Social Development - children learn to cooperate during group art projects
- Physical Development - small muscles, eye-hand coordination, dexterity, and a sense of rhythm are developed as children engage in art activities
- Language Development - vocabulary is increased as the children talk about their art projects; drawing contributes to the development of writing
- Cognitive Development - art contributes to thinking skills in many areas, including classification, symbolic representation, and spatial relationships

B. Fostering Creativity

Students should be allowed to explore and create with as few limits as possible! Genuine creative thinking consists of flights of fancy tempered by practical limitations, and is a requirement for success in modern society. In a world that is becoming increasingly technological, creativity is tantamount to success. Students will develop their creative skills in an environment that fosters mental flexibility. Respect for the individual and his ideas are more than a democratic principle; it is a cardinal code of conduct for the

teacher who expects genuine, sustained interest from students. Simply put, students should be allowed to explore and create with as few limits as possible. Students should be allowed choice of topic, choice of design, and choice of tools as much as possible. Use of patterns and examples limits creativity.

C. Developing Perception and Visual Literacy

Visual literacy refers to the way we use our senses and perceive the world. It is the ability to identify the visual and tactile qualities of the environment. The development of visual literacy is fundamental to learning. Visual literacy allows students to:

- interpret symbols and understand symbolism
- communicate ideas more effectively
- comprehend artworks
- visually analyze their environment

Students with weak visual perception struggle in many areas. Visual Arts education provides unique opportunities for students to build visual perception skills. Students can build visual perception skills by:

- drawing and creating images from observation
- cooperative discussion prior to activities that stimulates students' prior knowledge
- creating artworks and images from their imagination
- * creating artworks that demonstrate the student's thoughts and beliefs - works that include symbolism and contain a message
- multi-sensory experiences - activities in which artworks are based on things they see, feel, taste, smell, or hear

continued

42. Visual Arts

D. Critical Thinking and the Visual Arts

Few venues offer finer opportunities for critical thinking and problem solving. In the study of art, students must constantly seek innovative ways to express their thoughts and ideas. They must consider the world around them from many perspectives. They must focus on minute detail, while still considering the overall composition. To capitalize on these opportunities, teachers should include elements of critical thinking in every art lesson with methods such as:

- cooperative discussion prior to activities that examines projects and issues from many angles
- allowing students to make informed choices about how they will create their artworks, including choices about tools and techniques they will use
- lead student discussions on the merits and shortfalls of various tools and techniques as related to the work at hand
- question students regarding their choices and the choices of other (professional and peer) artists and artworks; use higher order questioning from Bloom's Taxonomy (What if? Is it effective? How can it be improved? Predict...)
- teach students to apply Bloom's Taxonomy to their own works and to create effective questions for themselves—to evaluate their own works
- include self-reflection activities as a routine part of every lesson by having students explain or justify their choices and the messages of their works, creating an artist's statement, and by displaying the works
- teach students to respectfully evaluate their own works, the works of their peers, and the works of professional artists.

E. The Elements of Art

The elements of art are apparent in all living systems. They have practical applications in mathematics, assist readers with comprehen-

sion and inference, and provide a myriad of opportunities for written expression.

1. Line

Lines are the most basic element of art. They take on many forms including horizontal, straight, diagonal, vertical, zigzag, curved and wavy. Lines create the underlying concepts and boundaries for works of art.

2. Texture

Texture brings clarity and depth to art. Textures may be soft, smooth, rough, bumpy or silky.

3. Shape

Basic shapes create the form for objects in art. Shapes include circles, triangles, organic shapes, geometric shapes, rectangles, symbols and letters, ovals, squares and diamonds.

4. Form

Art moves from basic shapes to three dimensional forms with the addition of geometric figures. These add depth and perspective to art. Form includes geometric shapes, cones, spheres, pyramids and triangular prisms, rectangular prisms, cubes, cylinders, and organic forms (forms found in nature).

5. Color

Color is used in three ways: to describe things, as a symbol, and to convey feelings or set the mood. Primary colors blend to create secondary colors, which in turn blend to create intermediate colors. Complimentary colors—those that oppose each other on the color wheel—affect each other, causing the colors to be more vibrant. When complementary colors are together, they create contrast. Analogous colors—colors that are positioned next to each other on the color wheel—create a sense of harmony. Colors can be complementary, cool, warm, primary, secondary, or intermediate.

42. Visual Arts

6. Value

Value is created through the blending of colors, and is used to enhance art and create specific effects. Colors mixed with white are lighter, and create highlights in art, giving depth and dimension. Colors mixed with black are darker, and create shadows and contrasts. Shadows and highlights are used to create focal points, or centers of attention. Values include shadows, tints (colors mixed with white), shades (colors mixed with black), and light to dark effects.

7. Space

Space is a critical element of art, as it allows the artist to create works with perspective. Perspective allows art viewers to see depictions from different angles. It is created with overlapping shapes, proportion (the size of one object in comparison to another object), and shadows. By drawing items in the foreground of the artwork larger than those in the background, the artist gives their work depth. Space elements include background, middle ground, foreground, proportion, positive and negative spaces, point of view, eye level view, worm's eye view and bird's eye view.

F. The Principles of Art

1. Unity

Unity is creating a bond between all the parts of a work, giving the work a balanced sense of wholeness. Unity is created using repeated lines, textures, colors, shapes and forms.

2. Variety

Variety allows artists to give their work contrast, to create depth, and to engender emotion. Variety is formed by the use of different lines, textures, colors, shapes and forms.

3. Emphasis

Emphasis is the process whereby an artist makes one element of a piece of art capture

the viewer's attention. Artists create emphasis by adjusting the size of the objects in their works, and with shading and highlighting techniques.

4. Pattern

Patterns create movement and rhythm. To create harmony in artworks, patterns should match each other and not clash. Artists create unity through patterns of repeated lines and shapes. Patterns of curved lines and complementary colors can create a sense of movement. Pattern is used to show proportion and to create balance—symmetrical, asymmetrical, and physical.

5. Harmony

Harmony is created when elements of a work blend and flow together into a cohesive statement. Harmony is created by the use of analogous colors (colors that are beside each other on the color wheel), tints (colors mixed with white) and shades (colors mixed with black).

6. Conflict

Conflict is created when complementary colors meet and create a contrast. Conflict is also created using arbitrary colors, colors that do not normally occur in nature (e.g., a green dog).

G. A Variety of Media

Elementary students should be exposed to and use a variety of media, including

- Crayon, pencil, colored pencil, pen
- Paint - acrylic paint, oil paint, tempera, Water color
- Pastel, oil pastel
- Collage and paper crafts
- Clay and fresco
- Print-making (lithography)
- Fabric crafts including yarn and beads

Teachers should be familiar with these tools

continued

42. Visual Arts

and the methods for clean-up and storage of them.

H. A Variety of Art Techniques

Elementary students should be exposed to and use a variety of art methods, including

- Drawing
- Painting
- Printmaking
- Construction (assembling artworks from found objects, cutting and pasting, collage, etc.)
- Ceramics (clay art)
- Fiber Art (art made with fabric, yarn and thread)
- Computer and digital art (artworks made on or with computers and digital cameras)

There is much focus on combining technology and art, as students skilled in both have unique opportunities in the future. Teachers should be familiar with these art methods.

I. Development and Art

The teacher needs to choose art activities of variety that will contribute to all aspects of a student's development.

The Stages of Artistic Development

1. Manipulative Stage

- usually ages 2-5
- characterized by exploration and the joy of discovery
- art is frequently unintelligible to adults
- art is often accompanied by a story (large black streak with overlapping white patch: "This is a cow and a chicken. The cow went to sleep.")
- child is developing coordination and exploring new materials

2. Symbolic Stage

- usually ages 4-7

- child discovers the ability to produce likenesses
- crude images
- scale often reflects an object's importance to the child (large swing set, floating in the sky, small stick figure below: "The boy went to the park and had fun.")
- uses recognizable images, but only as a means to an end, usually to express an idea
- the child has little interest in realism
- color is used extensively and often reflects the mood of the child

3. Realistic Stage

- usually ages 7-12
- child becomes more factually oriented
- begins to produce images that are more realistic, and moves away from abstract design
- child desires factual information in order to produce "accurate" images
- child often feels his work is inferior and needs encouragement

Teachers should evaluate students stage of artistic development and design activities that help each individual student to progress in their artistic development.

J. Art Appreciation

Exploration and evaluation of art is a major focus in Visual Arts instruction. In addition to exploring and evaluating the works of art masters, students should explore art as a form of recording human culture and tradition. Students should see, discuss, and create art in the styles of artists throughout history and from many cultures. Students should explore a variety of art from multiple cultures (both present and throughout history) and should discuss how art was created and used by these cultures.

42. Visual Arts

K. TEKS

The State of Texas has developed a vertically and horizontally aligned, standards-driven curriculum to promote cumulative knowledge and skills. Texas teachers must have comprehensive knowledge of the Texas Essential Knowledge and Skills (TEKS) for art, and must use this knowledge to plan, implement, and assess effective instruction. The TEKS provide clear goals that both teachers and students can understand, assess, and achieve. The TEKS for art can be downloaded from:

<http://www.tea.state.tx.us/teks/117toc.htm>.

1. Art TEKS are integrated and focus on four strands:

- **Perception.** The student develops and organizes ideas from the environment.
- **Creative expression/performance.** The student expresses ideas through original artworks, using a variety of media with appropriate skill.
- **Historical/cultural heritage.** The student demonstrates an understanding of art history and culture as records of human achievement.
- **Response/evaluation.** The student makes informed judgments about personal artworks and the artworks of others.

2. Art TEKS are vertically and horizontally aligned to promote cumulative knowledge and skills across grade levels.

L. Integration

Art is an expression of creativity that opens doorways to cross-curricular learning. Relegating artistic expression solely to the art room eliminates a multitude of educational opportunities. Art is extremely engaging in almost any form, a reward unto itself. Through artistic representation, students can create a variety of visual aids and can demonstrate a volume of learning.

Unique discoveries and innovations belong in both the art room and the mainstream classroom. Integrating art into academic curriculum

- provides opportunities for new and unique discoveries
- allows a creative expression of acquired knowledge
- provides an opportunity for synthesis and evaluation

When integrating the arts into the curriculum, educators should

- organize experiences that link with the unique needs, interests, and abilities of students
- challenge students with tasks that increase in complexity and sophistication
- establish clear and relevant learning objectives
- provide opportunities for open-ended creative responses with as few limits as possible

45. Physical Education

Competency 45:

The teacher uses knowledge of the concepts, principles, skills, and practices of physical education to plan and implement effective and engaging physical education instruction.

A. Key Concepts

1. Exercise Related Terms

- Aerobic - exercise that requires the presence of oxygen such as walking or jogging
- Anaerobic - oxygen-deprived exercise such as weight lifting or sprinting
- Ballistic Stretching - quick, bouncing movements that are held very briefly
- Conditioning - engaging in regular physical activity or exercise that improves physical fitness
- Warm-up - low intensity activities that prepare the body for more vigorous activities

2. Fitness Concepts

- Cardiovascular - relating to or involving the heart and blood vessels
- Dehydration - excess fluid loss from the body
- Heart Rate - heartbeats during specified time
- Metabolic Rate - the number of calories that are burned or expended as heat
- Muscular Endurance - the ability to contract muscles repeatedly without excessive fatigue
- Muscular Strength - the maximum force that can be exerted when muscles are contracted
- Overload Principle - to improve your level of physical fitness, you must increase your amount of activity
- Reaction Time - the ability to react or respond quickly to what you hear, see or feel
- Recovery Time - time or rest between exercises

- Repetition - the completed execution of an exercise one time
- Target Heart Rate - a figure used to determine the number of heartbeats per minute required to positively affect the cardio-respiratory system during exercise

B. Healthy Lifestyle

1. Components of a Healthy Lifestyle

- good nutrition
- adequate exercise
- maintenance of a healthy body weight

2. Health Related Fitness - physical fitness primarily associated with disease prevention and functional health

Health related fitness has five components:

- cardiovascular fitness
- body composition
- flexibility
- muscular strength
- muscular endurance

3. Activities that Build Muscle Strength:

- push-ups
- pull-ups
- tug-of-war
- rowing
- running
- in-line skating
- bike riding

4. Activities that Build Flexibility:

- tumbling and gymnastics
- yoga
- dancing, especially ballet

continued

45. Physical Education, cont'd.

- martial arts
- simple stretches

5. Body Mass Index

- a calculation that uses height and weight to estimate how much body fat you have
- too much body fat can lead to illnesses and other health problems

6. Obesity

- the body is burdened with excessive adipose (fat) tissue
- can lead to body system breakdown, illness, and disease

C. Movement Principles

1. Movement Concepts

- Agility - the ability to change direction quickly, while controlling body movement
- Balance - the ability to control or stabilize your body while moving or staying still
- Center of Gravity - the point where gravitational forces on the body are focused
- Coordination - the ability to use your eyes and ears to direct the smooth movement of your body
- Flexibility - the elasticity of muscles and connective tissues; determines the range of motion of the joints
- Fundamental Movement Skills - five skills important skills for elementary students: rolling, transferring weight, balancing, climbing, and hanging and swinging
- Locomotion - movement
- Locomotor Skills - moving the total body to get from one place to another using a walk, run, hop jump, leap, skip, gallop or slide or some combination of these
- Manipulative Skills - a skillful movement done to or with objects such as throwing a bean bag, striking a soccer ball, catch-

ing a Frisbee, or juggling

- Momentum - how much motion a body has based on its mass and velocity
- Range of Motion (ROM) - varying degrees of motion around a joint
- Resistance - opposition of some force upon another
- Velocity - the rate of motion in a particular direction in relation to time (example: miles per hour)

2. Newton's Laws

- Newton's Laws of Motion First Law of Motion (Law of Inertia) - an object at rest stays at rest, and an object in motion remains in motion, at a constant speed and in a straight line, unless acted on by an outside force.
- Second Law of Motion (Law of Motion) - the acceleration of an object depends on the mass of the object and the amount of force applied.
- Third Law of Motion (Law of Action and Reaction) - whenever one object exerts a force on a second object, the second object exerts an equal and opposite force on the first.

D. Rules, Etiquette, and Fair Play

Students should learn:

- the importance of manners and rules
- to follow rules and procedures
- to show consideration and respect for all people
- to include everyone and to take turns
- how to cooperate and work on common goals
- to respond to winning and losing with dignity and understanding

E. Positive Interactions

Students should learn:

- to treat all people with respect regardless of individual differences

45. Physical Education, cont'd.

- to be considerate of people with disabilities and people who are learning English
- to play cooperatively with all cultures, genders, religions, and ethnicities
- the negative results of solving conflict by violence
- to control their emotions and actions
- to resolve conflicts peacefully

F. Safety

Safety Rules for Physical Education Students

- Wear protective gear, such as helmets, protective pads, and other gear.
- Warm up.
- Know and follow the rules of the game.
- Listen to and follow instructions.
- Watch out for others.
- Don't play when you're injured.

G. Physical Education Activities to Promote Positive Interaction and Engagement

Every physical education activity has the purpose of involvement, sportsmanship, and learning. Each activity can build the confidence, self-esteem, and knowledge of the students and provide them with life lessons for social interaction, following rules, playing fairly, and proper etiquette. It is important that the chosen activities include all students.

1. Positive Interaction

- To treat people with respect regardless of individual differences
- To be considerate of people with disabilities
- To be considerate of people who are learning English
- To play cooperatively with all cultures, genders, religions, and ethnicities
- The negative results of solving conflict by violence
- To control their emotions and actions
- To resolve conflicts peacefully

2. Active Engagement by All Students

- To include everyone and take turns
- Groups appropriate for size of class
- Activities conducive to learning for size of class
- Every action by teammate is important to the outcome for the team
- Positive reinforcement with teachable moments
- Encourage teamwork

3. Rules, Etiquette, and Fair Play

- The importance of manners and rules
- To follow rules and procedures
- To show consideration and respect for all people
- How to cooperate and work on common goals
- To respond to winning and losing with dignity and understanding
- To prevent injury
- Teaches how to function in society
- Builds self-esteem

H. Understands Areas of Diverse Needs

The educator should be creative when adapting and modifying activities in order to make it easier, fun, and more understandable for all to participate. For younger students, use balls that are larger and softer and make the field of play smaller to ensure success. The more success the students experience, the more they will enjoy the game(s) and participate in them throughout their lives. Some examples of adapting to diverse needs are:

Team Sports

- Softball and baseball - move the bases closer together and the pitcher's mound closer to home plate; use a bigger ball and lighter bats
- Basketball - lower the goals and give a smaller basketball
- Volleyball - lower the net, shorten the court, provide bigger ball

continued

45. Physical Education, cont'd.

- Soccer-shorten the field, provide bigger ball, widen the goal
- Flag Football-more flags per belt, smaller ball, shorten the field
- Field Hockey-larger stick faces, bigger ball, widen the goal

Dances and Non-Traditional Games

- Teach dances that match the maturity level of the student
- To lessen embarrassment, modify for comfort level
- Teach dances in group (or scattered format) first
- Have fun with the dance, teach it like a sport to get the students' attention
- Do not expect perfection with the dances, avoid strictness to ensure participation

I. TEKS

The State of Texas has developed a vertically and horizontally aligned, standards-driven curriculum to promote cumulative knowledge and skills. Texas teachers must have comprehensive knowledge of the Texas Essential Knowledge and Skills (TEKS), and must use

this knowledge to plan, implement, and assess effective instruction. The TEKS provide clear goals that both teachers and students can understand, assess, and achieve. The TEKS for physical education can be downloaded from: <http://www.tea.state.tx.us/rules/tac/chapter116/index.html>

1. The Physical Education TEKS are integrated and focus on three strands:

- Movement
- Physical Activity and Health
- Social Development

2. The Physical Education TEKS are vertically and horizontally aligned to promote cumulative knowledge and skills across grade levels.

Competency Definitions

Domain I

1. Oral Language

Competency 1

The teacher understands the importance of oral language, knows the developmental processes of oral language, and provides children with varied opportunities to develop listening and speaking skills.

2. Phonological and Phonemic Awareness

Competency 2

The teacher understands phonological and phonemic awareness and employs a variety of approaches to help students develop phonological and phonemic awareness.

3. Alphabetic Principle

Competency 3

The teacher understands the importance of the alphabetic principle for reading English and provides instruction that helps students understand the relationship between spoken language and printed words.

4. Literacy Development

Competency 4

The teacher understands that literacy develops over time, progressing from emergent to proficient stages, and uses a variety of approaches to support the development of students' literacy.

5. Word Analysis and Identification Skills

Competency 5

The teacher understands the importance of word identification skills (including decoding, blending, structural analysis, sight word vocabulary, and contextual analysis) and provides many opportunities for students to practice and improve word identification skills.

6. Readng Fluency

Competency 6

The teacher understands the importance of fluency for reading comprehension and provides many opportunities for students to improve their reading fluency.

7. Readng Comprehension and Applications

Competency 7

The teacher understands the importance of reading for understanding, knows the components and processes of reading comprehension, and teaches students strategies for improving their comprehension, including using a variety of texts and contexts.

8. Readng, Inquiry and Research

Competency 8

The teacher understands the importance of research and inquiry skills to students' academic success and provides students with instruction that promotes their acquisition and effective use of those study skills in the content areas.

9. Writing Conventions

Competency 9

The teacher understands the conventions of writing in English and provides instruction that helps students develop proficiency in applying writing conventions.

10. Written Communication

Competency 10

The teacher understands that writing to communicate is a developmental process and provides instruction that promotes students' competence in written communication.

11. Viewing and Representing

Competency 11

The teacher understands skills for interpreting, analyzing, evaluating, and producing visual images and messages in various media and provides students with opportunities to develop skills in this area.

12. Assessment of Developing Literacy

Competency 12

The teacher understands the basic principles of literacy assessment and uses a variety of assessments to guide literacy instruction.

Domain II

13. Mathematics Instruction

Competency 13

The teacher understands how students learn mathematical skills and uses that knowledge to plan, organize, and implement instruction and assess learning.

14. Number Concepts and Operations

Competency 14

The teacher understands concepts related to numbers, operations and algorithms, and the properties of numbers.

15. Nonlinear Functions

Competency 15

The teacher understands concepts related to patterns, relations, functions, and algebraic reasoning.

Competency Definitions

Domain II

16. Geometry and Measurement

Competency 16

The teacher understands concepts and principles of geometry and measurement.

17. Probability and Statistics

Competency 17

The teacher understands concepts related to probability and statistics and their applications, images and messages in various media and provides students with opportunities to develop skills in this area.

18. Mathematical Processes

Competency 18

The teacher understands mathematical processes and knows how to reason mathematically, solve mathematical problems, and make mathematical connections within and outside of mathematics.

Domain III

19. Social Science Instruction

Competency 19

The teacher understands and applies social science knowledge and skills to plan, organize, and implement instruction and assess learning.

20. History

Competency 20

The teacher understands and applies knowledge of significant historical events and developments, multiple historical interpretations and ideas, and relationships between the past, the present, and the future as defined by the Texas Essential Knowledge and Skills (TEKS).

21. Geography and Culture

Competency 21

The teacher understands and applies knowledge of geographic relationships involving people, places, and environments in Texas, the United States, and the world; and also understands and applies knowledge of cultural development, adaptation, diversity, and interactions among science, technology, and society as defined by the Texas Essential Knowledge and Skills (TEKS).

22. Economics

Competency 22

The teacher understands and applies knowledge of geographic relationships involving people, places, and environments in Texas, the United States, and the world; and also understands and applies knowledge of cultural development, adaptation, diversity, and interactions among science, technology, and society as defined by the Texas essential knowledge and skills (TEKS).

23. Government and Citizenship

Competency 23

The teacher understands and applies knowledge of concepts of government, democracy, and citizenship, including ways that individuals and groups achieve their goals through political systems.

Domain IV

24. Safe and Proper Laboratory Processes

Competency 24

The teacher understands how to manage learning activities, tools, materials, equipment, and technologies to ensure the safety of all students.

25. Scientific Inquiry

Competency 25

The teacher understands the history and nature of science, the process and role of scientific inquiry, and the role of inquiry in science instruction.

26. Impact on Daily Life/Environment

Competency 26

The teacher understands how science impacts the daily lives of students and interacts with and influences personal and societal decisions.

27. Unifying Concepts and Processes in Science

Competency 27

The teacher knows and understands the unifying concepts and processes that are common to all sciences.

28. Theory and Practice of Science Teaching

Competency 28

The teacher has theoretical and practical knowledge about teaching science and about how students learn science.

29. Assessments in Science Learning

Competency 29

The teacher knows the varied and appropriate assessments and assessment practices for monitoring science learning in laboratory, field, and classroom settings.

30. Forces and Motion

Competency 30

The teacher understands forces and motion and their relationships.

Competency Definitions

Domain IV

31. Physical and Chemical Properties of Matter

Competency 31

The teacher understands the physical and chemical properties of and changes in matter.

32. Interactions Between Matter and Energy

Competency 32

The teacher understands energy and interactions between matter and energy.

33. Energy and Conservation of Matter

Competency 33

The teacher understands energy transformations and the conservation of matter and energy.

34. Structure and Function of Living Things

Competency 34

The teacher understands the structure and function of living things.

35. Reproduction and Heredity

Competency 35

The teacher understands reproduction and the mechanisms of heredity.

36. Adaptations and the Theory of Evolution

Competency 36

The teacher understands adaptations of organisms and the theory of evolution.

37. Ecosystems

Competency 37

The teacher understands the relationships between organisms and the environment.

38. Earth Systems

Competency 38

The teacher understands the structure and function of earth systems.

39. Cycles in Earth Systems

Competency 39

The teacher understands cycles in earth systems.

40. Weather and Climate

Competency 40

The teacher understands the role of energy in weather and climate.

41. Solar System and the Universe

Competency 41

The teacher understands the characteristics of the solar system and the universe.

Domain V

42. Visual Arts

Competency 42

The teacher understands the concepts, processes, and skills involved in the creation, appreciation, and evaluation of art and uses that knowledge to plan and implement effective and engaging visual arts instruction.

43. Music

Competency 43

The teacher understands the concepts, processes, and skills involved in the creation, appreciation, and evaluation of music and uses that knowledge to plan and implement effective and engaging music instruction.

44. Health

Competency 44

The teacher uses knowledge of the concepts and purposes of health education to plan and implement effective and engaging health instruction.

45. Physical Education

Competency 45

The teacher uses knowledge of the concepts, principles, skills, and practices of physical education to plan and implement effective and engaging physical education instruction.

Worksheet 2

Competency Key Titles

List the Key Title for each Competency: (Study them on the Competency study pages in this manual, and then write them from memory here.)

- | | |
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| 1. _____ | 24. _____ |
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