What is the TExES?

The TExES instrument has been designed to measure the requisite knowledge and skills that an entry-level educator in this field in Texas schools must possess.

The TExES is a criterion-referenced test, that measures the teacher’s knowledge in relation to an established standard of competence, rather than in relation to the performance of other test takers (that is how a norm referenced test report your score).

See the official website for dates and more details: www.texes.ets.org
What does this test look like?

• It has 140 questions—125 scorable and 15 non-scorable or pilot questions (number of non scorable questions may vary)

• All questions are multiple choice
  – Some may contain “stimulus material” or situations that you use to answer several questions
  – Questions are designed to test your ability to recall factual information as well as to think critically about information (analyze, compare or judge the information)
What about my score?

• For paper & pencil tests, you will receive a scaled score approximately 4 weeks after you take the test

• For CAT (computer administered testing) tests, you will receive your scaled score in approximately 3-5 business days

  – A scaled score is “is not the percentage of items answered correctly and is not determined by averaging the number of questions answered correctly in each domain.” (from Preparation Manual)

  – This mean that each item may be worth a different amount

• Minimum passing is a scaled score of 240 (out of 300)
Some general tips for the test...

• Know yourself—study areas where you have less background knowledge &/or experience.

• Eliminate answers—carefully read the question and underline/circle key words
  – Usually absolutes are the wrong answer.
  – Trends/popular methods and points of view are often the correct answer.
  – Student centered is preferred over teacher focused instruction.
<table>
<thead>
<tr>
<th>Domain</th>
<th>Subject</th>
<th>Percentage of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain I</td>
<td>English Language Arts &amp; Reading</td>
<td>32%</td>
</tr>
<tr>
<td>Domain II</td>
<td>Math</td>
<td>19%</td>
</tr>
<tr>
<td>Domain III</td>
<td>Social Studies</td>
<td>19%</td>
</tr>
<tr>
<td>Domain IV</td>
<td>Science</td>
<td>18%</td>
</tr>
<tr>
<td>Domain V</td>
<td>Fine Arts, Health &amp; Physical Education</td>
<td>Not covered in this review</td>
</tr>
</tbody>
</table>
Domain I: English Language Arts & Reading

- ESL Standard I:
  - Oral Language
- ESL Standard II:
  - Phonological and Phonemic Awareness
- ESL Standard III:
  - Alphabetic Principle
- ESL Standard IV:
  - Literacy Development and Practice
Domain I: English Language Arts & Reading

- ESL Standard V:
  - Word Analysis and Decoding
- ESL Standard VI:
  - Reading Fluency
- ESL Standard VII:
  - Reading Comprehension
- ESL Standard VIII:
  - Development of Written Communication
Domain I: English Language Arts & Reading

• ESL Standard IX:
  • Writing Conventions.

• ESL Standard X:
  • Assessment and Instruction of Developing Literacy

• ESL Standard XI:
  • Research and Inquiry Skills

• ESL Standard XII:
  • Viewing and Representing
Big Ideas in Language Arts

• Teachers provide many opportunities for children to examine texts and to write and discuss material from multiple perspectives.

• Teachers model for students and provide multiple ways for students to understand material and gradually release their responsibility (scaffolding).

• Teachers allow students to construct meaning for themselves and want students to become independent learners.

• Teachers ask students to work together in cooperative groups and collaborate.
Big Ideas in Language Arts

• Teachers can help families work with their children in the language arts through encouraging informal literacy skills at home such as reading different texts (books, magazines, newspapers, internet texts), writing lists, playing rhyming games and other word play, and singing songs.
Oral Language Development

- Songs, rhymes, word plays, dramatic play, discussion, puppets, wordless picture books, interactive reading and read alouds are all excellent ways to develop children’s oral language.

- The Language Experience Approach (LEA) is a research based method for connecting oral language to written language. The Language Experience Approach consists of an experience the entire class shares and then the sharing/writing of the experience together. Teacher models writing or asks students to write on large chart paper. The text is then read aloud by teacher and followed along by all.
Language Experience Approach

• All language skills used at once—reading, writing, speaking & listening
• words from students’ vocabularies are used
• skill building is promoted in a meaningful context
• oral vocab is increased
• self concept is enhanced [“I wrote that”]
• appropriate for all skill & language levels
• less proficient students benefit from seeing text that more proficient students generated about topics they understand
• students’ points of view are valued
• content is authentic, relevant to students’ lives—leads to higher motivation and interest
• can be used with whole group, small group & individuals, either as chart stories or class or individual books
Phonological and Phonemic Awareness

• Phonological and Phonemic Awareness are both oral language skills. Phonics is tied to print.

• “Phonological awareness is something you can do in the dark with your eyes closed. Phonics you do with the lights on”

• Phonological awareness—knowledge that words are made up of individual sounds (more global, includes rhyme, syllables)

• Phonemic awareness—knowledge about individual phonemes, tends to be structure focused rather than meaning focused
Phonological Awareness--Stages

Recognition (& production of):
• that sentences are made up of words.
• that words can rhyme
• that words can be broken down into syllables
• that words can be broken down into onsets and rimes
• that words can begin with the same sound
• that words can end with the same sound
• that words can have the same medial sound(s)
• that words can be broken down into individual phonemes
• that sounds can be deleted from words to make new words
• Ability to blend sounds to make words
Alphabetic Principle

• The alphabetic principle is the concept that there is a relationship between letters (print) and sounds (oral language).

• English is not phonetically “regular” and has many allophones (letters or combinations of letters that make the same sound). This can make English quite challenging!

• Skills include:
  – Letter sound association ("p" makes the /p/ sound)
  – Visual discrimination (knowing difference between letters such as b/d)
  – Blending letter sounds to form words (/c/ /a/ /t/ makes “cat”)

Alphabet and Print Awareness

- Alphabet tubs- Use two tubs-Give each child an object from the tub. (Ex. "b") Create a silly story with each of the objects. The children can listen for their object to be included in the story. This activity can be used as a transition tool, group activity, and placed in centers for choosing later.
- Have activities where children construct letters of straight lines with sticks or curved lines with pipe cleaners or yarn. Children need to physically create letters or participate in the process to construct understanding.
Literacy Development

• This includes the understanding that literacy develops over time and in different contexts. It is also the understanding that literacy progresses from emergent to proficient stages.
  – Teachers use a variety of children’s literature and genres and explore literary elements including:
    1. Setting
    2. Character
    3. Plot
    4. Style
    5. Point of view
    6. Mood or tone
    7. Theme
Read alouds

- Good practice for teaching vocabulary (wide reading)
- Teacher models and “blesses” a book
- Can use “Souvenirs” or “Story Bits”— to prompt the retelling of the story and to help the child remember -- -- can be symbolic such as a piece of yarn, a dog biscuit, etc.
  - not there to represent whole story but to help the child remember and to prompt retelling of the story
  - great way to make connections between real world and the world of reading!
Choral/Echo Reading

• Choral reading is reading with the teacher (all together)
• Echo reading is reading after the teacher – the teacher reads a sentence or page, students echo or repeat what she has read

Both:
  – Can be choreographed
  – Can use props
  – Help build fluency
  – Are excellent for ELLs to practice pronunciation, fluency
Shared Reading

- Teacher reads a book/text aloud and students follow along and are asked to read certain words/phrases/sections of the story. In this way a reading is “shared”.
  - students need to be able to see the pictures and the print (Big Books or have their own copy)
  - May engage in multiple readings of the same book
  - Great to use predictable books with young readers, ELLs
  - teacher works to build prior knowledge
  - questions are asked before, during and after
Word Analysis

- Word Analysis skills include
  - phonetic analysis (knowing isolated sounds, knowing that speech sounds are tied to letters and the ability to blend/manipulate these sounds);
  - structural or morphological awareness (knowing parts of words and types of affixes – suffixes and prefixes-- and being able to break words into parts such as “chairs” = “chair” + “s” for plural);
  - context clues (using pictures as well as other information in the text to inform your understanding)
Reading Fluency

• Fluency is the ability to read text accurately, quickly, and with good prosody (like melody of speech) and with effective comprehension.

• Developing fluency in children is a very important component of reading instruction and to build it we:
  – Read a text multiple times
  – Read text that is at a students’ independent reading level and below
  – Engage in choral reading (we all read together)
  – Conduct Reader’s Theater (we read and “perform” the text)
Reading Fluency

• Sight words can aid with fluency.
  – Help with **automaticity** (being able to automatically read what the word is)
  – If a student recognizes the word and knows what it means, they can attend to other aspects of reading like prosody and intonation, expression

• A common assessment of fluency is timed reading (how many words can a student read accurately in a minute).

• ELLs often appear fluent but they are sometimes good at “word calling” but not comprehending what they read.
Reading Comprehension

• Reading comprehension is an important aspect of reading development and teachers should:
  – Encourage students to make connections to the text along various levels
    • Text to self
    • Text to text
    • Text to world
Levels of Questioning

There are three main levels of questioning to show comprehension of a text:

1. **Literal**— students respond to questions that are from the text (students don’t need to think beyond the text)
2. **Inferential**— students use ideas in the text along with background information (predicting is an example)
3. **Evaluative**— students are asked to make value statements about a piece of literature (judging the outcome is an example)
Writing Process

• Teachers should engage students in writing through the writing process. This includes the following areas:
  – Brainstorming/prewriting – gathering ideas on a topic
  – Drafting – getting ideas down on paper in some order
  – Revising – refining/changing ideas or concepts in the text
  – Editing – perfecting the grammar, mechanics, spelling of the text
  – Publishing – making the text ready to share with an audience
Writing Process

• Not all pieces of writing that students create have to go through the writing process, but students should be encouraged to engage in meaningful making of texts in a variety of genres and for a variety of purposes.

• A writer’s workshop approach in the classroom uses the writing process but does not strictly adhere to that order, students are gathering ideas in a writer’s notebook, revising ideas and preparing some of their writing for publication.
Writing

- Shared writing: Children and Teacher compose a text together, deciding on what to write and how to say it, with the teacher doing the scribing. Parallels shared reading & is usually a whole class endeavor (also is part of the Language Experience Approach discussed earlier).

- Interactive writing: Students take the “pen in hand” to cooperatively compose and scribe a text. As one child works out a part of the text on chart paper, the others do the same on their wipe – off boards or in their journals.
There are four main stages of spelling development:

1. Prephonetic – children scribble and do not think of writing as made up of letters

2. Phonetic – children use a letter or word to represent a complete thought, but they do not spell conventionally – In English, students often use a consonant to represent a word with the initial consonant sound (fish is “f” or mine is “m” or “mn”; school is “skl”)
Stages of Spelling Development

3. Transitional – children spell words as they sound, using both vowels and consonants (because is “bicuś” and eagle is “egil”)

4. Conventional – children spell most words correctly and are able to apply spelling rules at about age 8-9
Language Arts Assessment

Assessment should include formative and evaluative or summative measures.

- **Formative**
- “For me” as the teacher, to help me know if students learned
- **Informal measures such as observations, anecdotal records, performance, and teacher made tests**
- **Evaluative/Summative**
- More formal assessments and typically created by someone else and used to determine if students mastered the subject matter
- **Benchmarks, End of Course Exams, STAAR**
Language Arts Assessment

• In reading we use informal reading inventories (IRIs) that are a series of increasingly difficult reading passages followed by comprehension checks/questions. IRIs are formative assessments used to determine reading levels (independent, instructional, frustrational)

• Running records are a very good type of formative reading assessment and miscue analysis as part of running records helps teachers determine what areas of reading are causing difficulties in comprehension
Research/Inquiry

- Research skills and academic inquiry are integral to comprehension and success in all areas. Teachers should help students
  - conduct research across content areas and with a variety of sources;
  - form questions as part of their investigations;
  - organize and synthesize information from a variety of sources;
  - come to their own conclusions;
  - present projects and reports using a variety of media;
  - and formulate hypotheses as a result of their inquiry.
Viewing/Representing

• Students understand and interpret visual communication (nonverbal)
  – Students examine, describe and deconstruct various types of media for point of view
  – Students evaluate images and how they are used to confirm, enhance or distract from meaning of texts

• Students express their own opinions and understandings through visual media
  – Students are not merely consumers of media, but produce multimedia reports as well
Domain II: Mathematics
Standards Assessed:

- **Standard I:**
  - Number Concepts
- **Standard II:**
  - Patterns and Algebra
- **Standard III:**
  - Geometry and Measurement
- **Standard IV:**
  - Probability and Statistics
- **Standard V:**
  - Mathematical Processes
Domain II: Mathematics
Standards Assessed:

• Standard VI:
  • Mathematical Perspectives
• Standard VII:
  • Mathematical Learning and Instruction
• Standard VIII:
  • Mathematical Assessment
• Standard IX:
  • Professional Development
Important Concepts in Math

• An effective teaching environment for math includes:
  – Posing worthwhile and authentic mathematical tasks
  – Using models, calculators, and technology as thinking tools
  – Encouraging discourse and writing around math
  – Requiring justification of student responses
  – Listening actively
  – Connecting mathematical activities to real-world tasks
Important Concepts in Math

• Students should:
  – Be active participants in learning and given time to construct their own meaning and discoveries.
  – Work together to solve problems and construct meaning through cooperative learning (this will require some discussion, so students are also talking about what they are learning).
  – Use manipulatives and hands-on learning to make connections between concepts and symbols.
  – Be able to articulate, explain, and teach others how they reached their answer.
  – Understand historical aspects of math, present day professions, and how math concepts are used in everyday life.
Number Concepts

• Early number concepts include the ability to recognize numbers of objects (* * *), the word associated with a number (three), and the symbol that corresponds to the word (3).

• Later number concepts include relationships between base, exponent, place value and a variety of ways of representing number concepts.
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>5,</th>
<th>9</th>
<th>6</th>
<th>8</th>
<th>.</th>
<th>3</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
</table>

Place Value
125,968.378
Patterns and Algebra

• Patterns are ways that people organize and order the world.
  – Young children need to recognize patterns and use their understandings of patterns to make predictions

• Algebraic thinking includes
  – making generalizations and using symbols (+, -, =, etc) to represent mathematical ideas
  – Representing and solving problems
Geometry and Measurement

- Geometry helps students understand the world in which they live (2- and 3- dimensions) and understand spatial relationships
- Children should work with plane (2-D) and solid (3-D) figures and identify them in the world (a ball is a sphere)
- Vocabulary: circle, square, rectangle, triangle, quadrilaterals, pentagon, hexagon, octagon, cube, cone, pyramid, cylinder, polygon
Geometry and Measurement

- Students need to have many experiences using standard and nonstandard measurement and estimating measurement.
- Measurement helps them understand physical aspects of the world and includes number operations, geometric ideas, statistical concepts, and function.
- **Scaling** includes making an object smaller or larger or drawing to scale.
- Measurement includes **length, time, area, mass, volume or capacity.**
Probability and Statistics

• Probability is the likelihood that something will have a particular outcome, for example, if a bag has 2 red beans and 5 black beans, what is the probability that you will choose a red bean?
  • The total number of beans/outcome = 7
  • The number of red beans/favorable outcomes = 2
  • So the probability of getting a red bean is 2/7
Mathematical Process and Perspectives

- Mathematical processes help students to reason and solve problems, make connections to the world and communicate mathematically.
  - Common strategies for problem solving:
    - Drawing a picture/diagram/table
    - Using tools (manipulatives, technology)
    - Acting out the problem
    - Trial & error
    - Work backward to solve the problem
- Teachers should be able to connect the history and evolution of mathematical concepts, procedures and ideas to classroom activities.
Mathematical Assessment

• Teachers should use a variety of ongoing assessments to develop an understanding of what students understand in Math
• Students should be given opportunities to assess their own understanding of math concepts and to set goals accordingly
• Students should be able to decide which mathematical operation should be used to solve a problem
Professional Development

• Teachers must develop competence and confidence in mathematics and become reflective practitioners that connect mathematical concepts to real-world, authentic problems.
Domain III: Social Studies Standards Assessed:

• Standard I:
  – Comprehensive knowledge of Social Studies.
• Standard II:
  – Integrates various Social Studies disciplines.
• Standard III:
  – Uses TEKS to plan and implement an effective curriculum.
• Standard IV:
  – History
• Standard V:
  – Geography
Domain III: Social Studies Standards Assessed:

- Standard VI: Economics
- Standard VII: Government
- Standard VIII: Citizenship
- Standard IX: Culture
- Standard X: Science, Technology and Society
Important Concepts in Social Studies

• Social Studies is a people centered field and should aim to produce good citizens as well as thoughtful learners.
• Students in SS engage in ideas over memorization and are taught that historical events impact current events.
• EC-6 SS builds a foundation to support the learning that occurs in later grades.
• Students in SS should learn how to examine events and ideas from multiple perspectives or points of view through primary and secondary sources and strategies such as: debate, role play, cooperative learning, simulations, guest speakers, etc.
Comprehensive Knowledge & Integration of SS

• The SS teacher understands the TEKS and should be able to select and apply effective and developmentally appropriate instructional practices, activities, technologies and materials to promote students’ knowledge and skills in SS.

• Teachers create situations where students are practicing social skills and provide experiences for students to understand their own unique traits as well as commonalities with other students.
Comprehensive Knowledge & Integration of SS

• In Texas, the scope and sequence of SS follows an expanding environments model.
  – Kinder—self, home, family, classroom
  – 1st—classroom, school, community
  – 2nd—community, state, nation
  – 3rd— how individuals impact communities and world
  – 4th—Texas history
  – 5th—history of the US
  – 6th—people and places in the contemporary world
History

• History should be taught as a way for students to understand both events in the past and the present, especially notions of cause and effect.

• In teaching history, teachers use **primary sources** (original records or first hand accounts such as diaries, eye witness accounts) and **secondary sources** (use primary sources to learn about an event or deliver information at a later time – i.e. autobiographies, textbooks)

• Teachers use timelines to help put events in perspective and almanacs for statistical information.
History

- Students can actively engage in learning about history through oral histories—interviews with an eyewitness to an historical event; surveys, timelines, etc.
- Visual depictions such as photographs and cartoons help present data and visual/symbolic understanding of events.
- Students should be involved in historical methods such as 1) problem identification; 2) gather information from the past; 3) observe data carefully; 4) analyze data and make inferences; and 5) draw conclusions (Seefeldt, 1997).
Geography

• The study of geography includes our planet and the people who live on it.
  – Cultural geography studies how human groups live and change in relation to the environment.
  – Physical geography studies the Earth and its physical environment.
Geography

• Some important concepts of geography include:
  – Maps—visual means of representing location, distance, boundaries, features, etc
    • Relief maps have raised features to show elevation
    • Topographic maps show detailed elevations and use contour lines but are flat
    • Physical maps are also flat but use different colors and other details to show land forms
    • Reference maps show location
    • Thematic maps show other things about a place such as population, vegetation, languages spoken, etc
    • Political maps show boundaries of nations and states with capitals
Geography

- Relative location—where something is located in relation to something else
- Absolute location—precise location on a map
- Latitude – parallels or horizontal lines of the Earth’s grid (equator is one and cuts through the center of the earth horizontally and has a location of 0 degrees)
- Longitude – meridians or vertical lines of the earth that stretch “long-ways” or vertically from the north pole to the south pole. Prime meridian in Greenwich, England has a location of 0 degrees longitude.
Economics

- Economics focuses on the production, distribution, and consumption of goods and services.
- There are 3 main types of economic systems:
  - Communism, socialism, and capitalism
- In a free enterprise system (capitalism), individuals control the production of goods based on supply and demand.
  - Supply- the amount of available goods and services
  - Demand— the number of people who want to buy the product/service
  - Interdependence— how people, industry, and government are dependent on one another.
Economics in Texas

• Historically, the Texas economy was land based.
  – Cotton was a major cash crop and helped shape TX history, but was almost completely destroyed by the boll weevil in the early 1900s.
  – Cattle drives were also a major business in TX development and the King ranch was one of the largest ranches in the world.
• Most of the 20th century was shaped by petroleum businesses and contributed to much of its growth.
• Now the TX economy has diversified and computers and electronics are now the 2nd largest goods export (2nd to chemical manufacturing)
The government operates by a system of checks and balances. The three branches of the federal government include:
- Legislative Branch: Makes laws.
- Executive Branch: Carries out the laws.
- Judicial Branch: Interprets the laws.

Texas gained independence from Mexico in 1836 (signed Declaration of Independence)
Sam Houston was the first elected president of the Republic of Texas.
Ma Ferguson was the first woman governor of Texas (in 1924)
Symbols of TX: Capital—Austin; Motto—Friendship; State bird—mockingbird; flower—bluebonnet; tree—pecan.
Government, Citizenship & Culture

• Mission San Jose—known as the “Queen of the Missions” it is in San Antonio and all the outer walls, dwellings, workshops, and mill are still in place

• San Jacinto Monument— the world’s tallest obelisk was built to commemorate the Battle of San Jacinto (brought Texas independence)

• Texas has 254 counties
Science, Technology & Society

- For this strand, teachers need to understand what scientists and technological discoveries have impacted history.
  - Benjamin Franklin (electricity)
  - Louis Daguerre (photographic processes)
  - George Washington Carver (promoting alternative crops including peanuts and sweet potatoes)
  - Louis Pasteur (pasteurization)
  - Henry Ford (automobile; assembly line)
  - Joseph Glidden (barbed wire)
  - Alexander Graham Bell (telephone)
  - Jonas Salk (polio vaccine)
Domain IV: Science
Standards Assessed:

• Standard I:
  – Manages class, field and laboratory.
• Standard II:
  – Understands correct use of tools.
• Standard III:
  – Understands scientific inquiry.
• Standard IV:
  – Has theoretical and practical knowledge.
• Standard V:
  – Assessment in Science.
Domain IV: Science Standards Assessed:

• Standard VI:
  – Understands history and nature of science.
• Standard VII:
  – Science in personal lives of students and society.
• Standard VIII:
  – Physical science.
• Standard IX:
  – Life Science.
• Standard X:
  – Earth and Space Science.
• Standard XI:
  – Unifying concepts and processes.
Important Concepts in Science

• Key skills that are part of the scientific process include: hypothesizing, observing, classifying, measuring and communicating

• Students should engage in the process of science and these skills are more important than a particular outcome

• Students should engage in authentic learning experiences and be encouraged to analyze, synthesize and ask “what if...” in science classrooms
Manages class, field, laboratory & understands tools

– Teachers have a responsibility to create a safe laboratory environment for students and therefore
  • Post all safety rules
  • Model safe procedures
  • Use proper protective equipment
  • Clean work surfaces and wash hands after activities
  • Never return unused chemicals to containers
  • Never allow students to ingest any material
Understands Scientific Inquiry

Inquiry should happen in classrooms on a daily basis.

The basic process skills include:

• Observing
• Classifying
• Measuring
• Communicating

Integrated process skills include:

• Inferring and predicting
• Using variables
• Representing data
• Experimenting
Understands Scientific Inquiry

Scientists use processes and criteria to investigate and interpret the natural world—this is the **scientific method**. The process begins with observations, lead to examination of existing knowledge to learn more (research), hypothesis about a solution.

When scientists conduct experiments, they use **variables**. A variable is a factor that affects the outcome of the experiment. **Manipulated variables** are those that can change (independent variables). A **control variable** remains constant.
Has Theoretical and Practical Knowledge

– Teachers understand the combination of concrete experiences and verbal descriptions and explanations in learning science.

– Teachers understand the need for developmentally appropriate methods to plan and implement inquiry based science lessons.

  • Play
  • Observation
  • Labs
  • Relationships between parts and whole
  • Use of tools
Assessment in Science

• Students’ knowledge of science and procedures should be assessed in authentic and meaningful ways. For example, unidimensional assessment is not encouraged but instead assessment can be made through:
  – Portfolios
  – Lab performance
  – Observation
  – Discussion
  – Question-posing
Understands History and Nature of Science

– Science education is more than just memorization of facts and formulas but also a way of thinking and acting and the process of observing and understanding our world.

– Science affects and is affected by society.

– There are many important scientists who have contributed to our society such as:
  • Albert Einstein (theory of relativity)
  • Madame Curie (radioactivity)
  • Mae Jemison (first African American woman in space)
  • Louis Pasteur (pasteurization)
  • Rachel Carson (author of Silent Spring for environmental safeguards against chemicals)
Physical Science

Some basic concepts related to matter include:

– **Mass** – amount of matter in an object
– **Density** – the ratio of mass/volume (helps explain why things sink/float)
– Matter is made of basic particles called **atoms**.
– Matter is found in 4 states—solid, liquid, gas, and plasma.
  • Matter converts from one state to another by heating or cooling.
– **The Law of Conservation of Matter** states that in ordinary chemical reactions, matter is neither created nor destroyed but only changed from one form to another.
Some basic concepts related to energy include:

- **Energy** is the ability to do work.
  - **Potential energy** is stored energy.
  - When stored energy is released, it is changed to **kinetic energy**.
- Forms of **energy** include: light, heat, sound, chemical, nuclear, atomic, mechanical and electric.
• Newton’s laws of Motion
  – The **First Law of Motion** states that an object at rest tends to stay at rest unless a force acts on it to move it.
  – The **Second Law of Motion** states that the acceleration of an object is dependent upon two variables – the net force acting upon the object and the mass of the object.
  – The **Third Law of Motion** states that for every action there is an equal and opposite reaction.
Life Science

Life science is the study of living things—plants and animals. All plants and animals are made of cells. Living things reproduce, grow, respond to change, eliminate waste, and die. Living things adapt (change) to unique conditions in their environment and help them survive.

Plants undergo several life processes including photosynthesis (the chemical process that captures, converts, and stores solar energy), digestion (break down and use nutrients), transpiration (evaporation of excess water), and capillary action (transportation of materials within plant parts).
Life Science

• Animals are mostly divided into two groups—vertebrates (animals with backbones) and invertebrates (animals without backbones).
• Insects have 3 body parts—head, thorax & abdomen.
• Some insects undergo metamorphosis – four stages are egg, larva, pupa, and adult.
Earth and Space Science

The earth has 4 major layers—inner core, outer core, mantle and the crust. **Continental drift** is the theory that all land masses were once joined together as a single unit called Pangea and have since moved apart to form the 7 continents.

The **theory of plate tectonics** explains that the upper layer of the earth’s surface is made of 20 huge plates that move in different directions causing fault boundaries.

There are 3 basic types of rocks on the earth—**igneous** (rocks formed from cooled magma such as granite), **sedimentary** (rocks formed by pressing sediment together such as quartz) and **metamorphic** (rocks formed from other types of rocks that have been heated and pressed together such as marble).
Earth and Space Science

• The water cycle is movement of water between the earth’s surface and atmosphere. The cycle includes:
  – Precipitation (collecting and falling of water from clouds to earth)
  – Accumulation (movement of surface and ground water in streams, lakes, oceans)
  – Evaporation (from the water’s surface due to heat and wind)
  – Condensation (water vapor in the air transforms to water droplets and forms clouds)
Earth and Space Science

Our planet is one of 8 planets in our solar system. The order is:

- Mercury
- Venus
- EARTH
- Mars
- Jupiter
- Saturn
- Uranus
- Neptune
Earth and Space Science

Planets travel in orbit around the sun. The length of time it takes the planet to travel around the sun = the planets’ year. The longer the orbit, the longer the year.

Our sun is a star (giant ball of glowing gas) that radiates energy.

Our moon is a satellite of our planet that revolves around the earth and reflects the sun’s light. The moon has 9 phases each month, depending on its position. The gravity of the moon pulls water on earth, causing low and high tides.
Unifying Concepts and Processes

• Scientific literacy relates not only to facts and information but also connections that make the information useful and relevant. Concepts and processes that are a unifying framework across disciplines include:
  • Systems, order, and organization
  • Evidence, models, and explanations
  • Change, constancy, and measurements
  • Evolution and equilibrium
  • Form and function