APES Summer Assignment

Welcome to AP* Environmental Science (APES) for the 2024 - 25 school year, taught by Maxwell and Terranova

APES is designed to be the equivalent of a one semester, introductory college course in Environmental Science. The course is interdisciplinary, encompassing topics in chemistry, physics, geology, biology, environmental studies, and geography. It also incorporates a sociological, political, and global perspective. APES is designed to provide students with the scientific principles, concepts, and methodologies required to understand the interrelationships of the natural world, to identify and analyze environmental problems both natural and human made, to evaluate the relative risks associated with these problems, and to examine alternative solutions for resolving and/or preventing them.

This assignment serves to help you prepare for the year ahead. To be a successful APES student, you must be willing to spend significant time outside of class preparing and completing work. Remember that this course is modeled after a college course, so both the fast pace and sheer depth of information may be new to you. This course requires dedication, commitment, and total immersion into the field of environmental science.

This assignment is to be completed independently and is DUE ON THE FIRST DAY OF SCHOOL. Any assignments that are late will follow the school approved late policy.

Assignment	Estimated time	Materials needed	What you need to turn in.
Part 1 **Introduction to APES**	1 hour	*Computer required to watch videos. Paper and pen. News outlet.	Take detailed handwritten notes on video and answer reflection questions(handwritten). Bring it on the first day of school.
Part 2 **Scavenger Hunt**	Varies	*Mobile device/camera *Computer required to create powerpoint	Create a powerpoint or slideshow of photographs with captions. Turn in on Google Classroom by the first day of school.
Part 3 **Assessment questions and graph prep**	6 hours+	Pencils and paper.	Handwrite or type answers to problems, showing all work. Bring completed on the first day of school. There will be a quiz in class sometime during first two weeks of school.

Part One: *Introduction to Environmental Science*

Directions: Go to the Bozeman Science website and to the AP Environmental Science course.

- Watch the first video, *001 Environmental Science* (9:08 minutes).

Link : http://www.bozemanscience.com/apenvironmentalscience/

- Take detailed, handwritten notes on the material presented.

- Answer the following reflection questions:
  1. What environmental topics do you hope to learn about this year?

  2. Why is it important for high school students to take this course?

  3. Do you consider yourself to be environmentally conscientious?

  Explain
- Look at the news (newspaper, online, tv). Research and write a two paragraph summary of one current environmental issue that stands out to you. Make connections to the video. Be prepared to discuss.

Part Two: *APES Scavenger Hunt*

Directions: Find the items in the following scavenger hunt list! Proof should be obtained digitally in a photograph or video, and compiled into a slideshow or video. To prove that it was you who did the work, each of the following *must* appear in each photo: *YOU* appear in the photo, the item from the list, and a *cut out of this waving ape! (on next page)* The ape is nice because you can keep it in your wallet or purse during your summer travels ;)

Each photo should have a **caption** which identifies the item from the list and an explanation or connection to an environmental science theme or topic. These will be shown in class. A fantastic example can be seen on YouTube https://www.youtube.com/watch?v=4gEWjJcwZzo

1. An herbivore eating a producer.
2. Growing crops.
3. An organic food item in the grocery store.
4. A genetically modified food item.
5. 3 pieces of litter from a public place.
6. Product made from recycled materials.
7. Renewable energy.
8. A source of freshwater.
9. Nonpoint or point source of pollution.
10. Decomposition.
11. Reuse of potential waste.
12. Fossil fuel production, processing, or use
13. A human less than 5 years old.
14. Two cars, in the same image, differ by more than 20 mpg.
15. Worker in an environment related profession.
16. Farm raised fish.
17. A tree you cannot put your arms more than halfway around.
18. A mineral that came from a mine.
19. An electric or hybrid vehicle in use (i.e., not merely at a dealership, but can be parked)
20. An environmentally positive sight (i.e., something you think is helping the environment)
21. A LEED certified building
22. Source of air pollution that is *not* an automobile
23. Invasive species
24. Endangered species
25. A nonhuman thing in the environment you find extraordinarily beautiful

Part Three:

<u>Summer Assignment Questions 2022-2023</u>
Complete all the questions below and be sure to answer the question fully. Do not copy and paste. Answer in your own words.

1. What is environmental science?

2. Why is environmental science interdisciplinary?

3. Differentiate between each of these land designations during the Progressive Era:
a. National Parks -
b. National Forest -
c. National Wildlife Refuges -

4. Define environmental ethics
    a. Anthropocentrism -
    b. Ecocentrism -

5. Describe each of these designations of natural resources made during the Progressive Era: a. Inexhaustible resources -
    b. Renewable resources -
    c. Nonrenewable resources -
    d. Recyclable resources -

6. What is the difference between normal waste and hazardous waste?

7. Briefly define the role of each of these laws passed during the 1970s:
    a. Safe Drinking Water Act -
    b. Clean Water Act -
    c. Clean Air Act -
    d. Resource Conservation and Recovery Act -
    e. Endangered Species Act -
    f. Environmental Protection Agency

8. What is gross domestic product (GDP)?

9. What is a developing country?

10. What does life expectancy measure?

11. What does ecological footprint measure?

12. Define each term:
    a. Matter -
    b. Mass -
    c. Volume -.
    d. Energy -

13. What is an atom?

14. Define each part of an atom:
    a. Protons -
    b. Neutrons -.
    c. Electrons -
15. What is a molecule?

16. What is photosynthesis?

17. What is the equation of photosynthesis?

18. What is cellular respiration?

19. What is a producer, consumer and decomposer?

20. Define potential energy and provide an example.

21. Define kinetic energy and provide an example.

22. What are the first two Laws of Thermodynamics?

23. What does a food chain diagram show?

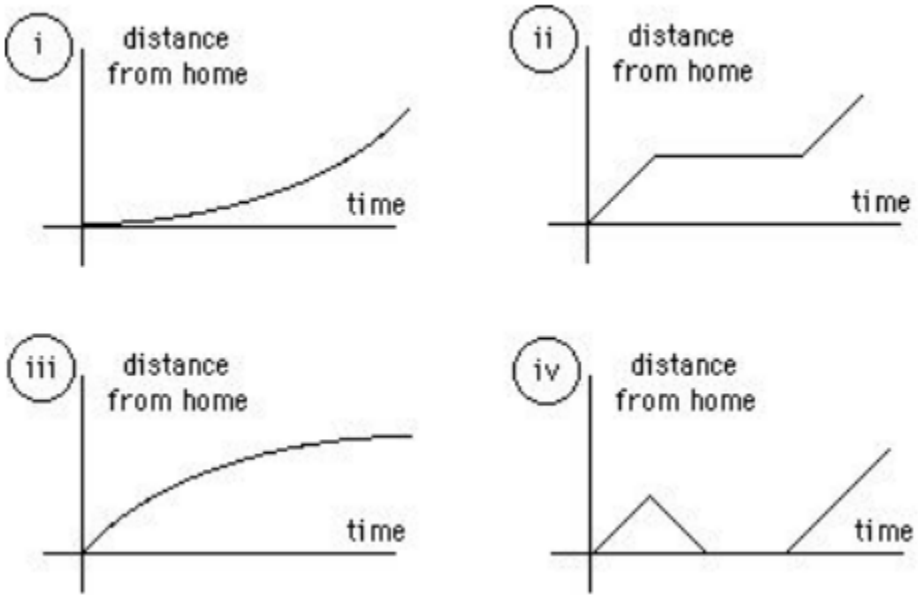
24. Create a food chain and label each level.
25. What is the role of biogeochemical cycles?

Graph Prep

Practice Interpreting Data: The following questions are to help you practice reading information shown on a graph. Answer each question on the separate answer sheet.

1. Identify the graph that matches each of the following stories:

a. I had just left home when I realized I had forgotten my books so I went back to pick them up.
b. Things went fine until I had a flat tire.
c. I started out calmly, but sped up when I realized I was going to be late i



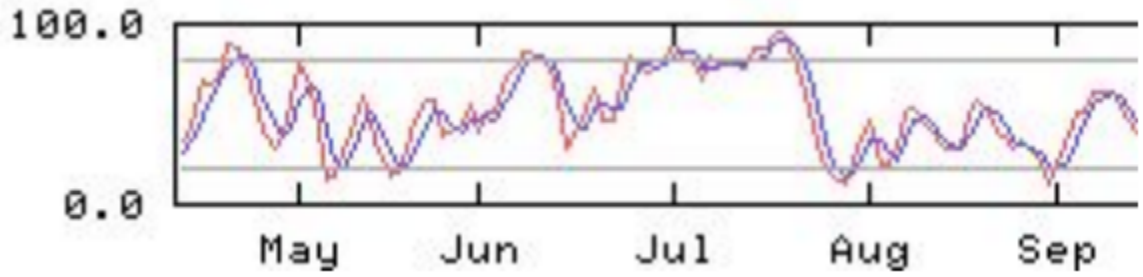
2. The graph at the right represents the typical day of a teenager. Answer these questions:

a. What percent of the day is spent watching TV?
b. How many hours are spent sleeping?
c. What activity takes up the least amount of time?
d. What activity takes up a quarter of the day?
e. What two activities take up 50% of the day?
f. What two activities take up 25% of the day?

3. Answer these questions about the graph at the right:

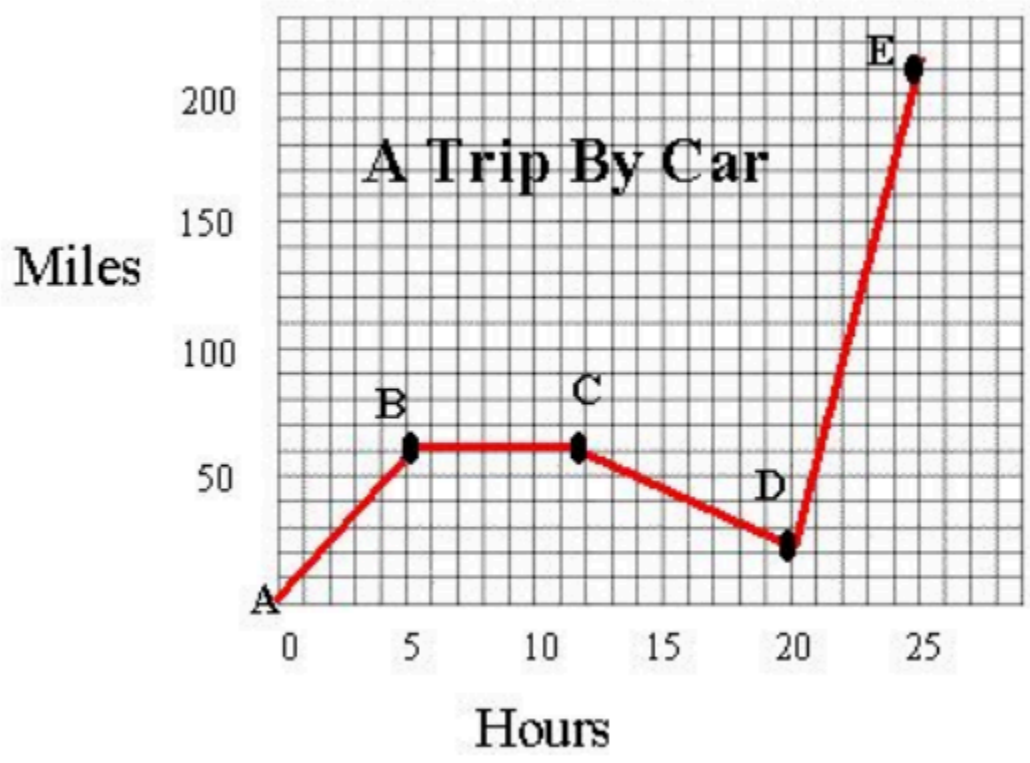
a. How many sets of data are represented?
b. On approximately what calendar date does the graph begin?

c. In what month does the graph reach its highest point?



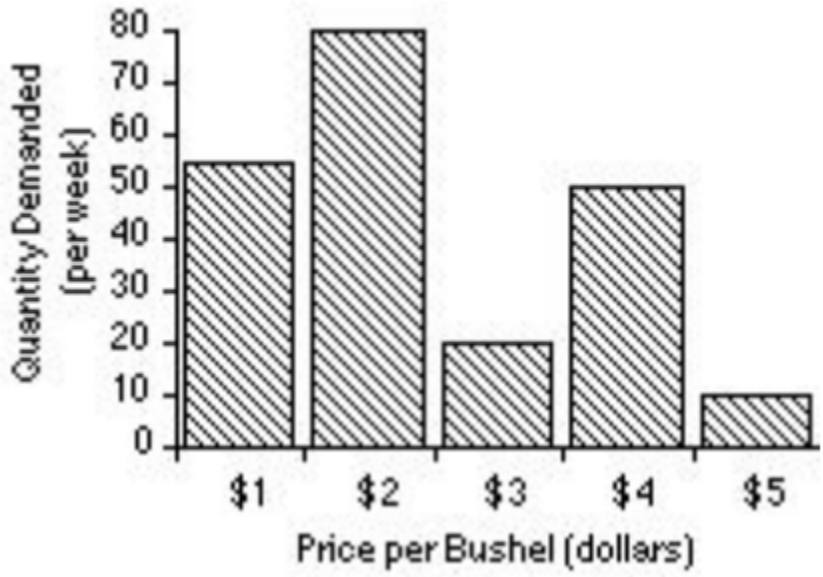
4. Answer these questions about the graph on the right:

a. How many total miles did the car travel?
b. What was the average speed of the car for the trip?
c. Describe the motion of the car between hours 5 and 12?
d. What direction is represented by the line CD?
e. How many miles were traveled in the first two hours of the trip?
f. Which line represents the fastest speed?



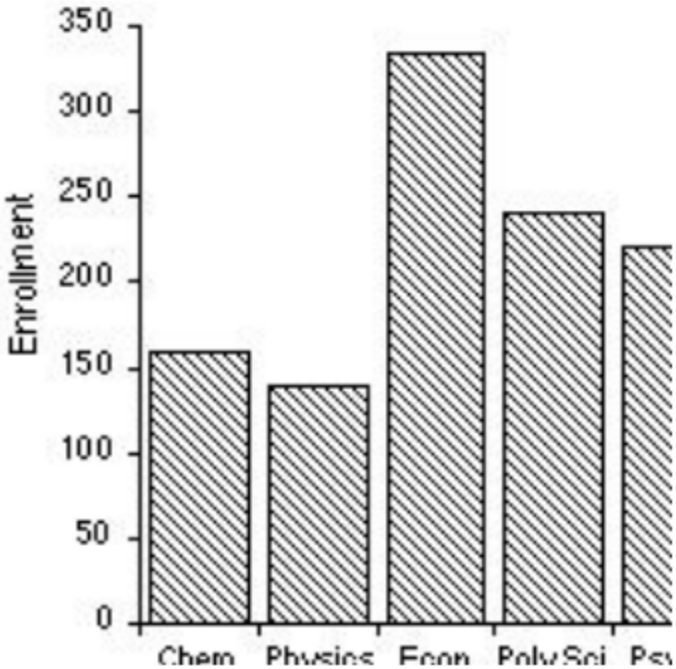
5. Answer these questions about the graph at the right:

a. What is the dependent variable on this graph?
b. Does the price per bushel always increase with demand?
c. What is the demand when the price is 5$ per bushel?



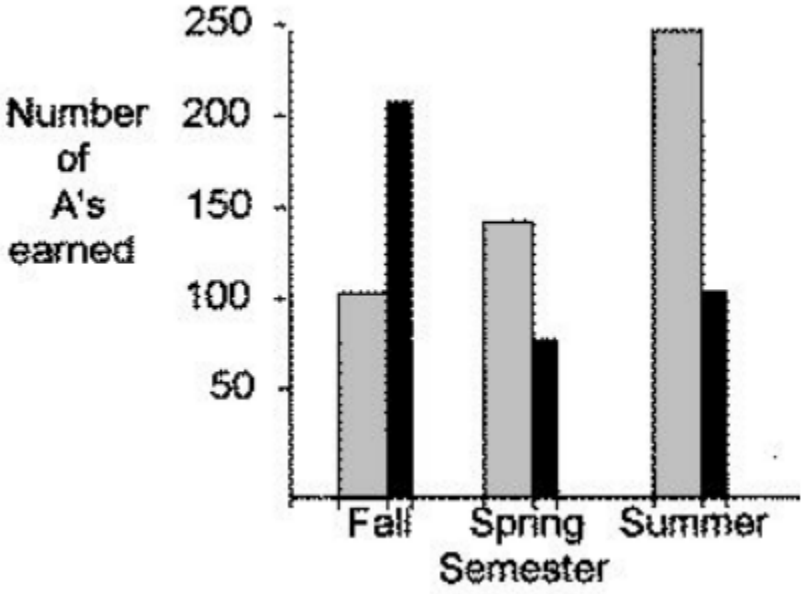
6. The bar graph below represents the declared majors of freshman enrolling at a university. Answer the following questions:

a. What is the total freshman enrollment of the college?
b. What percent of the students are majoring in physics?
c. How many students are majoring in economics?
d. How many more students major in poli sci than in psych?



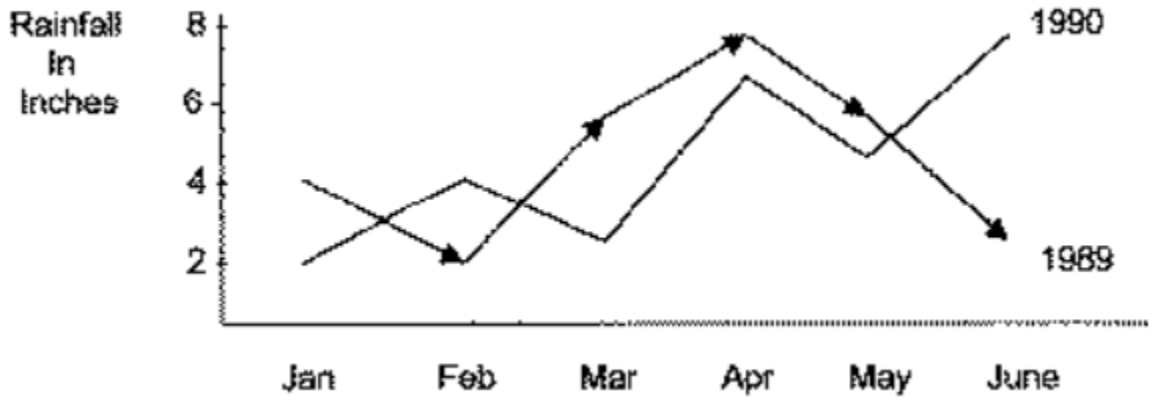
7. This graph represents the number of A's earned in a particular college algebra class. Answer the following questions:

a. How many A's were earned during the fall and spring of 2009?
b. How many more A's were earned in the fall of 2010 than in the spring of 2010?
c. In which year were the most A's earned? d. In which semester were the most A's earned?
e. In which semester and year were the fewest A's earned?



8. Answer these questions about the graph below:

a. How much rain fell in Mar of 1989?
b. How much more rain fell in Feb of 1990 than in Feb of 1989?
c. Which year had the most rainfall?
d. What is the wettest month on the graph?



9. Answer these questions about the data table:

a. What is the independent variable on this table?
b. What is the dependent variable on this table?
c. How many elements are represented on the table?
d. Which element has the highest ionization energy?
e. Describe the shape of the line graph that this data would produce?

Atomic Number	Ionization Energy (volts)
2	24.46
4	9.28
6	11.22
8	13.55
10	21.47

10. Answer the following using the solar system data table:
a. How many planets are represented?
b. How many moons are represented?
c. Which moon has the largest mass?
d. Which planet has a radius closest to that of Earth?
e. How many moons are larger than the planet Pluto?
f. Which of Jupiter's moons orbits closest to the planet?
g. Which planet is closest to Earth?

Name	Orbits	Distance (000 km)	Radius (km)	Mass (kg)
Sun			697000	1.99×10^{30}
Jupiter	Sun	778000	71492	1.90×10^{27}
Saturn	Sun	1429000	60268	5.69×10^{26}
Uranus	Sun	2870990	25559	8.69×10^{25}
Neptune	Sun	4504300	24764	1.02×10^{26}
Earth	Sun	149600	6378	5.98×10^{24}
Venus	Sun	108200	6052	4.87×10^{24}
Mars	Sun	227940	3398	6.42×10^{23}
Ganymede	Jupiter	1070	2631	1.48×10^{23}
Titan	Saturn	1222	2575	1.35×10^{23}
Mercury	Sun	57910	2439	3.30×10^{23}
Callisto	Jupiter	1883	2400	1.08×10^{23}
Io	Jupiter	422	1815	8.93×10^{22}
Moon	Earth	384	1738	7.35×10^{22}
Europa	Jupiter	671	1569	4.80×10^{22}
Triton	Neptune	355	1353	2.14×10^{22}
Pluto	Sun	5913520	1160	1.32×10^{22}

Practice Making Graphs: Use the following steps to create graphs and answer questions for each of the problems below. All your work will go on the separate answer sheet.

1. Identify the variables. The independent variable is controlled by the experimenter. The dependent variable changes as the independent variable changes. The independent variable will go on the X axis and the dependent variable on the Y axis.

2. Determine the variable range. Subtract the lowest data value from the highest data value.

3. Determine the scale of the graph. The graph should use as much of the available space as possible. Each line of the scale must go up in equal increments. For example, you can go 0, 5, 10, 15, 20, etc. but you cannot go 1, 3, 9, 34, 50, etc. Increments of 1, 2, 5, 10, or 100 are commonly used but you should use what works best for the given data.

4. Number and label each axis.

5. Plot the data. If there are multiple sets of data on one graph, use a different color for each.

6. Draw a smooth, best fit line for each data set.

7. Title the graph. Titles should explain exactly what the graph is showing and are sometimes long. Don't be afraid of a long title!

8. Create a key to the graph if there is more than one set of data.

Problem 1

The thickness of the annual rings indicate what type of environmental situation was occurring at the time of its development. A thin ring usually indicates a rough period of development. Lack of water, forest fires, or a major insect infestation. On the other hand, a thick ring indicates just the opposite.

A. Make a line graph of the data.
B. What is the dependent variable?
C. What is the independent variable?
D. What was the average thickness of the annual rings of 40 year old trees in Forest A?
E. Based on this data, what can you conclude about Forest A and Forest B?

Age of the tree in years	Average thickness of the annual rings in cm. Forest A	Average thickness of the annual rings in cm. Forest B
10	2.0	2.2
20	2.2	2.5
30	3.5	3.6
35	3.0	3.8
50	4.5	4.0
60	4.3	4.5

Problem 2

A. Make a line graph of the data.
B. What is the dependent variable?
C. What is the independent variable?
D. What is the average pH in this experiment?
E. What is the average number of tadpoles per sample?

F. What is the optimum water pH for tadpole development?
G. Between what two pH readings is there the greatest change in tadpole number?
H. How many tadpoles would you expect to find in water with a pH reading of 5.0?

pH of water	Number of tadpoles
8.0	45
7.5	69
7.0	78
6.5	88
6.0	43
5.5	23