

AP Bio Summer Homework: Instructions

- 1) Watch the videos one by one and complete the corresponding worksheets. The URL for the videos are at the top of each worksheet. You can also find them by searching "Bozeman science AP Biology".
- 2) Read the background information for your first lab on Animal Behavior, then complete the lab design worksheet.

Due Date: The first day of school =)

AP Biology Practice 1 – Models and Representations

Video Review Sheets

www.bozemanscience.com/apb-practice-1-models-representations

A. What is a model?.....A visual representation of

B. A _____ of how it works is a "Conceptual Model".

C. What are the four Big Ideas we will be discussing in AP Biology? List below along with associated example:

1. _____ - example shows natural _____

2. Free _____ - example:

3. _____ - genetics and cell

4. _____ - pyramid of

C. What are the 5 things you will need to be able to do using models and visual representations?
[Please keep in mind, some of the examples that he uses may be unknown to you at this time, focus on the "practice" not the content.]

1. _____

a. Relating to beetles, draw/label the final graph he created below:

b. Why do you think there were fewer light colored beetles when the trees became darker?

2. _____ What was is going to move in his example? _____

3. _____ They will give you a model and then _____ based on that.

4. _____ Means that you are _____ your knowledge to a visual representation

5. _____ Asking you to _____ the knowledge that you have.

D. Models allow us to make _____ of a _____ model.

E. What is the most famous model of all? _____ That was created by _____

Review Sheet for AP Biology Practice 1 – Models and Representations

Contributed by Winnie Litten — YouTube - /mslittenbiology Twitter-@mslittenbiology

AP Biology Practice 2 – Using Mathematics Video Review Sheet

www.bozemanscience.com/apb-practice-2-using-mathematics

NEED YOUR CALCULATOR!!!

A. All sciences have what at their core?

B. What is "Mathematical Biology" driven by:

1. _____: sequencing DNA – what is the trend?
2. _____ Theory: being used to predict
3. Computing _____: computers are getting
4. Laboratory experiments in silico:
 - a. In vitro:
 - b. In vivo:
 - c. In silico: simulating

C. Four equations in the four big ideas: want to be familiar with these

1. Evolution:
 3. Information:
2. Free energy:
 4. Systems:

D. Understandings in Using Mathematics:

1. _____ the _____ of a Mathematical Routine: Pause video, try and do it and then check it. You should do this one no problem. Show your work below
2. Apply _____ Routines: Again, try this problem, showing your work below. I think you can do this one based on common sense!
3. _____ quantities that _____ natural phenomena.
 - a. You can absolutely do this, show work.
 - b. Potatoes: you can do this too! _____ M Sucrose

AP Biology Practice 3 – Scientific Questioning Video Review Sheet

www.bozemanscience.com/apb-practice-3-scientific-questioning

1. I should be able to ask you, "How do we...."
2. Students should be able to answer, "This is how...."
3. What is a good example of how you ask questions all the time?
4. What is the problem with:
 - a. Smallest bird question?
 - b. Universe question?
 - c. Genetically modified food question?
5. Why is the plant growth question more scientific?....but what is a problem with it too?
6. Why is the CO₂ question a good scientific question?
7. A good question is going to lead to: (2x)
8. What are the three things you have to be able to do during the practice of "Scientific Questioning"?
9. Write out one of the three questions he "posed" concerning the phylogenetic tree. (You are just asking, not answering.)
10. When you "refine" a question, you are taking it to another _____
11. What is the third part of scientific questioning?
12. What can you then do if you are good at scientific questioning?

AP Biology Practice 4 – Data Collection Strategies

Video Review Sheet

www.bozemanscience.com/apb-practice-4-data-collection-strategies

1. What is science? Diagram his flow chart (you can do it left to right): The belief that:

2. In addition to collecting data you have to be able to:

3. Questions in four areas:
 - a. To _____ Data Collection Strategies. See if you can guess the right answer to the photosynthesis question BEFORE he explains it. You can see how he *justified* his answer. Did you get it right? _____

 - b. To _____ a plan for _____ Data of your own
 - i. First you would need to:

 - ii. Then: _____ an experiment that

What would a good essay contain?:

 - c. To _____ to

 - d. To _____ of Data.

4. What makes science, science?

AP Biology Practice 5 – Analysis and Evaluation of Evidence Video Review Sheet

www.bozemanscience.com/apb-practice-5-analysis-evaluation-of-evidence

1. One of the first things you want to do with data is:

2. When you look at data, see if there are patterns that you can

3. You will be asked:
 - a. To _____ data to Identify
 - b. To _____ Observations and
 - c. To _____ Evidence

4. We collect data. First we have to _____ it and then we have to

AP Biology Practice 6 – Scientific Explanations and Theories Video Review Sheet

www.bozemanscience.com/apb-practice-6-scientific-explanations-theories

A. Diagram the process of developing a theory; be sure to include the feedback loops.

B. The five ways to deal with theories and scientific explanations:

1. Justify claims with
2. Construct explanations based on
3. _____ the Reasons that Explanations and Theories are
4. Make _____ and predictions about
5. Evaluate

C. Theories get better and better over _____ and on the test they want you to be able to

AP Biology Practice 7 – Scales, Concepts and Representations Video Review Sheet

www.bozemanscience.com/apb-practice-7-scales-concepts-representations

1. This practice is about _____ knowledge. Bringing together different disciplines.
2. Scale: draw and label intersecting diagram and use one of his examples:

3. Domains: _____ of biology.
 - a. Thermodynamics (Physics) Example:

 - b. Biochemistry Example:

 - c. Chemistry Example:

4. Big Idea examples: elaborate on
 - a. Evolution example: peppered moth, what happens over _____

 - b. Free Energy: Feedback loops and how they allow organisms to survive in...

 - c. Information: Himalayan rabbit ex, expressing different genes depending on

 - d. Systems: Cotton ex sugar able to create

5. Two goals:
 - a. Connect Phenomenon and Models Across _____ and _____ scales. Try answering the question before he does. ____

 - b. Connect Concepts _____ and _____ Domains. Try ____

Are you going to try his Wiki game?

AP Biology Lab 11 – Animal Behavior

Video Review Sheet

www.bozemanscience.com/ap-bio-lab-11-animal-behavior

1. Where is a pill bug found?
2. Define Ethology:
3. Name and describe the two different responses animals show in response to stimuli:
4. WHY do fruit flies go through a courtship ritual?
5. What are some of the fruit fly rituals?
6. Diagram the pill bug lab set-up:

background

Organisms orient to stimuli that are important to their survival. Movement toward or away from important stimuli depends upon both the sensory and motor abilities of the organism. For example, humans do not sense a magnetic field and cannot orient towards it (without instruments like a compass). Therefore, we may infer that magnetic fields have not been very important for human survival as a species.

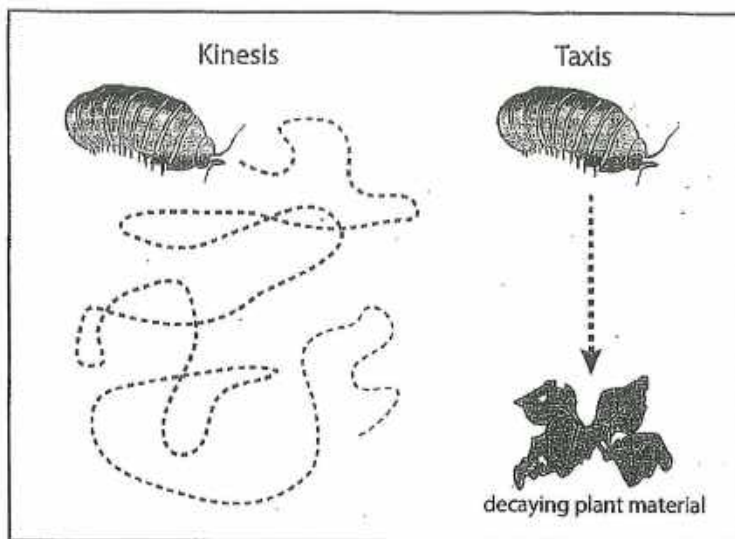
A stimulus might involve anything that can be sensed, like light, sound, touch, heat, or chemicals. Once an organism with sensory/motor abilities perceives a stimulus, it can orient or move either towards or away from that stimulus depending upon the nature of the stimulus (opportunity or threat). Movement in response to a stimulus is classified as **taxis**, whereas random movement or movement irrespective of stimulus is classified as **kinesis**. Generally, the more critical a stimulus is to an organism's survival, the stronger the response to that stimulus.

Therefore, an organism that senses an optimal food source will usually orient strongly toward it. In an animal that senses primarily through smell, movement towards an appropriate food source would be called positive **chemotaxis**. In the same vein, orienting with reference to light is called **phototaxis**, and orienting in response to gravity is called **geotaxis**, etc.

Behavior is not limited to motile organisms. Plants also show each of these types of taxis. Geotaxis is demonstrated by the roots growing down and the shoots growing up. Trees will turn their leaves to capture the optimum amount of sunlight for photosynthesis.

Behavior can be classified as innate or learned. **Innate behavior** is inherited and instinctive, and develops independently of the experience of an organism in its environment over time. On the other hand, **learned behaviors** are not inherited and can be changed as a result of the animal's experience with its environment and other organisms.

In this lab, you will be investigating and observing the taxis and kinesis of model organisms - either fruit flies or pill bugs. As you make behavioral observations, think about how those behaviors contribute to making the species an evolutionary success in its natural environment. Since differential reproduction is a strong driver of evolution, you may want to take special note of any taxis related to reproductive behaviors.



(continued on next page)

LABORATORY 11. ANIMAL BEHAVIOR

OVERVIEW

In this laboratory you will observe some aspects of animal behavior. In laboratory 11A, you will observe pill bugs and design an experiment to investigate their responses to environmental variables. In laboratory 11B, you will observe and investigate mating behavior in fruit flies. Your teacher may suggest other organisms, or other types of animal behavior to study.

OBJECTIVES

Before doing this laboratory you should understand:

- the concept of distribution of organisms in a resource gradient, and
- the difference between kinesis and taxis.

After doing this laboratory you should be able to:

- describe some aspects of animal behavior, such as orientation behavior, agonistic behavior, dominance display, or mating behavior, and
- understand the adaptiveness of the behaviors you studied.

INTRODUCTION

Ethology is the study of animal behavior. Behavior is an animal's response to sensory input, and falls into two basic categories: **learned** and **innate** (inherited).

Orientation behaviors place the animal in its most favorable environment. In **taxis**, the animal moves toward or away from a stimulus. Taxis is often exhibited when the stimulus is light, heat, moisture, sound, or chemicals. **Kinesis** is a movement that is random and does not result in orientation with respect to a stimulus. If an organism responds to bright light by moving away, that is taxis. If an animal responds to bright light by random movements in all directions, that is kinesis.

Agonistic behavior is exhibited when animals respond to each other by aggressive or submissive responses. Often the agonistic behavior is simply a display that makes the organism look big or threatening. It is sometimes studied in the laboratory with Bettas (Siamese Fighting Fish).

Mating behaviors may involve a complex series of activities that facilitate finding, courting, and mating with a member of the same species.

EXERCISE 11A: General Observation of Behaviors

In this lab, you will be working with terrestrial isopods commonly known as pillbugs, sowbugs or roly-polies. These organisms are members of the Phylum Arthropoda, Class Crustacea, which also includes shrimp and crabs. Most members of this group respire through gills.

Animal Behavior Lab Design Prep

Part 1

Read the background information about animal behavior, complete the vocabulary table, and commit the words to memory (flash cards help!)

| Term | Definition in your own words | Sketch to represent the term |
|------------------|------------------------------|------------------------------|
| Kinesis | | |
| Taxis | | |
| Chemotaxis | | |
| Phototaxis | | |
| Geotaxis | | |
| Innate behavior | | |
| Learned behavior | | |

Part 2

Read the lab overview, objectives and introduction. Based on the objectives, design a lab that will test pill bug behavior (are they responding to a stimulus or is their movement just kinesis). Include all the elements of a traditional lab design including a sketch of the set-up, listed procedure, and data table to collect data. Use an additional separate sheet of paper if needed.

Question to be tested:

Hypothesis:

Null Hypothesis (look this up on your own if you don't know what a null hypothesis is):

Listed (1., 2. 3, etc) Lab Procedure:

Lab set up sketch:

Data table: