AP Biology Summer Assignment
Hermitage High School
Mrs. Ruiz de Velasco *aka* Mrs. R & Mrs. Sarah Hammonds

Welcome to AP biology! This class is highly intensive, with a lot of material that needs to be covered. Please be aware that part of taking this class is a commitment to being on time, on task, and hard working. Although AP Biology is a huge commitment, we will have a lot of fun. We are looking forward to working with each one of you next year! Here are a few items of interest before you get started on the summer assignment. The reason we are giving you a summer assignment is to keep your mind sharp and thinking, so you are ready to hit the ground running!

Mandatory Assignment 1: Introduction Letter

First, we would like to know a little about who you are so your first assignment is to send us an email. Yup....that's it! Part of your first AP Biology grade will be sending an email...if only all of the grades were this easy! We will reply so you have electronic record that your assignment was received. Don't worry! There is no right or wrong answer....be honest so that we can figure out the best way to help you next year! Please remember to use proper salutations, closing, phrasing, etc. in your email.

Here is what we would like you to email to BOTH teachers before the end of **JUNE!**

To: cprdevelasco@henrico.k12.va.us smfenton@henrico.k12.va.us

Subject Line: AP Biology 18-19

1. Your full name (& nickname that you go by if you have one) & stuff about you!
2. Who was your last science teacher? What class?
3. What other science classes have you taken? Are planning to take next year?
4. What do you like to do (hobbies, sports, music, interests, etc.)?
5. Do you have a job or plan on getting a job next year? What kind?
6. What are your personal strengths and weaknesses when it comes to learning new material?
7. What is the most effective way for you to prepare for a test?
8. How many AP classes have you taken so far? How many have you passed with a 3 or higher?
9. How many AP classes are you taking this year (please list)?
10. Was there anything that you liked or disliked about your earlier biology class?
11. What are you looking forward to the most in AP Biology?
12. What are you most anxious about in AP Biology?
13. Why are you taking AP Biology? What do you hope to accomplish/gain?

Mandatory Assignment #2 – Schoology

Using Schoology, use the code 54JW8-46KCT to join the 2018-19 AP Biology Group. This is where you will find a digital copy of the summer work, along with all instructions and supplemental material. The same information will be posted in Schoology as soon as rosters are available during the summer. Post questions, comments, etc. to others that are taking AP Biology next year if you like ☺

Mandatory Assignment #3 – Get your supplies for AP Biology Class

Get yourself ready for class! Below is the list of SUGGESTED supplies that you might need for class. One thing you can be assured of is that our class is interactive – that being said you will need the proper tools to engage in project based, interactive learning, labs and classroom activities.

AP Biology Summer Work 2018-19

REQUIRED:

For RUIZ DE VELASCO: One (1) Mead/Five Star **HEAVY DUTY** (plastic cover) 5 subject Notebook College ruled. This will be used daily in class for notes and daily activities; our interactive notebook!

For HAMMONDS: 1 ½ in – 2 in Heavy Duty Binder. This will be used for notes, labs, worksheets, etc.

1. Loose leaf paper (wide or college rule) for various activities and assignments. Do not use your interactive notebook to take blank pages out of!
2. Blue/Black pens and Red Pen (for corrections) – & pencils (for testing days)

SUGGESTED:

1. Pack of highlighters (several different colors); might be useful for your notes, reading, and activities
2. Colored pencils or markers that WILL NOT bleed through pages

Mandatory Assignment #4 – Ecology Pre-Assessment

- Our first unit of study is Animal Behavior and Ecology. In order to assess your prior knowledge of ecological principles, you will be completing a pre-assessment "quiz" via Google forms. This assessment should be used by you to determine what you recall from your previous Biology course and need to review, and will be used by the teachers to evaluate which principles students know well and focus areas requiring additional review. This assessment also introduces you to the high-level, application based questions that you will encounter in the course.
- If you score an 85% or higher on the pre-assessment, you are not required to complete assignment #4.

Link to assessment: https://goo.gl/forms/WQSLukZg57G2nKHq2

Mandatory Assignment #5 – Ecology Review Problem Set

- If you completed the pre-assessment with an 85% or higher, you are not required to complete this assignment; however, the more you practice with the material, the better off you will be on test day!
- Complete the attached Ecology Review Problem set to review ecological principles from your previous Biology course.

Mandatory Assignment #6 – Graphing and Data Analysis

- Proficiency in both graphing and data analysis are critical in AP Biology. The two attached "Data Nuggets" will serve as refreshers for proper graphing and data interpretation.
    - Data Set #1 – Bye Bye Birdie
    - Data Set #2 – Won't you be my urchin?

We are so excited to get to know you next year! Please do not hesitate to contact either of us during the summer with questions about the course or summer assignment, and have a great summer!

AP Biology Summer Work 2018-19

SUMMER ASSIGNMENT CHECKLIST

DUE DATE	ASSIGNMENT	CHECK WHEN COMPLETED
6/29/18	Introduction Letter – send intro letter to Mrs. R & Hammonds	
6/29/18	Schoology Group – join AP Bio Schoology Group	
9/4/10	Supplies – when your schedule is available, start looking for supplies	
9/10/18	Pre-Assessment – complete Google form	
9/10/18	Ecology Practice Problems – complete to review concepts from Bio 1	
9/10/18	Data Nuggets – complete 2 graphing and analysis scenarios	

ECOLOGY PRACTICE PROBLEMS

Multiple-Choice Questions

1. All of the following statements about Earth's ozone layer are false EXCEPT
   (A) It is composed of O_2.
   (B) It increases the amount of ultraviolet radiation that reaches Earth.
   (C) It is thinning as a result of widespread use of certain chlorine-containing compounds.
   (D) It is a result of widespread burning of fossil fuels
   (E) It allows green light in but screens out red light.

2. Which of the following is the major primary producer in a savanna ecosystem?
   (A) lion
   (B) gazelle
   (C) grass
   (D) snake
   (E) diatom

3. The carrying capacity of a population is defined as
   (A) the amount of time the parents in the population spend rearing and nurturing their offspring.
   (B) the maximum population size that a certain environment can support at a particular time.
   (C) the amount of vegetation that a certain geographic area can support.
   (D) the number of different types of species a biome can support.
   (E) the number of different genes a population can carry at a particular time.

4. Which of the following terms is used to describe major types of ecosystems that occupy broad geographic regions?
   (A) biome
   (B) community
   (C) chaparral
   (D) trophic level
   (E) photic zone

5. A lake that is nutrient rich and that supports a vast array of algae is said to be
   (A) oligotrophic.
   (B) abyssal.
   (C) littoral.
   (D) eutrophic.
   (E) limnetic.

6. Which of the following best describes an estuary?
   (A) An area that is periodically flooded, causing its soil to be consistently damp
   (B) An area where a river changes course after being diverted from its original course by an obstacle
   (C) The area where a freshwater river merges with the ocean
   (D) The area where a mass of cold water and a mass of warm water meet in the pelagic zone
   (E) An outshoot of land that extends into the ocean

7. Which of the following is the term that refers to the layer of light penetration in aquatic ecosystems?
   (A) littoral zone
   (B) limnetic zone
   (C) photic zone
   (D) benthic zone
   (E) aphotic zone

Directions: The group of questions below consists of five lettered choices followed by a list of numbered phrases or sentences. For each numbered phrase or sentence, select the one choice that is most closely related to it. Each choice may be used once, more than once, or not at all.

Questions 8–12

(A) Temperate grassland
(B) Tropical forest
(C) Temperate broadleaf forest
(D) Tundra
(E) Desert

8. Characterized by permafrost and few large plants

9. Characterized by epiphytes and significant canopy

10. Characterized by an understory of shrubs and trees that lose their leaves in the fall

11. Characterized by occasional fires, nutrient-rich soil, and large grazing animals

12. Characterized by sparse rainfall and extreme daily temperature fluctuations

13. A bacterial colony that exists in an environment displaying ideal conditions will undergo
   (A) logistic growth.
   (B) intrinsic growth.
   (C) hyperactive growth.
   (D) exponential growth.
   (E) unbounded growth.

14. A species' specific use of the biotic and abiotic factors in an environment is collectively called the species'
(A) habitat.
(B) trophic level.
(C) ecological niche.
(D) placement.
(E) partitioning.

15. In which type of camouflaging does a non-toxic animal mimic the appearance of a toxic animal?
(A) Müllerian mimicry
(B) cryptic coloration
(C) aposematic coloration
(D) Batesian mimicry
(E) parasitoidism

16. The dominant species in a community is the one that
(A) has the greatest number of genes per individual.
(B) is at the top of the food chain.
(C) has the largest biomass.
(D) eats all other members of the community.
(E) bears the most offspring in each mating.

17. Which statement best describes energy transfer in a food web?
(A) Energy is transferred to consumers, which convert it to nitrogen compounds and use it to synthesize amino acids.
(B) Energy from producers is converted into oxygen and transferred to consumers.
(C) Energy from the sun is stored in green plants and transferred to consumers.
(D) Energy is transferred to consumers that use it to synthesize food.
(E) Energy moves from autotrophs to heterotrophs to decomposers, which convert it to a form producers can use again.

18. A fire cleared a large area of forest in Yellowstone National Park in the 1980s. When the first plants pioneered this burned area, this was an example of
(A) primary succession.
(B) secondary succession.
(C) biological evolution.
(D) a keystone species.
(E) the top-down model.

19. In the nitrogen cycle, the process by which nitrogen in the atmosphere is made available for use by plants is known as
(A) ammonification.
(B) denitrification.
(C) nitrogen fixation.
(D) nitrogen cycling.
(E) nitrogenation.

20. The process in which CO_2 in the atmosphere intercepts and absorbs reflected infrared radiation and re-reflects it back to Earth is known as
(A) global warming.
(B) atmospheric insulation.
(C) stratospheric insulation.
(D) biological magnification.
(E) the greenhouse effect.

21. A Type I survivorship curve is level at first, with a rapid increase in mortality in old age. This type of curve is
(A) typical of many invertebrates that produce large numbers of offspring.
(B) typical of human and other large mammals.
(C) found most often in *r*-selected populations.
(D) almost never found in nature.
(E) typical of all species of birds.

22. Which of the following would not be a density-dependent factor limiting a population's growth?
(A) increased predation by a predator
(B) a limited number of available nesting sites
(C) a stress syndrome that alters hormone levels
(D) a very early fall frost
(E) intraspecific competition

23. The human population is growing at such an alarmingly fast rate because
(A) technology has increased our carrying capacity.
(B) the death rate has greatly decreased since the Industrial Revolution.
(C) the age structure of many countries is highly skewed toward younger ages.
(D) fertility rates in many developing countries are above the 2.1 children per female replacement level.
(E) all of the above are true.

24. When one species was removed from a tidepool, the species richness became significantly reduced. The removed species was probably
(A) a strong competitor.
(B) a potent parasite.
(C) a resource partitioner.
(D) a keystone species.
(E) the species with the highest relative abundance.

25. Which of the following interspecific interactions is not an example of a +/− interaction?
(A) ectoparasite and host
(B) herbivore and plant
(C) honeybee and flower
(D) pathogen and host
(E) carnivore and prey

Free-Response Question

1. All of the organisms in a community are interrelated by the abiotic and biotic resources they use in the course of their lives.

(a) Describe the relationships that exist among a hawk, a mouse, a plant, and soil in a particular ecosystem.
(b) As unlikely as it may seem, biotic components of an environment do influence the abiotic components of an environment. Give two examples of this influence.

Name_____

DATA Nugget

Bye bye birdie? Part I

Featured scientist: Richard Holmes from the Hubbard Brook Experimental Forest

Research Background:

The Hubbard Brook Experimental Forest is an area where scientists have collected ecological data for many years. It is located in the White Mountains of New Hampshire, and data collected in this forest helps uncover trends that happen over long periods of time. It is important to collect data on ecosystems over time because these patterns could be missed with shorter experiments.

Each spring, Hubbard Brook comes alive with the arrival of migratory birds. Many migrate from the tropics to take advantage of the abundant insects and the long summer days of northern areas, which are beneficial when raising young. **Avian ecologists** are scientists who study the ecology of birds. They have been keeping records on the birds that live in the experimental forest for over 40 years. These data are important because they represent one of the longest bird studies ever conducted!

Richard is an avian ecologist who began this study early in his career as a scientist. He was interested in how bird populations were responding to long-term environmental changes in Hubbard Brook. Every summer since 1969, Richard has taken his team of trained scientists, students, and technicians into the field to count the number of birds that are in the forest and identify which species are present. Richard's team monitors

Male Black-throated Blue Warbler feeding nestlings. Nests of this species are built typically less than one meter above ground in a shrub such as hobblebush. Photo by N. Rodenhouse.

Name_____

populations of over 30 different bird species. They wake up every morning before the sun rises and travel to the far reaches of the forest. They listen for, look for, identify, and count all the birds they find. The team has been trained to be able to identify the birds by sight, but also by their calls. Team members are even able to identify how far away a bird is by hearing its call! The scientists record the number of birds observed in four different study areas, each of which are 10 hectare in size — roughly the same size as 19 football fields. Each of the four study areas contains data collection points that are arranged along **transects** that run east to west through the valley. Transects are parallel routes along which the measurements are taken. Each transect is approximately 500 meters from the next. At certain points on each transect, an observer stands and records all birds seen or heard during a ten-minute interval, and estimates the distance the birds are from the observer. The entire valley is covered three times a season. By looking at bird abundance data, Richard and his colleagues can identify trends that reveal how avian populations change over time.

Scientific Question: How has the total number of birds at the Hubbard Brook Experimental Forest changed over time?

Scientific Data:

Use the data below to answer the scientific question

Year	Total number of birds counted / study area
1969	158
1970	163
1971	212
1972	214
1973	192
1974	161
1975	201
1976	194
1977	187
1978	149
1979	147
1980	131
1981	117
1982	124
1983	118
1984	89
1985	116
1986	91
1987	85
1988	113
1989	101
1990	133
1991	120
1992	130

Year	Total number of birds counted / study area
1993	94
1994	84
1995	72
1996	93
1997	87
1998	72
1999	85
2000	89
2001	91
2002	71
2003	89
2004	76
2005	96
2006	108
2007	100
2008	92
2009	106
2010	108
2011	95
2012	105
2013	120
2014	113
2015	114

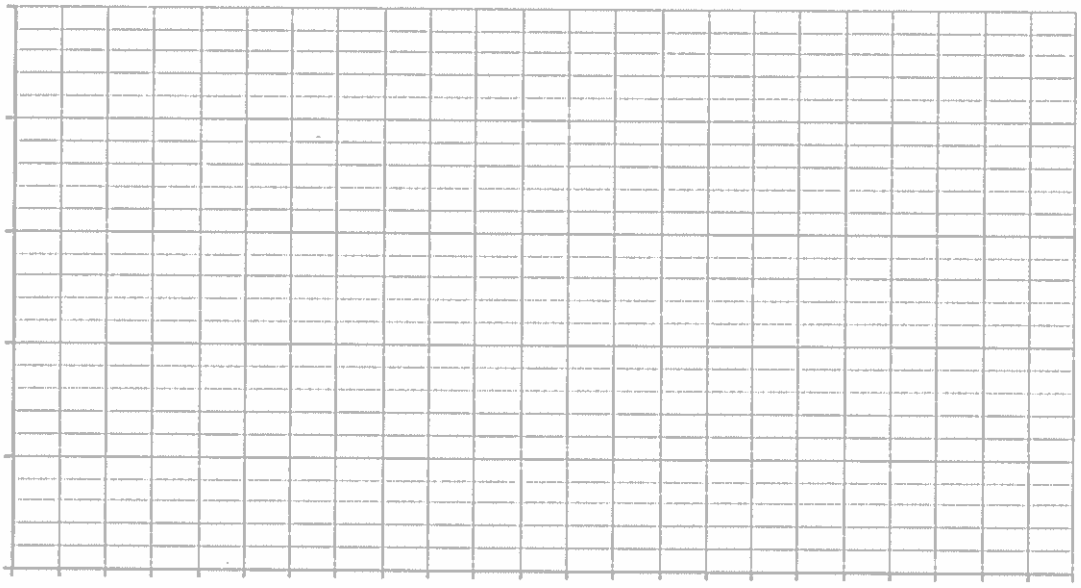
Name_____

What data will you graph to answer the question?

Independent variable: _____

Dependent variable: _____

Draw your graph below: Identify any changes, trends, or differences you see in your graph. Draw arrows pointing out what you see, and write one sentence describing what you see next to each arrow.



Interpret the data:

Make a claim that answers the scientific question.

Name_____

What evidence was used to write your claim? Reference specific parts of the tables or graph.

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about long-term datasets and what they can tell us about bird populations.

Name_____

DATA Nugget

Won't you be my urchin?

Featured scientist: Sarah W. Davies from University of Texas at Austin

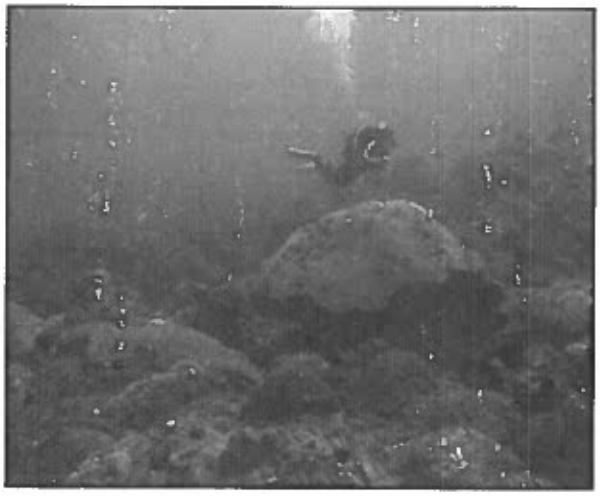
Research Background:

Imagine you are snorkeling on a coral reef where you can see many species living together. Some animals, like sharks, are predators that eat other animals. Other species, like anemones and the fish that live in them, are mutualists and protect each other from predators. There are also herbivores, like **urchins**, that eat plants and algae on the reef. All of these species, and many more, need the coral reef to survive.

Corals are the animals that build coral reefs. They are very sensitive and can be hurt by human activity, like boating and pollution. Corals reef ecosystems are also in danger from warming waters due to climate change. Sadly, today many coral reefs around the world are dying because the places they grow are changing. Sarah is a marine biologist who is determined to figure out ways to save coral reefs. Sarah wants to understand how to help the dying corals so they can keep building the important and diverse coral reef habitats.

Corals compete with large types of **algae**, like seaweed, for space to grow on the reef. Corals are picky and only like to live in certain places. If there is too much algae, corals will have no place to attach and grow. Sea urchins are important herbivores and one of the species that like to eat algae. Sarah thought that when urchins are present on the reef, corals will have less competition from algae for space, and thus more room to grow. Maybe adding urchins to a coral reef is a way to help corals!

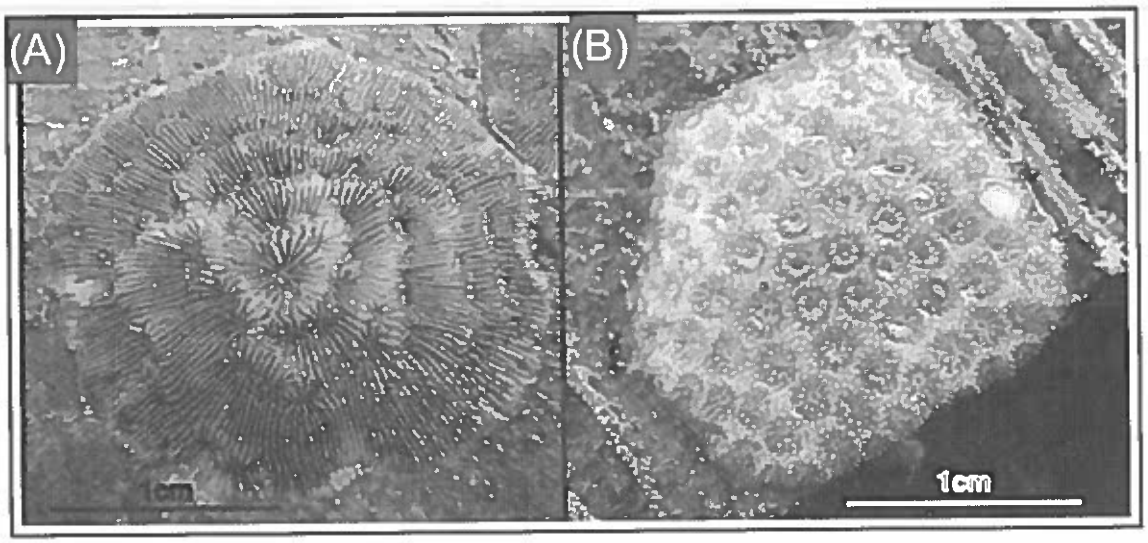
Experimental setup with tiles in bins. Some bins have sea urchins and some do not.



Scientist Sarah scuba diving on the coral reef for fieldwork.

Name_____

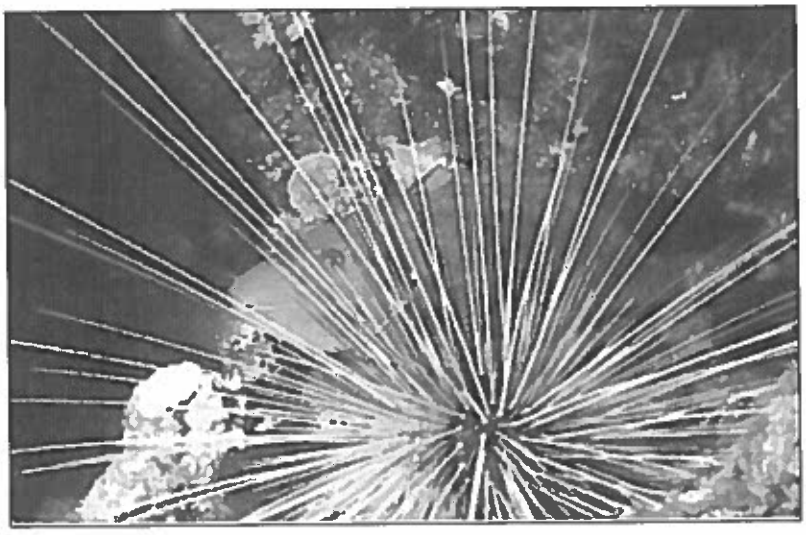
To test her idea Sarah set up an experiment. She set 8 bins out on the reef. Into half of the bins, Sarah added urchins. Into the other half she left without urchins as a control. Sarah put tiles into all of the bins. Tiles gave an empty space for coral and algae to compete and grow. After a few months, Sarah looked at the tiles. She counted how many corals were growing on each tile. Sarah predicted that more corals would grow on the tiles in bins with sea urchins compared to the control bins with no sea urchins.



(A) Coral species *Agaricia* juvenile on experimental tile.
(B) Coral species *Porites* juvenile on experimental tile.

Scientific Question: How does the presence of urchins affect corals?

What is the hypothesis? Find the hypothesis in the Research Background and underline it. A hypothesis is a proposed explanation for an observation, which can then be tested with experimentation or other types of studies.



The vegetarian sea urchin *Diadema antillarum*.

Name_____

Draw a food web for the coral reef ecosystem:

1. Include **corals**, **urchins**, **and algae** in your food web. Write out the name of each species and put a box around it.
2. Add arrows to connect the boxes. Arrows represent the interactions between the species in the ecosystem. For example, you can use arrows to show who eats whom, or to show competition between different species. Use the direction of the arrow to show the direction of energy flow or other relationships.
3. Once you have drawn your arrows, label them with the type of interaction. For example, label an arrow with the words "eaten by" if the arrow connects a species to the species that consumes it.

Name_____

Scientific Data:

Complete the table and use the data below to answer the scientific question:

Treatment in the bin	Bin #	Number of corals on tile
Sea urchins present	1	8
Sea urchins present	2	12
Sea urchins present	3	10
Sea urchins present	4	25
No sea urchins	5	1
No sea urchins	6	3
No sea urchins	7	6
No sea urchins	8	11
Average number of corals on tile when urchins present		
Average number of corals on tile when there are no sea urchins		

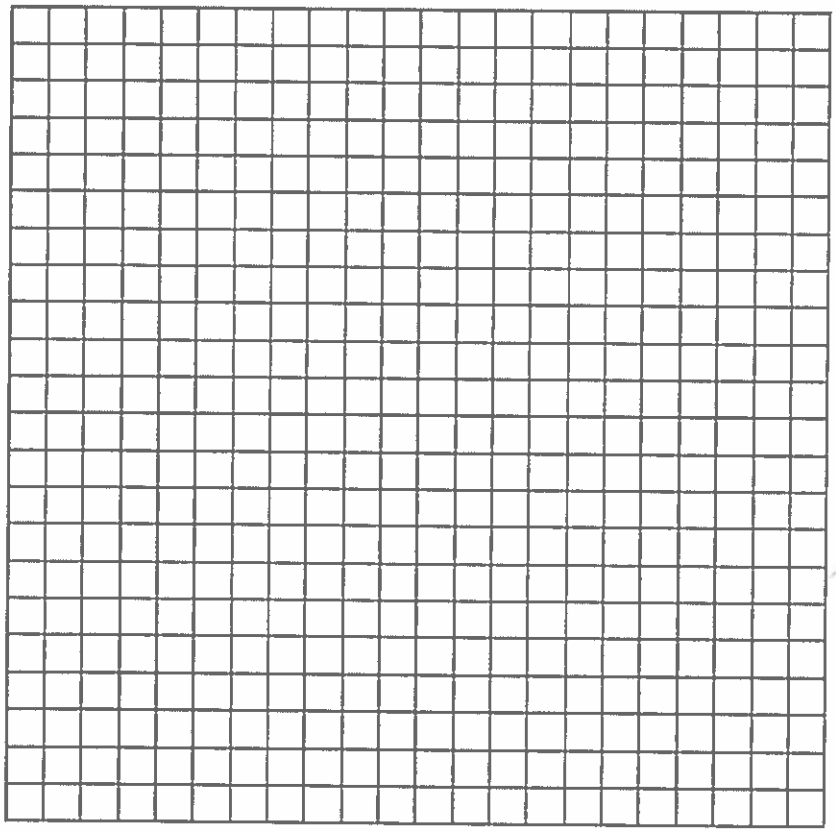
What data will you graph to answer the question?

Independent variable: _____

Dependent variable: _____

Name_____

Draw your graph below: Identify any changes, trends, or differences you see in your graph. Draw arrows pointing out what you see, and write one sentence describing what you see next to each arrow.



Interpret the data:

Make a claim that answers the scientific question.

Name_____

What evidence was used to write your claim? Reference specific parts of the table or graph.

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about the relationships between coral, algae, and urchins.

Did the data support Sarah's hypothesis? Use evidence to explain why or why not. If you feel the data were inconclusive, explain why.

Your next steps as a scientist: Science is an ongoing process. What new question(s) should be investigated to build on Sarah's research? What future data should be collected to answer your question?