TUBERCULOSIS (TB) UNIT
LESSON 1: GOOD NEWS! TB KILLER ON THE LOOSE!

TEXAS BIOMEDICAL RESEARCH INSTITUTE
HEALTH STARTS WITH SCIENCE

NEXT GENERATION SCIENCE STANDARDS (NGSS)
TEXAS ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS)
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

TEKS

High School | Biology

(4) Scientific and engineering practices: The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;

(B) relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content.

(5) Science concepts--biological structures, functions, and processes. The student knows that biological structures at multiple levels of organization perform specific functions and processes that affect life. The student is expected to:

(B) compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity;

(12) Science concepts--biological structures, functions, and processes. The student knows that multicellular organisms are composed of multiple systems that interact to perform complex functions. The student is expected to:

(A) analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals.

High School | Environmental Systems

(2) Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

(4) Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.

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NIH SEPA Project #1R25GM142021-01A1

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(8) Science concepts. The student knows the relationship between carrying capacity and changes in populations and ecosystems. The student is expected to:

(B) identify factors that may alter carrying capacity such as disease; natural disaster; available food, water, and livable space; habitat fragmentation; and periodic changes in weather.

High School | Anatomy & Physiology

(3) Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

(A) identify advantages and limitations of models such as their size, scale, properties, and materials;

(B) analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

(5) Scientific and engineering practices. The student knows the contributions of scientists and engineers and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;

(B) relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists and engineers as related to the content.

(6) Human body organization. The student demonstrates an understanding of the anatomic and physiological basis of life and the ability to explain the interdependence of structure and function in biological systems. The student is expected to:

(A) distinguish between the six levels of structural organization in the human body, including chemical, cellular, tissue, organ, system, and organism, and explain their interdependence;

(B) identify and use appropriate directional terminology when referring to the human body, including directional terms, planes, body cavities, and body quadrants;

(C) identify and describe the major characteristics of living organisms, including response to stimuli, growth and development, homeostasis, cellular composition, metabolism, reproduction, and the ability to adapt to the environment.

(17) Respiratory system. The student analyzes the relationships between the anatomical structures and physiological functions of the respiratory system. The student is expected to:

(A) identify and sequence the anatomical structures and functions of the respiratory system;

(B) compare and contrast the functions of upper and lower respiratory tract;

(F) identify and describe common diseases of the respiratory system such as asthma, emphysema, pneumonia, viruses, and allergies.

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High School | Pathology

(5) The student knows the contributions of scientists and engineers and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing so as to encourage critical thinking by the student;

(B) relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists and engineers as related to the content.

(6) The student analyzes the mechanisms of pathology. The student is expected to:

(C) investigate factors that contribute to disease, including age, gender, environment, lifestyle, and heredity.

(7) The student examines the process of pathogenesis. The student is expected to:

(C) analyze the body's natural defense systems against infection, including barriers, the inflammatory response, and the immune response;

(D) analyze other mechanisms of disease prevention and treatment such as vaccinations, antibiotics, chemotherapy, and immunotherapy.

(8) The student examines diseases throughout the body's systems. The student is expected to:

(A) investigate the etiology, signs and symptoms, diagnosis, prognosis, and treatment of diseases;

(B) explore and describe advanced technologies for the diagnosis and treatment of disease;

(C) research and describe reemergence of diseases such as malaria, tuberculosis, polio, and measles;

(F) differentiate between various types of diseases and disorders, including hereditary, infectious, and auto-immune;

(9) The student integrates the effects of disease prevention and control. The student is expected to:

(A) evaluate public health issues related to asepsis, isolation, immunization, and quarantine;

(D) analyze and interpret epidemiological data to determine common trends and predict outcomes in disease progression;

(E) research and summarize diseases that threaten world health and propose intervention strategies;

Middle School | 8th grade

(2) Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

(B) analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations;

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(C) use mathematical calculations to assess quantitative relationships in data.

(3) Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

Middle School | 7th grade

(2) Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:

(B) analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations;

(C) use mathematical calculations to assess quantitative relationships in data; and

(D) evaluate experimental and engineering designs.

(3) Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:

(A) develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;

(B) communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and

(C) engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

(4) Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:

(A) relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content;

(B) make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used

(13) Organisms and environments. The student knows how systems are organized and function to support the health of an organism and how traits are inherited. The student is expected to:

(A) identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems;

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TEXAS ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS)

Learning Strategies (1.C) Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary.

Listening (2.C) Learn new language structures, expressions, and basic and academic vocabulary heard during classroom instruction and interactions.

Speaking (3.C) Speak using a variety of grammatical structures, sentence lengths, sentence types, and connecting words with increasing accuracy and ease as more English is acquired.

Reading (4.C) Develop basic sight vocabulary, derive meaning of environmental print, and comprehend English vocabulary and language structures used routinely in written classroom materials.

Writing (5.C) Spell familiar English words with increasing accuracy, and employ English spelling patterns and rules with increasing accuracy as more English is acquired.

NEXT GENERATION SCIENCE STANDARDS (NGSS)

Middle School (MS-LS1-1) Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

Clarification Statement: *Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.*

NGSS: Observable Features of Student Performance
https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-LS1-1%20Evidence%20Statements%20June%202015%20asterisks.pdf

Middle School (MS-LS1-3) Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

Clarification Statement: *Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems.]*

Assessment Boundary: *Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.*

NGSS: Observable Features of Student Performance
https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/MS-LS1-3%20Evidence%20Statements%20June%202015%20asterisks.pdf

High School (HS-LS1-2) Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Clarification Statement: *Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could*

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be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system

Assessment Boundary: *Assessment does not include interactions and functions at the molecular or chemical reaction level.*

NGSS: Observable Features of Student Performance
https://www.nextgenscience.org/sites/default/files/evidence_statement/black_white/HS-LS1-2%20Evidence%20Statements%20June%202015%20asterisks.pdf