

**NAZARETH ACADEMY SCIENCE DEPARTMENT
AP BIOLOGY 2026 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 realized today in biology than in any other area of science.

AP Biology is an intense 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 (Evolution)
Unit Four: Cell Communication and The Cell Cycle	Unit Eight: Ecology

The two main goals of AP Biology are to help students develop a conceptual framework for modern biology and to help students gain an appreciation of science as a process. The ongoing information explosion in biology makes these goals even more challenging. Students are encouraged to focus on understanding important relationships, processes, mechanisms, and potential extensions and applications of concepts. **NOT memorization of facts.**

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. You can find many resources online to answer this review. This review will not be collected in class but **will be included on the Unit One Chemistry of Life Test when administered in class.**

The **second** review is all about graphing, an important concept that will be used through all the 8 units we will investigate in AP Biology. This will be the first material we cover in class in August. The final 5 pages of the Graphing Practice will be collected. So, make sure they are done neatly and are readable.

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?

NAME _____

AP BIOLOGY GRAPHING PRACTICE

Graphing plays a major role in AP biology. Most students think they know how to graph because they have graphed a lot in math classes. Past experience has indicated that this is a false sense of knowledge since oftentimes one can use a graphing calculator or plots on graph paper with axes and scaling already on the graph. In AP Biology you will almost always be given a blank graph and will have to determine the proper size, scaling and axes for the graph you will be plotting. Points are often awarded for

1. correct scaling (Proper spread of axis numbers and the use of most of the graph)
2. correct labeling of axes with units
3. correct plotting of data points
4. sometimes you may get a point if the graph is properly titled

Science Practice 4: Representing and describing data

Representing and describing data is one of six major practice skills that you will need to learn for the national exam.

You must know how to construct and interpret the following graph types:

1. X,Y 2. Bar 3. Line 4. Box & Whisker 5. Log Y 6. Histogram 7. Dual Y 8. Pie

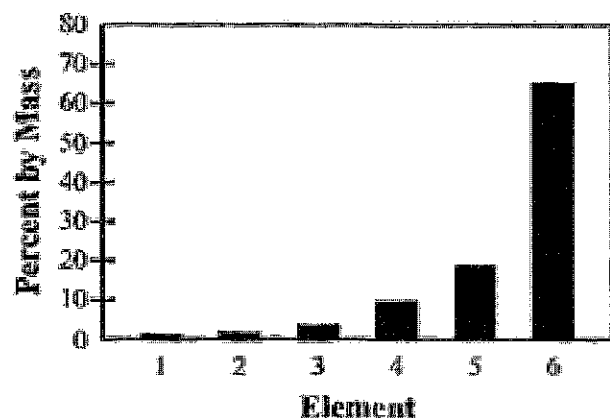
1. Remember **TAILS** when creating a graph

- **Title:** Depicts what the graph is about. The title gives the reader an understanding about the graph. A good title is closer to a sentence than a phrase and is usually found at the top of the graph.
- **Axes:**
 - Independent Variable: Variable controlled by the experimenter. The variable that "I" am testing. (I for Independent). This variable goes on the X-axis. If there are more than one independent variable you should also have a key
 - Dependent Variable: Variable that is affected by the independent variable; what is being measured. This variable goes on the Y-axis.
- **Interval:** Each axis should have clearly marked and evenly spaced intervals.
- **Labels:** Should briefly describe the variables on the axes. Be sure to include units!
- **Scale:** Before you can plot your data points, you must figure out how much each box on your graph paper is worth. Use the range of data (max – min) to help you determine a scale that makes sense. Scale doesn't always have to start at zero, but it must be consistent. If you start off making each box worth 5 cm, each subsequent box must also be 5 cm.

Example:

Using the information above, identify what is good about the graph below and what needs improvement

Common Elements in the Human Body



Good:

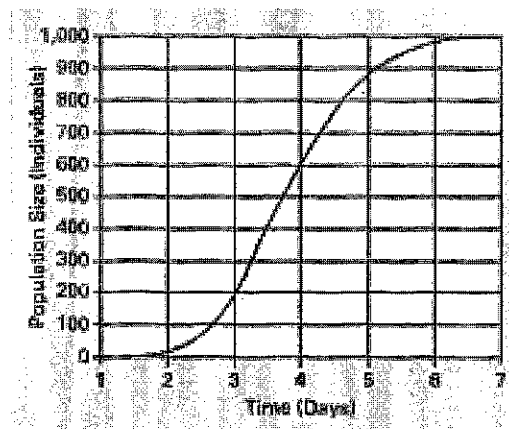
Improve:

Let's learn about each graph type and then practice constructing some of them.

1. X, Y Graph:

This is your standard graph with the independent variable on the X-axis and the dependent variable on the Y-axis.

An example is at right.



Example:

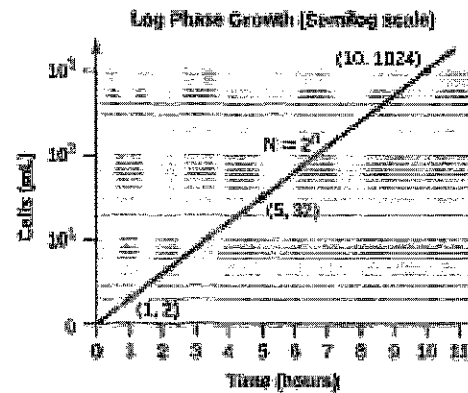
Sometimes rates can be determined from graphs by determining the slope ($\Delta Y / \Delta X$).

Study the X,Y graph above and determine the change in population per day (include units!)

A. between days 3 and 4. _____ B. between days 3 and 5. _____

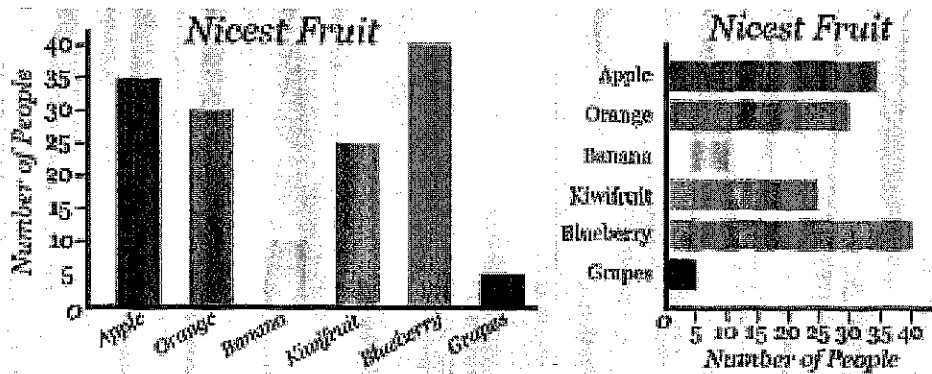
2. Log Y graph:

This graph is similar to the X,Y graph except the Y axis is a logarithmic scale. Note line spacings: separation decreases as one goes up the Y axis



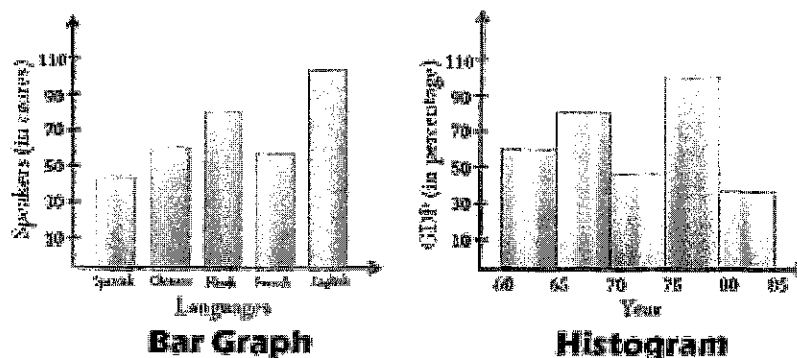
3. Bar Graph:

A graph showing the numerical value of a variable as the height or length of a rectangle representing categorical (non numerical) data. Note that the categorical data can be on the horizontal or vertical axis



4. Histogram:

A histogram is like a bar graph except that the data is noncategorical and continuous (think distribution) and that the rectangles are placed side-by-side. A **histogram** represents the frequency distribution of continuous variables. Conversely, a **bar graph** is a diagrammatic comparison of discrete variables. A **histogram** presents numerical data whereas a **bar graph** shows categorical data. The **histogram** is drawn in such a way that there is no gap between the bars.



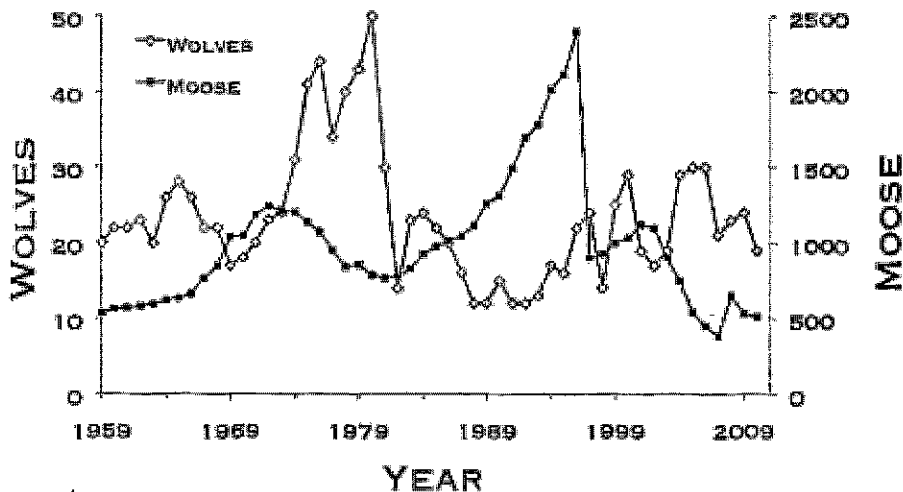
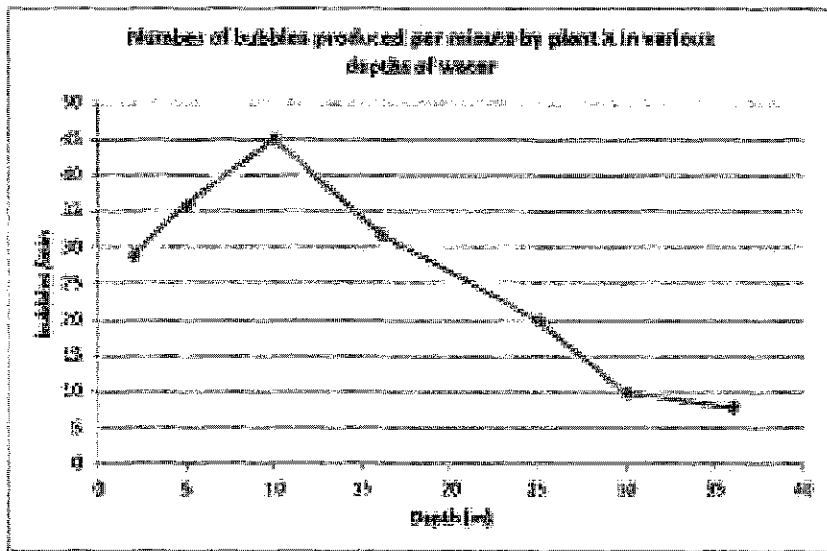
5. Line Graph:

A **line graph** consists of a series of points plotted on the grid and connected point to point by a **line**. **Line graphs** are only used when both variables are quantitative. **Line graphs** show trends, such as

how things change over time. See the example below. Lines should start and end on dots! **Do not draw the line past a dot unless asked to extrapolate**

6. Dual Y Graph:

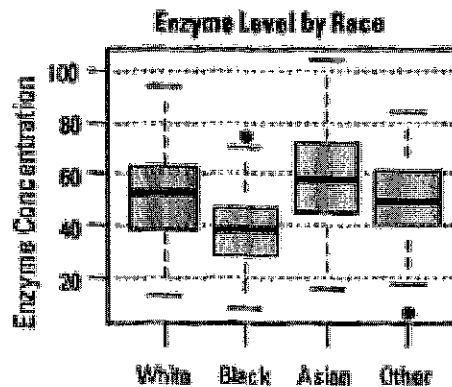
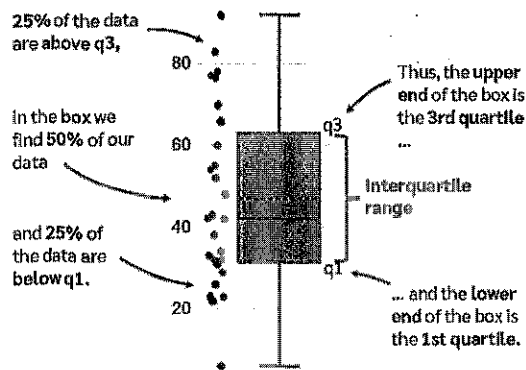
A graph showing two dependent variables (Y-axes) for the same independent variable (x-axis). The Y-axes are placed at opposite ends of the X-axis and scaled and labeled independently.



- In which year is the moose population the greatest? _____
- What is the moose population in that year? _____
- In which year is the wolf population the greatest? _____
- What is the wolf population in that year? _____

7. Box and Whisker Graph:

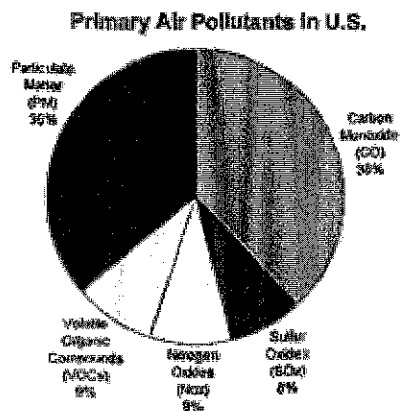
A graphic way to display the median, quartiles, and extremes of a data set on a number line to show the distribution of the data.



8. Pie Graph:

A special **chart** that uses "**pie slices**" to show relative sizes of data. The **chart** is divided into sectors, where each sector shows the relative size of each value. The total equals 100%.

It is Practice Time! Correctly construct graphs and interpret data asked below.



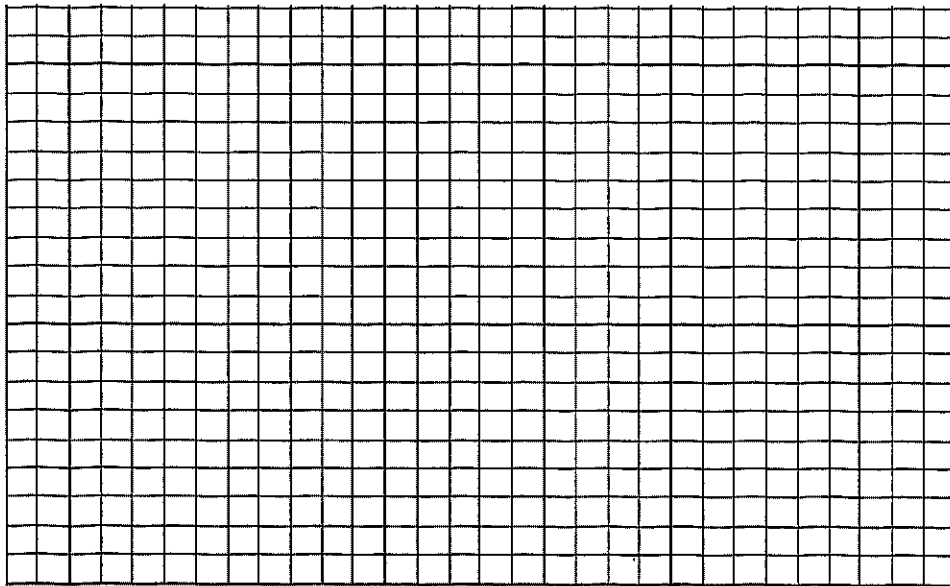
AP Biology Graphing Practice

Name _____ Block _____

1. Baby chickens, like all baby birds, require a constant source of food. As chick grow, more energy is required for daily activities, and their food requirements increase. The following data table reports the average food eaten by a group of 10 chickens over a 5-day period.

Baby Chicken Food Consumption

Day	Food Consumed (g)
0	0.0
1	1.0
2	3.2
3	6.5
4	10.6
5	15.4



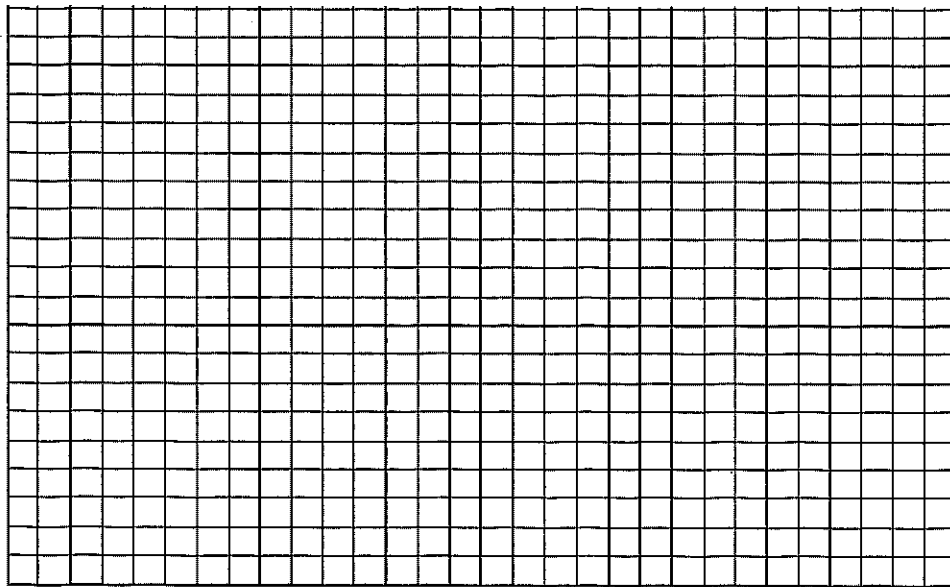
Questions:

1. Identify the independent and dependent variables.
2. How much grain will the chicks eat on day 6?
3. On day 7?
4. What type of relationship does the graph represent?

2. Elodea, a water plant commonly found in aquariums, gives off bubbles of oxygen when placed in bright light. Students in a biology class noted that if a light were placed at different distances from the plant in an aquarium, the rate of bubble production varied. The following data table shows the average results from several trials.

Elodea Bubble Production

Distance from Light (cm)	Bubble Production Rate (bubbles/min)
10	40
20	20
30	10
40	7
50	3



Questions

1. Identify the independent and dependent variables.
2. Estimate the O_2 production at 25 cm.
3. At 35 cm?
4. What type of relationship does the graph represent?

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:

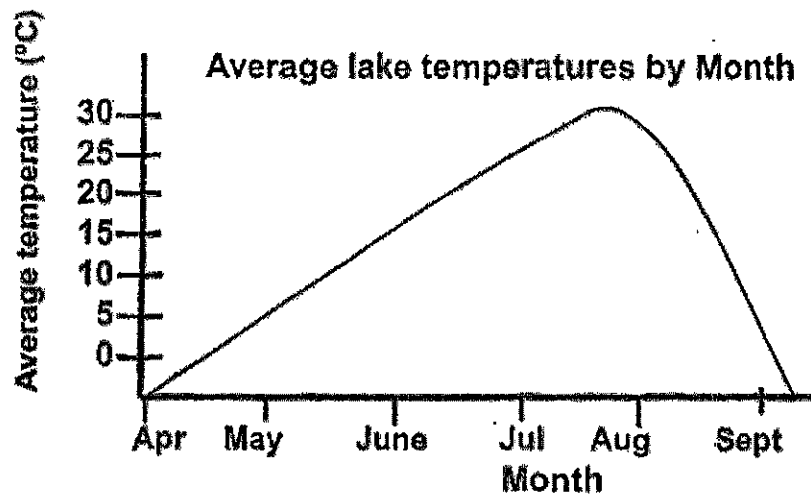
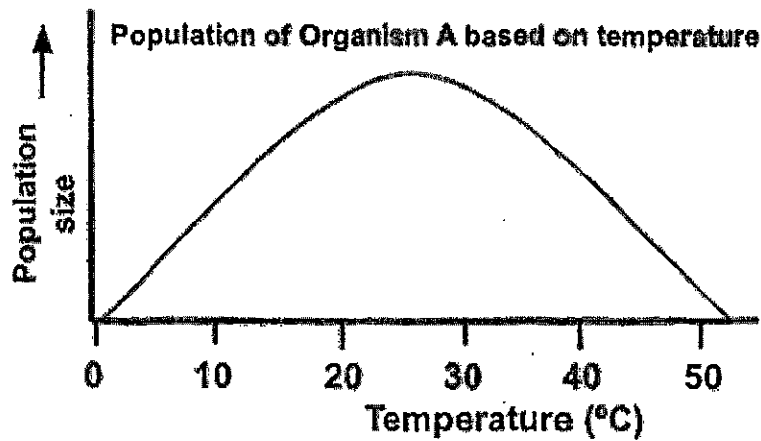
A biology student wanted to determine if there is a relationship between resting heart rate and body height. She gathered information from 12 classmates and constructed the table below.

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

AP Biology

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)
Resting respiratory rate	0	14	18
Exercise phase	1	18	30
	2	20	34
	3	24	40
Post-exercise phase	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.