



BIOLOGY

FOR TEXAS 



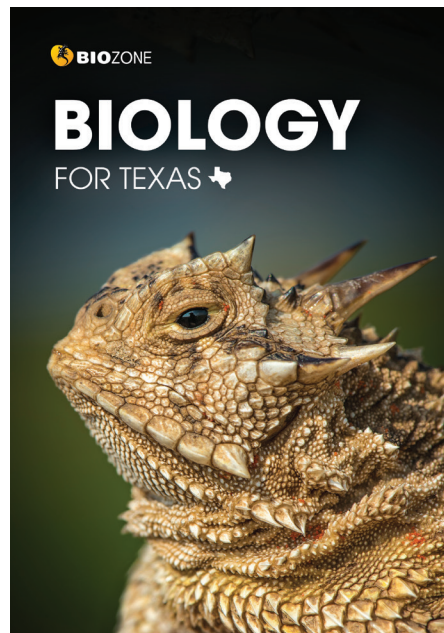
User Guide
for Caregivers

User Guide

For Caregivers

Contents

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This User Guide for Caregivers outlines key features integrated into **BIOZONE's Biology for Texas**.

Why choose BIOZONE's **Biology for Texas** for your son or daughter?

- ▶ Multiple opportunities are provided for your child to investigate, apply knowledge, and then to demonstrate mastery across all of the Biology TEKS.
- ▶ Engaging, current, and relevant phenomena and case studies are extensively embedded, to develop deeper understanding of the concepts, prompt questioning, and encourage learning.
- ▶ The unique format of the worktext, a combined textbook and workbook, allows your child to personalize, respond, and interact directly with the stimulus material.
- ▶ The scale of the biology concepts deliberately builds from the small, cellular world, through to the expansive ecological system, allowing for scaffolded knowledge to be built upon, while applying prior knowledge.
- ▶ BIOZONE's **Biology for Texas** is much more than just a book! Some of the features that support your child include:
 - Curated digital resources, such as 3D models, videos, interactive programs and more, to enhance the learning experience.
 - Learning outcomes linked to TEKS, allowing for mastery of High School Biology in a way that is logical and accessible
 - Digital student progress tracking tools, so your child can clearly visualize their progression throughout the course and identify areas needing further revision or coverage.
 - English Language Proficiency support, including easy-to-follow learning suggestions, and a Spanish-English glossary of important terms.

Head to <https://biozone.com/us/texas/> to find out how your son or daughter can begin your journey with this exciting new way of learning.

Unpacking the Chapters

Each chapter introduction provides an overview of the chapter content presented as a set of concise learning outcomes. This list provides clear and defined goals, that indicate mastery of the Biology TEKS, as they progress through the chapters. The check-boxes can be used as an organization and planning tool. Your child can use the check-boxes to mark learning outcomes reached, and tick it off when completed. The student progress tracker tool, a digital program accessible in the **Resource Hub**, can be used to record and monitor your child's level of progress as they work through each learning outcome, indicating areas that can be returned to for further learning or homework.

The chapter introduction also provides a list of the TEKS and ELPS covered in the chapter. The introductory chapter can be referred to for explanations of the codes used to identify the TEKS and ELPS.

The QR code provides direct access to BIOZONE's **Resource Hub**.

CHAPTER 3

Photosynthesis and Cellular Respiration

Scientific and Engineering Practices TEKS:
Summary of Scientific and Engineering TEKS covered in the chapter.

Science Concepts TEKS:
Summarizes the Science Concept TEKS covered in the chapter.

Direct link to Resource Hub:
Scanning this provides direct access to BIOZONE's **Resource Hub**. Encourage your child to interact with this collection of resources often.

TEKS
Scientific and Engineering Practices

B.1: Investigation and Inquiry
1.A 1.B 1.C 1.D
1.E 1.F 1.G

B.2: Data and Patterns
2.B 2.C 2.D

B.3: Communicating in Science
3.A 3.B

B.4: Science as a Human Endeavor

TEKS
Science Concepts

B11.A explain how matter is conserved and energy is transferred during photosynthesis and cellular respiration using models, including the chemical equations for these processes

B11.B Investigate and explain the role of enzymes in facilitating cellular processes

RESOURCE HUB

bit.ly/3ZmNAoe

Learning Outcomes
I know I have achieved this when I can:

| | Activity number |
|---|-----------------|
| <input type="checkbox"/> Explain the role of mitochondria and chloroplasts in cells. | 52 |
| <input type="checkbox"/> Describe the structure and function of ATP in cells. | 53 |
| <input type="checkbox"/> Describe the relationship between photosynthesis and cellular respiration. | 53 |
| <input type="checkbox"/> Write a simple word equation for photosynthesis. | 54 |
| <input type="checkbox"/> Identify the steps of photosynthesis. | 54 |
| <input type="checkbox"/> Describe the steps of cellular respiration. | 55 |
| <input type="checkbox"/> Investigate the photosynthetic rate in <i>Cabomba</i> plants when altering light levels. | 56 |
| <input type="checkbox"/> Construct a schematic diagram representing energy flow and conservation of matter during photosynthesis and respiration. | 57 |
| <input type="checkbox"/> Write a simple word equation for respiration. | 58 |
| <input type="checkbox"/> Describe the general location of respiration and the transportation of the reactants and products. | 58 |
| <input type="checkbox"/> Compare and contrast aerobic and anaerobic respiration, including fermentation. | 59 |
| <input type="checkbox"/> Detail the steps of respiration, including the specific location where they occur. | 60 |
| <input type="checkbox"/> Discuss the transfer of energy and the role of glucose in cellular respiration. | 60 |
| <input type="checkbox"/> Calculate the energy efficiency of cellular respiration. | 60 |
| <input type="checkbox"/> Investigate respiration rates in germinated and non-germinated seeds. | 60 |
| <input type="checkbox"/> Model photosynthesis and respiration reactions. | 61 |
| <input type="checkbox"/> Compare anabolic and catabolic reactions. | 62 |
| <input type="checkbox"/> Explain the importance of enzymes to human metabolism. | 63 |
| <input type="checkbox"/> Describe the induced fit model of enzyme activity. | 63 |
| <input type="checkbox"/> Link enzyme activity to lowering activation energy of reactions. | 64 |
| <input type="checkbox"/> Explain how concentration and temperature affect enzyme reaction rates. | 65 |
| <input type="checkbox"/> Investigate the effect of temperature on amylase enzyme reaction rates. | 65 |
| <input type="checkbox"/> Plan an investigation to test how the number of days of mung bean germination affects the rate of photosynthesis. | 66 |

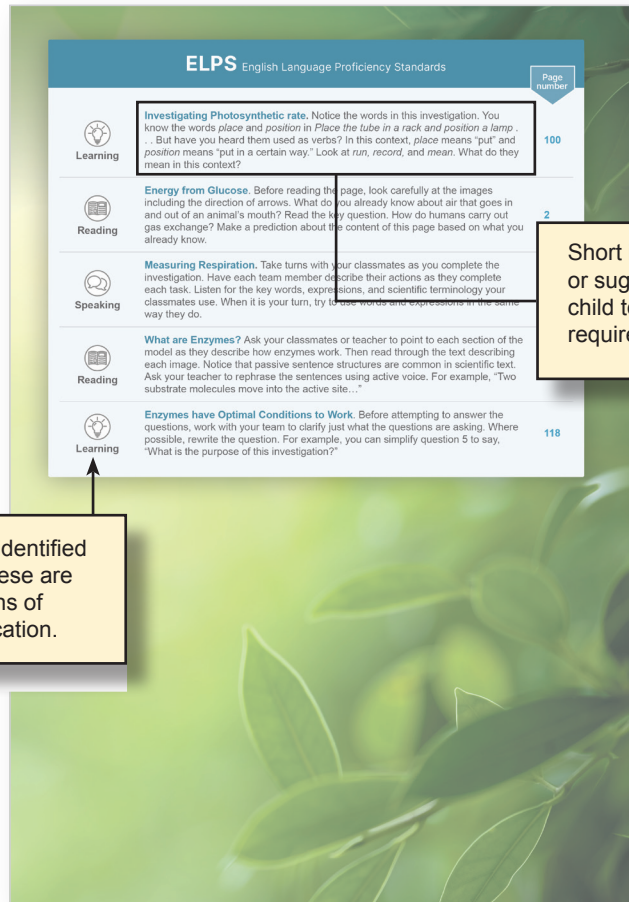
Learning Outcomes:
Measurable statements for student learning in the activities / lessons. Your child will assess their learning against these.

Activity number:
The activity in the worktext related to these Learning Outcomes.

Check boxes for planning:
Encourage your child to mark the checkboxes with work they need to complete. They can tick them off once each Learning Outcome is reached

Unpacking the English Language Proficiency Standards (ELPS)

► The second page of the chapter introduction identifies the ELPS covered within the chapter. These can either be integrated into a lesson by the teacher, especially those involving group work, or utilized independently by your child.



The category of ELPS is identified through **visual icons**. These are also present in the margins of activities for easy identification.

Short instructions, tips, guidance, or suggestions are provided to your child to help them meet the ELPS requirements of this program.

Structure of a Chapter

Chapter introduction

Identifies the activities relating to the learning outcomes. Relevant TEKS and ELPS are identified

Summing up

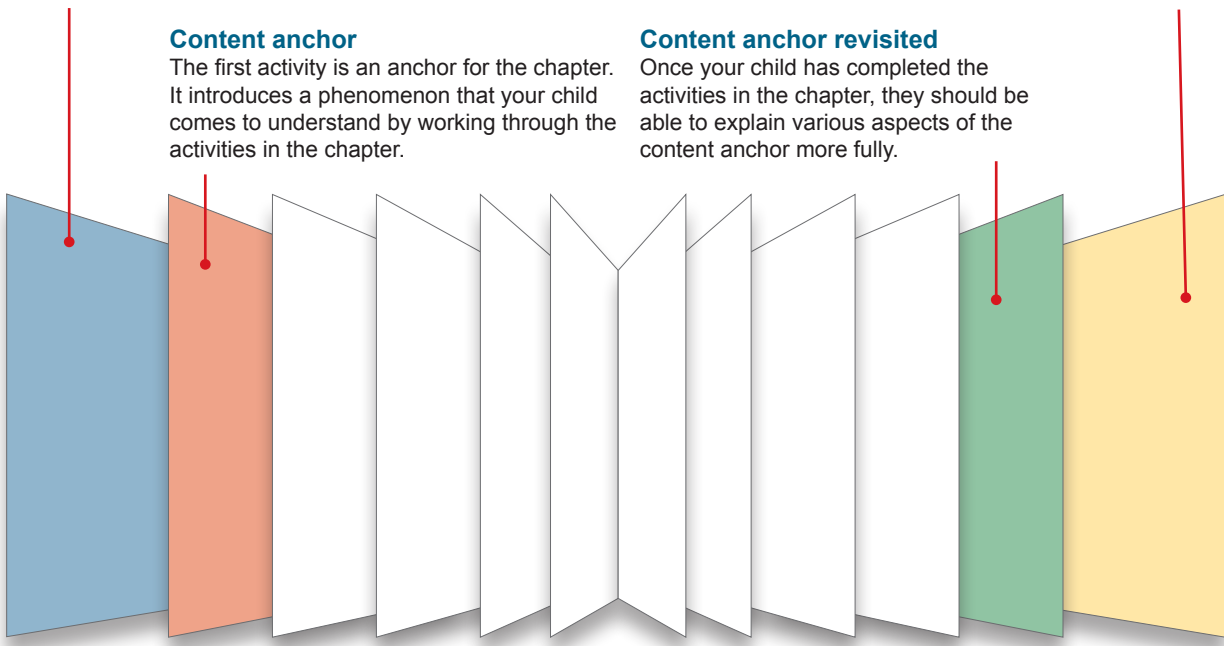
Find out what your child knows about the content and skills they have explored in the chapter.

Content anchor

The first activity is an anchor for the chapter. It introduces a phenomenon that your child comes to understand by working through the activities in the chapter.

Content anchor revisited

Once your child has completed the activities in the chapter, they should be able to explain various aspects of the content anchor more fully.



Activity pages

Material is scaffolded over a learning sequence in a series of related activities. Questions allow your child to demonstrate their understanding of the material.

Unpacking the Activities

The activity pages have been carefully designed to provide high quality information in an easily accessible format. They include a number of features designed to engage, and help your child unpack and understand the information. Features include:

- ▶ Short blocks of text so that your child does not feel overwhelmed with too much reading.
- ▶ High quality, informative graphics.
- ▶ Links to 3D models (following page). These provide another dimension to your child's engagement and learning.
- ▶ Question and answer sections allow your child to demonstrate their understanding of the content. By having the stimulus material and their answers in one place, your child can easily revise for assessments.
- ▶ The tab system identifies when there is support material on the **Resource Hub**. Tabs also identify the applicable TEKS (see following page).

15 Distinguishing Features of Eukaryotic Cells

Key Question: What are the distinguishing features of eukaryotic cells?

▶ Plants, fungi, protists, and animals are all **eukaryotes**. Their cells are more complex than those of **prokaryotes** and contain a **nucleus** and membrane-bound organelles, such as the **mitochondria**, and **chloroplasts** in autotrophs (organisms that produce **glucose** using photosynthesis).

A generalized eukaryote (animal) cell

Plasma membrane (located inside the cell wall in plants) controls the movement of materials into and out of the cell.

Nucleus containing most of the cell's DNA enclosed in a **nuclear membrane**.

Cytoplasm: a watery solution containing dissolved materials, enzymes, and the cell organelles.

Centrioles organize the **microtubule cytoskeleton** and assist in cell division.

Endoplasmic reticulum: A network of tubes and flattened sacs continuous with the nuclear membrane. There are two types of ER. **Rough ER** has **ribosomes** attached. **Smooth ER** has no ribosomes (so it appears smooth).

The **Golgi apparatus** is a stack made up of membranous sacs that stores, modifies, and packages proteins.

Mitochondria are the cell's energy producers. They use the chemical energy in **glucose** to make **ATP** (the cell's usable energy).

Ribosomes (R) are small structures that make proteins by joining amino acids.

Note: A **cell wall** is present in fungi, plants, and some protists. Most plants, fungi, and protist cells do not have centrioles, or they are modified for different functions. Plant cells, and autotroph protists also have **chloroplasts**. Plant cells often have large **vacuoles**.

Plant cells **Animal cells**

Cell wall made of cellulose Red blood cell

Chloroplast Nucleus

Palisade mesophyll cells Epidermal (leaf) cell Blood cells White blood cell

Muscle fibers (cells)

Features common to all eukaryotes (animal, plant, fungi, and protists)

much less complex cellular structure than eukaryotes. What does this tell you about the common groups of organisms (this will be explored in more detail in activity 19)?

Introductory paragraph: Provides background information and an introduction to the activity.

Key question: Provides a focus for the activity. Your child answer the key question once they have completed the activity?

Diagrams: Full color diagrams and photos help your child visualize important information or concepts.

Key Terms: Words in **blue bold** are key terms. Definitions for these can be found in the glossary at the back of the worktext. Encourage your child to understand and use these terms to develop their scientific literacy.

QR codes: Scanning the QR code takes your child directly to an interactive 3D model.

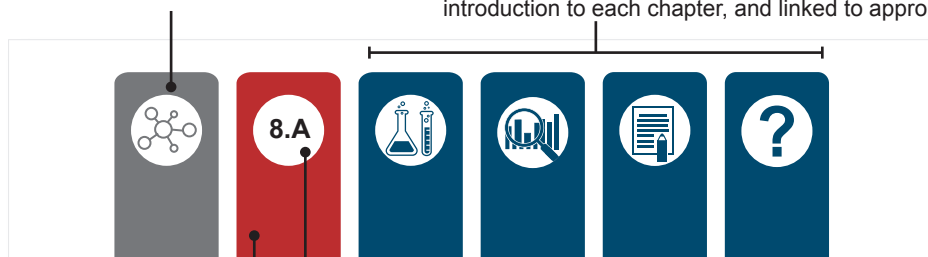
Questions: Your child can input their answers directly onto the page (print and digital products) to help reinforce the learning moment. This approach also makes revision easy because the stimulus material and answers are in one place.

Tab system: The gray hub tab alerts your child that this activity has material on **BIOZONE's Resource Hub** to support the activity content. The colored tabs indicate the specific TEKS covered in this activity.

Understanding the Tab System

The gray hub tab indicates that the activity has online support via the **BIOZONE RESOURCE HUB**. This may include videos, animations, articles, 3D models, and computer models.

The **blue TEKS** tabs use picture codes to identify the scientific and engineering practices TEKS relevant to the activity, B.1 - B.4 from left to right, below. These are detailed in the introduction to each chapter, and linked to appropriate activities.



The **red TEKS** tabs indicate the Science Concepts TEKS covered in the activity. These are detailed in the introduction to each chapter.

The TEKS code refers specifically to the Science Concept TEKS covered in the activity.

Practical investigations

Throughout *Biology for Texas*, your child is given opportunities to explore through investigations. These are opportunities for your child to develop competency in laboratory procedures, to practice and refine skills in observation and analysis, and to manipulate data. Some investigations act as stimulus material, while others require your child to take what they have already learned and apply their knowledge to a more complex scenario. Investigations can take several forms, including paper practicals, modeling activities, and wet lab experiments.

The investigations provide an excellent opportunity for collaborative work and will stimulate discussion and the sharing of ideas. Students of different abilities may be sometimes paired for investigations, so that confident students can guide and encourage less able students and, in this relaxed environment, striving students will be encouraged to share their own observations and thoughts. Collaboration through paired practical work provides an excellent opportunity for English language learners to interact in meaningful ways to extend their English language and scientific vocabulary.

Each investigation is clearly numbered sequentially through the chapter.

Where applicable, the investigations provide your child, and their teacher, with health and safety information at the start of the investigation.

Prior to the investigation, your child's teacher will:

- Ensure the students read through the procedure fully *before beginning* the investigation.
- Highlight any hazardous steps or important steps where extra care may be required.
- Ensure students have all the equipment assembled and know if there are pinch points in the process. If necessary, have the groups allocate specific people to steps, e.g. timing, collecting samples, recording data or observations etc.

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11 Studying Cells

Key Question: What techniques are used to prepare and view cells under a light microscope?

Specimens are usually prepared in some way before viewing in order to highlight features and reveal details. A wet mount is a temporary preparation in which a specimen and a drop of fluid are trapped under a thin coverslip. Wet mounts improve a sample's appearance and enhance visible detail. Sections must be made very thin.

Investigation 1.2 Preparing an onion slide

See appendix for equipment list.

Hazards and required PPE (where applicable) are clearly identified on the investigation.

Caution is required when using scalpels or razors. Iodine stains skin and clothes, and irritates eyes. You should wear protective eyewear.

- Onions make good subjects for preparing a simple, wet mount. Cut a square segment from a thick part of the bulb using a scalpel.
- Bend the segment to expose the inner surface. The upper epidermis is peeled away using a scalpel.
- Carefully strip the epidermis from the inner surface of the segment.
- Place a small drop of water on a glass slide.
- Carefully place the epidermis on the water.
- Use a small piece of tissue or filter paper to remove any excess water.
- Place the slide on the microscope tray. Locate the specimen or region of interest at the lowest magnification. Focus using the lowest magnification first (remembering to move the lens away from the slide) before switching to the higher magnifications.
- After viewing the slide under various magnifications, remove the slide and place it on the bench.
- At the edge of the coverslip, place a small drop of iodine stain.
- On the opposite side of the coverslip use a piece of tissue or filter paper to draw the water out from under the coverslip. The iodine will be drawn under the coverslip.
- Replace the slide on the microscope, view the stained onion peel, and scientifically draw the cells you observe.

1. Why must sections viewed under a microscope be very thin? _____

2. Why do you think the specimen is covered with a coverslip? _____

3. Why would no chloroplasts be visible in an onion epidermis cell slide? _____

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12 Studying DNA

Key Question: How is DNA structure related to its function?

Genes are segments of DNA that code for proteins. Proteins are important steps in the process of gene expression. Genes are produced using the information stored in DNA.

2. In the spaces on the following pages to show a short length of DNA.

A short length of DNA

Unloaded tRNA

Anticodons

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Appendix: Equipment list

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| | | |
|---|---|--|
| <p>1: Cells and Viruses</p> <p>INVESTIGATION 1.1 Modelling protein structure</p> <p>Per student/group Pipe cleaners (2 white, 2 pink, 2 purple, 4 blue) Sticky tape 2 x binder clips or paper clips</p> <p>INVESTIGATION 1.2 Preparing an onion slide</p> <p>Per student/pair Light microscope Onion/onion leaf Glass microscope slides Coverslips Scalpel or razor Iodine stain Filter paper/tissue paper</p> <p>INVESTIGATION 1.3 Simple diffusion across a membrane</p> <p>Per student/pair 200 mL beaker 1 mL pipette Glucose dipsticks Lego's indicator 4 x test tubes Dialysis tubing Thread or nylon line Distilled water 1% starch solution 10% glucose solution Timer or watch</p> <p>INVESTIGATION 1.4 Modelling disease outbreak and spread</p> <p>Per student/pair Computer Spreadsheet application e.g. Excel</p> | <p>3: Photosynthesis and cellular respiration</p> <p>INVESTIGATION 3.1 Measuring bubble production in <i>Cabomba</i></p> <p>Per pair/group 10 g <i>Cabomba aquatica</i> Balance Scissors Water 1 x large beaker (large enough to hold the glass funnel) 1 x glass funnel 0.2 mol/L sodium hydrogen carbonate solution (enough to cover the plant) 1 x leafy twigs 1 x lamp with a 60W bulb Lux meter Timer 1 x ruler or tape measure</p> <p>INVESTIGATION 3.2 Measuring respiration in germinating seeds</p> <p>Per group 2 x boiling tubes Marker pan 4 x cotton balls 15% KOH solution 2 x eye dropper or plastic pipette 2 x coarse pipette Germinating seeds (e.g. mung beans) Ungerminated bean seeds (enough to fill one quarter of the boiling tube) Glass beads (enough to fill one quarter of the boiling tube) 3 x 2-hole tube stoppers 3 x bent glass tubes or pipettes 3 x tubes (must be able to be clamped shut) 3 x screw clips A few drops of colored liquid 3 x syringes (must fit tube with screw clamp attached) 3 x clamp stands or rack Water bath (25°C) Ruler Timer</p> <p>INVESTIGATION 3.3 Modelling photosynthesis and cellular respiration</p> <p>Per individual, pair or group Scissors</p> | <p>INVESTIGATION 3.4 Effect of temperature on enzyme activity</p> <p>Per group/temperature 1 x spotting plate/reaction plate 1 x test tube 1 x plastic pipette Water bath Timer 0.1 M iodine solution (2x3) 2 mL 1% amylose solution 1 mL buffer solution (pH 7.0) 1 mL 1% starch solution</p> <p>4: Animal and Plant Structure and Function</p> <p>INVESTIGATION 4.1 Investigating effect of exercise on heart rate</p> <p>Per student/pair 1 x stopwatch per group</p> <p>INVESTIGATION 4.2 Investigating effect of exercise on breathing rate</p> <p>Equipment depends on group method</p> <p>INVESTIGATION 4.3 Investigating vascular tissue</p> <p>Per student/pair Light microscope Dwarf plants (e.g. <i>Barbarea orthoceras</i>) Microscope slide (use one per group) Glass microscope slides Coverslips Scalpel or razor Access to a computer or device with internet connection</p> <p>INVESTIGATION 4.4 Investigating plant transpiration</p> <p>Per pair/group 250 mL conical flask with rubber bung Petrioleum jelly 1 cm³ pipette Clamp stand Leafy plant shoot Water Corking oil (for optional set up) Timer or watch Lamp or plastic bag and water spray bottle, or fan A4 or graph paper</p> |
|---|---|--|

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No kits are required for the investigations.

The investigations have been designed using everyday materials and equipment easily found in most high school laboratories.

A list of the equipment and chemicals required for each investigation is provided in the back of the book to assist with preparation.

Many non-laboratory investigations can be adapted so students are able to carry them out at home, if needed.

Digital Support

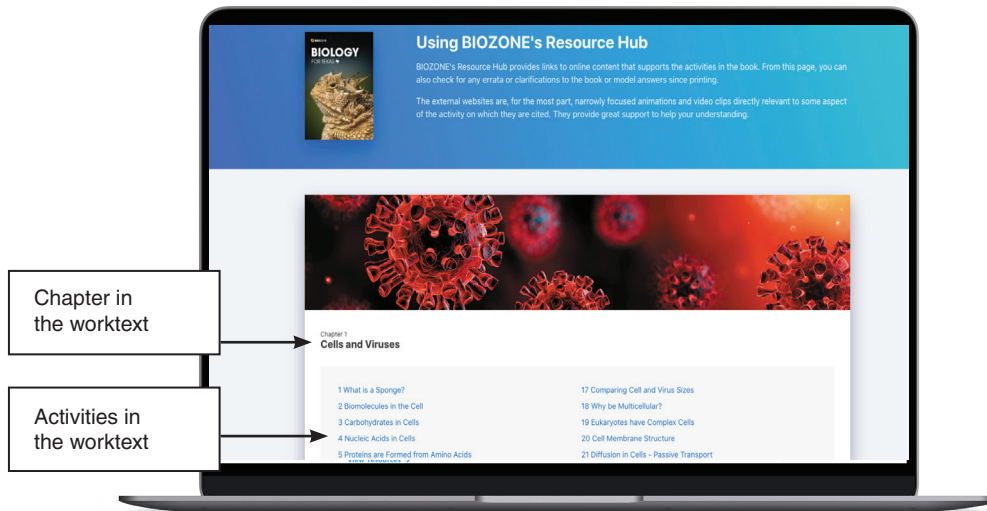
BIOZONE's Resource Hub provides links to online content supporting the activities in the worktext.

The external websites are mostly narrowly focused information, interactive labs and games, and video clips directly relevant to that part of the activity identified by the hub icon. They provide great support to help your child's understanding.

BIOZONE's Resource Hub supports learners of all abilities. Some material is specifically tagged for those students needing further extension, both in the classroom and at home.



Then enter the code provided in the BIOZONE Biology for Texas Book.



Encourage your child to scan the QR codes on the activity pages. These link directly to informative and engaging 3D models. All models can be rotated and zoomed, and some contain informative annotations.

Responding to exercise

During exercise, your body needs more oxygen to meet the extra demands placed on the muscles, heart, and lungs. At the same time, more carbon dioxide must be expelled. To meet these increased demands, blood flow must increase. This is achieved by increasing the rate of heart beat. As the heart beats faster, blood is circulated around the body more quickly, and exchanges between the blood and tissues increase.

The arteries and veins must be able to cope with the extra pressure of higher blood flow and must expand (dilate) to accommodate the higher blood volume. If they didn't, they could rupture (break). During exercise, the muscular, circulatory and nervous systems interact to maintain the body's systems in spite of increased demands (right).

Muscular system
Increased activity increases demand for oxygen and nutrients.

Nervous system

- Heart**
Heart beats faster and rate of blood flow increases.
- Blood vessels**
Arteries dilate (widen) to accommodate increased blood flow.

Delivery of blood to capillaries of working muscle increases.

Capillaries dilate during exercise to increase the rate of exchanges of gases, nutrients, and wastes between the blood and the tissues.

Muscular activity helps return blood to the heart.

Valves stop back-flow of blood.

Artery
The strong, stretchy structure of arteries enables them to respond to increases in blood flow and pressure as more blood is pumped from the heart.

Vein
Veins return blood to the heart. They are less muscular than arteries, but valves and the activity of skeletal muscles, especially during exercise, help venous return.

1. In your own words, describe how the circulatory system and respiratory system work together to provide the body with oxygen and remove carbon dioxide.

2. (a) What happens to blood flow during exercise?
(b) How do body systems interact to accommodate the extra blood flow needed when a person exercises?

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Glossary

BIOZONE has several support mechanisms in place to scaffold the development of language skills, including tools for English Language Learners (ELLs) in your classroom. A **glossary** of important key terms is provided in English and Spanish. In the digital versions of the worktext, **text to speech** (read aloud) and **translation** functions support ELLs in their learning journey. More information on these features is provided below.

Encourage your child to use the **glossary** to build scientific literacy and become comfortable with using the terms appropriately. Key terms, which have been **blue bolded** within an activity, are included in the glossary. Key terms are only bolded the first time they appear within an activity.

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143 Different Alleles For Different Traits

Key Question: What are alleles, and what determines whether a trait is offspring?

Homologous chromosomes
In sexually reproducing organisms, chromosomes are generally found in pairs in their cell's nucleus. One of each pair of chromosomes came from the original gametes, formed through meiosis in the parents, and brought together at fertilization. The pairs are called homologues or homologous pairs. Each homologue carries an identical assortment of **genes**, but the version of the gene, known as the **allele**, from each parent may differ. This diagram shows the position of three different genes on the same chromosome that control three different **traits** (A, B and C).

Homologous chromosomes
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Having two different versions of gene A is a **heterozygous** condition. Only the dominant allele (A) will be expressed.

When both chromosomes have identical copies of the dominant allele for gene B the organism is **homozygous dominant** for that gene.

When both chromosomes have identical copies of the recessive allele for gene C the organism is said to be **homozygous recessive** for that gene.

Maternal chromosome originating from the egg of the female parent.

1. Define the following terms, describing the allele combinations of a gene in _____

(a) Heterozygous: _____

(b) Homozygous dominant: _____

(c) Homozygous recessive: _____

2. For a gene given the symbol 'A', write down the alleles present in an org: _____

(a) Heterozygous: 4 _____ (b) Homozygous dominant: _____

3. What is a homologous pair of chromosomes? _____

abiotic factor: Non-living, physical features in an ecosystem, including temperature, humidity, and rainfall.

factor abiótico: Características físicas no vivas en un ecosistema, incluida la temperatura, la humedad y la lluvia.

accuracy: The correctness of a measurement; how close a measured value is to the true value.

exactitud: La exactitud de una medición; qué tan cerca está un valor medido del valor verdadero.

active site: Region of an enzyme where the substrate binds and undergoes a chemical reaction.

sitio activo: Región de una enzima donde el sustrato se une y sufre una reacción química.

active transport: The movement of molecules or ions across a cell membrane against a concentration gradient, requiring an expenditure of energy.

transporte activo: Movimiento de moléculas o iones a través de una membrana celular contra un gradiente de concentración, que requiere un gasto de energía.

adenosine triphosphate - ATP: An organic compound that serves as an energy source for metabolic processes.

ATP/trifosfato de adenosina: Un compuesto orgánico que sirve como fuente de energía para los procesos metabólicos.

aerobic: A biological process that requires oxygen.

aerobio: Un proceso biológico que requiere oxígeno.

aerobic respiration: type of respiration that requires oxygen.

Respiración aeróbica: tipo de respiración que requiere oxígeno.

allele: Any of the alternative versions of a gene that may produce distinguishable phenotypes.

alelo: Cualquiera de las versiones alternativas de un gen que puede producir fenotipos distinguibles.

amino acid: Any organic compound containing both an amino group and a carboxylic acid group.

aminoácido: Cualquier orgánico compuesto que contenga tanto un grupo amino como un grupo ácido carboxílico. Los bloques de construcción de las proteínas.

anabolic reaction / anabolism: A chemical reaction that constructs large, complex molecules from simpler molecules.

reacción anabólica: Una reacción química que construye moléculas grandes y complejas a partir de moléculas más simples.

anaerobic respiration: Type of respiration that does not require oxygen.

respiración anaeróbica: Tipo de respiración que no requiere oxígeno.

antibody: A protein produced by the body in response to a specific antigen and aimed at targeting and destroying it.

anticuerpo: Una proteína producida por el cuerpo en respuesta a un antígeno específico y destinado a atacar y destruirlo.

anticodon: A sequence of three adjacent nucleotides in tRNA that binds to a corresponding codon in mRNA during protein synthesis.

anticodón: Secuencia de tres nucleótidos adyacentes en el ARNt que se une a un codón correspondiente en el ARNm durante la síntesis de proteínas.

antigen: A foreign molecule that stimulates an immune response in the body.

antígeno: Una molécula extraña que estimula una respuesta inmune en el cuerpo.

assumption: A statement that is assumed to be true but is not (or cannot be) tested.

presunción: Una afirmación que se supone que es verdadera pero que no se prueba (o no se puede probar).

ATP/adenosine triphosphate: An organic compound that serves as an energy source for metabolic processes.

ATP/trifosfato de adenosina: Un compuesto orgánico que sirve como fuente de energía para los procesos metabólicos.

auxin: Any of several plant hormones that regulate the growth and development of plants.

auxina: Cualquiera de varias hormonas vegetales que regulan el crecimiento y desarrollo de las plantas.

biodiversity: The amount of biological variation present in a region (includes genetic, species, and habitat diversity).

biodiversidad: La cantidad de variación biológica presente en una región (incluye genética, especies y diversidad de hábitat).

bioinformatics: The use of computer science, mathematics, and information theory to organize and analyze complex biological data.

bioinformática: El uso de las ciencias computacionales, las matemáticas y la teoría de la información para organizar y analizar datos biológicos complejos.

biological drawing: An illustration that visually communicates the structure of a subject being studied, showing specific details.

dibujo biológico: Una ilustración que comunica visualmente la estructura de un tema que se está estudiando, mostrando detalles específicos.

biotic factor: Relating to the living factors in an ecosystem, including distribution and abundance.

factor biótico: Relacionado con los factores vivos en un ecosistema, incluida la distribución y la abundancia.

cancer: The malignant growth of cells due to uncontrolled cell division.

cáncer: El crecimiento maligno de las células debido a la división celular incontrolada.

carbohydrate: Any of a class of molecules that contain carbon, hydrogen and oxygen, with a general formula C_n(H₂O)_n.

carbohidrato: Cualquiera de una clase de moléculas que contienen carbono, hidrógeno y oxígeno, con una fórmula general C_n(H₂O)_n.

carbon cycle: The process by which carbon is exchanged between living organisms, the earth and its atmosphere.

ciclo del carbono: El proceso por el cual el carbono se intercambia entre los organismos vivos, la tierra y su atmósfera.

catabolic reaction / catabolism: The breakdown of large, complex molecules into smaller, simpler molecules.

reacción catabólica: La descomposición de moléculas grandes y complejas en moléculas más pequeñas y simples.

catalyst: A substance that modifies and increases the rate of a chemical reaction without being consumed in the process.

catalizador: Sustancia que modifica y aumenta la velocidad de una reacción química sin ser consumida en el proceso.

Glossary: English/Spanish

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Student Assessment

Biology for Texas provides ample opportunity for your child to demonstrate their understanding and proficiency in both the TEKS and ELPS. Opportunities for formative and summative assessment are provided. While most activities require your child to record a response, we do not recommend that every question is graded. In most instances, your child's answers form a record of work for them, allowing them to review their answer within the context of the activity at any time.

Formative Assessment

139 Real-Life Superpowers Revisited

Key Question: What is the result of changes in DNA and can they produce beneficial results?

This chapter has studied the structure of DNA, the effects of changing its sequence, and how DNA can be investigated and manipulated. At the start of the chapter you were given some examples of mutations that could potentially enhance a person's abilities in some aspects of their biology. You should now be able to explain how mutations occur and why. You should also be able to explain how we can manipulate DNA to work out which parts of the DNA carry a mutation.

► The three mutations given as examples at the start of the chapter are shown below.

217 Commensalism: Free for the Taking

Key Question: How does commensalism support an ecosystem to maintain sufficient populations of particular species?

► Recall that commensalism occurs when some species have a symbiotic relationship with another one that provides resources or services that would be difficult for it to acquire elsewhere. The other species gains no obvious benefit from the relationship.

► A healthy population of the beneficial partner in the relationship is likely to be important for maintaining ecosystem stability. They control populations of some food sources and are, in turn, likely to be a food source for another species.

Eastern screech owls and Texas blind snakes

► Blind Eastern screech owls and Texas blind snakes are found in many habitats across the state. The blind snake occupies most of its life underground, coming up to the surface infrequently during the night if it rains.

► Researchers have found two blind snakes in some of Eastern screech owl nests, brought there by the owls themselves.

► The owls do not eat the blind snakes. They benefit from the snake eating rodent meat particles in the nest. This keeps it clean and reduces the chance of disease.

► The blind snake obtains no direct benefit. It can find food equally well without being brought to the nest. The owls will leave the nest and return to the ground if it has the opportunity.

► This type of ecological relationship is called commensalism.

► Data from investigators indicated that owls (young owls) from the nests that contained blind snakes were healthier, and had a faster growth rate than those from nests with no blind snakes present.

1. What factors in the owl and blind snake commensalism make it likely that this behavior will persist?

2. What might this suggest to the habitat ecologist on population, and therefore the ecosystem stability, if the blind snake populations disappeared from the owl habitat?

3. Many examples of commensalism exist, such as cattle egrets and cattle, tree frogs and trees, half crows and trees, remoras and sharks, and tree shrews in this chapter and other chapters to answer the questions below.

(a) What examples have you selected?

(b) What benefits result from the relationship and how?

(c) What role does the species that benefits from the relationship play in the ecosystem: is it a predator, a food source for other species, or does it have another role?

(d) What might be some consequences of your selected beneficial species being removed or disappearing from the ecosystem? Investigate how might that affect the stability of the ecosystem using several sources, such as those from an online search and library books. Summarize your notes, and attach your report to the page.

Summative Assessment

140 Summing Up

Read each question carefully. Place a cross in the box beside the best answer to the question from the four answer choices provided.

1. Which is correct order of the structures from largest to smallest?

(a) Gene, chromosome, cell, chromosome
 (b) Gene, exon, chromosome, chromatid
 (c) Exon, gene, chromatin, chromosome
 (d) Exon, chromatin, chromosome, gene

2. During mRNA editing

(a) The primary mRNA is translated into protein.
 (b) Exons are removed to produce the mature mRNA.
 (c) Introns are removed to produce the mature mRNA.
 (d) The primary mRNA is translated into a poly-A tail.

3. A transcription factor has the following gene sequence (shown as the reverse complement): ACCCTCCAGGCAAGC. An amino acid sequence using codons so that the sequence becomes ACCCTCCAGGCAAGC? This translation is a

(a) Dilation
 (b) Transcription
 (c) Translation
 (d) Replication

4. Which is the correct sequence for gene expression?

(a) DNA → mRNA → primary transcript → mRNA → translation
 (b) DNA → mRNA → primary transcript → translation
 (c) DNA → primary transcript → mRNA → translation
 (d) DNA → primary transcript → translation → mRNA → translation

5. Using the amino acid code below, what is the amino acid sequence for the following mRNA sequence?

AAA UUU GCG AUA UUU

(a) Leu Ser Cys Phe
 (b) Leu Ser Cys Phe
 (c) Leu Asp Ser Phe
 (d) Ser Leu Cys Phe

6. According to Chargaff's rules, in a DNA molecule

(a) The amount of A will equal the amount of T.
 (b) The amount of G will equal the amount of C.
 (c) The amount of G will equal the amount of A.
 (d) The amount of C will equal the amount of G.

7. The three components of a DNA molecule are

(a) Base, protein, phosphate
 (b) Phosphate, nucleotide, sugar
 (c) Phosphate, sugar base
 (d) Base, sugar, base

8. These DNA molecules are involved in the production of proteins from DNA.

X. Carries amino acids to the ribosome and releases them.
 Y. Primary component of ribosomes.
 Z. Carries the genetic code from the nucleus to the ribosome.

9. Which of the following might occur in a cell?

(a) A substitution mutation
 (b) An insertion mutation
 (c) An inversion mutation
 (d) None of the above

10. The nitrogenous bases are paired through DNA inserted into them by

(a) DNA replication
 (b) DNA transcription
 (c) DNA translation
 (d) None of the above

11. A restriction enzyme, polymerase

(a) Cuts DNA at a specific site.
 (b) Cuts DNA at a specific site, and joins the ends back together.
 (c) Cuts a section of DNA, and joins the ends back together.
 (d) Cuts DNA at a specific site, and joins the ends back together.

12. Which of the following is not a function of DNA?

(a) Stores genetic information.
 (b) Controls the rate of cell division.
 (c) Controls the rate of protein synthesis.
 (d) Controls the rate of cell growth.

13. The endoplasmic reticulum (ER) shows four profiles containing the ER after the mother (M), her daughter (D), and her parents (P) and (C). Which of the profiles is the biological father's?

(a) The biological father is

(b) Explain your answer.

(c) Why do profiles B and C only have 3 bands?

14. Complete the following paragraph by inserting the correct word from the list. Words may be used more than once or not at all.

Word list: Carbohydrate, capsaicin, mRNA, nucleus, polypeptide, rRNA, translocator, translation, tRNA

In eukaryotes, gene expression begins with _____, which occurs in the _____.

_____ is the copy of the DNA code. _____ is then transported to the _____, where _____ occurs. Ribosomes attach to the _____, and help maintain the code on _____ with the ribosomes.

_____ transports the amino acids to the ribosome chain where they are added to the growing _____.

15. The endoplasmic reticulum (ER) shows four profiles containing the ER after the mother (M), her daughter (D), and her parents (P) and (C). Which of the profiles is the biological father's?

(a) The biological father is

(b) Explain your answer.

(c) Why do profiles B and C only have 3 bands?

Digital Data Analysis

Digital Student Progress Trackers, downloadable from the [Resource Hub](#) in Google Sheet format, allow your child to self-report their grades for each Learning Outcome leading to a specific Student Expectation, as part of the Texas Essential Knowledge and Skills (TEKS) for Biology. Your child can track their progress as they move through each TEKS, identify patterns in their understanding, and be able to respond by working with more scaffolding, extension, or targeted revision.

BIOZONE Biology for Texas

| Chapter | NAME | TEACHER | SUBJECT | GRADE |
|--------------------------------|--|------------|-----------|-----------|
| Chapter 1 Cells and Viruses | A. Student | B. Teacher | Biology | 9-12 |
| Topic | Biomolecules | | | |
| Activity number | 2 | 3 | 4 | 5-7 |
| Learning Outcome | Discuss how cellular proteins are formed, including their folding, and match their function to examples found in cells. | | | |
| Status | Approaching | Proficient | Mastery | Mastery |
| Topic | Prokaryotes and Eukaryotes | | | |
| Activity number | 13 | 14-16 | 17 | 18 |
| Learning Outcome | Compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity. | | | |
| Status | Yet to do | Yet to do | Yet to do | Yet to do |
| Topic | Homeostasis and Cellular Transport | | | |
| Activity number | 20 | 21-22 | 23-24 | 25 |
| Learning Outcome | Investigate homeostasis through the cellular transport of molecules. | | | |
| Status | Yet to do | Yet to do | Yet to do | Yet to do |

Chapter identifier: Linked to BIOZONE: Biology for Texas paper worktext.

Identifier information: Placed into Details page - and linked to each page

Drop-down self-reported grade: Yet to do (grey), Approaching (red), Proficient (yellow), Mastery (green).

Science Concepts TEKS: The TEKS will be covered in the lesson / activity.

Activity or Activities: One or more Activities associated with the Learning Outcome listed below.

Key Topic: Linked to relevant Student Expectation covered in the activities.

Learning Outcome: Linked to an aspect of the TEKS covered in the activity / activities.