

NAZARETH ACADEMY SCIENCE DEPARTMENT AP BIOLOGY 2025 SUMMER ASSIGNMENT

Dear Student:

Welcome to AP Biology! The course that you have chosen may well be one of the most challenging, demanding, and exciting courses you have taken so far in your school career. You are studying biology at a time of many scientific advances. Perhaps more new knowledge is being acquired today in biology than in any other area of science.

AP Biology is a comprehensive survey course that follows strict guidelines set forth by The College Board. AP Biology is equivalent to an introductory college biology course and as such will include lectures, discussions, and laboratory investigations.

The AP curriculum emphasizes eight basic units in Biology:

Unit One:	Chemistry of Life	Unit Five:	Heredity
Unit Two:	Cell Structure and Function	Unit Six:	Gene Expression and Regulation
Unit Three:	Cellular Energetics	Unit Seven:	Natural Selection
Unit Four:	Cell Communication and The Cell Cycle	Unit Eight:	Ecology

The two main goals of AP Biology are to help you develop a conceptual framework for modern biology and to help gain an appreciation of science as a process. Students are encouraged to focus on understanding important relationships, processes, mechanisms, and potential extensions and applications of concepts. **NOT memorization of facts.**

The **first** part of the summer assignment is to help you review information from your previous science classes that you should already know. AP Biology refers to this as previous knowledge and assumes you **know** it and **can work with it without the teacher re-teaching it.** You are responsible for reviewing the following Chemistry section on your own. Print out and complete the following questions. Since you will not receive your textbook until the beginning of the new school year, you can use any resource available to you. This material will be included on the Unit One Chemistry of Life Test when we complete it.

The **second** section covers one of the most important skills required for this course, graphing and analyzing data. This section is to be completed and returned on the **FIRST FULL DAY OF CLASSES.**

If you have any questions, e-mail me any time at wiz@nazarethacademyhs.org.

Have a wonderful summer and come back to school refreshed and **READY TO GO!**

Miss Wizz (Frances Wiecezynski)

AP Biology Basic Chemistry Review

The following review is for your use **ONLY!** So, complete it in any way that will make it easier for you to study when test time comes along.

1. What is an **atom**?
2. Name and define the subatomic particles that are part of an atom.
How do they differ from each other?
How do these differences contribute to the properties of atoms and molecules?
3. How do **elements** differ from **compounds**?
4. What is the difference between **atomic number** and **atomic weight**?
5. Write the **symbol** for each of the following elements.
Determine their **atomic number** and **atomic weight**.

a. Carbon	e. Calcium
b. Oxygen	f. Hydrogen
c. Nitrogen	g. Potassium
d. Phosphorus	h. Sulfur
6. What is the difference between ^{12}C and ^{14}C ?
What is ^{14}C called?
7. Explain radioactive isotopes and state one medical application that uses them.
8. What are **valence electrons**?
Why are they important?

9. What is a **chemical bond**?
10. How do **ionic bonds** compare with **covalent bonds**?
11. What is **electronegativity**?
12. Explain the difference between a **nonpolar covalent bond** and a **polar covalent bond**.
13. What is an **ion**?
14. Define **anion** and **cation** and give an example of each.
15. What is the difference between a **structural** and **molecular** formula?
16. Why is **water** considered a polar molecule?
17. Briefly **define** the following properties of water.
 - a. Cohesion
 - b. Adhesion
 - c. Surface tension
 - d. High Specific heat
 - e. Heat of Vaporization
 - f. Evaporative cooling

18. What is **special** about water and density?

19. Define the following terms:
 - a. Solute
 - b. Solvent
 - c. Hydrophilic
 - d. Hydrophobic
 - e. Molarity

20. Define an **acid** and a **base**? Give an example of each.

21. What does the pH scale tell you?

22. What is a buffer?

23. If a solution becomes more acidic, does its pH go up or down?

24. How does one neutralize a basic solution?

25. What is special about **carbon** that makes it the central atom in the Chemistry of life?

Skill #3: Data Analysis
(Science Practice #4)

For this class, you will also need to be adept at analyzing data. This means that you will need to be able to interpret the data that you or others have gathered from an experiment by searching for trends and/or patterns in the data, by identifying specific data points of significance, and/or by describing relationships between variables. You will also need to be able to determine how to best present your own data in an experiment (as a bar graph, line graph, pie chart, etc.).

Below are some questions for you to practice analyzing data:

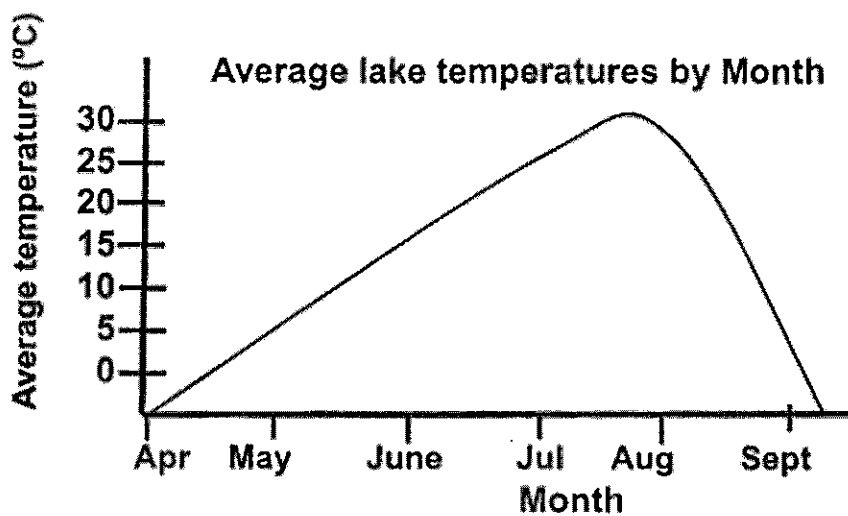
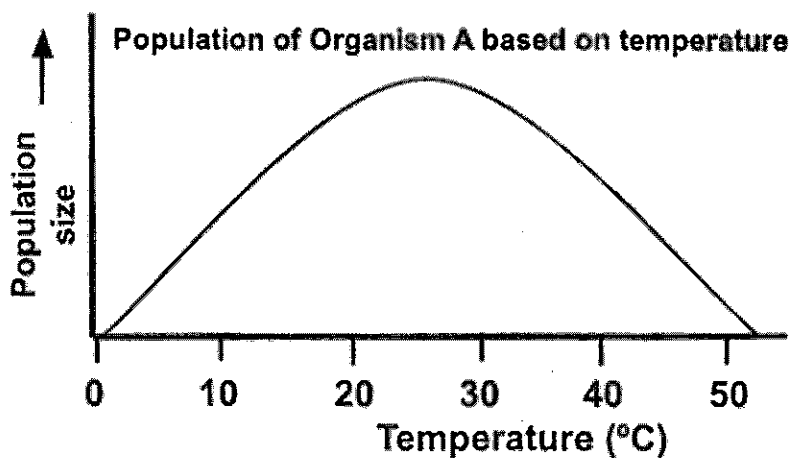
A biology student wanted to determine if there is a relationship between resting heart rate and body height. She gathered information from 12 classmates and constructed the table below.

Student height (cm)	Resting heart rate (beats per minute)
155	60
156	65
156	78
165	72
170	67
175	62
175	80
180	64
180	73
190	68
194	78
195	63

1. Which of the following is best supported by the data in the table? (*Circle one.*)
 - a. The taller the student, the higher the resting heart rate.
 - b. The shorter the students, the higher the resting heart rate.
 - c. A higher resting heart rate results in student growth.
 - d. There is no direct correlation between height and resting heart rate.

2. Which type of graph/chart would you use to show the trends in this data?
 (*Note: Multiple answers accepted here.*)

The graphs below show the population size of Organism A in a local lake, and the average temperatures of the lake by month.



3. What type of graphs or charts are shown in the figure above? (*Circle one.*)
- a. bar graphs
 - b. pie charts
 - c. line graphs
 - d. histograms

4. During which month would you expect the Organism A population to be the greatest? (Circle one.)
- a. August
 - b. May
 - c. June
 - d. July

A biology student wanted to see if runners from the track team would have a lower respiratory rate than non-runners during exercise.

She determined each student's resting respiratory rate. Each student performed the same exercise for a total of 3 minutes, measuring their respiratory rate at the end of each minute. They continued to measure their respiratory rates for 3 more minutes after the exercising had stopped.

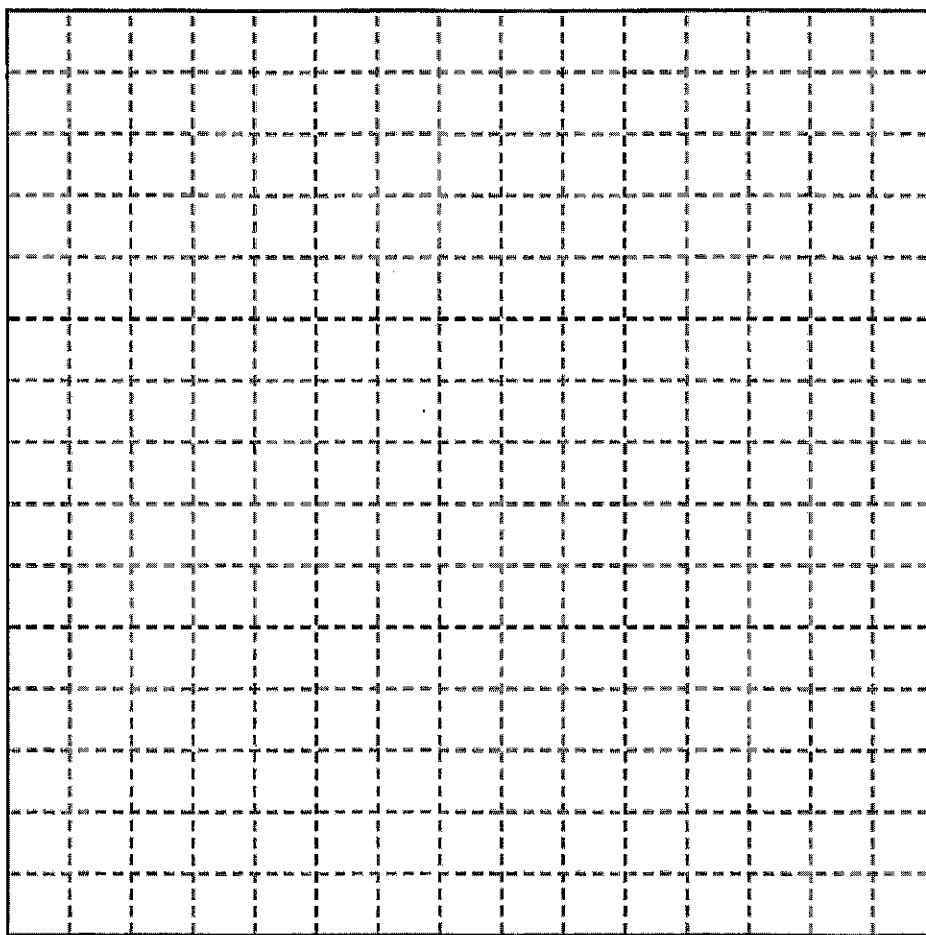
The table below shows the average respiratory rate of these students over time.

	Time (minutes)	Runners (breaths/min)	Non-runners (breaths/min)
<i>Resting respiratory rate</i>	0	14	18
<i>Exercise phase</i>	1	18	30
	2	20	34
	3	24	40
<i>Post-exercise phase</i>	4	22	39
	5	17	36
	6	14	32

5. Which of the following is best supported by the data in the table? (Circle one.)
- a. The non-runners had a lower respiratory rate than the runners during exercise.
 - b. The respiratory rates of the runners returned to the resting rate 3 minutes post-exercise.
 - c. The non-runners returned to resting respiratory rate faster than the runners.
 - d. The respiratory rates of both groups increased by the same amount during exercise.

AP Biology

6. Construct an appropriate graph using the data and the template provided on the following page. **NOTE:** For any graph that you are asked to construct in this course, you should always include the following four elements:
- an appropriate title
 - axis labels (both x-axis and y-axis)⁵
 - appropriate scaling⁶
 - appropriately plotted graph (line graph, bar graph, etc.)⁷



⁵ As a general rule, you typically plot the independent variable or time (whichever makes more sense) on the x-axis, and your dependent variable on the y-axis.

⁶ Scaling refers to how you number your axes. If, for example, the range of numbers that you intend to plot on your x-axis goes from 0 seconds to 100 seconds, and you are given a graph template that has an x-axis with 50 boxes or increments, appropriate scaling would have the x-axis labeled with 2 seconds per box/increment.

⁷ In this case, the appropriate graph would be a line graph because the x-axis (in this case, time) is a continuous value, rather than a set of non-continuous values or discrete categories.