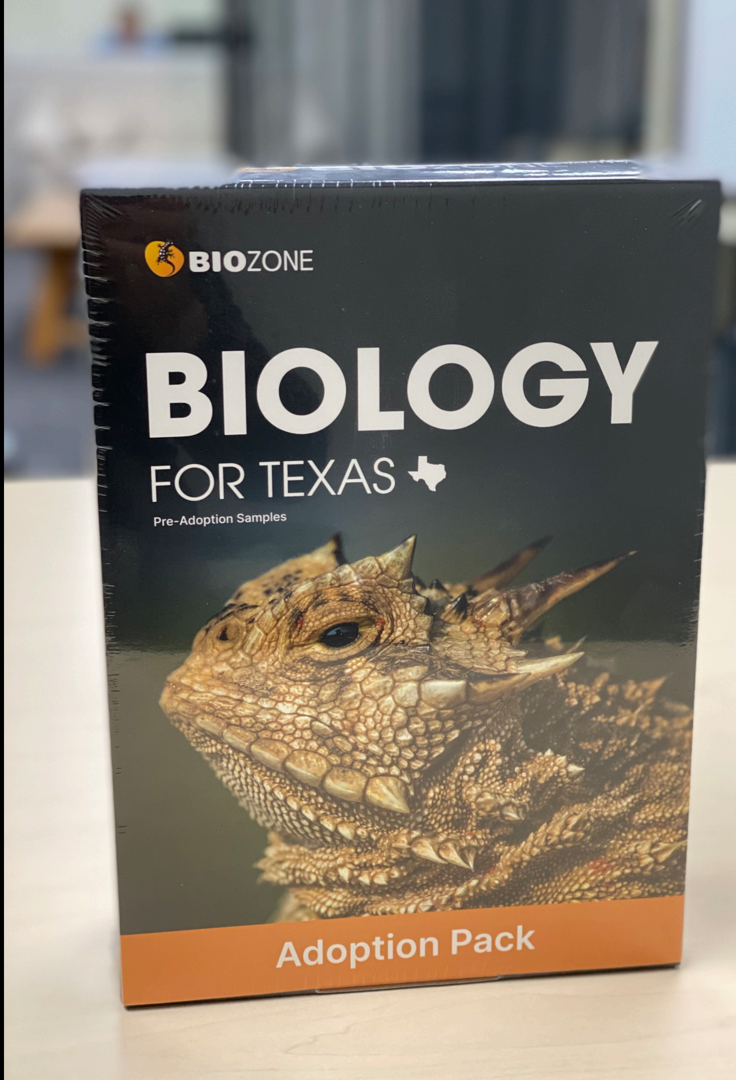
Scan to

learn more about **Biology for Texas**

or to **request an adoption pack**

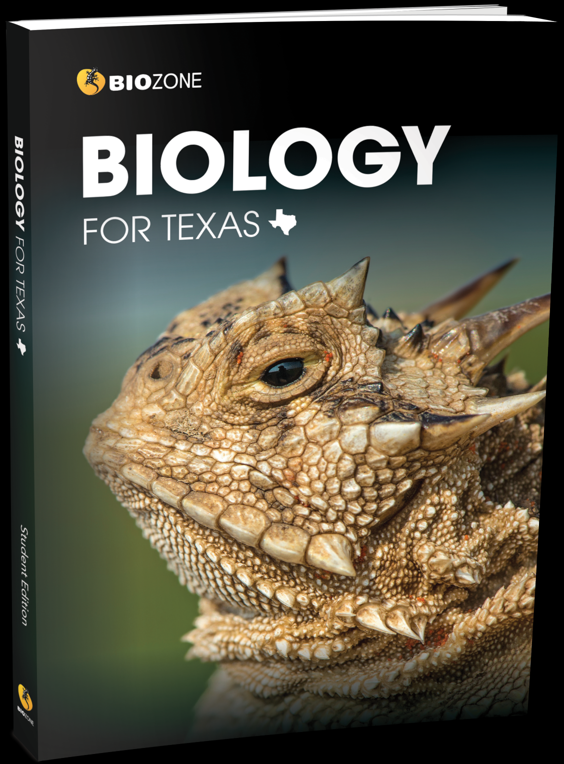


Introducing:

Lissa Bainbridge-Smith

Author

Professional development team leader



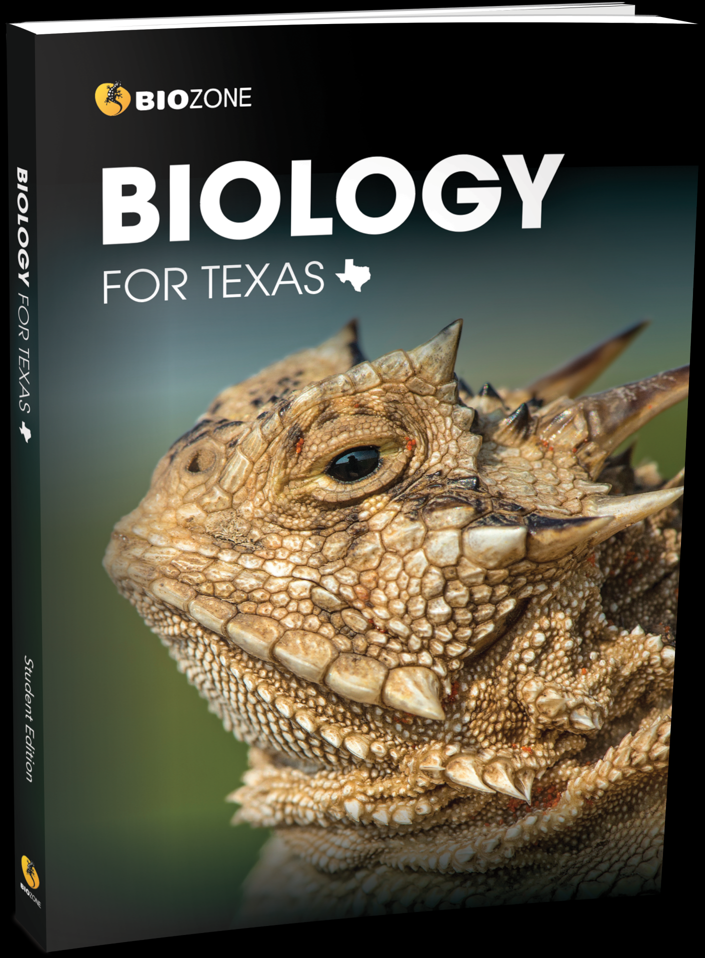
Biology for Texas

Why this title *needs* to be on your resource list

BIOZONE

Overview

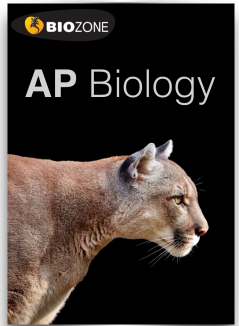
- Product overview
- BIOZONE's points of difference
- About Biology for Texas
  - Features
  - Teacher toolkit
- Digital platform: BIOZONE WORLD

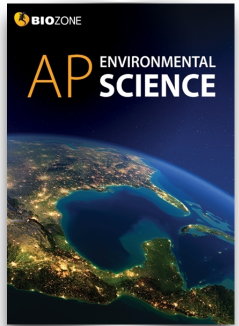


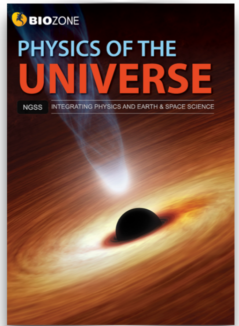
BIOZONE

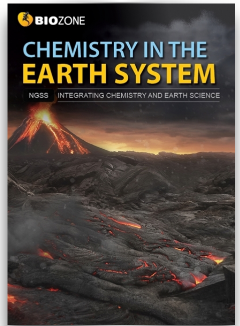
SCIENCE

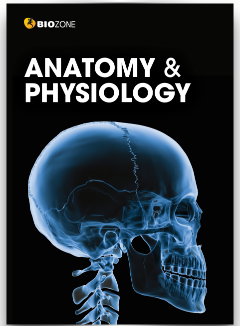
US PROGRAMS

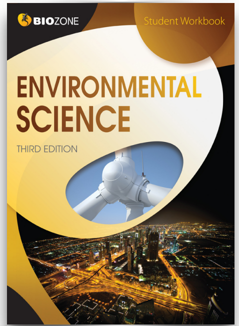


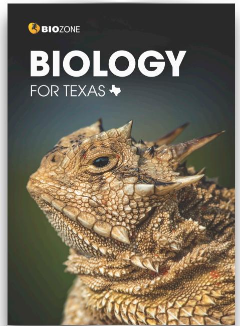


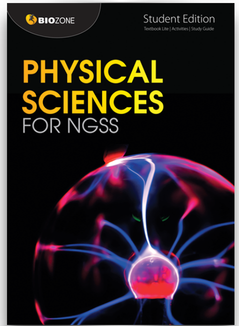


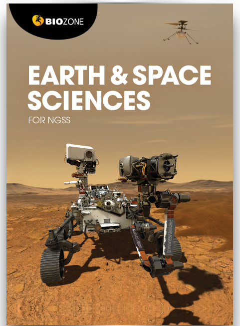


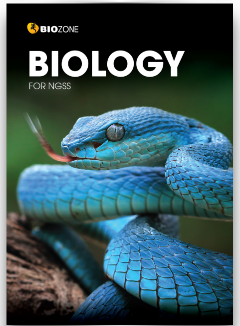


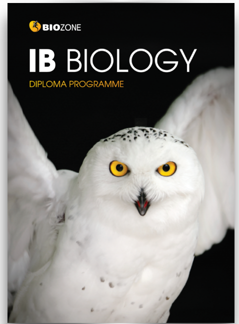


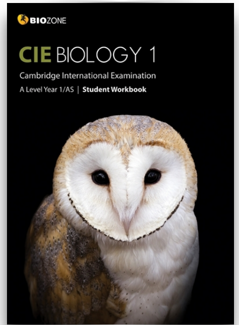


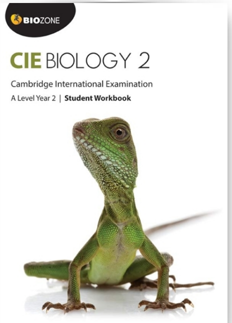






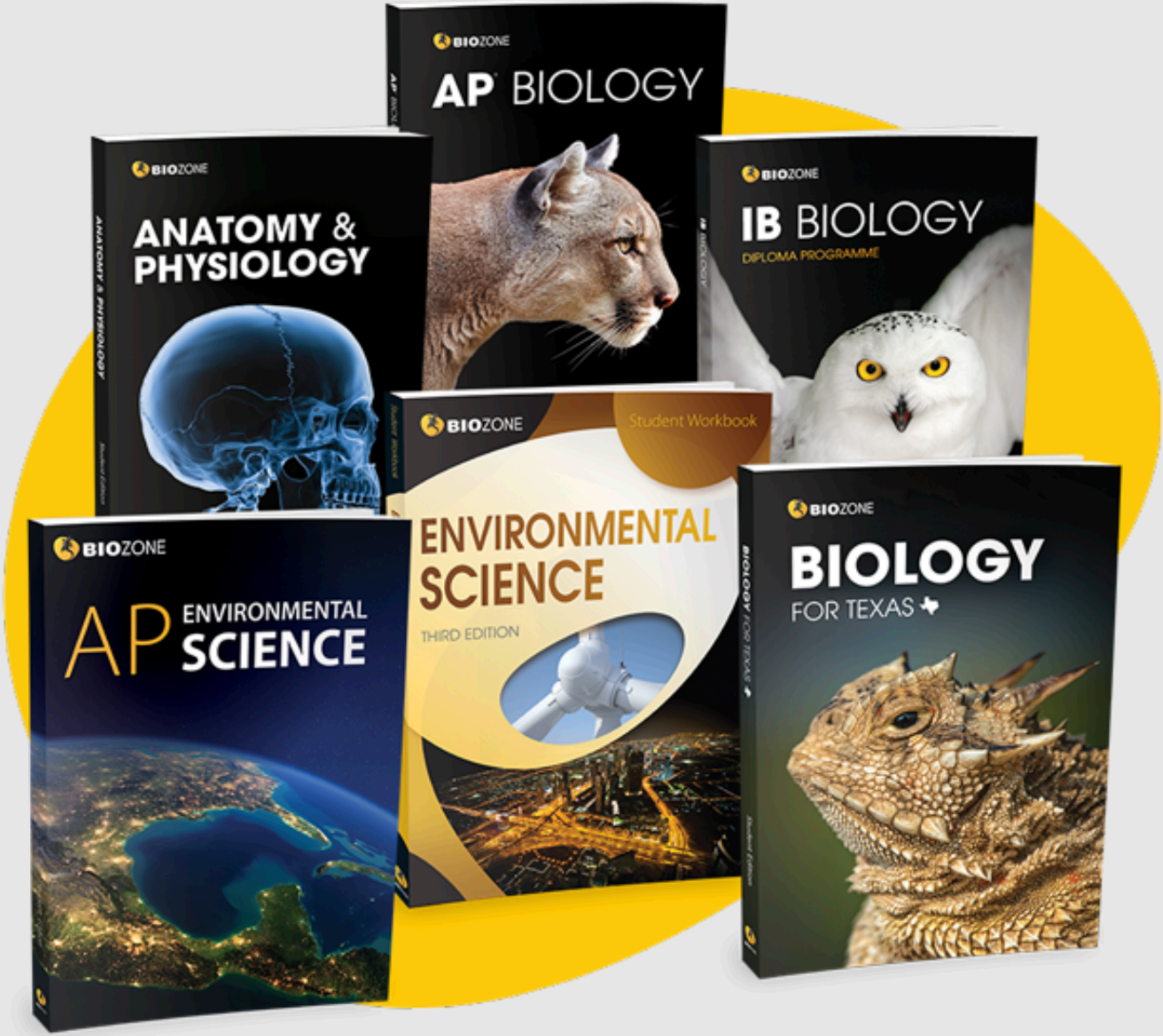






BIOZONE

TEXAS
PROGRAMS



What sets BIOZONE apart?

Teachers write our resources

Questions? Author Hotline: authors@biozone.com

Curricula-specific Titles

Designed *not* aligned

- Titles are written to meet the requirements of a **specific program.**
- Specific program components are integrated and identified:
  - **Program specific content**, examples, case studies
  - **Practical requirements** and **skills**
  - Curricula specific **assessment tools**

BIOZONE
Worktexts

Combine the very best features of a **textbook** ....

.... with the utility of **workbook**

A 3-in-1 hybrid resource

Part textbook

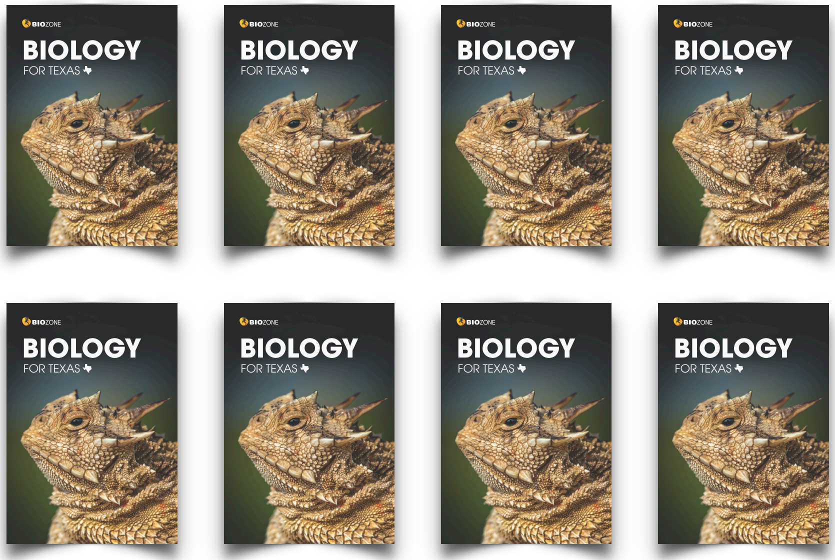
Part study guide

Part activity workbook

Supported by the: **Teacher Toolkit**

Designed to be a **consumable resource** …

What is the **BIOZONE solution?**

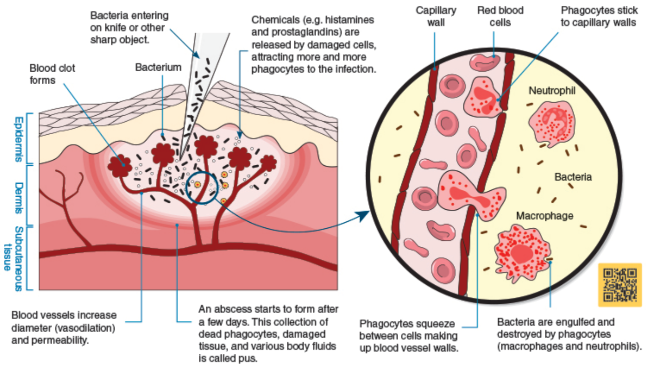


Each year of an adoption, students get a **fresh new copy** of the worktext to begin their learning journey.

128 Inflammation

Key Idea: Inflammation is a defensive response to damage. The inflammation process involves pain, redness, heat, and swelling.

Damage to the body's tissues can be caused by physical agents, e.g. sharp objects, heat, radiant energy, or electricity; microbial infection; or chemical agents, e.g. gases, acids and bases. The damage triggers a defensive response called **inflammation**. The inflammatory response is beneficial and the process of inflammation can be divided into three distinct stages. These are described below.



Stages in the inflammatory response

Increased diameter and permeability of blood vessels
Blood vessels increase their diameter and permeability in the area of damage. This increases blood flow to the area and allows defensive substances to leak into tissue spaces.

Phagocyte migration and phagocytosis
Within one hour of injury, phagocytes appear on the scene. They squeeze between cells of blood vessel walls to reach the damaged area, where they destroy invading microbes.

Tissue repair
Functioning cells or supporting connective cells create new tissue to replace dead or damaged cells. Some tissue regenerates easily (skin) while others do not at all (cardiac muscle).

1. Outline the three stages of inflammation and identify the beneficial role of each stage:

(a) ______

(b) ______

(c) ______

2. State the role of histamines and prostaglandins in inflammation: ______

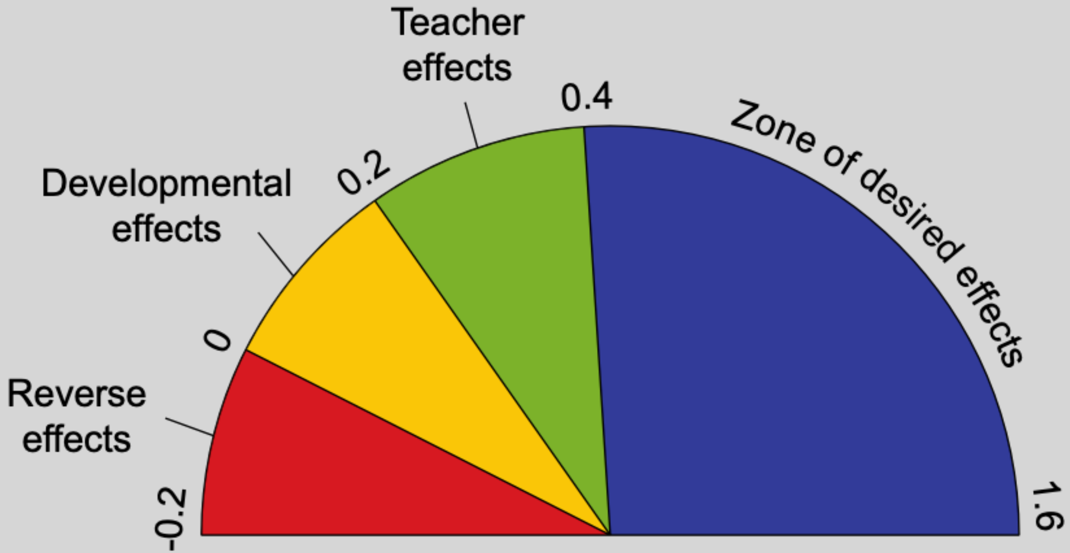
ISBN: 978-1-99-101408-5

Why are BIOZONE Worktexts Unique?

- A reputation for **scientific rigor …**
  … but our information is **accessible**
  - **Graphical delivery** of science concepts
  - **Chunked text**
- Students interact directly with material - **record of work**
- **Easy revision**
- **Self-grading** and **answer refinement**

Many factors influence student achievement

- Some detrimentally (red)
- Others positively (yellow, green, blue)
- **Results greater than 0.4 accelerate student learning** (blue)

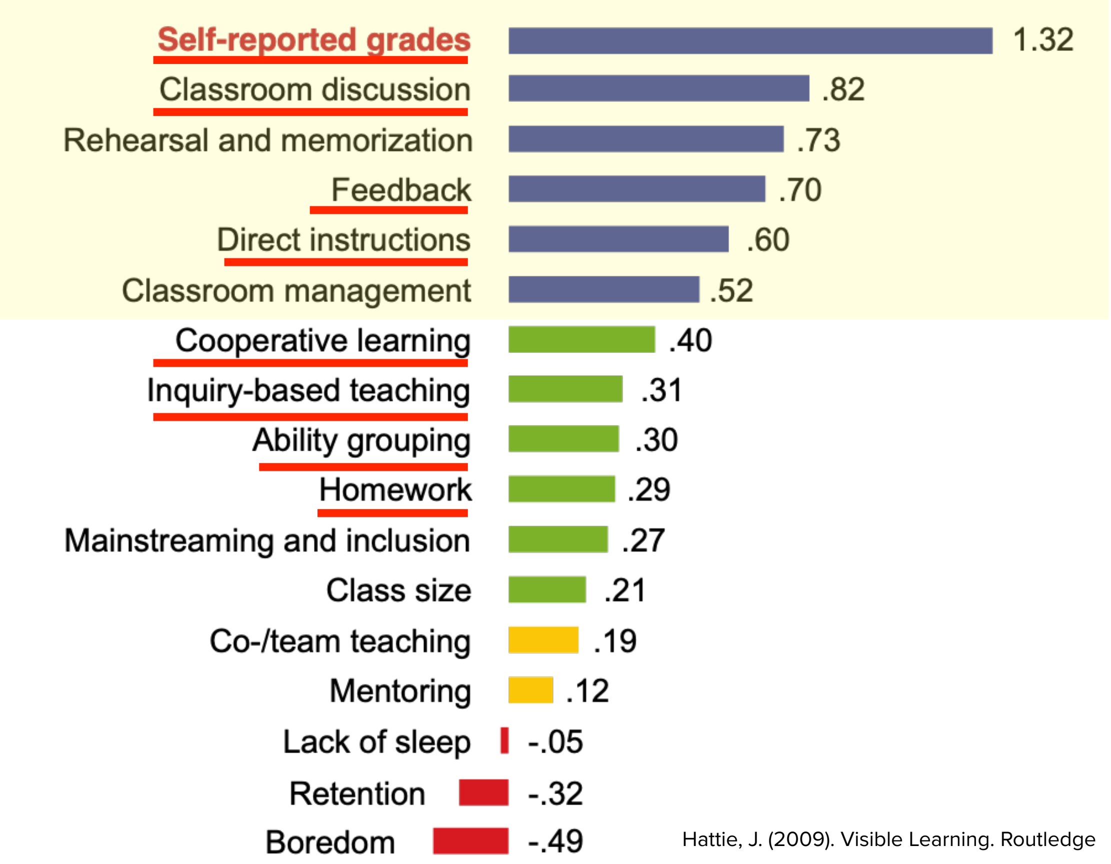


Influences on student achievement

- BIOZONE products incorporate many of the factors shown to positively influence student achievement.

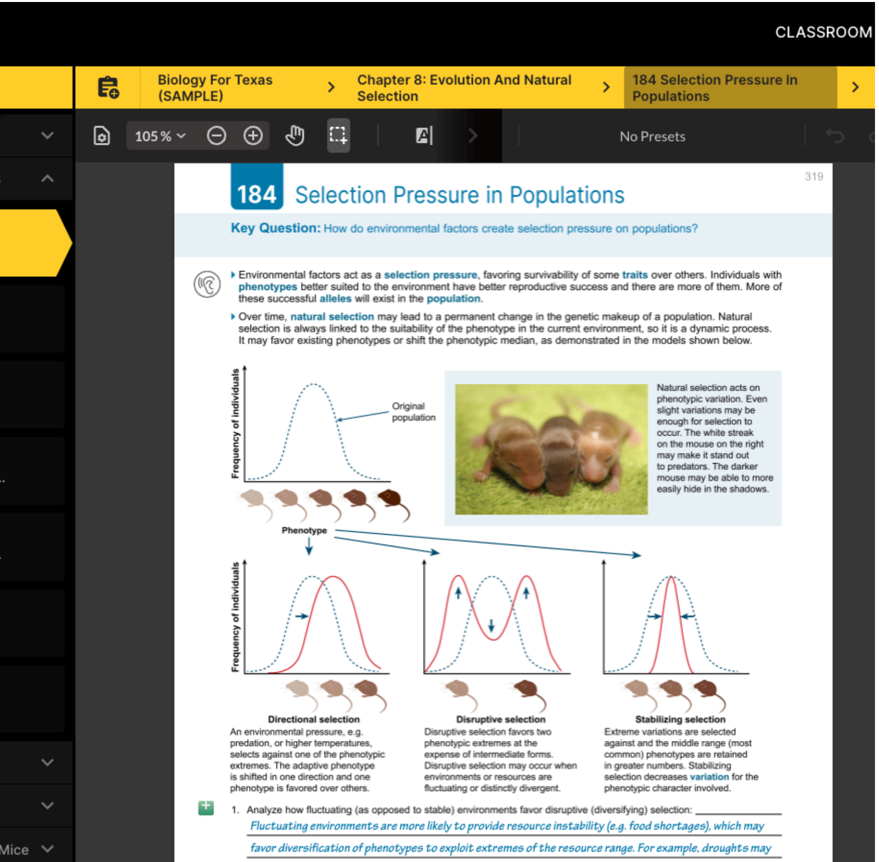
    - **Self-reported grades**; one of the most successful pedagogical tools to academic achievement.

- Where does the data come from? A synthesis of >2,000 meta studies involving over 100,000 individual studies and 300 million students.

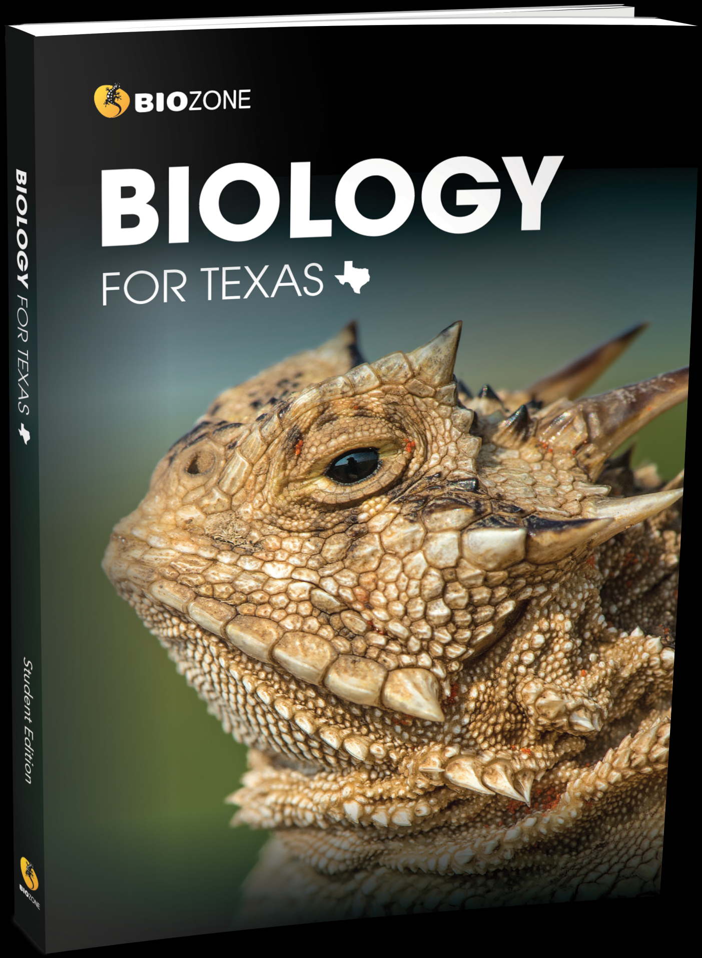


Hattie, J. (2009). Visible Learning. Routledge

How can students self-grade with BIOZONE?

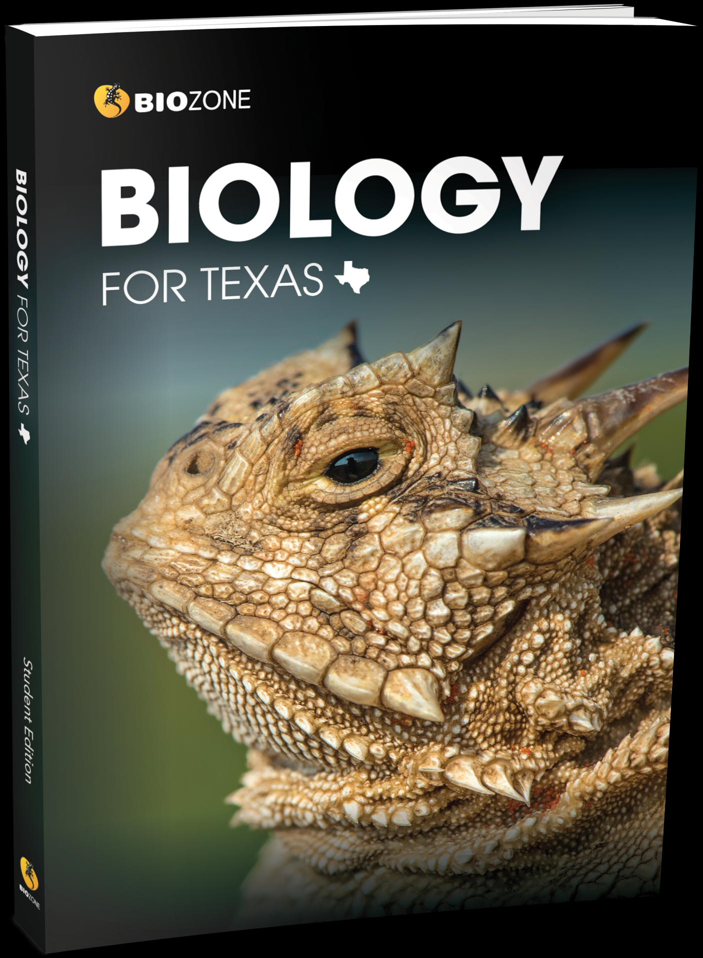


- Students record their answers
- Suggested answers are provided.
    - **Teacher's Edition** and **BIOZONE World**.
- With *teacher guidance*, answers can be provided to the class.
- Students can refine their answers and strengthen their understanding.
- This provides a powerful additional learning moment.



BIOLOGY FOR TEXAS

BIOZONE



SPECIFICALLY DESIGNED

Written for the **Texas Essential Knowledge and Skills** (TEKS) for Science (High School Biology) specified in **Proclamation 2024**.

BIOZONE

HOW WELL DID WE SCORE?

Texas Education Agency

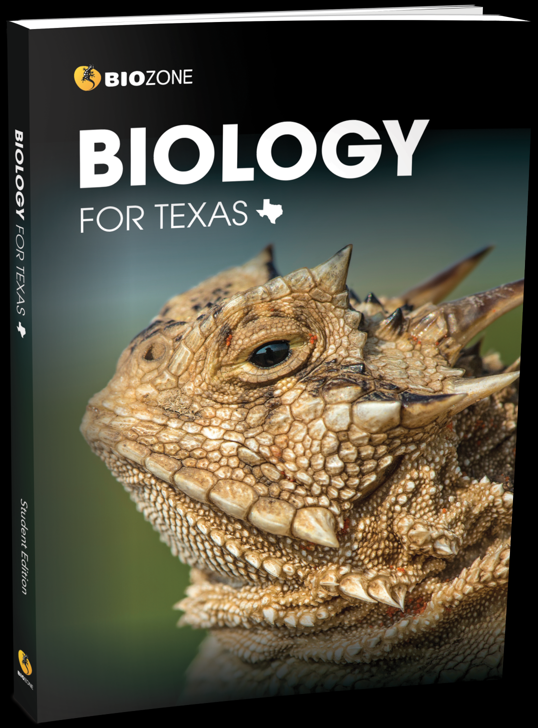
Student TEKS	Teacher TEKS	Student ELPS	Teacher ELPS
100%	100%	100%	100%

Texas Resource Review

50 / 52

High quality resource

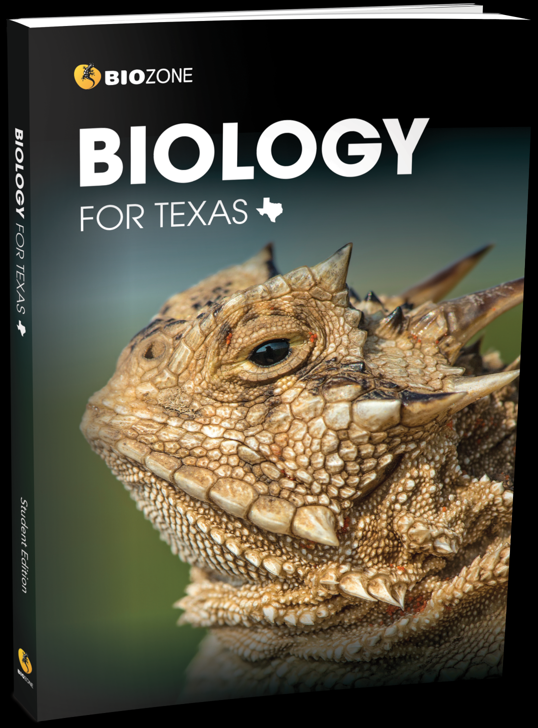
Design Features



- Written and structured on the HS Biology TEKS
- TEKS clearly identified
- ELPS clearly identified (4 levels)
- Content anchors book-end each chapter
- In-built assessments
- In-built practical Investigations and equipment list
- QR codes for direct access to 3D models
- Digital and print options

BIOZONE

Support Features

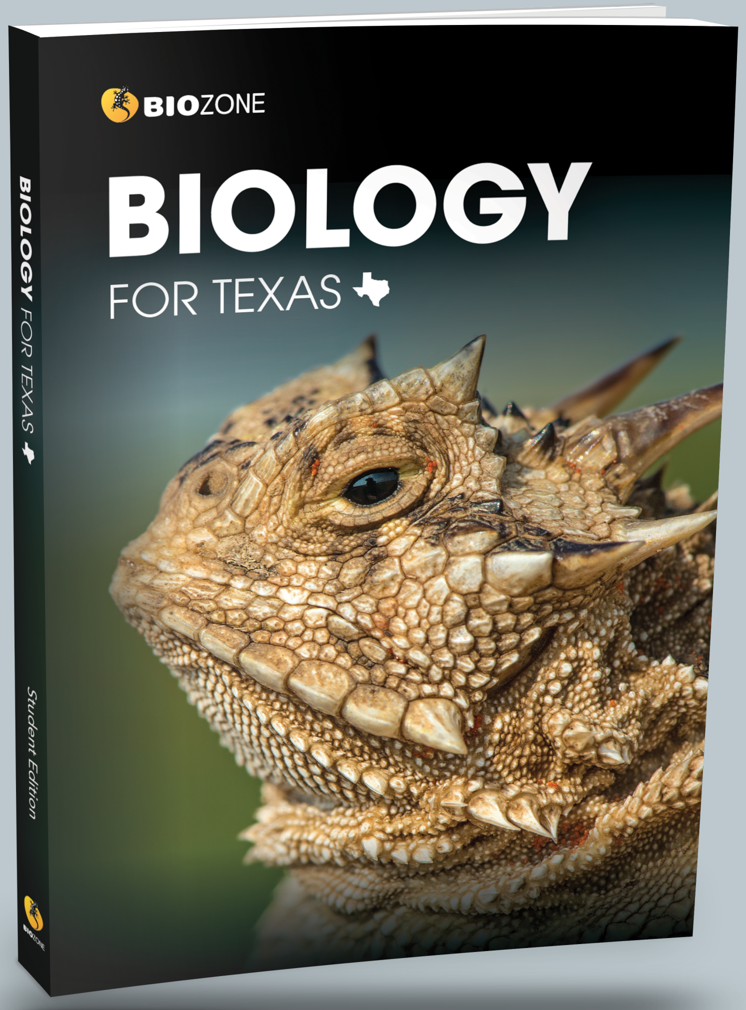


- Translation tool - digital platform

  150 languages including Spanish (experimental)
- Science skills chapter
- Glossary (English & Spanish)
- Extensive teacher support materials
- Implementation and PD training

BIOZONE

STRUCTURE



BIOLOGY FOR TEXAS

1. Cells and Cellular Processes
2. Cell Cycle
3. Photosynthesis and Cellular Respiration
4. Animal and Plant Structure and Function
5. DNA and Gene Expression
6. Patterns of Inheritance
7. Common Ancestry
8. Evolution and Natural Selection
9. Ecological Interactions
10. Science Practices

Structure of a chapter

CHAPTER INTRODUCTION

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

CONTENT ANCHOR

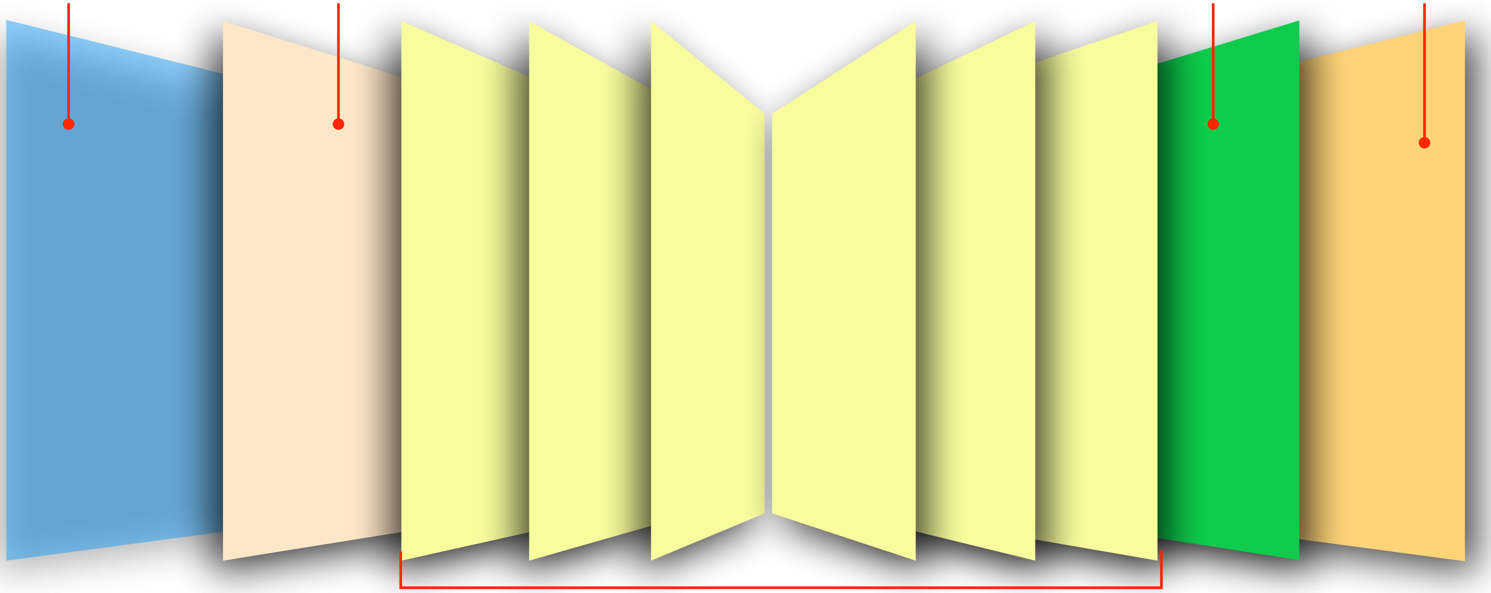
The first activity is an anchor for the chapter. It introduces a phenomenon that students come to understand through the activities in the chapter.

CONTENT ANCHOR REVISITED

Students should be able to explain various aspects of the content anchor fully.

SUMMING UP

Find out what students know about the content and skills they have explored in the chapter.

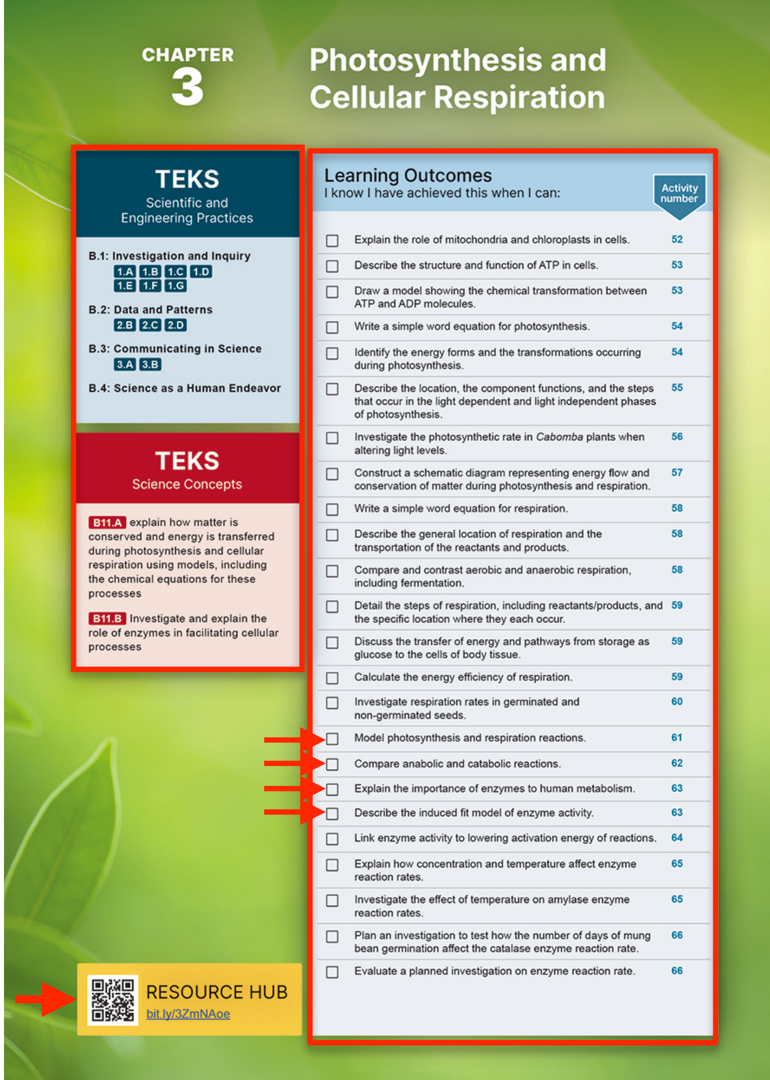


ACTIVITY PAGES

- Material is scaffolded over a learning sequence to develop deeper understanding.
- Questions allow students to demonstrate their understanding of the material.

Chapter Introduction

- **Learning objectives and TEKS**
  - Concise learning statements summarize key learning points.
  - Use the check boxes record progress.
  - The TEKS covered in the chapter are clearly identified.
  - QR code links to curated digital resources



CHAPTER 3

Photosynthesis and Cellular Respiration

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
☐ Explain the role of mitochondria and chloroplasts in cells.	52
☐ Describe the structure and function of ATP in cells.	53
☐ Draw a model showing the chemical transformation between ATP and ADP molecules.	53
☐ Write a simple word equation for photosynthesis.	54
☐ Identify the energy forms and the transformations occurring during photosynthesis.	54
☐ Describe the location, the component functions, and the steps that occur in the light dependent and light independent phases of photosynthesis.	55
☐ Investigate the photosynthetic rate in *Cabomba* plants when altering light levels.	56
☐ Construct a schematic diagram representing energy flow and conservation of matter during photosynthesis and respiration.	57
☐ Write a simple word equation for respiration.	58
☐ Describe the general location of respiration and the transportation of the reactants and products.	58
☐ Compare and contrast aerobic and anaerobic respiration, including fermentation.	58
☐ Detail the steps of respiration, including reactants/products, and the specific location where they each occur.	59
☐ Discuss the transfer of energy and pathways from storage as glucose to the cells of body tissue.	59
☐ Calculate the energy efficiency of respiration.	59
☐ Investigate respiration rates in germinated and non-germinated seeds.	60
☐ Model photosynthesis and respiration reactions.	61
☐ Compare anabolic and catabolic reactions.	62
☐ Explain the importance of enzymes to human metabolism.	63
☐ Describe the induced fit model of enzyme activity.	63
☐ Link enzyme activity to lowering activation energy of reactions.	64
☐ Explain how concentration and temperature affect enzyme reaction rates.	65
☐ Investigate the effect of temperature on amylase enzyme reaction rates.	65
☐ Plan an investigation to test how the number of days of mung bean germination affect the catalase enzyme reaction rate.	66
☐ Evaluate a planned investigation on enzyme reaction rate.	66

Chapter Introduction

- **Student ELPS**
  - Student ELPS covered in the chapter are clearly identified and explained.
  - Icons provide visual prompts.
    Also present in activity margins for easy identification.

- **Teacher ELPS**
  - Teacher's Edition lists and explains student ELPS.
  - Teacher's Edition lists and explains teacher ELPS.
  - ELPS level is clearly identified.

ELPS English Language Proficiency Standards

ELPS Level			Page number
Beginning 4.C.iii Comprehend English vocabulary used routinely in written classroom materials	**Learning** Recognize Multiple-Meanings	**Investigating Photosynthetic rate.** Notice the words in this investigation. You know the words *place* and *position* in *Place the tube in a rack and position a lamp . . .* But have you heard them used as verbs? In this context, *place* means "put" and *position* means "put in a certain way." Look at run, record, and mean. What do they mean in this context?	100
Beginning 4.F.v Use visual and contextual support to develop background knowledge needed to comprehend increasingly challenging language	**Reading** Build on What You Know	**Energy from Glucose.** Before reading the page, look carefully at the images, including the direction of arrows. What do you already know about air that goes in and out of an animal's mouth? Read the key question. How do humans carry out gas exchange? Make a prediction about the content of this page based on what you already know.	102
Advanced High 3.F.ii Give information ranging from using a very limited bank of high-frequency, high-need, concrete vocabulary, including key words and expressions needed for basic communication in academic and social contexts, to using abstract and content-based vocabulary during extended speaking assignments	**Speaking** Collaborate	**Measuring Respiration.** Take turns with your classmates as you complete the investigation. Have each team member describe their actions as they complete each task. Listen for key words, expressions, and scientific terminology your classmates use. When it is your turn, try to use words and expressions in the same way that they do.	106
Intermediate 4.F.ix Use support from peers and teachers to develop grasp of language structures needed to comprehend increasingly challenging language	**Reading** Use Text Features and Human Support	**What are Enzymes?** Ask your classmates or teacher to point to each section of the model as they describe how enzymes work. Then read through the text describing each image. Notice that passive sentence structures are common in scientific text. Ask your teacher to rephrase the sentences using active voice, i.e, "Two substrate molecules move into the active site…"	114
Advanced 4.G.iii Demonstrate comprehension of increasingly complex English by responding to questions commensurate with content area and grade level needs	**Learning** Make it Simple	**Enzymes have Optimal Conditions to Work.** Before attempting to answer the questions, work with your team to clarify just what the questions are asking. Where possible, rewrite the question. For example, you can simplify question 5 to say, "What is the purpose of this investigation?"	118
Teacher only			
Intermediate 2.I.iv Demonstrate listening comprehension of increasingly complex spoken English by collaborating with peers commensurate with content and grade-level needs	**Listening** Listen Actively	**Beginning of Chapter.** Provide tips for active listening before grouping students to complete investigations. Tell them to ask questions and summarize what they hear others say. Suggest that native speakers describe their actions as they model the activity before requiring English learners to contribute. Persuade English learners to use the visual aids provided with investigations to pick up key content-area language.	100

Content Anchors

- Begin every chapter
- Familiar to students, but cannot be fully explained
- Encompass chapter content

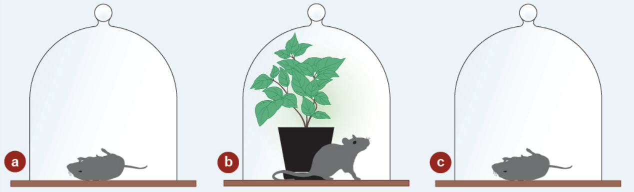
- **Two purposes**
  - Engage students
  - Teachers gauge prior knowledge, misconceptions and knowledge gaps

51 Mouse Trap

Content Anchor: Under what conditions can an animal survive in a sealed system?

Mouse in a jar

Around 1772, Joseph Priestley carried out a series of experiments. He wanted to see if there was a relationship between the survival of plants and animals in a closed system. One of his experiments is shown below.



(a) Priestley placed a mouse in a sealed, empty bell jar. The mouse quickly collapsed and died.

(b) Priestley placed a mint plant in a sealed bell jar and left it for several days before adding a mouse. After several minutes the mouse was still alive.

(c) Priestley removed the mouse from jar (b) and placed it into a sealed, empty bell jar. The mouse died very quickly.

1. (a) Can you explain why the mouse died in jars (a) and (c), but not in jar (b)? ______

   (b) What metabolic or chemical processes might explain the results that Joseph Priestley obtained? ______

2. Draw a very simple diagram to show what is happening in jar (b):

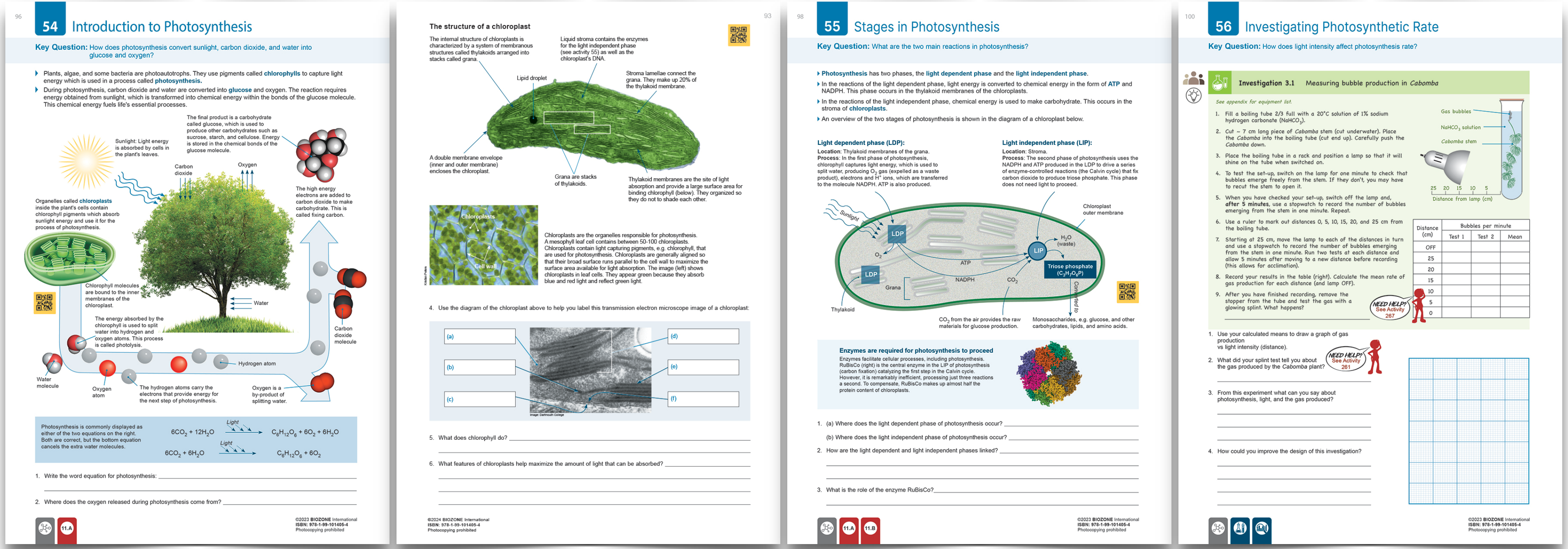
3. In another experiment, Joseph Priestley left a plant covered with a bell jar for many days. He then placed a candle with a glowing wick into the jar. The wick ignited and began to burn. What was present to allow the wick to ignite?

ISBN: 978-1-99-101417-7

Learning Sequence

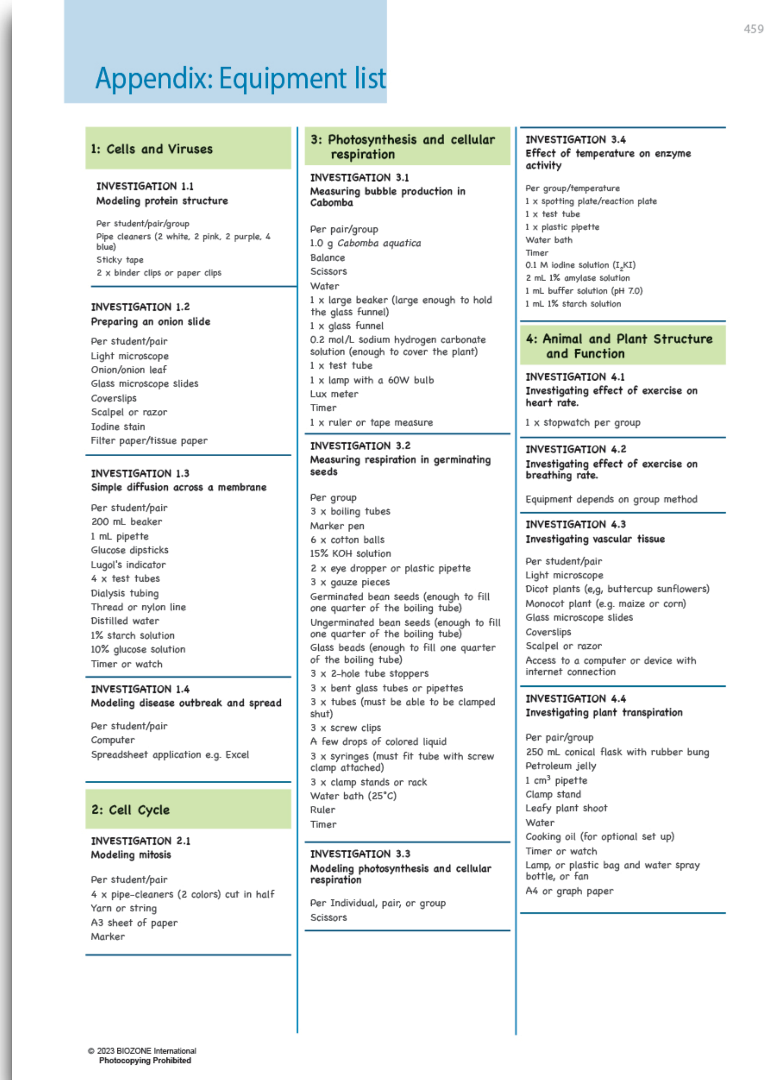
Scaffolded delivery

- Working through the learning sequence builds and develops a deeper understanding.



Practical Investigations

- Practical Investigations are clearly identified in green boxes.
    - Help meet the programs' practical requirements
    - Investigative phenomena
    - Promote collaboration
    - Enhance communication
    - Develop laboratory skills
- Investigations use equipment commonly found in high school laboratories and classrooms.
    - No special kits are required.
- Equipment list is provided.



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
Germinated 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 cm^3 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

Content Anchor Revisited

- Revisited at end of chapter
- Students should be able to fully explain the Content Anchor
- Formative assessment
- Is there anything which needs to be revisited before moving on?

67 Mouse Trap Revisited

Content Anchor Revisited: Under what conditions can an animal survive in a sealed system?

Man in a box

- In 2012, researchers carried out a larger version of Joseph Priestley's famous mouse in a jar experiment.
- 274 plants were placed in a sealed container with oxygen-depleted air (12.4% oxygen). A healthy 47 year-old man entered the container for 48 hours. Gas levels were monitored throughout the experiment. The container was kept in constant light.
- The experiment was run to completion with no harm to the person within the box.
- Ethics approval was obtained beforehand and medical staff were on hand during the experiment.

Martin D, Thompson A, Stewart I, et al. A paradigm of fragile Earth in Priestley's bell jar. Extrem Physiol Med. 2012;1(1):4. Published 2012 Sep 4. doi:10.1186/2046-7648-1-4

1. Use your understanding from the information in this chapter to identify:

   (a) The two gases primarily being monitored in the experiment: ______

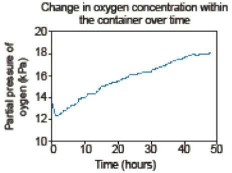
   (b) The two metabolic processes involved in this experiment: ______

2. (a) The graph on the right shows the change in oxygen concentration over the course of the experiment. Describe the trend in oxygen levels over time:

   ______

   (b) Explain why this change occurred (your answer should make reference to the gases and metabolic pathways involved):

   ______



3. Revisit the model you produced in activity 51. Refine it and add more detail to explain the relationship between cellular respiration and photosynthesis:

ISBN: 978-1-99-101417-7

Summative Assessment

Test understanding

68 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 statement best describes the function of ATP?
- ☐ (a) ATP is a structural component of plant cell walls
- ☐ (b) ATP carries the genetic information of organisms
- ☐ (c) ATP provides the energy for chemical reactions to occur
- ☐ (d) ATP is a biological catalyst

2. Select the option which correctly identifies the organelle below AND the cellular process which takes place in it:

- ☐ (a) Chloroplast, photosynthesis
- ☐ (b) Chloroplast, cellular respiration
- ☐ (c) Mitochondrion, photosynthesis
- ☐ (d) Mitochondrion, cellular respiration

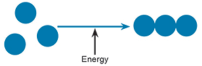
3. Enzymes speed up reactions by:
- ☐ (a) Reducing the activation energy needed
- ☐ (b) Increasing the activation energy needed
- ☐ (c) Adding energy to the reaction
- ☐ (d) Taking part in the reaction and forming part of the product(s)

4. The type of energy transformation occurring during photosynthesis is:
- ☐ (a) Light to heat
- ☐ (b) Light to chemical
- ☐ (c) Chemical to heat
- ☐ (d) None of the above

5. Which group of macromolecules do enzymes belong to?
- ☐ (a) Lipids
- ☐ (b) Proteins
- ☐ (c) Carbohydrates
- ☐ (d) Nucleotides

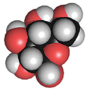
6. A solution of amylase was heated to 70°C for 10 minutes. When the treated amylase was added to a solution of starch, the iodine test showed no sugars had been produced. This is because:
- ☐ (a) The enzyme has been denatured
- ☐ (b) An enzyme inhibitor is preventing the enzyme from working
- ☐ (c) There is no substrate present
- ☐ (d) Amylase does not catalyze the reaction which converts starch in to sugars

7. The diagram below is showing:



- ☐ (a) A catabolic reaction, such as cellular respiration
- ☐ (b) A catabolic reaction, such as photosynthesis
- ☐ (c) An anabolic reaction, such as cellular respiration
- ☐ (d) An anabolic reaction, such as photosynthesis

8. The model below is of a glucose molecule. During cellular respiration glucose is converted into:



- ☐ (a) Starch and carbon dioxide
- ☐ (b) Starch and water
- ☐ (c) Water and oxygen
- ☐ (d) Water and carbon dioxide

9. Enzymes can change shape when exposed to extremes of temperature or pH. What is the most likely results if the shape of an enzyme changes?
- ☐ (a) The enzyme will no longer be able to bind its substrate
- ☐ (b) Enzyme activity will speed up
- ☐ (c) The enzyme will bind a new substrate
- ☐ (d) Different products will be produced during the reaction

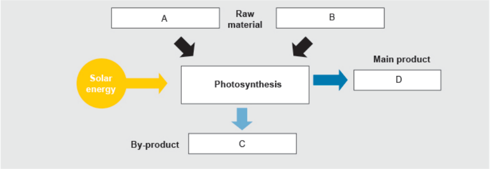
10. Which molecules are both the products of cellular respiration and the raw materials for photosynthesis?
- ☐ (a) Carbon dioxide, ATP, and oxygen
- ☐ (b) Carbon dioxide and water
- ☐ (c) Glucose and oxygen
- ☐ (d) Glucose, ATP, and oxygen

11. Which answer correctly describes the equation below, and the organelle in which it takes place?

$$H_2O + CO_2 \longrightarrow C_6H_{12}O_6 + O_2$$

- ☐ (a) Photosynthesis, chloroplast
- ☐ (b) Photosynthesis, mitochondrion
- ☐ (c) Cellular respiration, chloroplast
- ☐ (d) Cellular respiration, mitochondrion

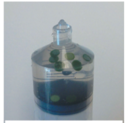
Question 12 and 13 relate the to the process of photosynthesis, shown below:



12. Raw materials A and B are:
- ☐ (a) Oxygen, carbon dioxide
- ☐ (b) Carbon dioxide, water
- ☐ (c) Water, oxygen
- ☐ (d) Water, glucose

13. Main product D and by-product C are
- ☐ (a) D: Oxygen C: Glucose
- ☐ (b) D: Carbon dioxide C: Oxygen
- ☐ (c) D: Glucose C: Oxygen
- ☐ (d) D: Water C: Glucose

14. Students investigated the effect of different light wavelengths (color) on the rate of photosynthesis. They used a leaf disk assay in which the rate of photosynthesis is measured indirectly by timing how long it takes for prepared leaf disks (right) to float to the surface when placed in an illuminated beaker of sodium hydrogen carbonate. The results are tabulated below:



Preparing the leaf disks by applying pressure to a sodium hydrogen carbonate solution.

Light color	Time taken for 10 discs to float (s)
Blue	162
Red	558
Green	998
White	694

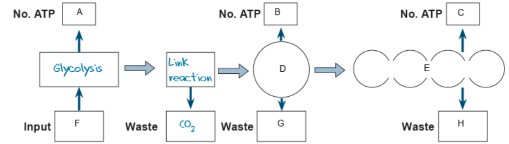
(a) Why do you think photosynthesizing leaf disks would float?

(b) Which light color was the most effective at driving photosynthesis? Explain:

(c) Which light color was the least effective at driving photosynthesis?

15. Outline the differences between photosynthesis and cellular respiration, including reference to the raw materials used and the waste products produced:

Refer to the diagram of cellular respiration below for questions 16-17



16. The total number of ATP molecules produced in steps A, B, and C is:
- ☐ (a) Approximately 20
- ☐ (b) Approximately 28
- ☐ (c) Approximately 32
- ☐ (d) Approximately 38

17. The waste products G and H are
- ☐ (a) G: Oxygen H: Carbon dioxide
- ☐ (b) G: Carbon dioxide H: Oxygen
- ☐ (c) G: Water H: Carbon dioxide
- ☐ (d) G: Carbon dioxide H: Water

18. Study the enzymatic word equation below and answer the following questions:

Sucrose + Water $\xrightarrow{\textit{Sucrase}}$ Glucose + Fructose

(a) Identify the substrate: ______

(b) Identify the products: ______

(c) Identify the enzyme: ______

19. Identify the following statements as true of false (circle the correct answer)

(a) Enzymes are biological catalysts. They lower the activation energy of a reaction. True / False

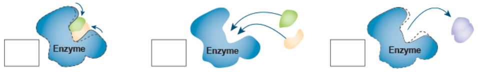
(b) Enzyme inhibitors allow enzymes to work faster. True / False

(c) The induced fit model states that the enzyme changes shape when a substrate fits into the active site. True / False

20. The diagram below outlines the three main steps when an enzyme catalyzes a reaction. The steps are NOT in order.

(a) In the boxes below, write the numbers 1 - 3 to indicate the correct order of sequence:

(b) Write a brief description under each image to describe what is happening:



TEKS & ELPS

Locating the TEKS

Differentiated for easy navigation

- Chapter fronts
- Tab on activity pages:
  - **Red** = Science Concept TEKS
  - **Blue** = Scientific and Engineering Practice TEKS
- Summary tables in Teacher's Edition
  - Science Concepts TEKS
  - Scientific and Engineering Practice TEKS

TEKS SCIENTIFIC AND ENGINEERING PRACTICES

B.1: Scientific and engineering practices.

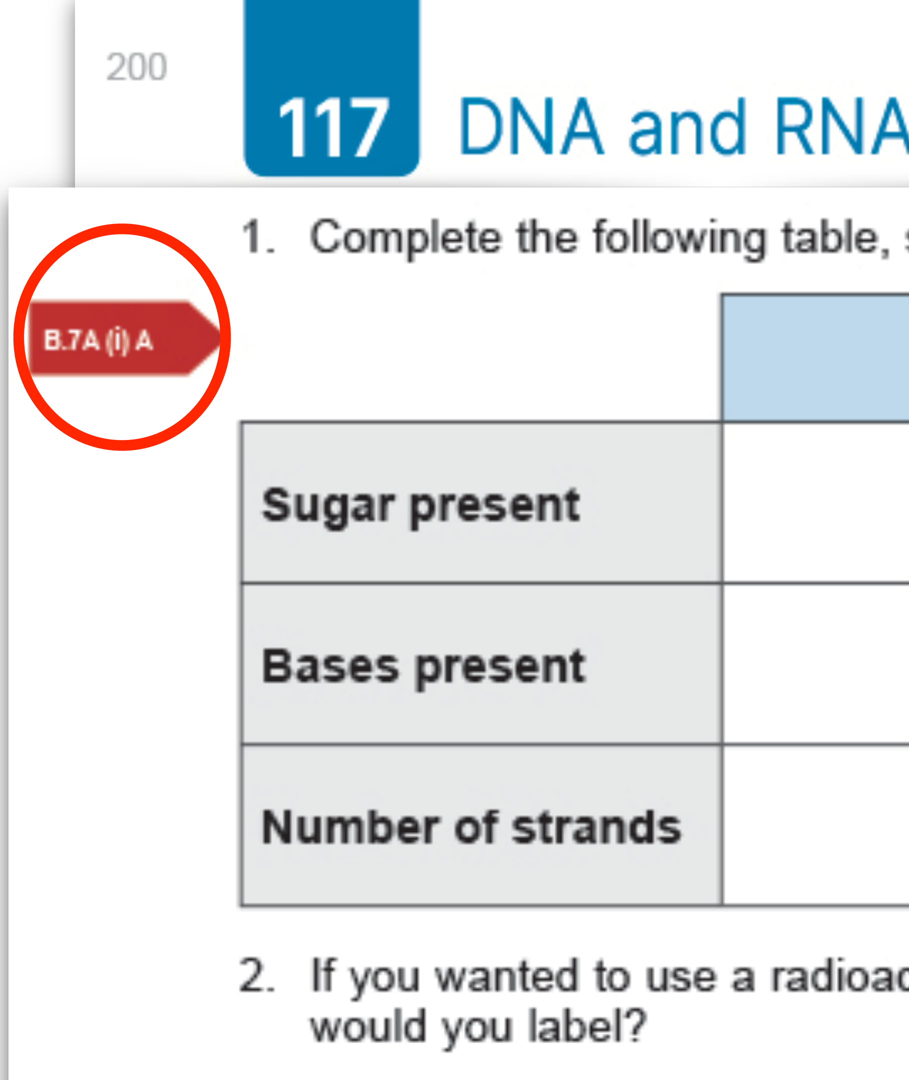
- The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models.

	TEKS Student Expectation	Activity Number	Page number	Activity Number	Page number	Activity Number	Page number
B1.A	Ask questions and define problems based on observations or information from text, phenomena, models, or investigations	34	63	94	166, 167	246	424
		66	119, 120	170	295	249	427
B1.B	Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems	9	17	94	166, 167, 168	226	384
		11	20	98	173	232	393
		12	22	102	179	238	406
		21	38	151	260	239	410
		30	53	181	315	249	427
		56	100	188	326	250	428
		60	106	215	367	257	435
		66	119	216	369	274	457
		80	143, 144	217	370		
B1.C	Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards	11	20	66	119, 120	232	393
		21	38	181	315	272	452, 453, 454
		38	69	211	361	274	457
		60	106	218	372		
		65	117	230	389		
B1.D	Use appropriate tools	11	20	90	161	255	433
		21	38	149	256	258	436
		60	106	230	389		
		65	117	232	393		
B1.E	Collect quantitative data using the International System of Units (SI) and qualitative data as evidence	21	38	94	167	258	436
		30	53	181	315	273	455
		60	106	211	361	274	456, 457
		65	117	218	372		
		90	161	256	434		
B1.F	Organize quantitative and qualitative data using scatter plots, line graphs, bar graphs, charts, data tables, digital tools, diagrams, scientific drawings, and student-prepared models	11	20	145	251	238	406
		21	38	149	256	239	408, 411
		28	49	167	289	244	419
		29	51	174	299	245	421
		30	53, 54	183	318	259	437
		38	69	187	323	260	438
		47	81	188	325, 326, 327	261	439
		50	87	211	362	262	440
		56	100	219	373	263	441
		60	106, 107, 108	224	380, 381	264	442
		65	117, 118	225	382, 383	266	444
		66	120	226	384	270	449, 450
		80	142	227	385	271	451
		90	161	230	389	273	455
		94	167, 168	234	397	274	456, 457, 458
		109	187	236	400, 401		

Locating the Breakouts

Differentiated for easy identification

- Breakout codes in the margin of Teacher's Edition identifies the breakouts.
  - **Red** = Science Concept breakouts
  - **Blue** = Scientific and Engineering Practice breakouts
- A **N** denotes a narrative component.
- An **A** denotes an activity component.


200

117 DNA and RNA

B.7A (i) A

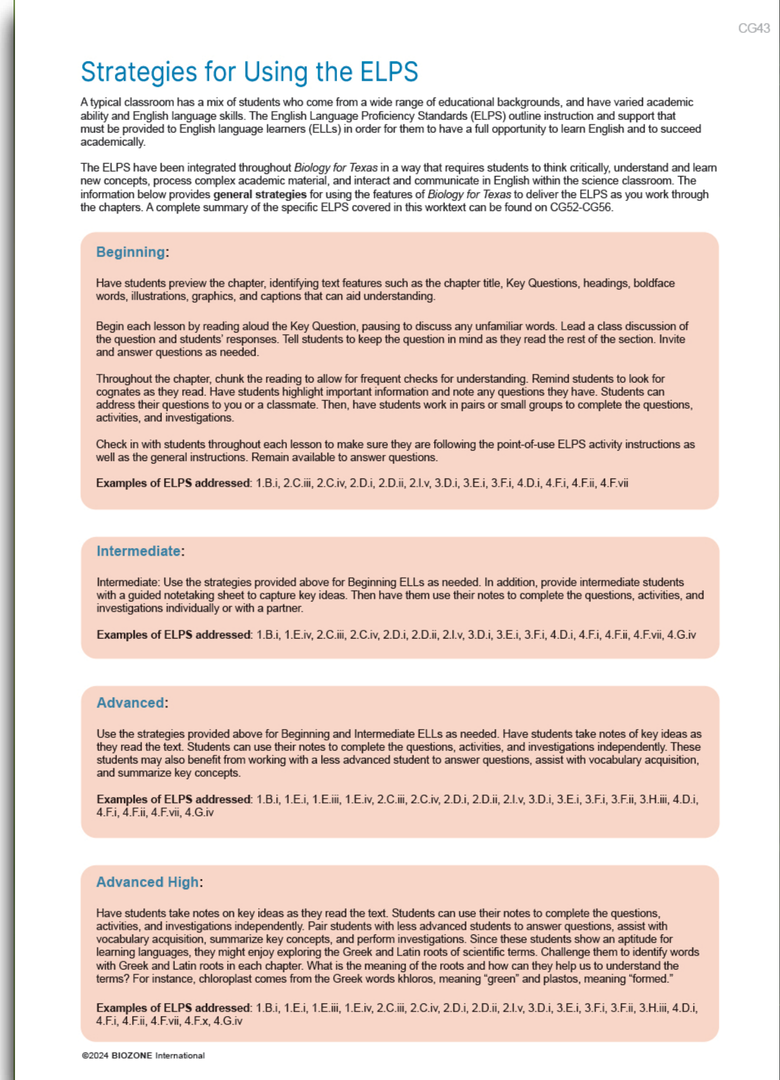
1. Complete the following table,

Sugar present	
Bases present	
Number of strands	

2. If you wanted to use a radioac
would you label?

Locating the ELPS

- Chapter fronts
- Margin icons
- Summary tables in Teacher’s Edition
  - The four proficiency levels are identified
- Strategies provided for delivering ELPS



Strategies for Using the ELPS

A typical classroom has a mix of students who come from a wide range of educational backgrounds, and have varied academic ability and English language skills. The English Language Proficiency Standards (ELPS) outline instruction and support that must be provided to English language learners (ELLs) in order for them to have a full opportunity to learn English and to succeed academically.

The ELPS have been integrated throughout *Biology for Texas* in a way that requires students to think critically, understand and learn new concepts, process complex academic material, and interact and communicate in English within the science classroom. The information below provides **general strategies** for using the features of *Biology for Texas* to deliver the ELPS as you work through the chapters. A complete summary of the specific ELPS covered in this worktext can be found on CG52-CG56.

Beginning:

Have students preview the chapter, identifying text features such as the chapter title, Key Questions, headings, boldface words, illustrations, graphics, and captions that can aid understanding.

Begin each lesson by reading aloud the Key Question, pausing to discuss any unfamiliar words. Lead a class discussion of the question and students' responses. Tell students to keep the question in mind as they read the rest of the section. Invite and answer questions as needed.

Throughout the chapter, chunk the reading to allow for frequent checks for understanding. Remind students to look for cognates as they read. Have students highlight important information and note any questions they have. Students can address their questions to you or a classmate. Then, have students work in pairs or small groups to complete the questions, activities, and investigations.

Check in with students throughout each lesson to make sure they are following the point-of-use ELPS activity instructions as well as the general instructions. Remain available to answer questions.

Examples of ELPS addressed: 1.B.i, 2.C.iii, 2.C.iv, 2.D.i, 2.D.ii, 2.I.v, 3.D.i, 3.E.i, 3.F.i, 4.D.i, 4.F.i, 4.F.ii, 4.F.vii

Intermediate:

Intermediate: Use the strategies provided above for Beginning ELLs as needed. In addition, provide intermediate students with a guided notetaking sheet to capture key ideas. Then have them use their notes to complete the questions, activities, and investigations individually or with a partner.

Examples of ELPS addressed: 1.B.i, 1.E.iv, 2.C.iii, 2.C.iv, 2.D.i, 2.D.ii, 2.I.v, 3.D.i, 3.E.i, 3.F.i, 4.D.i, 4.F.i, 4.F.ii, 4.F.vii, 4.G.iv

Advanced:

Use the strategies provided above for Beginning and Intermediate ELLs as needed. Have students take notes of key ideas as they read the text. Students can use their notes to complete the questions, activities, and investigations independently. These students may also benefit from working with a less advanced student to answer questions, assist with vocabulary acquisition, and summarize key concepts.

Examples of ELPS addressed: 1.B.i, 1.E.i, 1.E.iii, 1.E.iv, 2.C.iii, 2.C.iv, 2.D.i, 2.D.ii, 2.I.v, 3.D.i, 3.E.i, 3.F.i, 3.F.ii, 3.H.iii, 4.D.i, 4.F.i, 4.F.ii, 4.F.vii, 4.G.iv

Advanced High:

Have students take notes on key ideas as they read the text. Students can use their notes to complete the questions, activities, and investigations independently. Pair students with less advanced students to answer questions, assist with vocabulary acquisition, summarize key concepts, and perform investigations. Since these students show an aptitude for learning languages, they might enjoy exploring the Greek and Latin roots of scientific terms. Challenge them to identify words with Greek and Latin roots in each chapter. What is the meaning of the roots and how can they help us to understand the terms? For instance, chloroplast comes from the Greek words khloros, meaning “green” and plastos, meaning “formed.”

Examples of ELPS addressed: 1.B.i, 1.E.i, 1.E.iii, 1.E.iv, 2.C.iii, 2.C.iv, 2.D.i, 2.D.ii, 2.I.v, 3.D.i, 3.E.i, 3.F.i, 3.F.ii, 3.H.iii, 4.D.i, 4.F.i, 4.F.ii, 4.F.vii, 4.F.x, 4.G.iv

Inbuilt support

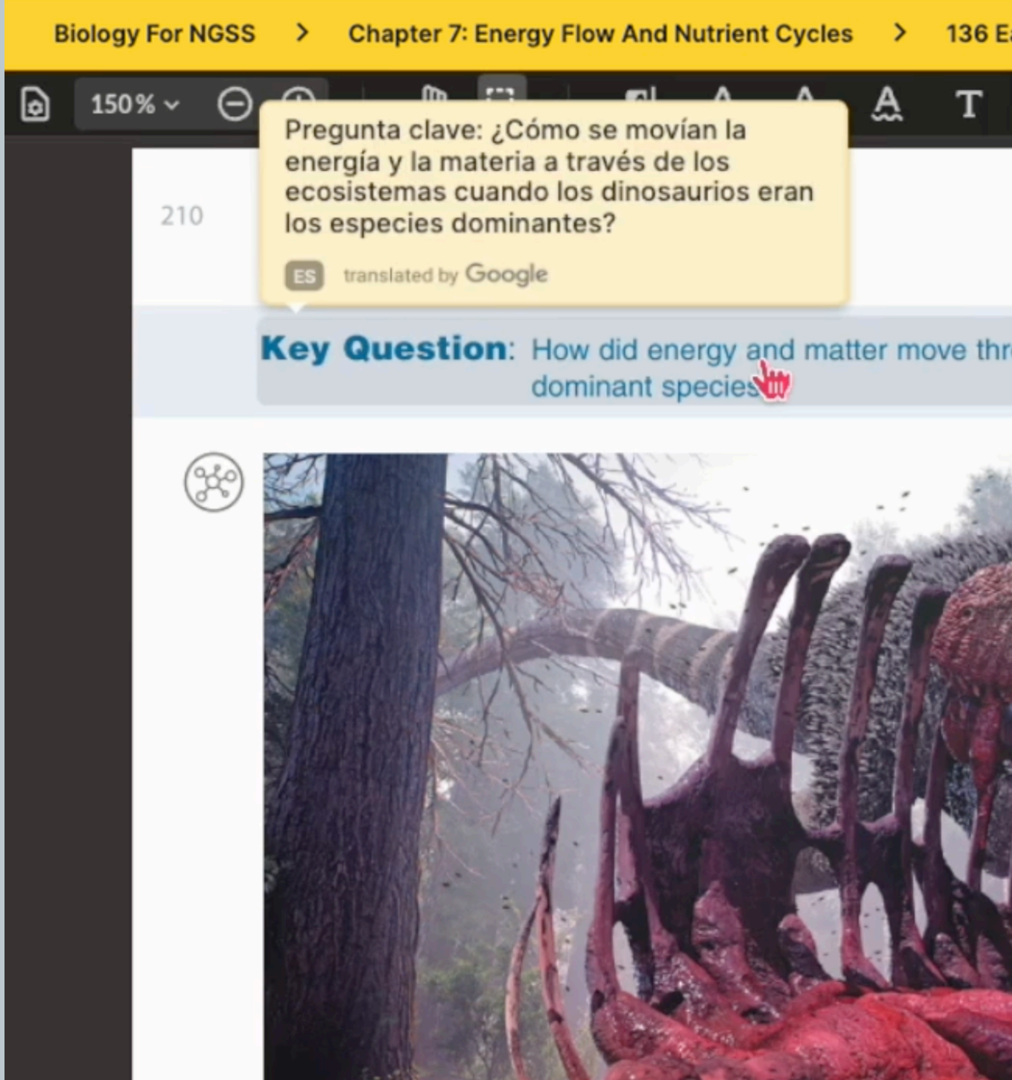
Translation

Digital platform

Experimental feature:

Translation for 150 languages

in realtime - highlight with text-to-text translation.



Glossary

Building scientific literacy

248

143 Different Alleles

Key Question: What are alleles, and wh
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

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

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

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

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.

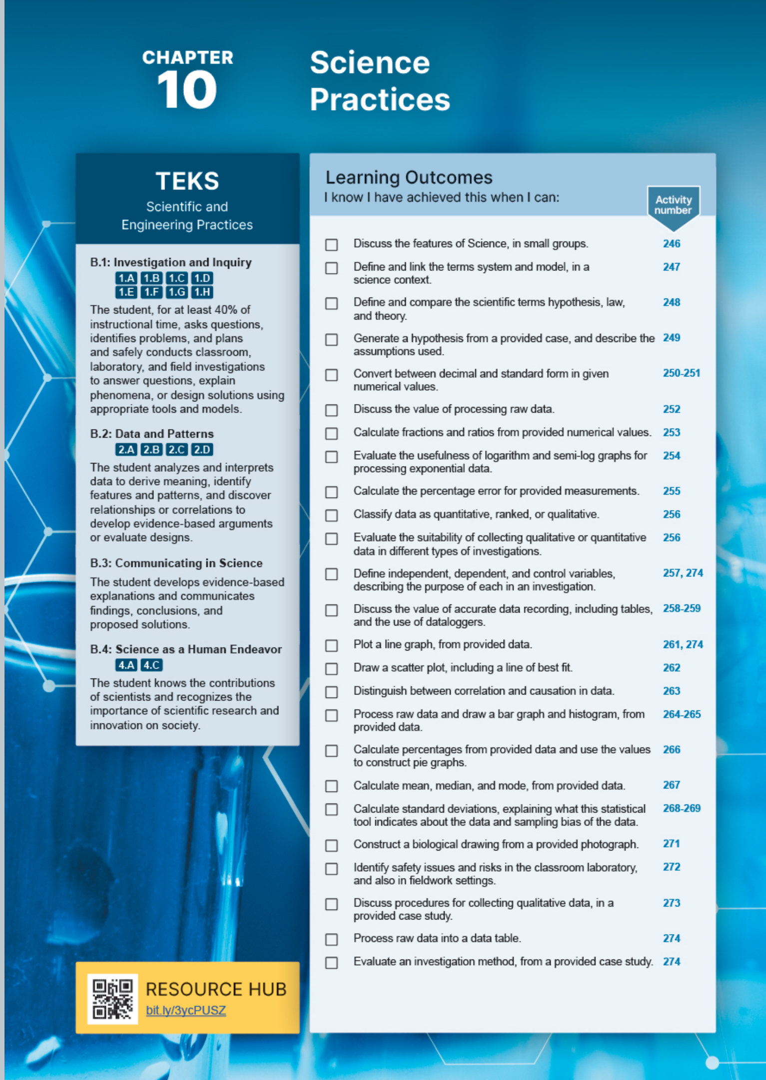
catalyst: A substance that modifies and increases the rate of a chemical reaction without being consumed in the process.
catalizador: Sustancia que modifica y aumenta la velocidad de una reacción química sin ser consumida en el proceso.

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.

Science Practices

Supporting Scientific and Engineering Practices

- **Dedicated chapter**
  supports students to master the Scientific and Engineering Practices TEKS
- **Need help icon**
  directs students to support



CHAPTER 10

Science Practices

TEKS

Scientific and Engineering Practices

B.1: Investigation and Inquiry

1.A 1.B 1.C 1.D 1.E 1.F 1.G 1.H

The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models.

B.2: Data and Patterns

2.A 2.B 2.C 2.D

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.

B.3: Communicating in Science

The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions.

B.4: Science as a Human Endeavor

4.A 4.C

The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society.

RESOURCE HUB
bit.ly/3ycPUSZ

Learning Outcomes

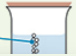
I know I have achieved this when I can:

	Activity number
☐ Discuss the features of Science, in small groups.	246
☐ Define and link the terms system and model, in a science context.	247
☐ Define and compare the scientific terms hypothesis, law, and theory.	248
☐ Generate a hypothesis from a provided case, and describe the assumptions used.	249
☐ Convert between decimal and standard form in given numerical values.	250-251
☐ Discuss the value of processing raw data.	252
☐ Calculate fractions and ratios from provided numerical values.	253
☐ Evaluate the usefulness of logarithm and semi-log graphs for processing exponential data.	254
☐ Calculate the percentage error for provided measurements.	255
☐ Classify data as quantitative, ranked, or qualitative.	256
☐ Evaluate the suitability of collecting qualitative or quantitative data in different types of investigations.	256
☐ Define independent, dependent, and control variables, describing the purpose of each in an investigation.	257, 274
☐ Discuss the value of accurate data recording, including tables, and the use of dataloggers.	258-259
☐ Plot a line graph, from provided data.	261, 274
☐ Draw a scatter plot, including a line of best fit.	262
☐ Distinguish between correlation and causation in data.	263
☐ Process raw data and draw a bar graph and histogram, from provided data.	264-265
☐ Calculate percentages from provided data and use the values to construct pie graphs.	266
☐ Calculate mean, median, and mode, from provided data.	267
☐ Calculate standard deviations, explaining what this statistical tool indicates about the data and sampling bias of the data.	268-269
☐ Construct a biological drawing from a provided photograph.	271
☐ Identify safety issues and risks in the classroom laboratory, and also in fieldwork settings.	272
☐ Discuss procedures for collecting qualitative data, in a provided case study.	273
☐ Process raw data into a data table.	274
☐ Evaluate an investigation method, from a provided case study.	274

56 Investigating Photosynthetic Rate

Investigation 3.1 Measuring bubble production in *Cabomba*

See appendix for equipment list.



1. Fill a boiling tube 2/3 full with a 20°C solution of 1% sodium

1. Use your calculated means to draw a graph of gas production
vs light intensity (distance).

2. What did your splint test tell you about the gas produced by the *Cabomba* plant?

3. From this experiment what can you say about photosynthesis, light, and the gas produced?

4. How could you improve the design of this investigation?

stopper from the tube and test the gas with a glowing splint. What happens?

5			
0			

3. From this experiment what can you say about photosynthesis, light, and the gas produced?

4. How could you improve the design of this investigation?

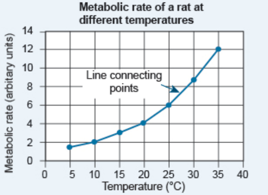
ISBN: 978-1-99-101405-4

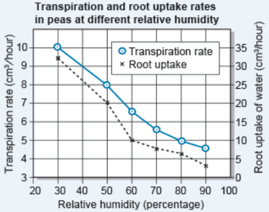
261 Drawing Line Graphs

Key Question: What kind of data is plotted on line graphs, and how do they show the relationship between the independent variable and the dependent variable?

Graphs provide a way to visually see **data** trends. Line graphs are used when one variable (the **independent variable**) affects another, the **dependent variable**. Important features of line graphs are:

- The data must be continuous for both variables.
- The dependent variable is usually a biological response.
- The independent variable is often time or the experimental treatment.
- The relationship between two variables can be represented as a continuum and the data points are plotted accurately and connected directly (point to point).
- Line graphs may be drawn with a measure of error. The data are presented as points (the calculated **means**), with bars above and below, indicating a measure of variability or spread in the data, e.g. standard deviation.
- More than one curve can be plotted per set of axes. If the two data sets use the same measurement units and a similar range of values for the dependent variable, one scale on the y axis is used. If the two data sets use different units and/or have a very different range of values for the dependent variable, two scales for the y axis are used (see right). Distinguish between the two curves with a key.

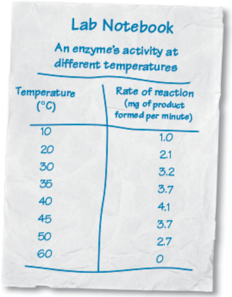




1. The results (shown right) were collected in a study investigating the effect of temperature on the activity of an enzyme.

(a) Using the results provided, plot a line graph on the grid below:

(b) Estimate the rate of reaction at 15°C: ___________



Lab Notebook

An enzyme's activity at different temperatures

Temperature (°C)	Rate of reaction (mg of product formed per minute)
10	1.0
20	2.1
30	3.2
35	3.7
40	4.1
45	3.7
50	2.7
60	0

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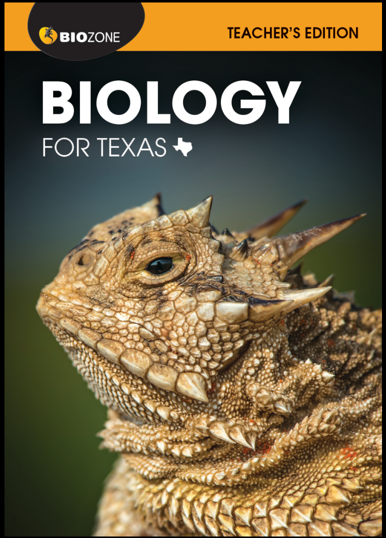
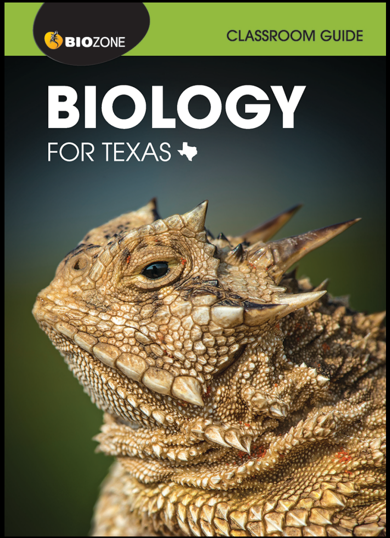
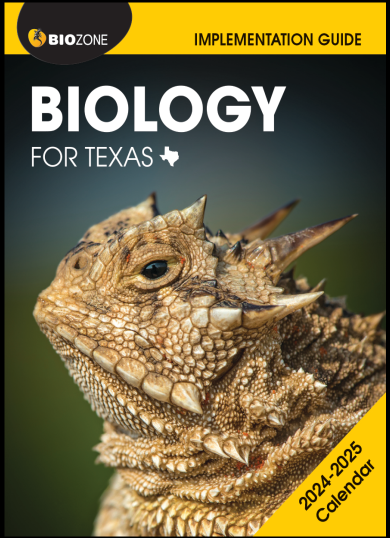
Teacher Support

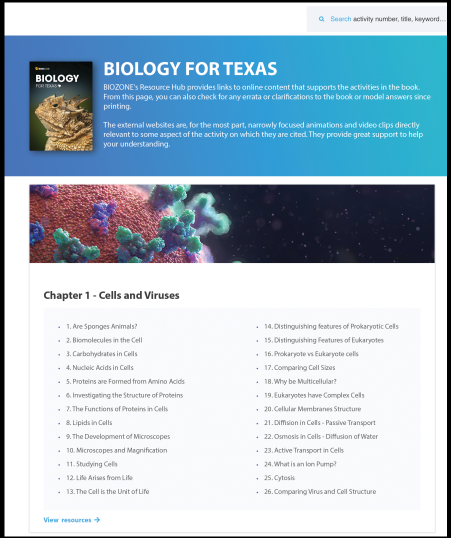
BIOZONE

Teacher Resources









Teacher's Edition

Classroom Guide

Implementation Guide

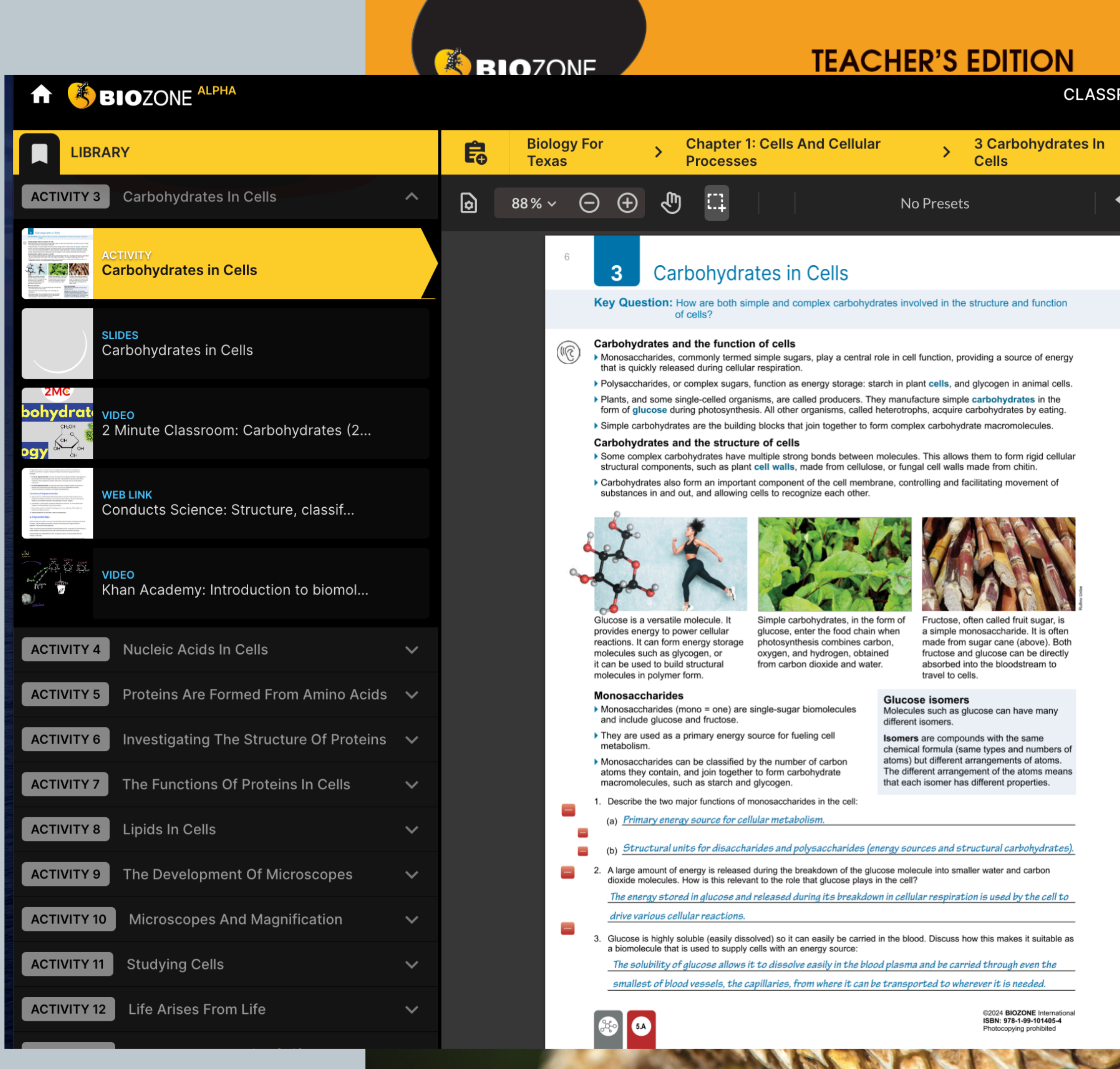
Resource Hub

Test Bank + Question Library

Teacher's Edition

- Available formats:
  - **Print**
  - **Digital** (BIOZONE WORLD)

- Additional content:
  - Classroom Guide
  - Student and Teacher ELPS
  - TEKS and breakouts
  - Model answers in place



Classroom Guide

- In Teacher's Edition or **download for free**
- Product orientation and features
- Teacher resources explained
- Planning, delivery, and assessment strategies
- Teacher notes (mini lesson plans)
- TEKS and ELPS summary tables

TEKS SCIENTIFIC AND ENGINEERING PRACTICES

B.1: Scientific and engineering practices.

- The student, for at least 40% of instructional time, asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models.

TEKS Student Expectation	Activity Number	Page number	Activity Number	Page number	Activity Number	Page number
B1.A Ask questions and define problems based on observations or information from text, phenomena, models, or investigations	**34**	63	**94**	166, 167	**246**	424
	66	119, 120	**170**	295	**249**	427
B1.B Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems	**9**	17	**94**	166, 167, 168	**226**	384
	11	20	**98**	173	**232**	393
	12	22	**102**	179	**238**	406
	21	38	**151**	260	**239**	410
	30	53	**181**	315	**249**	427
	56	100	**188**	326	**250**	428
	60	106	**215**	367	**257**	435
	66	119	**216**	369	**274**	457
	80	143, 144	**217**	370		
B1.C Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards	**11**	20	**66**	119, 120	**232**	393
	21	38	**181**	315	**272**	452, 453, 454
	38	69	**211**	361	**274**	457
	60	106	**218**	372		
	65	117	**230**	389		
B1.D Use appropriate tools	**11**	20	**90**	161	**255**	433
	21	38	**149**	256	**258**	436
	60	106	**230**	389		
	65	117	**232**	393		
B1.E Collect quantitative data using the International System of Units (SI) and qualitative data as evidence	**21**	38	**94**	167	**258**	436
	30	53	**181**	315	**273**	455
	60	106	**211**	361	**274**	456, 457
	65	117	**218**	372		
	90	161	**256**	434		
B1.F Organize quantitative and qualitative data using scatter plots, line graphs, bar graphs, charts, data tables, digital tools, diagrams, scientific drawings, and student-prepared models	**11**	20	**145**	251	**238**	406
	21	38	**149**	256	**239**	408, 411
	28	49	**167**	289	**244**	419
	29	51	**174**	299	**245**	421
	30	53, 54	**183**	318	**259**	437
	38	69	**187**	323	**260**	438
	47	81	**188**	325, 326, 327	**261**	439
	50	87	**211**	362	**262**	440
	56	100	**219**	373	**263**	441
	60	106, 107, 108	**224**	380, 381	**264**	442
	65	117, 118	**225**	382, 383	**266**	444
	66	120	**226**	384	**270**	449, 450
	80	142	**227**	385	**271**	451
	90	161	**230**	389	**273**	455
	94	167, 168	**234**	397	**274**	456, 457, 458
	109	187	**236**	400, 401		

Implementation Guide

Download for free
over 100 pages of support materials

- Scope and sequence guide
- Pacing guide
- Vertical alignment guide
- Lesson implementation guide
- Concept maps
- Progress tracker:
  - Teacher and student
  - Print and digital

IG106

Biology for TEXAS – Progress Tracker

Chapter 1: Cells and Viruses

Student Name ______________________ Class ____________

5.A relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell

Activity	**Biomolecules** Learning Outcomes	Approaching	Proficient	Mastery
2	Summarize the role of key biomolecules in the cell			
3	Distinguish between monosaccharides and polysaccharides and understand their role in cell structure and function.			
4	Identify components of nucleic acids, and explain the role they have in cells.			
5-7	Discuss how cellular proteins are formed, including their folding, and match their function to examples found in cells.			
8	Link the structure of lipids to their function in cells.			

5.B compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity

Activity	**Prokaryotes and Eukaryotes** Learning Outcomes	Approaching	Proficient	Mastery
13	Identify key features of different groups of cells.			
14-16	Compare and contrast prokaryote and eukaryote cells, including presence of organelles.			
17	Compare and contrast prokaryote and eukaryote cells, including size.			
18	Compare and contrast prokaryote and eukaryote cells, including multicellular forms.			
19	Evaluate evidence for eukaryote complexity, including endosymbiosis, and bacteria engulfment by protists.			

5.C investigate homeostasis through the cellular transport of molecules

Activity	**Homeostasis and Cellular Transport** Learning Outcomes	Approaching	Proficient	Mastery
20	Explore the fluid-mosaic model of the cell membrane, including building a model and examining evidence for its structure.			
21-22	Investigate diffusion, especially osmosis, as a process in passive transport in the cell membrane, that is linked to cellular homeostasis.			
23-24	Explain how active transport allows substances to travel against the concentration gradient in the cellular membrane.			
25	Compare and contrast prokaryote and eukaryote cells, including multicellular forms.			

5.D compare the structure of viruses to cells and explain how viruses spread and cause disease

Activity	**Viruses** Learning Outcomes	Approaching	Proficient	Mastery
26	Compare and contrast viral and cellular structures, linking to the classification of living organisms.			
27	Link the method of reproduction to the classification of viruses, including the use of 'spikes' to gain entry to cells.			
27	Distinguish between viral lysogenic and lytic cycles, linking to appearance of disease.			
28	Conduct a literature search on the method of transmission, entry, and disease symptoms of a selected human virus.			
29	Define the terms epidemic and pandemic, and discuss factors involved in their origin.			
29	Summarize key features shared by zoonotic diseases.			
30	Model viral disease spread using a digital simulation.			
31	Describe the methods of SARS-CoV-2 coronavirus transmission, and aspects of the COVID-19 disease.			

* after completing the activity, shade the square aligning to self-assessment of your progress. This may be revised after subsequent revision.

Resource Hub

Curated Digital Resources

- **FREE for teachers and students**
- Access to curated materials and resources which support the content of the worktext.

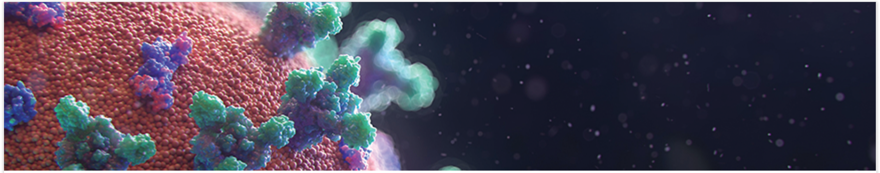
- Articles
- Videos
- Simulations
- Animations
- Games
- Spreadsheets
- 3D Models
- And more…

Search activity number, title, keyword…

BIOLOGY FOR TEXAS

BIOZONE's Resource Hub provides links to online content that supports the activities in the book. From this page, you can also check for any errata or clarifications to the book or model answers since printing.

The external websites are, for the most part, narrowly focused animations and video clips directly relevant to some aspect of the activity on which they are cited. They provide great support to help your understanding.



Chapter 1 - Cells and Viruses

- 1. Are Sponges Animals?
- 2. Biomolecules in the Cell
- 3. Carbohydrates in Cells
- 4. Nucleic Acids in Cells
- 5. Proteins are Formed from Amino Acids
- 6. Investigating the Structure of Proteins
- 7. The Functions of Proteins in Cells
- 8. Lipids in Cells
- 9. The Development of Microscopes
- 10. Microscopes and Magnification
- 11. Studying Cells
- 12. Life Arises from Life
- 13. The Cell is the Unit of Life
- 14. Distinguishing features of Prokaryotic Cells
- 15. Distinguishing Features of Eukaryotes
- 16. Prokaryote vs Eukaryote cells
- 17. Comparing Cell Sizes
- 18. Why be Multicellular?
- 19. Eukaryotes have Complex Cells
- 20. Cellular Membranes Structure
- 21. Diffision in Cells - Passive Transport
- 22. Osmosis in Cells - Diffusion of Water
- 23. Active Transport in Cells
- 24. What is an Ion Pump?
- 25. Cytosis
- 26. Comparing Virus and Cell Structure

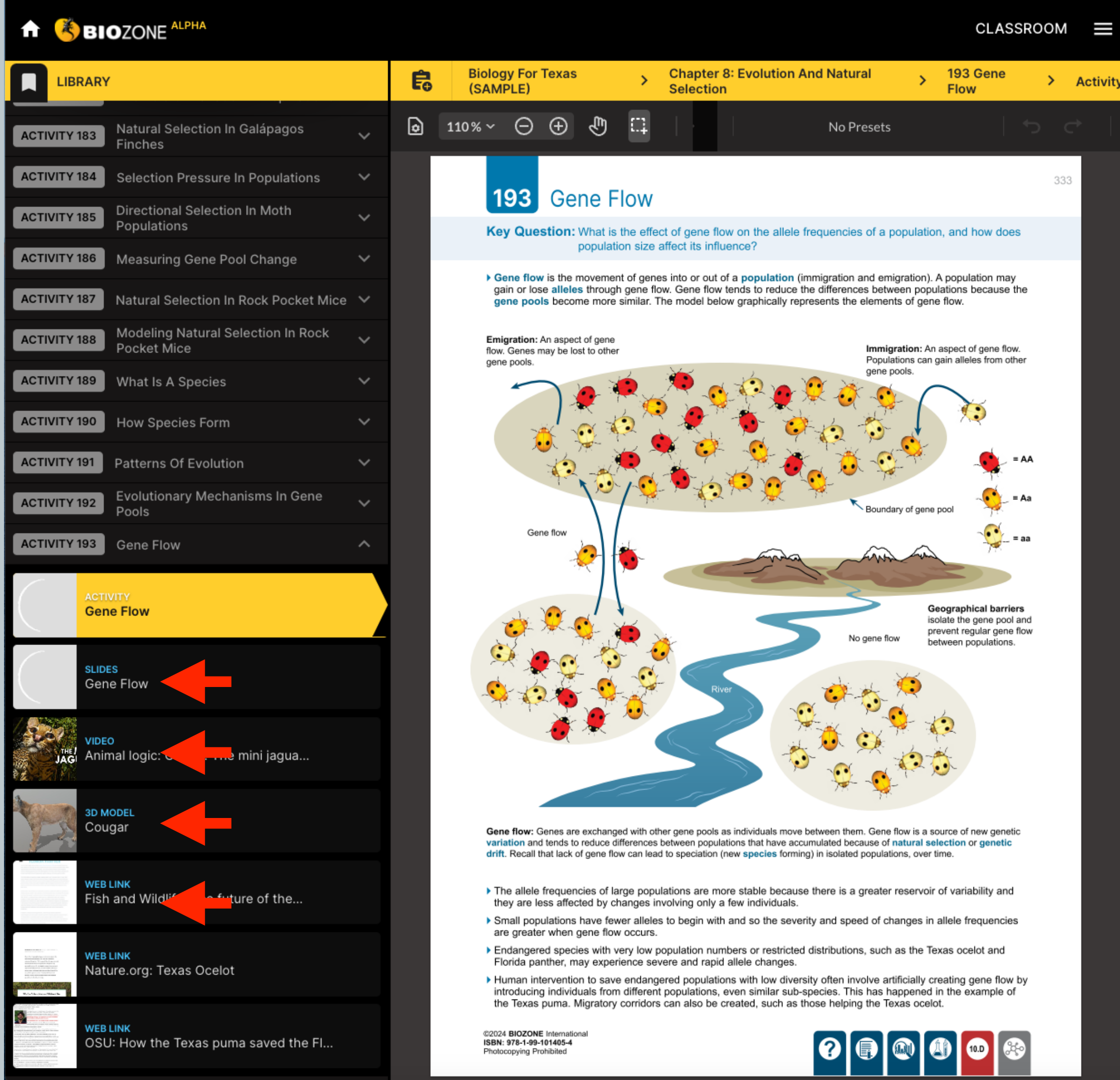
Accessing the Resource Hub

Print users:
Access details in introduction chapter.

- Bookmark for quick access
- QR code for quick access

BIOZONE WORLD:

Resources are embedded and show up automatically with an activity.



Resource Hub

Rich content to enhance learning

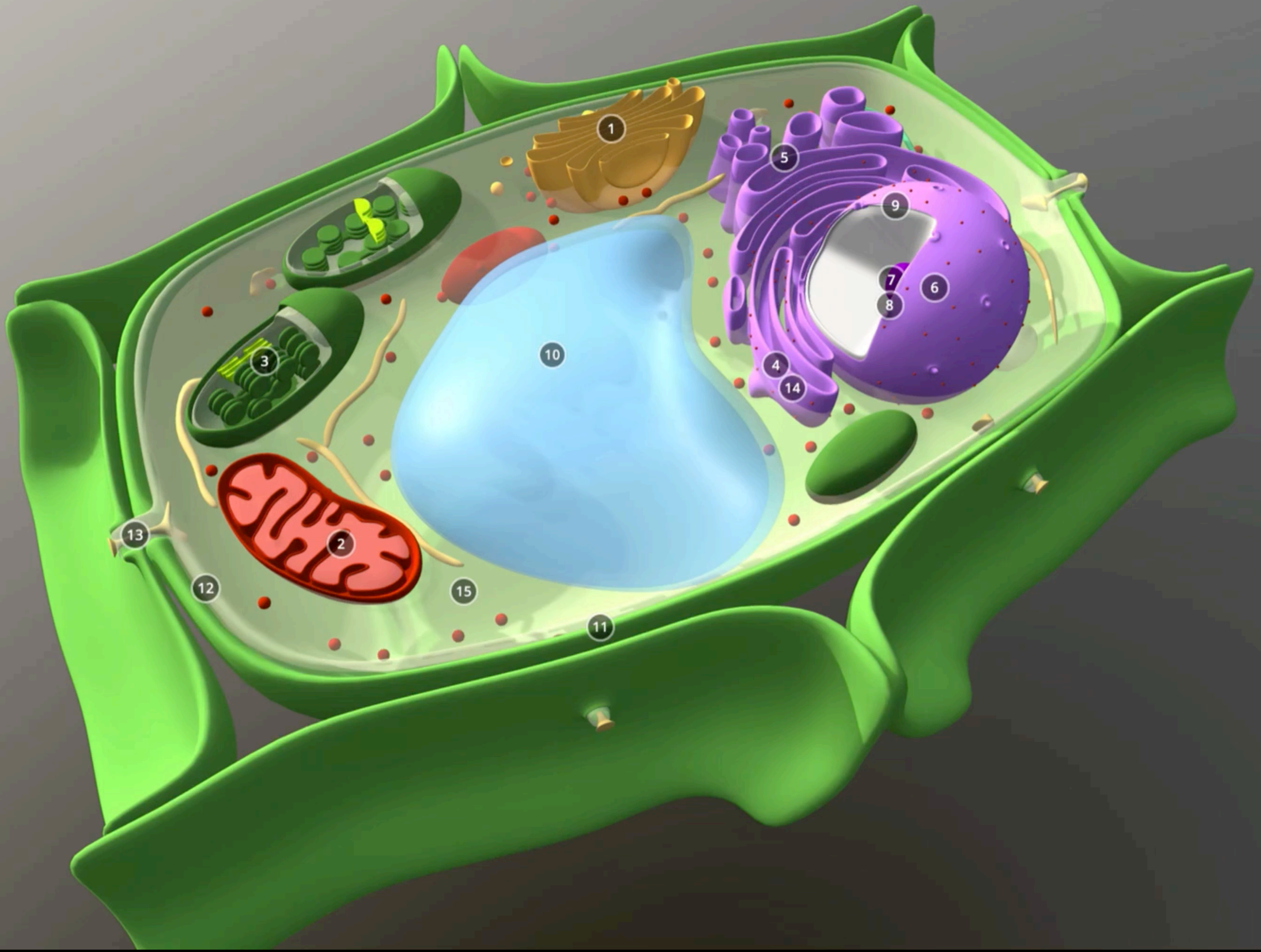
- Rich collection of resources at your fingertips
  - No need spend your time searching for content
- Engage students of all abilities
- Extend gifted and talented students
- Teacher resources tagged

Biology for Texas

LIST OF RESOURCE HUB MATERIALS

Resource type	Number of resources*
PDFs	36
3D models	182
Videos	455
Weblinks	312
Interactives	245
Spreadsheets	7

* approximate number of resources


1
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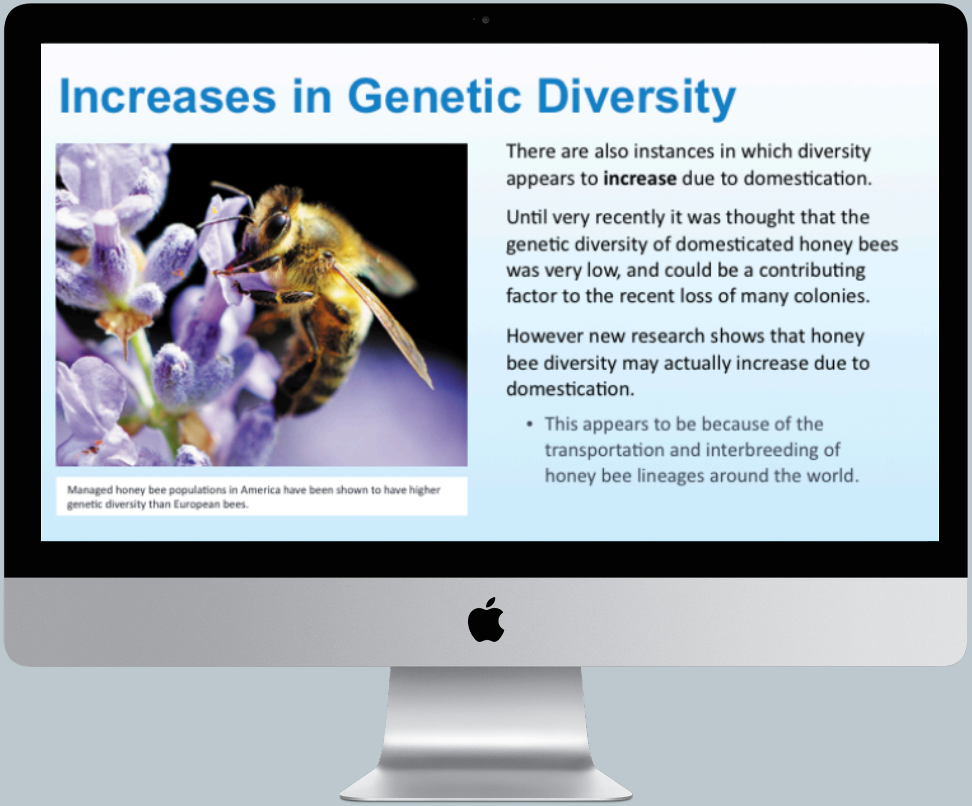
Presentation Slides

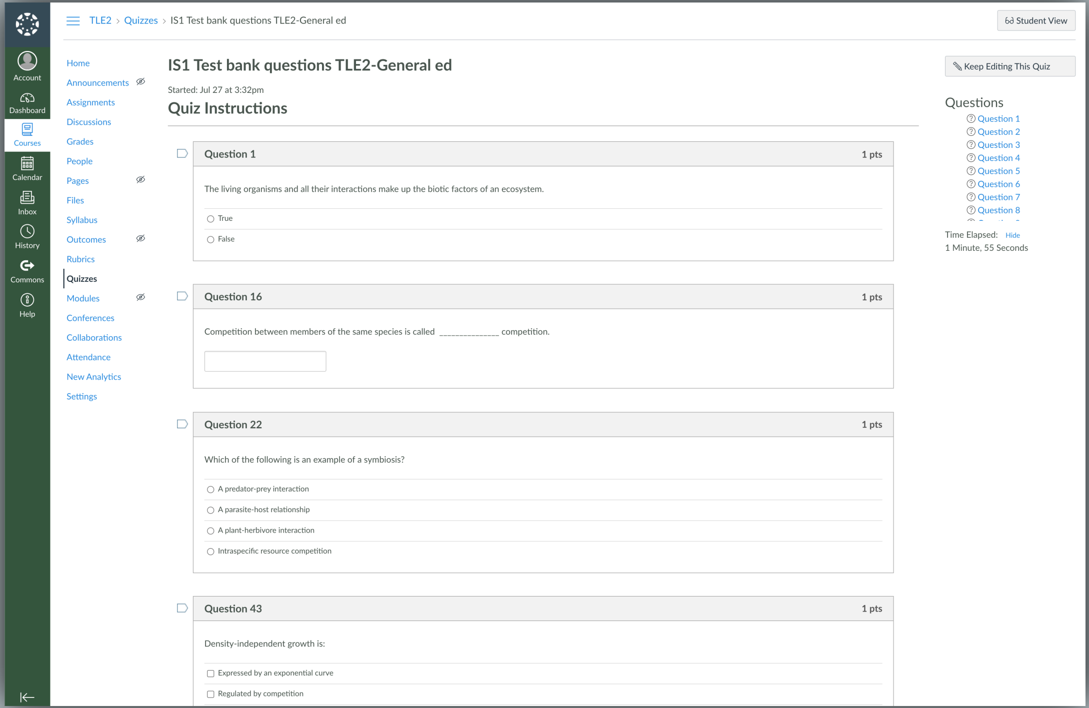
Embedded in BIOZONE WORLD

- Deliver BIOZONE content in a different and **engaging way**
- Present to your students using a **projector** or **interactive whiteboard**
- **Free teacher access** with purchase of class sets of the print books or with BIOZONE WORLD subscriptions



Test Bank content

- Additional questions test student knowledge.
- Formatted to ingest directly into your own test software or LMS.
- Range of question types, including:
    - Multiple choice
    - Multiple response
    - True/False
    - Modified true/false
    - Numeric
    - Matching

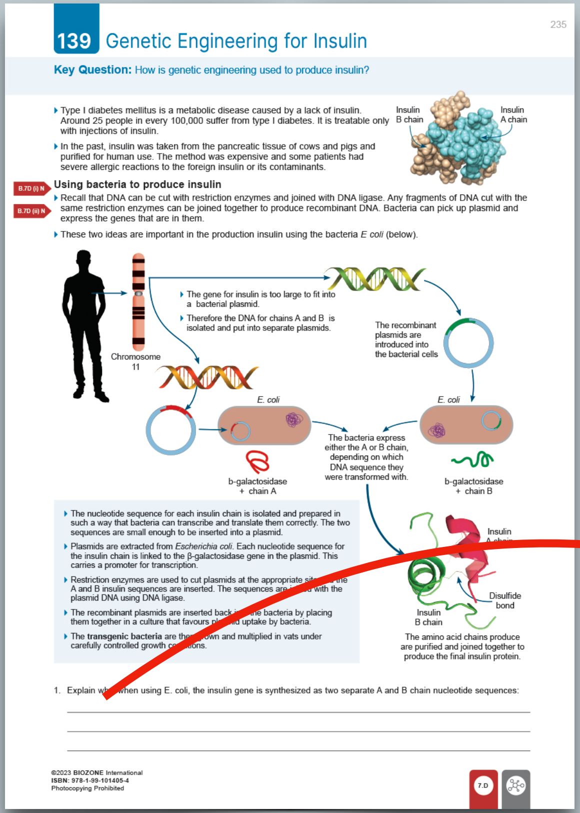


NOTE: Test Bank content is only available to schools/districts committing to multi-year adoptions

Question Library

- Embedded questions from the worktext are also provided digitally as a **question library**.

- Question library allows you to:
  - Deliver the same questions from the print version to students via an **online service** such as Google Classroom
  - **Customize questions** to suit **reading ability** and possible **ELL** support.



139 Genetic Engineering for Insulin

Key Question: How is genetic engineering used to produce insulin?

- Type I diabetes mellitus is a metabolic disease caused by a lack of insulin. Around 25 people in every 100,000 suffer from type I diabetes. It is treatable only with injections of insulin.
- In the past, insulin was taken from the pancreatic tissue of cows and pigs and purified for human use. The method was expensive and some patients had severe allergic reactions to the foreign insulin or its contaminants.

B.7D (i) N
B.7D (ii) N

Using bacteria to produce insulin

- Recall that DNA can be cut with restriction enzymes and joined with DNA ligase. Any fragments of DNA cut with the same restriction enzymes can be joined together to produce recombinant DNA. Bacteria can pick up plasmid and express the genes that are in them.
- These two ideas are important in the production insulin using the bacteria *E coli* (below).

- The nucleotide sequence for each insulin chain is isolated and prepared in such a way that bacteria can transcribe and translate them correctly. The two sequences are small enough to be inserted into a plasmid.
- Plasmids are extracted from *Escherichia coli*. Each nucleotide sequence for the insulin chain is linked to the β-galactosidase gene in the plasmid. This carries a promoter for transcription.
- Restriction enzymes are used to cut plasmids at the appropriate sit the A and B insulin sequences are inserted. The sequences are with the plasmid DNA using DNA ligase.
- The recombinant plasmids are inserted back the bacteria by placing them together in a culture that favours pl id uptake by bacteria.
- The **transgenic bacteria** are the own and multiplied in vats under carefully controlled growth co ions.

1. Explain wh when using E. coli, the insulin gene is synthesized as two separate A and B chain nucleotide sequences:

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7.D

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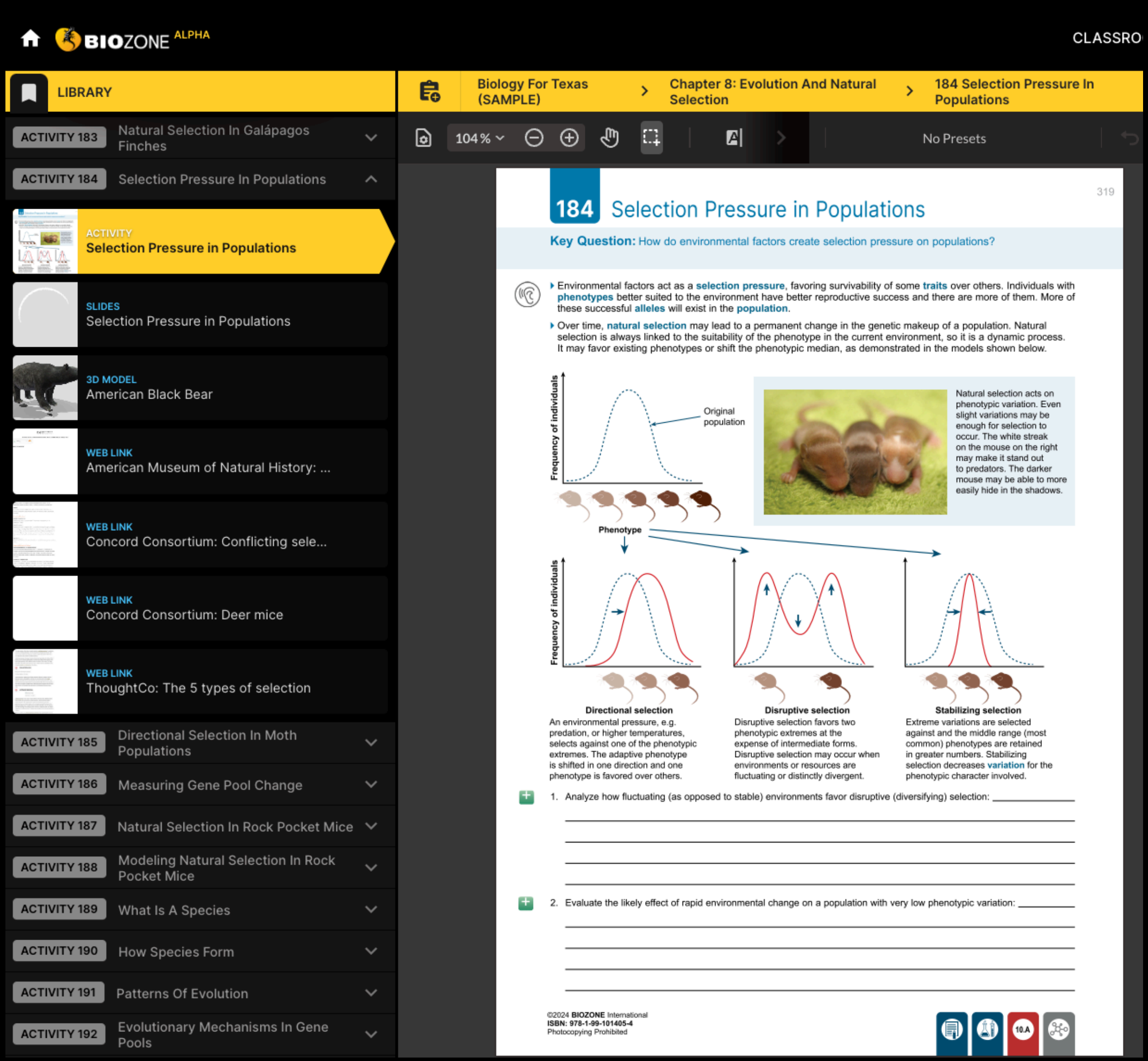
Digital platform: BIOZONE WORLD

Bringing together our

rich collection of **digital resources**



- Replicas of the printed books allow students to **answer questions online**.
- Student view and teacher view.
- Direct access to our excellent **proprietary** resources:
  - **Presentation slides**
  - **3D models**
- Plus access to our **curated OER** (Open Educational Resources) enrichment content:
  - **Curated Videos**
  - **Links to websites**

BIOZONE ALPHA CLASSROOM

LIBRARY

Biology For Texas (SAMPLE) > Chapter 8: Evolution And Natural Selection > 184 Selection Pressure In Populations

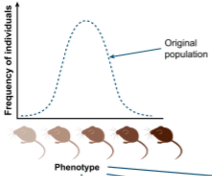
- ACTIVITY 183 Natural Selection In Galápagos Finches
- ACTIVITY 184 Selection Pressure In Populations
  - ACTIVITY: Selection Pressure in Populations
  - SLIDES: Selection Pressure in Populations
  - 3D MODEL: American Black Bear
  - WEB LINK: American Museum of Natural History: ...
  - WEB LINK: Concord Consortium: Conflicting sele...
  - WEB LINK: Concord Consortium: Deer mice
  - WEB LINK: ThoughtCo: The 5 types of selection
- ACTIVITY 185 Directional Selection In Moth Populations
- ACTIVITY 186 Measuring Gene Pool Change
- ACTIVITY 187 Natural Selection In Rock Pocket Mice
- ACTIVITY 188 Modeling Natural Selection In Rock Pocket Mice
- ACTIVITY 189 What Is A Species
- ACTIVITY 190 How Species Form
- ACTIVITY 191 Patterns Of Evolution
- ACTIVITY 192 Evolutionary Mechanisms In Gene Pools

105 % No Presets

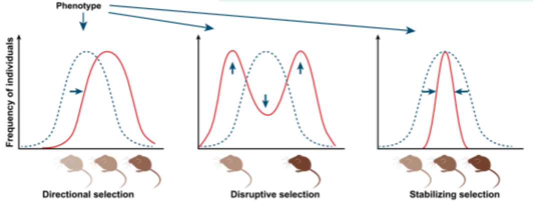
184 Selection Pressure in Populations

Key Question: How do environmental factors create selection pressure on populations?

- Environmental factors act as a **selection pressure**, favoring survivability of some **traits** over others. Individuals with **phenotypes** better suited to the environment have better reproductive success and there are more of them. More of these successful **alleles** will exist in the **population**.
- Over time, **natural selection** may lead to a permanent change in the genetic makeup of a population. Natural selection is always linked to the suitability of the phenotype in the current environment, so it is a dynamic process. It may favor existing phenotypes or shift the phenotypic median, as demonstrated in the models shown below.



Natural selection acts on phenotypic variation. Even slight variations may be enough for selection to occur. The white streak on the mouse on the right may make it stand out to predators. The darker mouse may be able to more easily hide in the shadows.



Directional selection
An environmental pressure, e.g. predation, or higher temperatures, selects against one of the phenotypic extremes. The adaptive phenotype is shifted in one direction and one phenotype is favored over others.

Disruptive selection
Disruptive selection favors two phenotypic extremes at the expense of intermediate forms. Disruptive selection may occur when environments or resources are fluctuating or distinctly divergent.

Stabilizing selection
Extreme variations are selected against and the middle range (most common) phenotypes are retained in greater numbers. Stabilizing selection decreases **variation** for the phenotypic character involved.

1. Analyze how fluctuating (as opposed to stable) environments favor disruptive (diversifying) selection:
Fluctuating environments are more likely to provide resource instability (e.g. food shortages), which may favor diversification of phenotypes to exploit extremes of the resource range. For example, droughts may lead to seed shortages, so birds may be forced to exploit seeds outside the range of sizes they would normally eat.

2. Evaluate the likely effect of rapid environmental change on a population with very low phenotypic variation:
It is likely the population would reduce rapidly as most members would not be able to survive the environmental changes. The few that had adaptations that allowed them to survive the environmental changes would be able to pass on their genes. Little genetic variation in the population would be left (a genetic bottleneck).

ISBN: 978-1-99-101405-4

10.A

- Perfect for introducing or reviewing content with students via shared screen.
- Teacher can **display model answers** when they want.
- Simply click the buttons on the teacher view to reveal the answers.
- Students can refine their own answers based on the model answers.

34 Plant Cells

Key Question: What are the general and specific features of a plant cell?

What is an organelle?

- The word **organelle** means "small organ". Therefore, organelles are the cell's "organs" and carry out the cell's work.
- Organelles represent one level of organization in a multicellular organism. One component (the cell) is made up of many smaller parts (organelles).
- Eukaryotic cells contain many different types of organelles. Each type of organelle has a specific role in the cell to help it function.
- Plant cells have several types of membrane-bound organelles called plastids. These make and store food and pigments. Some of the organelles found in a plant cell are shown below.

Features of a plant cell

- Plant cells are **eukaryotic cells**. Features that identify plant cells as eukaryotic cells include:
- A membrane-bound nucleus.
- Membrane-bound organelles, e.g. nucleus, mitochondria, endoplasmic reticulum.
- Features that can be used to identify a plant cell include the presence of:
  - Cellulose cell wall.
  - Chloroplasts and other plastids.
  - Large vacuole (often centrally located).

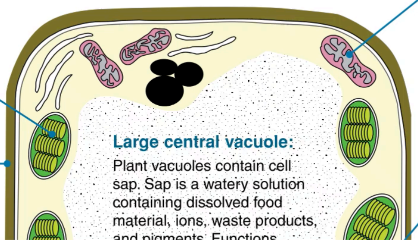
A generalized plant cell

Chloroplast

A specialized plastid containing the green pigment, chlorophyll. Chloroplasts are the site for photosynthesis. Photosynthesis uses light energy to convert carbon dioxide to glucose.

Mitochondrion

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



Cellulose cell wall

A semi-rigid structure that lies outside the plasma membrane. It has several

Endoplasmic reticulum (ER)

A network of tubes and flattened sacs continuous with the nuclear membrane. There are two types of ER. Rough ER has ribosomes

Experimental Features: COMING SOON

- **Translation for 150 languages** in realtime - highlight with text-to-text translation (experimental).
- Text **reading level simplification** in real time (experimental)
- Teacher adds links to their **own resources** (files and links)
- Integration with LMS platforms:
  e.g. Google Classroom, Canvas, Schoology, etc.

Apps

All Bookmarks

BIOZONE ALPHA

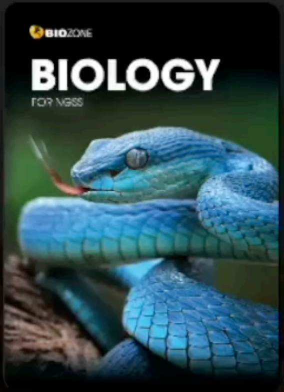
LA

CLASS A

DASHBOARD

ASSIGNMENTS

STANDARD NGSS



NEXT ASSIGNMENT SUN OCT 01 2023

Test case 1

REMINDERS

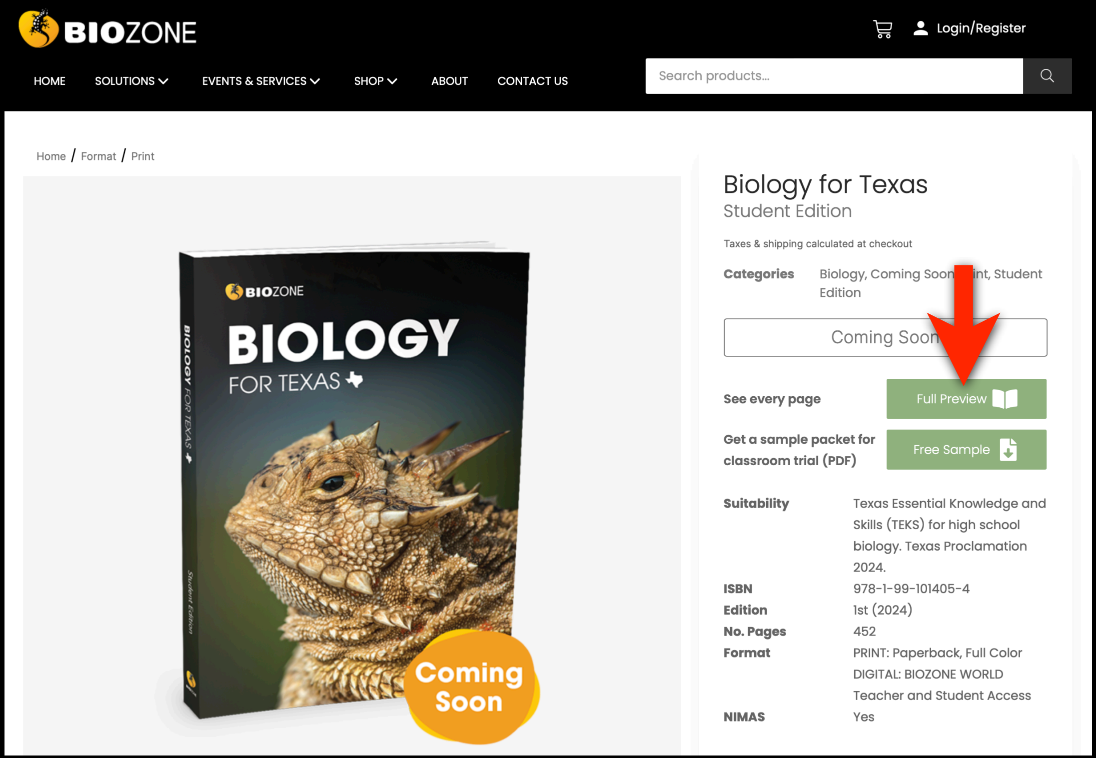
SCIENTIFIC AMERICAN.

How can you find out more?

Full Previews

for **ALL titles** are available via our website:

BIOZONE.com




BIOLOGY
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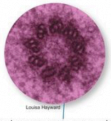
2 Biomolecules in the Cell

Key Question: What biomolecules are present in the cells of organisms, and what role do they play in the function and structure of the cell?

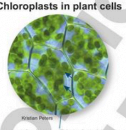
- Water is the main component of **cells** and organisms, providing an aqueous environment in which metabolic reactions, the metabolism, can occur.
- Most other substances in cells are compounds of carbon, hydrogen, oxygen, and nitrogen. Carbon can combine with many other elements to form a large number of carbon-based (or organic) molecules.
- The organic molecules that make up living things, called biomolecules, can be grouped into four broad classes: **carbohydrates**, **lipids**, **proteins**, and nucleic acids. In addition, a small number of inorganic ions, such as Mg^{2+} are also components of larger molecules.

The biomolecules in cells

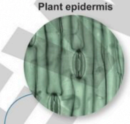
Centrioles



Chloroplasts in plant cells



Plant epidermis



B.5A (iii) N
B.5A (vii) N

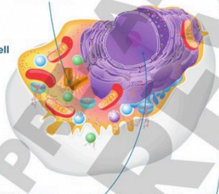
Proteins have an enormous number of structural and functional roles in cells, e.g. as enzymes, as structural materials such as collagen, in transport, and movement, e.g. cytoskeleton and centrioles.

Components: C, H, O, N, S, P

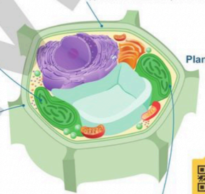
Inorganic ions: Dissolved ions participate in metabolic reactions and are components of larger, organic molecules, e.g. Mg^{2+} is a component of the green chlorophyll pigment in the chloroplasts of green plants.

Water is a major component of cells. Many substances dissolve in it and metabolic reactions occur in it. In plant cells, fluid pressure against the cell wall provides turgor, which supports the cell. **Components**: H, O

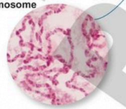
Animal cell



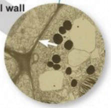
Plant cell



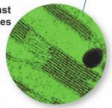
Chromosome



Plant cell wall



Chloroplast membranes



B.5A (i) N
B.5A (ii) N
B.5A (v) N
B.5A (vi) N
B.5A (viii) N

Nucleotides and **nucleic acids**: Nucleic acids encode information for the construction and functioning of an organism (DNA and RNA). ATP, a nucleotide derivative, is the energy carrier of the cell.

Components: C, H, O, N, P

Carbohydrates form the structural components of cells, e.g. cellulose **cell walls** (arrowed). They are important in providing usable energy as **glucose**, in energy storage and they are involved in cellular recognition.

Components: C, H, O

Simple lipids provide a concentrated source of energy. **Phospholipids** (a complex lipid) are a major component of cellular membranes, including the membranes of **organelles**, such as chloroplasts and mitochondria.

Components: C, H, O (lipids)

C, H, O, P, N (phospholipids)

5.A

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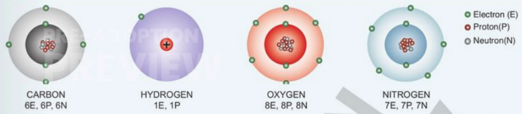
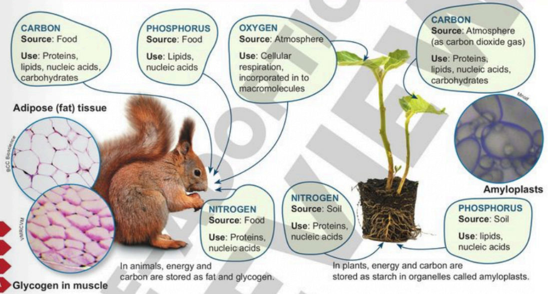
The elements of life



- Carbon is abundant. It has four valence (outer shell) electrons that are available to form up to four covalent (shared electron) bonds with other atoms. Complex biological molecules consist of carbon atoms bonded with other elements, especially oxygen and hydrogen, but also nitrogen, phosphorus, and sulfur.



B.5A (v) A
B.5A (vi) A
B.5A (vii) A
B.5A (viii) A

1. Summarize the role of each of the following cell components:
   (a) Carbohydrates: ______
   (b) Lipids: ______
   (c) Proteins: ______
   (d) Nucleic acids: ______
   (e) Inorganic ions: ______
   (f) Water: ______
2. Explain why carbon is so important for building the molecular components of an organism: ______
3. State the main source of carbon, phosphorus, and nitrogen for animals: ______
4. (a) State the main source of carbon for plants: ______
   (b) State the main source of phosphorus and nitrogen for plants: ______

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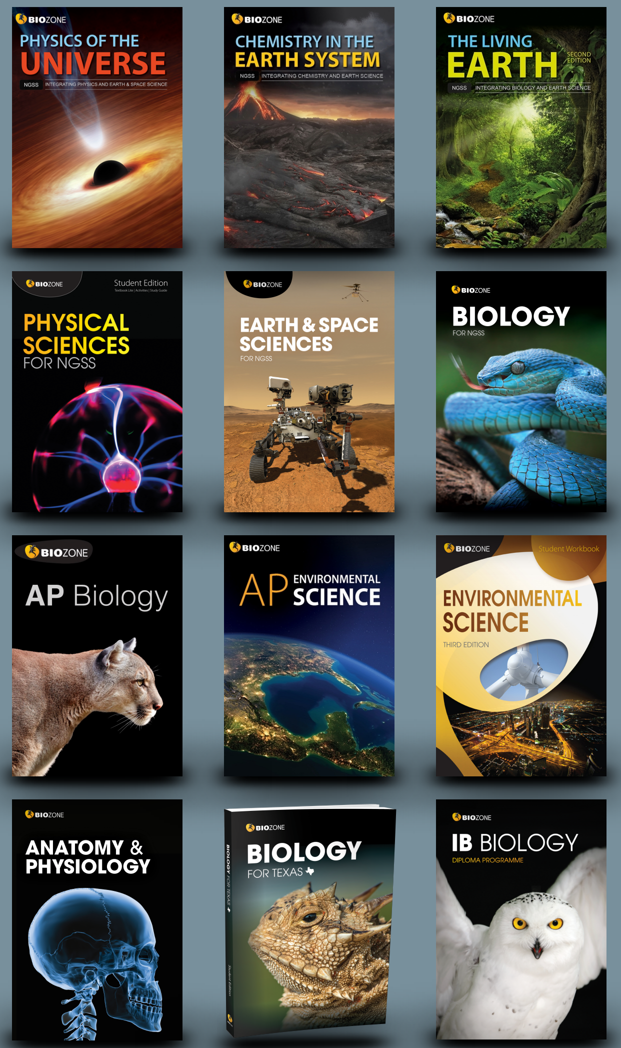

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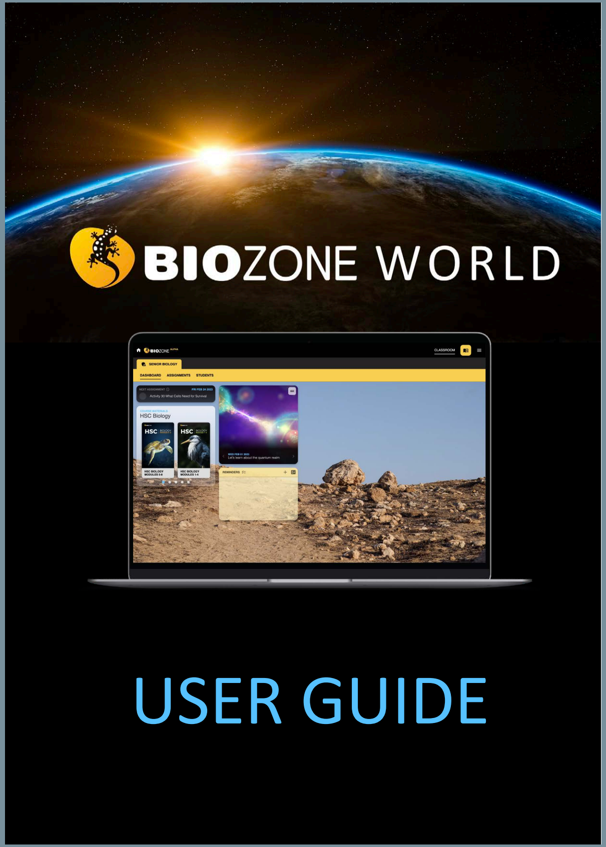

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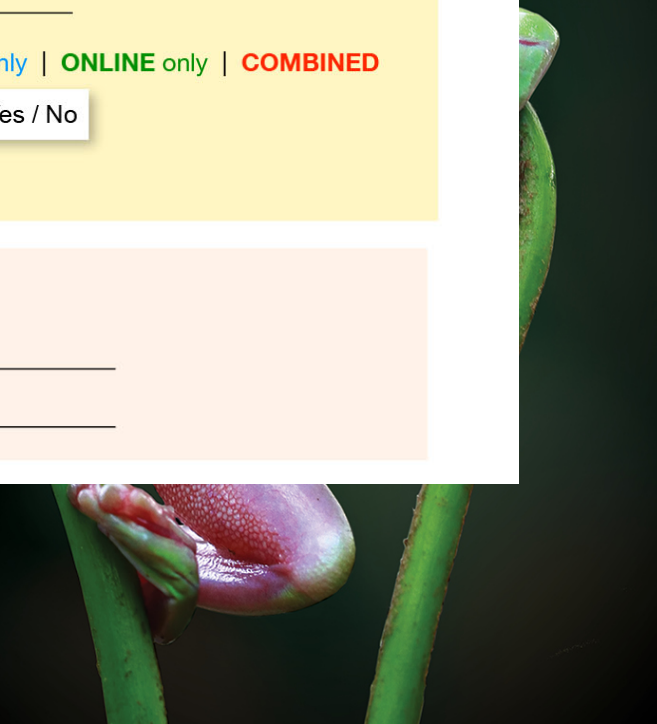

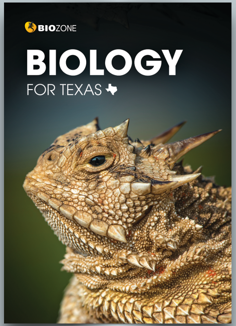

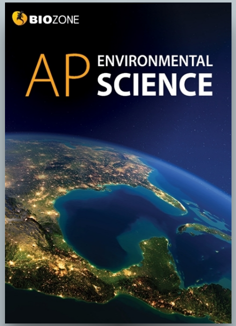

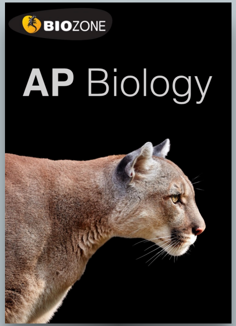

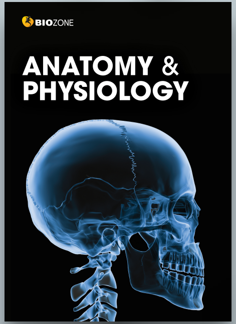

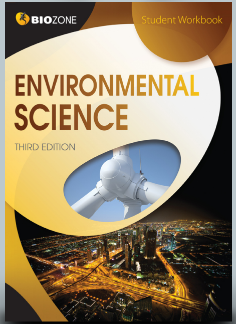

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