

ABOUT THIS BOOK

The purpose of this book is to help you review for the Advanced Placement Biology exam. It assumes that AP Biology is your second course in Biology and that you are preparing to take the AP Biology exam. This book is organized to correlate with *Biology*, Tenth Edition, by Sylvia S. Mader; the charts, tables, and figures are taken from that textbook. It is not necessary, however, for you to have used that textbook in your class in order to use this book for an effective review for the exam.

There are a number of features included in this book to aid you in your review process:

- **Take Note** boxes include helpful hints about information that you must know in order to successfully prepare for the AP Biology exam. Be sure to pay close attention to these tips.
- Information that tends to be heavily tested on the exam is more extensive in the chapter summaries.
- There are multiple-choice and free-response questions at the end of each chapter to give you more practice. The answers are explained in detail so that you can better understand those concepts with which you may struggle.
- Important vocabulary words are bolded.
- Two complete practice exams are included in the third section of this book. The exams are formatted exactly like the exam that you will take in May, so be sure to learn from your mistakes so that you can improve on any areas of weakness. The answers with complete explanations are included to help you. In addition, there is a chart that shows a correlation with the content of the exam to help you determine your areas of strength and weakness.

HOW TO USE THIS BOOK

This book should be used to supplement the textbook and materials your teacher provides. During the course of the year, your primary source of information should be your textbook in order for you to gain maximum understanding. Use this book to review and practice before the AP Biology exam.

The way that you use this book will depend largely on your strengths and weaknesses in understanding a particular topic. For those topics where you have a strong background, you may wish to skim the corresponding chapters and answer the questions at the end of the chapter. Important words are bolded and the sections are clearly labeled to help you. For other topics, you may decide to read the summary along with your textbook to reinforce the concepts you may have struggled with during the year. This book is not meant to replace your textbook, but to assist you in your review of material that you have learned throughout the school year.

CONTENT OF THE AP BIOLOGY EXAM

AP Biology is a college level course taught in high school, and is a preparation for the College Board Advanced Placement Biology Examination. This course is equivalent to a two-semester college course taken by Biology majors in the first year of college. The subject matter is more wide-ranging and in more depth than that usually covered in a high school biology course and includes: the chemical composition, structure and functions of cells, classical and molecular genetics, evolutionary biology, diversity and classification of organisms, structures and functions of plants and animals, and ecology. The concepts

covered in this course fall under three main topics: Molecules and Cells, Heredity and Evolution, and Organisms and Populations. The learning expectations are centered around eight major themes:

1. Science as a Process
2. Evolution
3. Energy Transfer
4. Continuity and Change
5. Relationship to Structure and Function
6. Regulation
7. Interdependence in Nature
8. Science, Technology and Society

The AP Biology exam is organized in the same way your class is organized, as described in the Course Description provided by the College Board:

I. Molecules and Cells (25%)

A. Chemistry of Life (7%)

1. Water
2. Organic molecules in organisms
3. Free energy changes
4. Enzymes

B. Cells (10%)

1. Prokaryotic and eukaryotic cells
2. Membranes
3. Subcellular organization
4. Cell cycle and its regulation

C. Cellular Energetics (8%)

1. Coupled reactions
2. Fermentation and cellular respiration
3. Photosynthesis

II. Heredity and Evolution (25%)

A. Heredity (8%)

1. Meiosis and gametogenesis
2. Eukaryotic chromosomes
3. Inheritance patterns

B. Molecular Genetics (9%)

1. RNA and DNA structure and function
2. Gene regulation
3. Mutation
4. Viral structure and replication
5. Nucleic acid technology and applications

C. Evolutionary Biology (8%)

1. Early evolution of life
2. Evidence for evolution
3. Mechanisms of evolution

III. Organisms and Populations (50%)

A. Diversity of Organisms (8%)

1. Evolutionary patterns
2. Survey of the diversity of life
3. Phylogenetic classification
4. Evolutionary relationships

- B. **Structure and Function of Plants and Animals (32%)**
 - 1. Reproduction, growth, and development
 - 2. Structural, physiological, and behavioral adaptations
 - 3. Response to the environment
- C. **Ecology (10%)**
 - 1. Population dynamics
 - 2. Communities and ecosystems
 - 3. Global issues

Thus, 25% of the questions on the AP Exam will focus on Molecules and Cells, 25% on Heredity and Evolution, and 50% on Organisms and Populations. Laboratory is an essential component of the exam. Laboratory questions that appear on the exam focus on skills such as experimental design, observation, proficiency in the use of laboratory equipment, gathering and interpreting data, and relating empirical information to scientific theory. Be sure to ask your teacher to provide you with materials that will help you to review the objectives, procedures, data and conclusions of the twelve required labs at a minimum, plus any additional labs that you may have performed in class.

OVERVIEW OF THE TEST

There are two sections of the AP Biology exam, which is three hours long and typically administered on the second Monday in May. The first section of the test consists of 100 multiple-choice questions. You have 80-minutes to complete this portion of the test, which comprises 60% of your overall score. The second section of the test involves a 10-minute reading period during which you will be able to read over the free response questions and begin to develop the outlines of your answers. You will then have 90 minutes to complete your responses. There will be four free-response questions, and all of them are required. This section comprises 40% of your overall score. Expect that one question will concentrate on Molecules and Cells, one on Heredity and Evolution, and two on Organisms and Populations. One or more questions may be based on one of the twelve required laboratory activities that you completed during the year.

HOW THE EXAM IS SCORED

The overall scoring of the AP Biology exam is the same as all the other AP exams:

- 5 Extremely well qualified
- 4 Well qualified
- 3 Qualified
- 2 Possibly qualified
- 1 No recommendation

The free-response questions are scored using a standard rubric. Each question is worth a maximum of 10 points. Students earn points based on the information that is contained in their responses. Points are lost only in the case where a student contradicts himself on a fact for which he has already earned a point. For instance, if an essay is about cellular respiration, a point is earned for stating that cellular respiration is the complete *oxidation* of glucose to form CO_2 and H_2O . If a student later writes that cellular respiration is the *reduction* of glucose, this is a contradiction and the earned point will be lost.

A complex formula is used to calculate your overall score from your raw scores in the multiple-choice and free-response sections. This formula is determined after the test is administered, and includes the

consideration of historical standards as well as the performance of students on the exam in a given year. Students typically receive their overall scores in July following the May administration of the exam.

PREPARING FOR THE EXAM

Your review period before the AP Biology exam should begin no later than mid-March. Each week, you should select a particular topic to review so that by the day of the exam you have reviewed each major topic. It is a good idea to organize your review schedule so that you review those topics you feel weakest on first. There is no right or wrong way to organize your review schedule. You should feel comfortable doing what is best for you. Just be sure that your schedule is realistic, so that you are not overwhelmed with lots of cramming in the final days preceding the exam. Here is a sample schedule that you may wish to use as a reference:

Date	Topics	Chapters
<i>March</i>		
Week 1	A View of Life The Cell	1–5
Week 2	The Cell, cont'd, Genetics	6–10
Week 3	Genetics, cont'd	11–14
Week 4	Evolution	15–19
<i>April</i>		
Week 1	Microbiology & Evolution Animal Evolution & Diversity	20–22 28–30
Week 2	Plant Evolution and Biology	23–27
Week 3	Comparative Animal Biology	31–36
Week 4	Comparative Animal Biology, cont'd	37–42
<i>May</i>		
Week 1	Behavior and Ecology	43–47

You do not have to wait until the weeks before the AP Biology exam to find ways to do well on the exam. Use these helpful hints to develop your own strategy for success in AP Biology throughout the school year. Some of these strategies will work for you, others will not. Find the ones that work best for you and consistently maintain them so that you can achieve maximum success not only in your class, but also on the AP Biology exam.

- **Develop a routine.** Review your notes each night instead of cramming the material one or two nights before the test. This is difficult at first, but once you have a routine, it becomes much easier to be consistent.
- **Each night, read over the sections that were discussed in class that day.** Immediate review of the material will help you remember it better. If you find you are confused, ask your teacher for clarification right away.
- **On the weekends, read over the sections that were discussed in class during the week, and go over your notes.** Fill in any information from your textbook that may help clarify information in your notes. This is particularly important if you have a heavy extracurricular load during the week.
- **Don't wait until the last minute to do your homework or assignments.** Pace yourself and do a little at a time. This will give you time to seek help from your teacher on things that you do not understand.

- **Study in groups.** The interaction with your classmates will help you remember concepts that you may forget if you always learn information by yourself. Don't depend on the group however; study on your own BEFORE reviewing with the group. It will help the study session to go more smoothly.
- **If you don't understand, ask.** Find out when your teacher is available to help you and make it a point to be consistent about seeking help as soon as you find yourself struggling. The sooner you get help, the easier it will be to understand when more difficult information is taught later in a chapter or unit.
- **Manage your time wisely.** Sometimes, it may be hard to find time to review your notes at night if you are heavily involved in extracurricular activities. Use travel time to and from school or sports events to review your notes. If you have a study hall, you can use that time to review as well.
- **Use study guides.** If your teacher provides study guides, take advantage of them. Write out the answers to the objectives so that you are sure that you understand the concepts that you need to know.
- **Attend after-school and weekend review sessions.** If your teacher offers review sessions outside of school, be sure to attend. The more you see and hear the information, the greater the chance that you will remember it.
- **If you need extra help, get a tutor.** If you decide to hire your own tutor, ask your teacher to talk to him or her so that he or she can better help you with what you need.

TIPS FOR TAKING THE EXAM

Before the Exam

- Familiarize yourself with the format and timing of the exam.
- Take as many practice tests as you can. Ask your teacher if he or she has any practice exams to share with you and ask him or her to assist you with finding practice exams that you can do on your own.
- Try to finish most of your review a few days before the exam so that you have time to ask your teacher for clarification on those concepts with which you may have trouble.
- Be sure to get at least eight hours of sleep the night before the test, and eat a nutritious breakfast that morning.
- Dress comfortably. It is a good idea to dress in layers in case the testing environment is at a temperature that is uncomfortable for you.

What to Bring:

- Several No. 2 pencils, sharpened, and an eraser
- Several ballpoint pens with navy blue or black ink (Try to avoid erasable ink that can easily smear.)
- A watch that does not make noise
- Your school code
- Your Social Security number
- A photo identification

What Not to Bring:

- Calculators or computers
- A watch with an alarm that beeps
- Cameras, cell phones, pagers, or PDAs
- Portable listening devices such as radios, iPods, MP3 players, and CD players

- Books or notes
- Scratch paper
- Clothing with subject-related information

During the Exam

Multiple Choice Questions

Sixty percent (60%) of the AP Biology Exam grade is based on 100 multiple-choice questions. Please take heed to the following recommendations for answering these questions:

- Manage your time wisely. Answering 100 questions in 80 minutes equates to 48 seconds per question. Some questions will require less time, while others will require more. Pace yourself.
- Read each question carefully. Watch for questions that read “...all of the following EXCEPT...” so that you don’t get confused. If a narrative and/or figure is associated with a question, be sure to study it carefully before you select your answer.
- Plan to read through the test three times. The first time, answer all of the questions about which you are absolutely sure of the answer. Skip the questions that you are not sure about. The second time, answer the questions you were not sure about the first time, as long as you do not have to spend too much time on any one question. If you spend more than one minute thinking about a question, move on. You don’t want to miss questions later in the test that you can answer quickly by spending too much time on questions at the beginning. The third time through the test, try to answer the questions that you were not sure about the first two times.
- The decision to guess on a question is an individual one. Some teachers advise their students to guess if they can narrow the choices down to two, while others advise against it. There is a ¼ point penalty for guessing, so incorrect answers result in a loss of 1.25 points, while blank answers result in a loss of 1 point. Make your decision to guess according to what you feel most comfortable doing.

Free Response Questions

Forty percent (40%) of the AP Biology Exam grade is based on four (4) required free-response (essay) questions. Please take heed to the following recommendations for writing answers to the free-response questions:

- **Read the question carefully.** Be sure to take note of the instructional words (describe, explain, compare, design, etc.) of the question, which are always bolded. Frame your answer around the instruction in order to earn as many points as possible. When the instruction is to “compare,” be sure to discuss differences as well as similarities. If you are asked to “describe the effect,” write about both positive and negative effects in order to earn maximum points.
- **Organize your thoughts** during the reading period. Spend approximately two minutes writing out ideas for each question. Organize your answer in the same way as the question is asked. If it has three distinct parts, then organize your answer in three distinct parts, and label each part accordingly.
- **Attempt to answer all four questions.** Write as much as you know, even if you feel you know very little. You may earn one or two points, whereas if you make no attempt to answer a question, you will not earn any.
- **Answer the question about which you know the most first.** You are not obligated to answer questions in any specific order. During the reading period, rank the questions from 1–4, with #1 being the question you know the most about and #4 being the one you are least comfortable with. Answer the questions in the order in which you feel most knowledgeable and comfortable.
- **Restating the question earns no points.** Dive right into the answer to save time. An introductory or summary paragraph is unnecessary and usually earns no points.

- **Answer each question on a separate page** to make it easy for the reader to find each of your answers. For your convenience, each question is printed on a separate page in the answer booklet so that you can write your answer immediately following the question. Answering more than one question per page can make finding all of your answers a challenge for the reader. Use the entire answer booklet if necessary.
- **Pace yourself.** Look at the clock at the beginning of the free-response section. Break the time into four 22-minute periods. Stop writing your answer to a particular question when your time is up. You can always come back to a question if you finish another one before your allotted time has expired.
- **Use dark blue or black ink.** Avoid pencil and felt-tip pen. Avoid excessive scratch-outs if possible.
- **If the question breaks naturally into parts, leave several lines between the answers** to insert more information later as it comes to you. You may even prefer to answer each part on a separate page; just mark your paper plainly so that it is obvious that there is more on the next page.
- **Develop your ideas as completely as possible, but avoid repeating the same information.** Elaboration points are often given for well-written answers, so it is advantageous to include as much information as you can without being redundant.
- **Show your work** if you are asked to do a calculation. Be sure to include units in your final answer if applicable.
- **Label the axes with units** if you are asked to draw a graph, and be sure to include a scale and title.
- **Write legibly.** If necessary, skip lines to make your essay easier to read.