

Welcome to *Unlocking the Keystone Exam: Biology*.

If you're reading this introduction, then you are about to take or retake the PA Keystone Exam for Biology. This kind of test might cause you to feel a bit of anxiety. This is normal. After all, earning a "proficient" score in Biology may be a graduation requirement, so we fully understand the pressure that you are under.

We are here to help.

The goal of this book is to help you test to your potential. In fact, we designed every lesson with you in mind. We included only the material that will be addressed on the exam and nothing more. Every activity, practice problem, test trick, etc. was carefully crafted to prepare you for the kinds of questions you are likely to encounter.

This book is separated into 8 lessons. Each lesson, or Key, has these goals in mind:

1. **To Train Your Brain:** These activities (review games, partner discussions, and other activities) will review knowledge that will be tested on the Keystone. This is good news because you have already learned everything in your Biology class!
2. **To Learn Test Tricks:** These activities give you tips on how to answer questions when you are having trouble selecting the correct answer choice.
3. **To Think Like a Test Maker:** These activities will show you how Test Makers think. By creating your own multiple-choice questions and answers, you will unlock the mysteries of the exam. Once you begin to think like a Test Maker, you become a better Test Taker.
4. **To Think Like a Test Grader:** Some activities will take you through the steps of what a Test Grader will be looking for in the constructed-response answers. If you know and understand what Test Graders will be looking for in a short answer response, you will become a better Test Taker.
5. **To Provide Practice Questions:** Practice questions will be similar in format and content to those you will find on the Keystone Exam. By exposing you to similar questions, we are hoping to eliminate your anxiety.

Before we begin, you need to know two things. First, you don't have to get every question right on the exam in order to earn a "proficient" score. The exam does not test your perfection; it tests your proficiency. Second, it is not only important that you understand Biology, but it is also important that you are comfortable answering the kinds of questions that you will see on the exam. This book was designed to help you in both of these areas.

You are ready to begin. There are 8 Keys in this workbook, which correspond to Biology knowledge tested on the PA Keystone Exam for Biology. Four keys and half of the test will cover the topic **Cells and Cell Processes**, while the other four keys (and the other half of the test) cover **Continuity and Unity of Life**. You will do your best on all parts (multiple-choice and constructed-response) of the exam!

Okay, take a deep breath. You're going to be fine!

Biology: Keystone Exam Overview

The Keystone Exam is divided into two separate tests, or modules. Each module contains both multiple-choice and constructed-response questions. The quantity and value of these questions are shown below.

Module 1: Cells & Cell Processes (covers 16 pieces of Eligible Content that make up 50% of the exam)	Number of Questions	Weight	Total Value
Multiple-Choice	24	x1	24 points
Multiple-Choice Field Test*	8	x0	0 points
Constructed-Response	3	x3	9 points
Constructed-Response Field Test*	1	x0	0 points

Module 2: Continuity & Unity of Life (covers 22 pieces of Eligible Content that make up 50% of the exam)	Number of Questions	Weight	Total Value
Multiple-Choice	24	x1	24 points
Multiple-Choice Field Test*	8	x0	0 points
Constructed-Response	3	x3	9 points
Constructed-Response Field Test*	1	x0	0 points

Module 1 + Module 2 = 66 Points
(48 multiple-choice points and 18 constructed-response points)

The number of points you earn out of 66 will determine the scaled score you receive from the state of Pennsylvania. These scores range from 1200 to 1800, and you must earn a score of at least 1500 in order to be deemed “proficient” and thus pass the exam.

So how many questions must you answer correctly in order to pass? Unfortunately, it is impossible to know that answer for sure. All we can tell you is that you should do your best and earn as many points as you can.

(*NOTE FROM ABOVE: Each module contains 8 multiple-choice and 1 constructed-response field test questions, for a total of 16 multiple-choice field test questions and 2 constructed-response field test questions. These questions do not factor into your overall score. Rather, they are new questions that the state of Pennsylvania is testing for use on future exams. Field test questions are randomly distributed throughout the exam, so you will NOT know which questions count toward your score and which questions are field test questions. You must give every question your best effort.)

General Test Taking Strategies

1. **Take your time.** Each module is meant to take a student 1-1.5 hours to complete (for a total of 2-3 total hours), but there is not a time limit on either one. Be patient and pay no attention to the students who finish early.
2. **Read through the question and answer options a *second* time and remember our Test Taking Hints.** Look for **Important Words** (all, both, must have, can have, some, etc.), look for any prefixes and suffixes, and remember to use the Process of Elimination to remove distracting options from the multiple-choice potential answers.
3. **Do exactly what constructed-response questions ask you to do.** Constructed response questions do not provide you with answer choices. They are open-ended questions that contain multiple parts and ask you to do things like identify, explain, describe, predict, and compare. Follow the directions carefully. Make sure you *fully* answer *each part* of *each* constructed response question!
4. **Explain thoroughly.** In your constructed response questions, write so that you can PROVE it to the Test Grader that you know what you are talking about! Use words and phrases such as: *since*, *because*, *as a result*, *therefore*, and *which means that*.
5. **Fight for partial credit.** In your Constructed Response answers, you get 3 out of 3 points for “thorough” understanding and 2 out of 3 points for “partial” understanding. You will have 8 total Constructed Response questions. All of the samples given by the state have Parts A, B, and C. That means that you have to get all 3 Parts correct to get 3 points = “thorough” understanding. If you get 2 of the 3 parts correct, you get 2 points = “partial” understanding. Going through the content in this workbook will help you be able to fight for at least partial credit!
6. **If a question is difficult, save it for later...but don't forget about it!** If you are unsure of the answer, you might want to move on and then come back to it later. Just make sure you don't forget about it. Sometimes when you come back to a question you'll remember something about that topic or remember an extra test taking trick!
7. **When you don't know...GUESS!** Never leave a question unanswered. Of course we want you to work hard to get the right answers, but if you come across a question that you don't understand, take your best guess. There is no penalty for wrong answers. Remember...in a multiple-choice question? The correct answer is THERE, sitting right in front of you.
8. **Get a good night's rest.** You'll need to be fresh and alert if you want to do your best. A solid eight hours should do the trick.
9. **Eat a good breakfast!** You don't want to be distracted by your rumbling tummy! (And you don't want to be embarrassed by it either, in a quiet room full of Test Takers!)
10. **RELAX!** Of course this is easier said than done, but you should feel well prepared after working through this book. Walk into the exam with confidence!

Unlocking the Keystone Exam: Biology.

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Key 1

Basic Principles of Biology

Part I

Prokaryotic vs. Eukaryotic

Part II

Structure & Function Relationships

Key 1: Part 1: Prokaryotic vs. Eukaryotic

- Bio.A.1.1.1: Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms. ¹
- Bio.A.1.2.1: Compare cellular structures and their functions in prokaryotic and eukaryotic cells. ¹

Ready to get started? Here we go!!

Prokaryotic and eukaryotic cells...remember those? In all of the brain warm-ups and stretches that we will be doing throughout this book, this by far will be your biggest stretch. In this archeological dig of your Biology Brain, this is the deepest layer. We are going waaay back to the beginning here. Bring it up, and dust it off.

Train you Brain (Partner Review Activity)

Let's see what you can remember! You'll first work alone, and then with a partner, and then with your teacher! This activity will take you through not only the differences between prokaryotic and eukaryotic cells, but this will also take you through the process of comparing their structures and/or functions. This knowledge will be essential for some Biology Keystone Exam questions!

1. Your teacher will review the directions with you.
2. Grab a pair of scissors and some tape/glue, and rip page 7 out of your book.
3. Cut up the chart into slices.
4. Slide those slices around your desk to organize into two groups/piles: Prokaryotic, Eukaryotic.
5. Can you line them up so that one Prokaryotic slice is across from its matching Eukaryotic slice?
6. Work with someone seated next to you upon completing the activity. You may quietly discuss your arrangement with your partner. Do your arrangements agree?
7. Please wait for your teacher for further instructions!

BIG HINT to keep in mind for the next page AND for your exam:

- Prokaryotic cells are the simpler cells.
- Eukaryotic (pronounced YOU-kary-otic) cells are the more complex cells. See what I did there? YOU-karyotic cells are the kind of cells that make up YOU! And we are super complex, right?

And here is probably the MAIN DIFFERENCE to remember about these two, and this might help you with the activity: Eukaryotic cells have their genetic material (chromosomes!) tucked away inside a membrane = nucleus! Prokaryotic cells still have genetic material (plasmids!) floating around = NO nucleus! And actually, prokaryotic cells have NO organelles that are inside membranes!

❖ Prokaryotic Cells	❖ Eukaryotic Cells

Here is why we took a chunk of time to review PRO-karyotic and EU-karyotic cells. This info comes from waaay back. This activity should have pulled some additional vocabulary words from the back of your brain (like chromosome, mitosis, meiosis, lysosome, etc.) and hopefully if you didn't remember some of them, you were able to go back and refresh your memory! Do you have questions on any of the words from the above activity? If so, write them below:

If there is chlorophyll, it is tucked inside a membrane to make chloroplasts.	If a cell wall present, then it is very simple.
Divides through binary fission.	Able to survive in harsh environments (such as really high temperatures or really dry conditions or areas with high salinity)
Membrane-bound nucleus.	Bacteria.
If there is chlorophyll, it is scattered through the cytoplasm	Does not have organelles with membranes (NO lysosomes, peroxisomes, endoplasmic reticulum, mitochondria, or Golgi apparatus.
Has a cytoskeleton	If cell wall present, then it is more complex.
Unicellular.	May or may not have a cytoskeleton.
Chromosomes tucked inside a membrane to make a nucleus.	Plant and animal cells.
No meiosis, only transfer of DNA fragments.	No membrane-bound nucleus.
Divides through mitosis.	Meiosis.
Plasmids (not “real” chromosomes) are throughout cytoplasm, NOT inside a membrane to make a nucleus.	Smaller surface area to volume ratio (thus lower growth rate, lower metabolic rate).
Have organelles with membranes (lysosomes, peroxisomes, endoplasmic reticulum, mitochondria, and Golgi apparatus).	Larger surface area to volume ratio (thus higher growth rate, higher metabolic rate).
Has vacuoles and ribosomes.	Can be unicellular or multicellular.

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so that the Prokaryotic vs. Eukaryotic slices
on the previous page can be torn out and
cut apart

PRACTICE QUESTION NUMBER 1: (Read it! Don't answer it yet! Let's talk about it!)

Both prokaryotic and eukaryotic cells can have the following:

- a. Vacuoles and a nucleus
- b. Chloroplasts and chlorophyll
- c. Cell walls and genetic material
- d. Nucleus and flagellum

Learn a Test Trick: Process of Elimination (BOTH / CAN HAVE)

To do well at answering multiple-choice questions, you need to both READ THE ENTIRE QUESTION and READ ALL OF THE OPTIONS. Your goal is to try to narrow down your possible choices:

Process of Elimination or **POE**. Of course your ultimate goal is to get it down to one possible answer, the **RIGHT** answer, but even if you can narrow the answers down to 2 or even 3 options, you still increase your chances of getting the question correct!

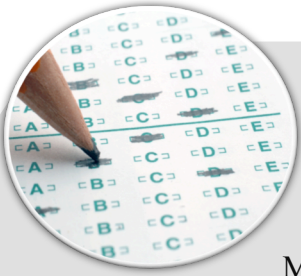
We are going to practice looking for Important Words, but the ones you'll see here? **BOTH** and **CAN HAVE**. (Circle those in the question above!!) Your correct answer must be completely true in at least one case of both prokaryotes and eukaryotes. Wait, what was that again? In this case, the full answer must be true for at least **SOME** prokaryotes and also at least **SOME** eukaryotes. However, it does **NOT** have to be true for **ALL** prokaryotes and eukaryotes. "Can have" is different than "must have!" We'll discuss in more detail below...

So, what's the answer? If you know the biggest difference between prokaryotic and eukaryotic cells (genetic material in a nucleus vs. **NO** nucleus), then you can immediately **eliminate A and D!** You have already increased your chances of getting this question correct to 50%, even if you aren't fully sure of the answer quite yet! (Please cross them out in the Practice Question above to follow along!)

Let's look at option B. Simpler prokaryotic cells don't have a nucleus; they also don't have the typical organelles that occur in membranes. Option B talks about chlorophyll and chloroplasts. You should already know that plant cells are eukaryotic cells, they have chlorophyll, and their chlorophyll is tucked into membranes to make chloroplasts. Eukaryotic cells can have chlorophyll and chloroplasts. You should also already know that bacteria are prokaryotic cells, and there are certain kinds of bacteria that might have chlorophyll. **HOWEVER**, you should also know that prokaryotes don't have organelles in membranes! Since a chloroplast is an organelle in a membrane, it is **ONLY** in eukaryotic plant cells, so you can also **eliminate B**. (Please cross this option out in the Practice Question above!)

What's left? Cell walls and genetic material, choice C. This is where "can have" and "must have" come into play. Eukaryotic cells can have cell walls. (Not all eukaryotic cells--animal cells!--have cell walls. If this question used "must have" instead of "can have," then this answer actually wouldn't be correct either!) Prokaryotic cells can have cell walls too. So far so good with cell wall. Next up? Genetic material. Prokaryotic cells have genetic material, yes. (Their genetic material is in the form of a plasmid, which is *not* tucked inside a nucleus.) Eukaryotic cells have genetic material, yes. (Their genetic material is in the form of a chromosome, which is tucked inside a nucleus.) Sweet! **The correct answer is C!** Both prokaryotic and eukaryotic cells can have cell walls, and both prokaryotic and eukaryotic cells can have genetic material!

Just so you know, you will not always have this much detail for each Practice Question. Your teacher will give you more info, and/or you will find more info at the end of each Key in Answer Explanations!



Think Like a Test Maker

One of the best ways to become a better Test Taker is to begin thinking like a Test Maker. Throughout this workbook, you will have opportunities to create good wrong answers. This process will help you to understand the Test Maker's tricks.

Directions: Complete the multiple-choice questions by filling in good wrong answers. For Practice Question Number 2, you are going to pretend you are a Test Maker and fill in your own incorrect answers. Notice the correct answer is already filled in.

1. Read through Practice Question Number 2 below.
2. The correct answer is already filled in for you for option D.
3. Read the **Learn a Test Trick: Process of Elimination (ALL)** below.
4. Let's fill in option A. For this option (you can use your brain and/or the chart, textbook, and notes), write down something that is FALSE for PROKARYOTES but TRUE for all or some EUKARYOTES.
5. For option B, write down something that is TRUE for all or some PROKARYOTES but FALSE for EUKARYOTES.
6. For option C, write down something that is FALSE for BOTH prokaryotes and eukaryotes, but still sounds good enough that someone just skimming over it might still choose it. (Example: if option C says "They are able to send emoticons to each other," then someone's brain might say, "Hey! I know what emoticons are! This one must be the answer!" and they might pick that answer. But YOU will NOT, because you know better than that, to not just pick the first option that kinda sounds a little familiar!

Learn a Test Trick: Process of Elimination (ALL)

We will be stressing this every time it comes up! Look for those key words, such as *ALL* or *SOME* or *CAN HAVE* or *MUST HAVE*! The Test Makers might even put the word in **bold** or *italics* FOR you! Just don't forget it! What is the important word in the question below? _____ When the **Important Word** is ALL, then every single part of the option must be TRUE for BOTH prokaryotes AND eukaryotes!

PRACTICE QUESTION NUMBER 2:

Which statement is true for **all** prokaryotes and eukaryotes?

A. _____
(Write something false for prokaryotes and something true for eukaryotes.)

B. _____
(Write something true for prokaryotes and something false for eukaryotes.)

C. _____
(Write something false for prokaryotes and something false for eukaryotes.)

D. They contain genetic material and cytoplasm. (True for both prokaryotes and eukaryotes!)

Key 1 Part II
(Structure & Function Relationships)
is not included in this sample.

Constructed-Response Practice for Key 1

We know, we're giving you a lot of information here already. We discussed using **Process of Elimination (POE)** for our multiple-choice question in Practice Question Number 1, and we have discussed how to **Think Like a Test Maker** for our multiple-choice question in Practice Question Number 2. Don't worry, as we move through each Key, you will get many opportunities (and reminders!) to practice POE and Thinking Like a Test Maker!

In the Biology Keystone Exam, the constructed-response questions will make up approximately 27% of the possible exam points. Test Makers have determined that EACH of the 8 constructed-response questions should take approximately 8 minutes to complete. That means that the Test Makers assume that students may be spending over an hour on the constructed-response questions alone!

Constructed-response questions can easily be intimidating. If you weren't nervous before, you might be now! However, as you are making your way through this workbook, you will be practicing. Many, many times. And you WILL be ready!

Think Like a Test Grader

Below is the general scale that is used by Keystone Exam graders.² Each constructed-response answer is worth up to 3 possible points. Once you learn what the Test Graders will be looking for, you will better understand how to form your responses to the question.

General Description of 3-Point Scoring Guidelines for Biology Constructed Response

3 points:

- Demonstrates a *thorough* understanding of scientific content, concepts, and/or procedures
- Clear, complete, and correct response
- Can contain a *minor* blemish or omission, but *still* demonstrates a *thorough* understanding.

2 points:

- Demonstrates a *partial* understanding of scientific content, concepts, and/or procedures
- Somewhat correct with *partial* understanding
- May contain *some unclear or incomplete* work.

1 point:

- Demonstrates a *minimal* understanding of scientific content, concepts, and/or procedures
- Somewhat correct with *minimal* understanding
- May contain *some unclear or incomplete* work.

0 points:

- Demonstrates *insufficient* evidence of understanding of scientific content, concepts, and/or procedures
- May only show information copied from the question or rephrased.

A rubric is a map to scoring 100%! Successful Test Takers use the rubric.

It highlights exactly what you need to do.

There is an interesting piece to the biology constructed-response questions. Often times, there will be THREE PARTS (A, B, and C) to ONE constructed-response question, while each whole constructed-response question is worth THREE POINTS. That means when you are answering each PART, you either get it RIGHT (1 point) or WRONG (0 points). If you get Part A and B correct but Part C incorrect, you get 2 of the 3 points. If you get only Part A correct and Part B and C incorrect, you get 1 of the 3 points. You will need to remember that partial understanding (worth 2 points) = thorough understanding of 2 of the 3 Parts. Minimal understanding (worth 1 point) = thorough understanding of 1 of the 3 Parts.

Learn a Test Trick: Use “Prove It To Me” Language

As you can see from the rubric on the previous page, you need to convince the Test Graders that you really do know about the topic! They want you to PROVE that you know it. There are two ways of doing this in your Biology Keystone constructed responses.

1. Make sure you *pay attention* to **EVERY PIECE of the question**. Make sure you *answer EVERY PIECE of the question*.
2. When applicable, use **Prove It To Me Language** when you can. You need to demonstrate you have a thorough understanding of the material. (If you do not have a *thorough* understanding of the topic at hand, then your goal will be to show that you have *partial* understanding. We’ll talk about that below.)

Take a look at the list below of “Prove It To Me” Language. By using these words in applicable constructed-response questions, you set yourself up for success. You can’t help but analyze and explain when you use these key words! You do not need to memorize the list. Rather, pick your 5 favorite options from the list below and promise to use them. It doesn’t matter to the Test Graders if you use the same “Prove It To Me Language” in all of your responses when applicable. Remember, they are not judging how well you write. They are grading you *on the extent to which you answer the question and demonstrate your knowledge*. While no deductions are taken for misspelled words or grammatical errors, you’ll obviously do your best in those aspects!

Look over the list and pick out 5 that you think you might be able to use on the exam. Circle them. We will be referring back to this list as we work our way through the other Keys!

Prove It To Me Language

- Since
- So that
- So there is
- Would likely
- The fact that
- Therefore
- Which shows
- As a result
- Because
- Would be due to
- Even though
- However
- In addition
- In particular
- This means that

On the next page, we are going to review the topics from Key 1 in the constructed-response format.

1. In the true Biology Keystones, the general rubric is turned into a *specific content-based rubric* based on the content addressed in the question. On the next page, we will practice turning the general rubric into a content-based rubric like the Test Graders would use.
2. We will look at a practice constructed-response question on the next page. After completing the content-based rubric, we will then look at sample student answers provided for you. We will use the content-based rubric to assign scores to each sample student answer.
3. We will be discussing the characteristics of good constructed-response answers. We will also be working through the not-quite-good-enough sample student answers and turn them into good constructed-response answers!
4. (In Key 2, we will start practicing our own constructed-response answers, ensuring that we are answering *every part of the question* and using some of the **Prove It To Me Language** where we can!)