BIOZONE

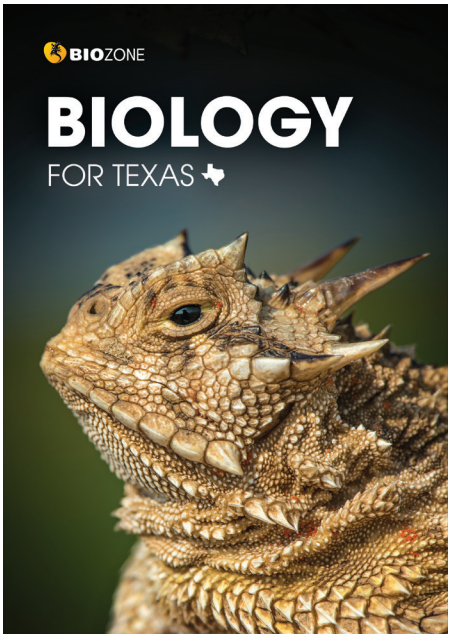
BIOLOGY

FOR TEXAS

User Guide for Caregivers

User Guide
For Caregivers

Contents



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 accessable
    - ☐ 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.

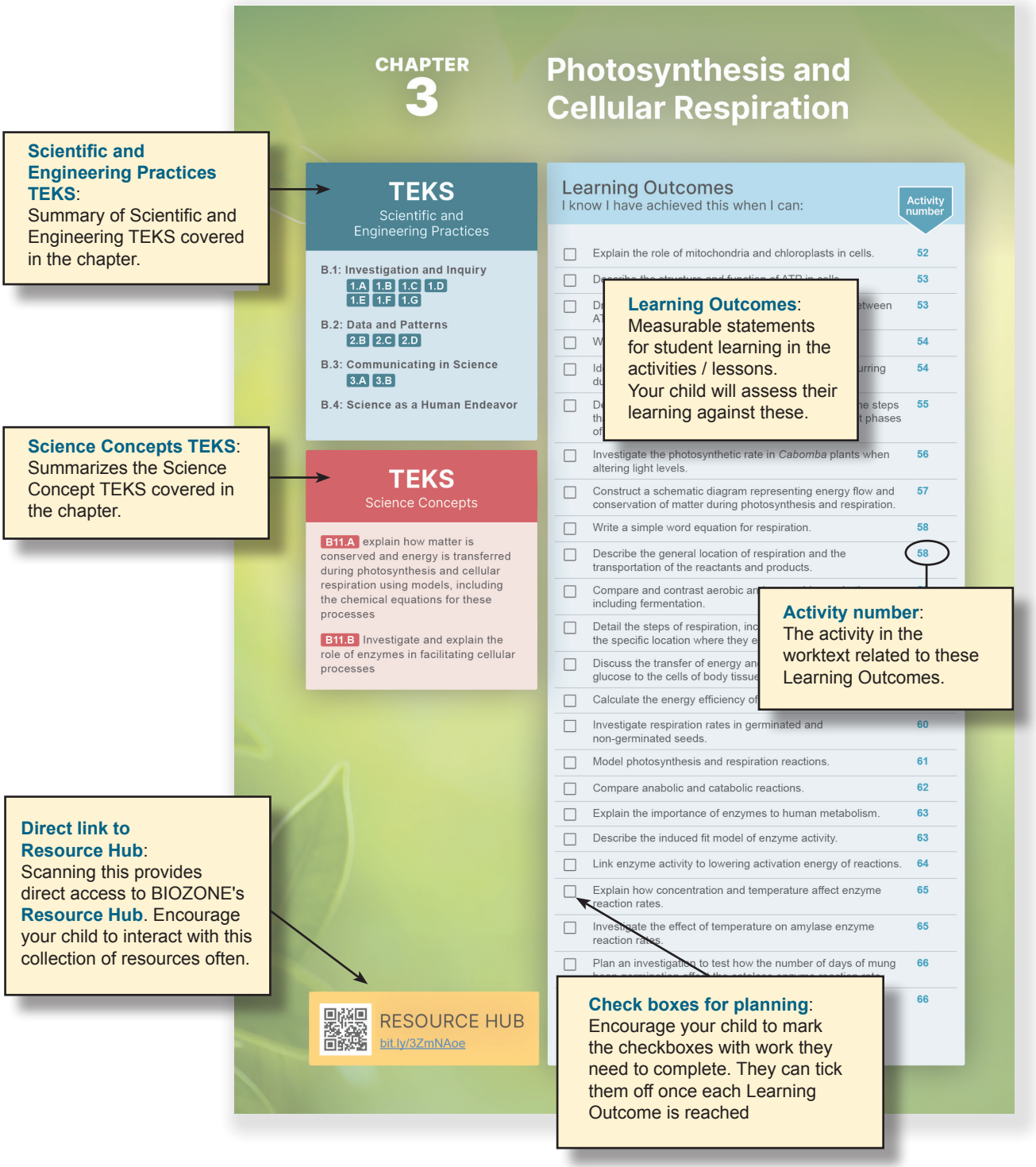
Head to https://biozone.com/us/texas/ to find out how your son or daughter can begin your journey with this exciting new way of learning.

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, indictaing areas that can be returned to for further learning or homework.

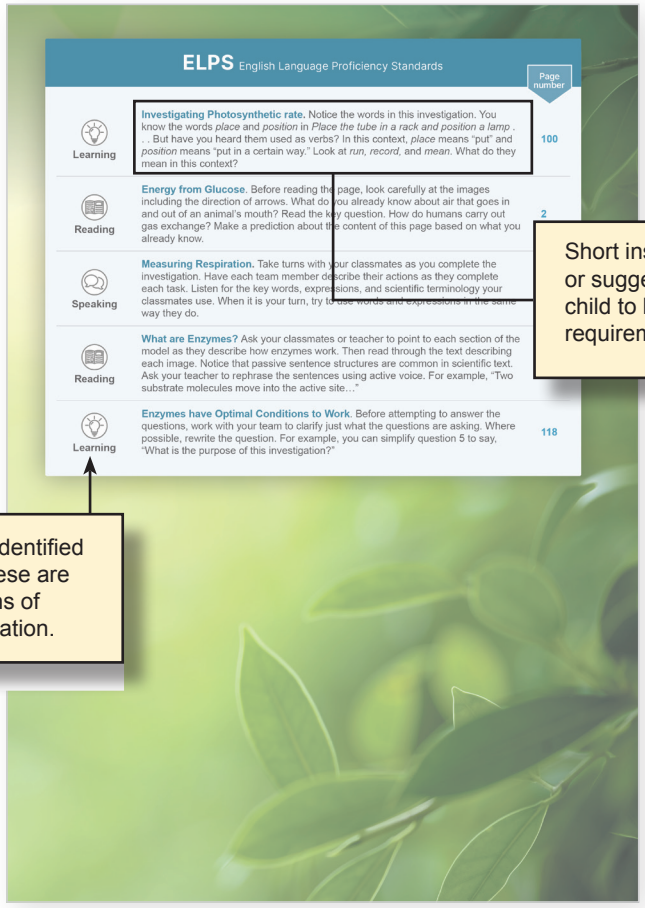
The chapter introduction also provides a list of the TEKS and ELPS covered in the chapter. The introductory chapter can be refered to for explanations of the codes used to identify the TEKS and ELPS.

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



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.



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

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

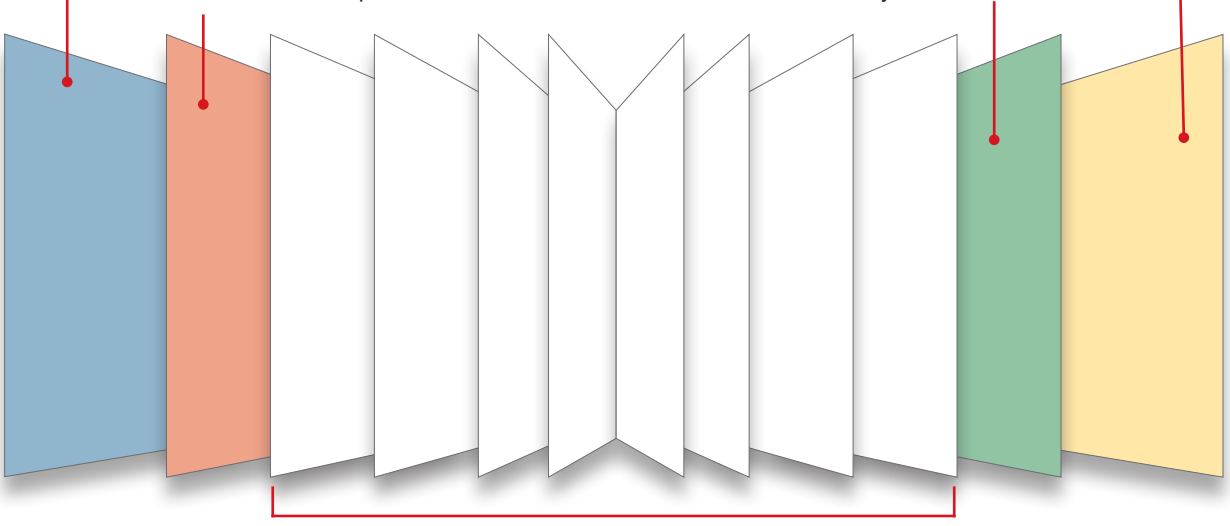
Structure of a Chapter

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

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.

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

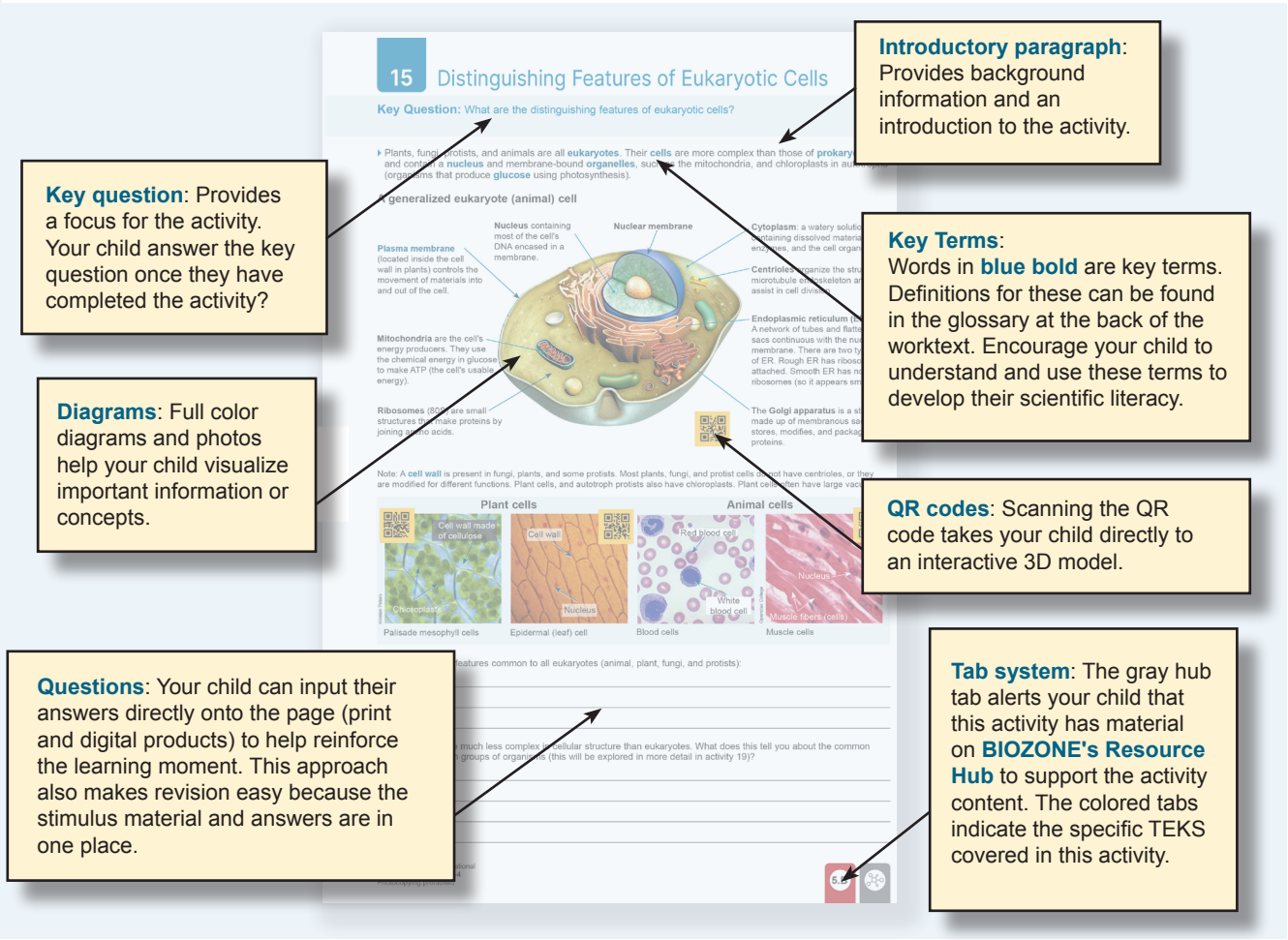


Activity pages
Material is scaffolded over a learning sequence in a series of related activities. Questions allow your child to demonstrate their understanding of the material.

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:

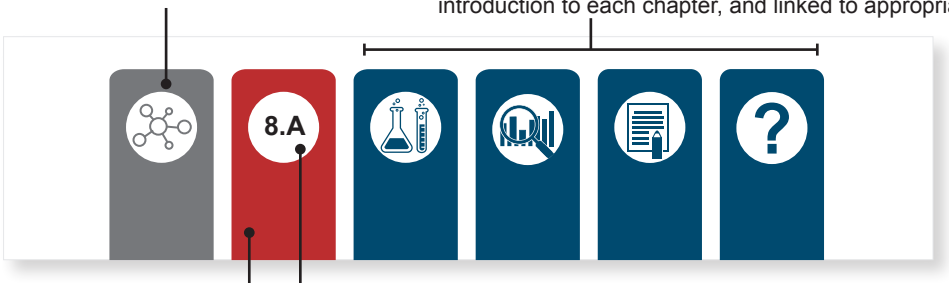
- Short blocks of text so that your child does not feel overwhelmed with too much reading.
- High quality, informative graphics.
- Links to 3D models (following page). These provide another dimension to your child's engagement and learning.
- Question and answer sections allow your child to demonstrate 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).



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.

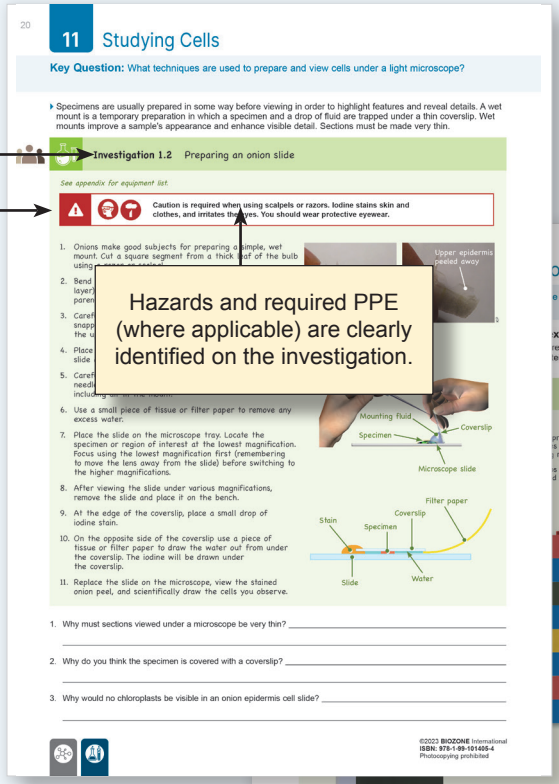
The investigations provide an excellent opportunity for collaborative work and will stimulate discussion and the sharing of ideas. Students of different abilities may be sometimes paired for investigations, so that confident students can guide and encourage less able students and, in this relaxed environment, 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.

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

1. Onions make good subjects for preparing a simple, wet mount. Cut a square segment from a thick leaf of the bulb using
2. Bend
3. Caref
4. Place
5. Caref
6. Use a small piece of tissue or filter paper to remove any excess water.
7. 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.
8. After viewing the slide under various magnifications, remove the slide and place it on the bench.
9. At the edge of the coverslip, place a small drop of iodine stain.
10. 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.
11. Replace the slide on the microscope, view the stained onion peel, and scientifically draw the cells you observe.

Upper epidermis peeled away

Mounting fluid
Specimen
Coverslip
Microscope slide

Filter paper
Coverslip
Stain
Specimen
Slide
Water

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

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on

e expression?

xpression

ree important steps in the process of **gene** eins are produced using the information stored in

processes. The photographs below, and on the s that make up DNA, a DNA strand, and tRNA. Using mRNA, ribosomes, transcription and translation.

s in the spaces on the following pages to show d share with your class and teacher.

A short length of DNA

Unloaded tRNA

U

Anticodons

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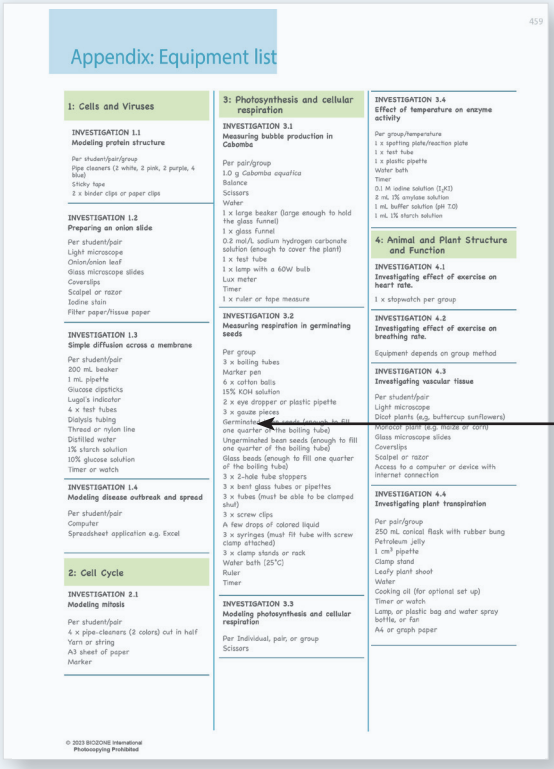

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Appendix: Equipment list

1: Cells and Viruses

INVESTIGATION 1.1
Modeling protein structure
Per student/pair/group
Pipe cleaners (2 white, 2 pink, 2 purple, 4 blue)
Sticky tape
2 x binder clips or paper clips

INVESTIGATION 1.2
Preparing an onion slide
Per student/pair
Light microscope
Onion/onion leaf
Glass microscope slides
Coverslips
Scalpel or razor
Iodine stain
Filter paper/tissue paper

INVESTIGATION 1.3
Simple diffusion across a membrane
Per student/pair
200 mL beaker
1 mL pipette
Glucose dipsticks
Lugol's indicator
4 x test tubes
Dialysis tubing
Thread or nylon line
Distilled water
1% starch solution
10% glucose solution
Timer or watch

INVESTIGATION 1.4
Modeling disease outbreak and spread
Per student/pair
Computer
Spreadsheet application e.g. Excel

2: Cell Cycle

INVESTIGATION 2.1
Modeling mitosis
Per student/pair
4 x pipe-cleaners (2 colors) cut in half
Yarn or string
A3 sheet of paper
Marker

3: Photosynthesis and cellular respiration

INVESTIGATION 3.1
Measuring bubble production in Cabomba
Per pair/group
1.0 g *Cabomba aquatica*
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 test tube
1 x lamp with a 60W bulb
Lux meter
Timer
1 x ruler or tape measure

INVESTIGATION 3.2
Measuring respiration in germinating seeds
Per group
3 x boiling tubes
Marker pen
6 x cotton balls
15% KOH solution
2 x eye dropper or plastic pipette
3 x gauze pieces
Germinating bean seeds (enough to fill one quarter of the boiling tube)
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

INVESTIGATION 3.3
Modeling photosynthesis and cellular respiration
Per Individual, pair, or group
Scissors

INVESTIGATION 3.4
Effect of temperature on enzyme activity
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 (I_2KI)
2 mL 1% amylase solution
1 mL buffer solution (pH 7.0)
1 mL 1% starch solution

4: Animal and Plant Structure and Function

INVESTIGATION 4.1
Investigating effect of exercise on heart rate.
1 x stopwatch per group

INVESTIGATION 4.2
Investigating effect of exercise on breathing rate.
Equipment depends on group method

INVESTIGATION 4.3
Investigating vascular tissue
Per student/pair
Light microscope
Dicot plants (e.g. buttercup sunflowers)
Monocot plant (e.g. maize or corn)
Glass microscope slides
Coverslips
Scalpel or razor
Access to a computer or device with internet connection

INVESTIGATION 4.4
Investigating plant transpiration
Per pair/group
250 mL conical flask with rubber bung
Petroleum jelly
1 cm³ pipette
Clamp stand
Leafy plant shoot
Water
Cooking oil (for optional set up)
Timer or watch
Lamp, or plastic bag and water spray bottle, or fan
A4 or graph paper

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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

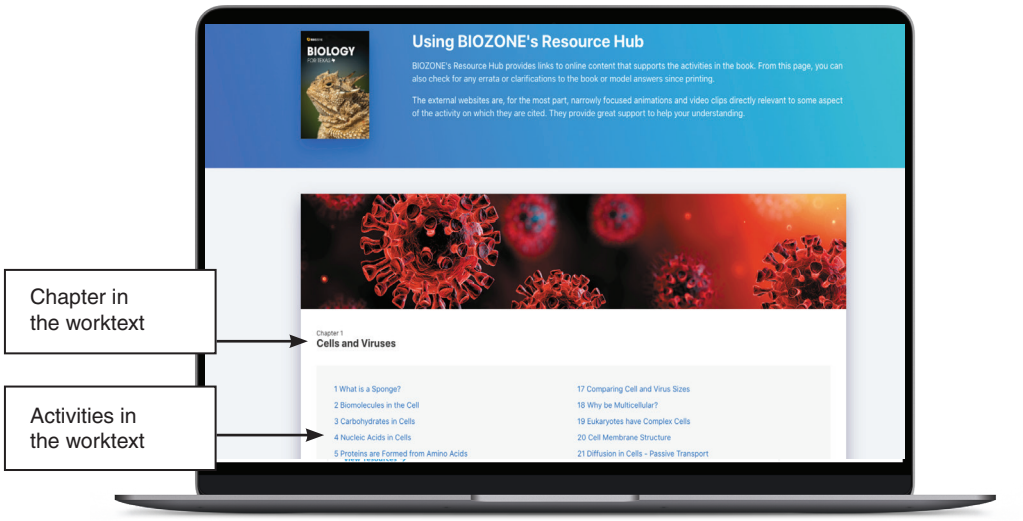
BIOZONE's Resource Hub provides links to online content supporting the activities in the worktext.

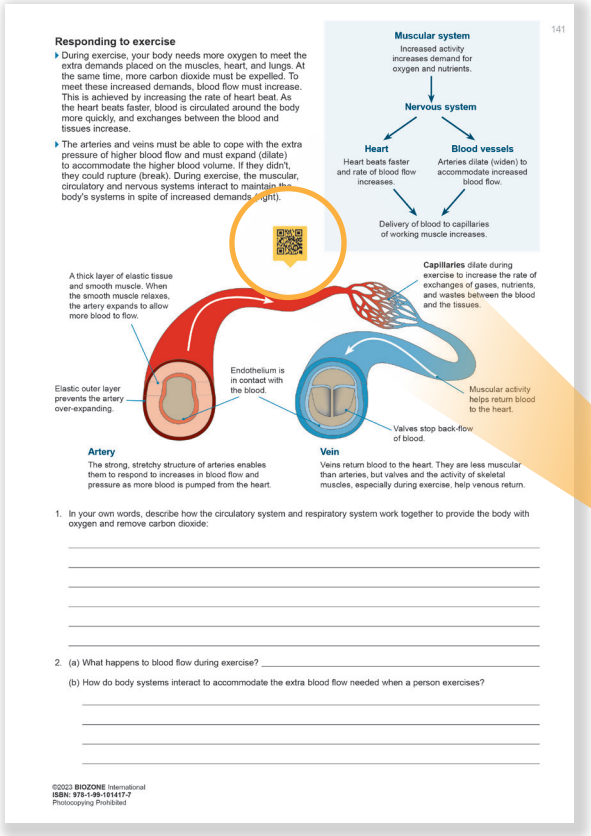
The external websites are mostly narrowly focused information, interactive labs and games, and video clips directly relevant to that part of the activity identified by the hub icon. They provide great support to help your child's understanding.

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.

www.BIOZONEhub.com

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



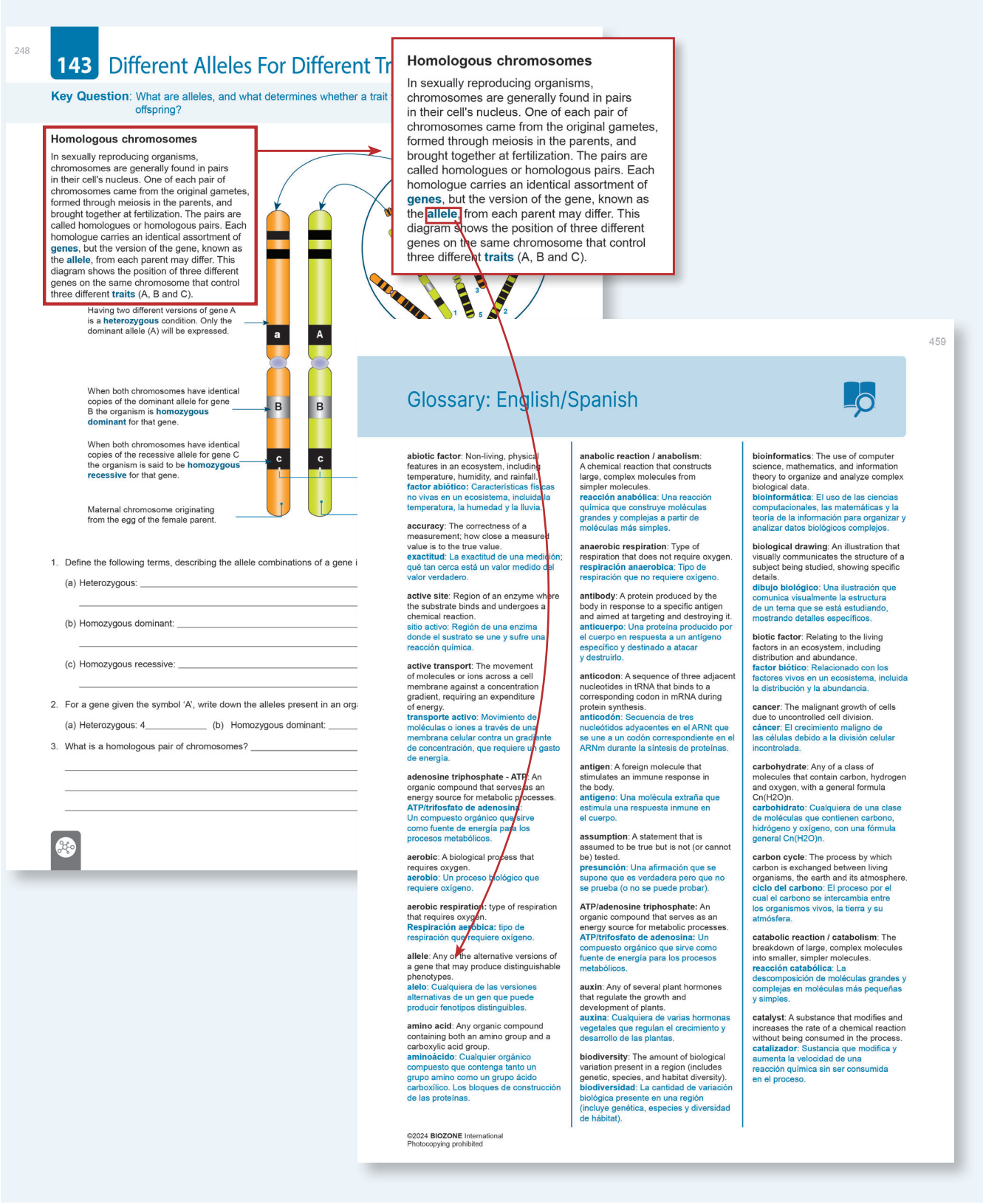


Encourage your child to scan the **QR codes** on the activity pages. These link directly to informative and engaging 3D models. All models can be rotated and zoomed, and some contain informative annotations.

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 Tr

Key Question: What are alleles, and what determines whether a trait 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).

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 i

(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? _____

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).

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Glossary: English/Spanish

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 anaerobica: 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 producido 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 Cn(H2O)n.
carbohidrato: Cualquiera de una clase de moléculas que contienen carbono, hidrógeno y oxígeno, con una fórmula general Cn(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.

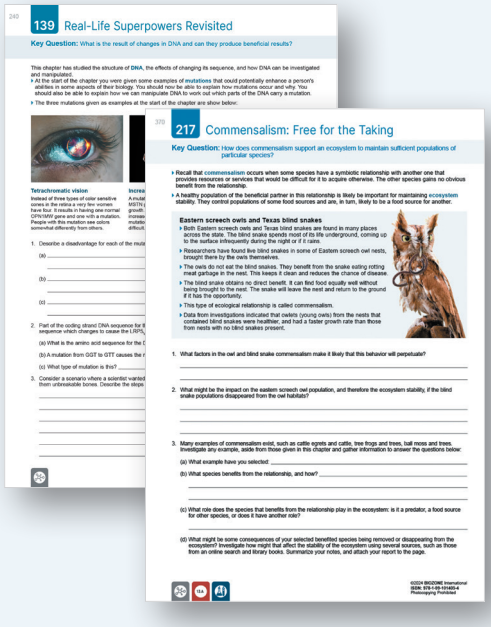
catabolic reaction / catabolism: The breakdown of large, complex molecules into smaller, simpler molecules.
reacción catabólica: La descomposición de moléculas grandes y complejas en moléculas más pequeñas y simples.

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.

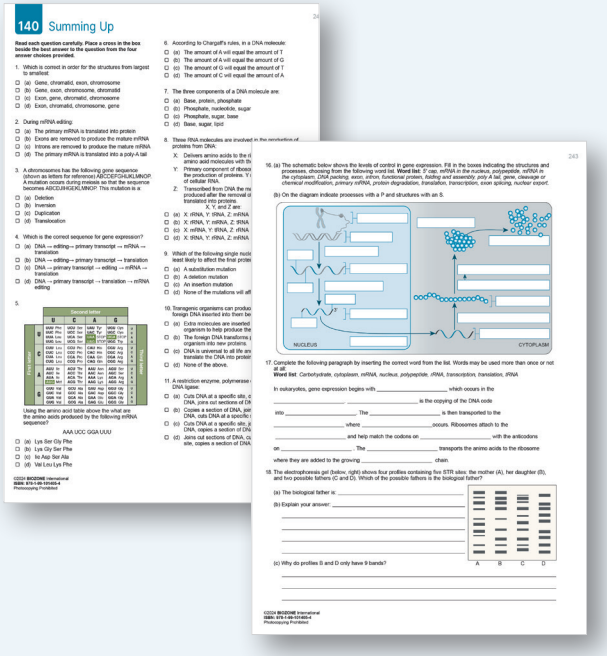
Student Assessment

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



Summative Assessment



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.