Welcome to AP Environmental Science. You can read about the course on my website and from the College Board. This is a college level course and as such the workload and expectations are high. All work, including summer assignments, should be submitted through Google Classroom by the due dates specified. If you have questions please email me at lmendenhall@bhpsnj.org. If you need an extension for any reason, please post a private comment on the assignment prior to the due date. I look forward to a fun and productive year. Go outside and enjoy the sunshine!

1. **Course Preparation:** Please complete the "Welcome to APES" course survey. I ask you to answer some questions about yourself, read the course syllabus, confirm your College Board account, ensure you have the correct apps working on your iPad, and to sign the Honor Code. (10 points) **DUE:** Wednesday, July 15 (12pm)

2. **Observe Nature:** Food webs are an important part of the study of ecosystems and ecosystem management. Visit an area for at least **one** hour. This area could be a park nearby your house, a place you are visiting on vacation, or your backyard. Note the exact location, date, time, and general weather. Identify all life seen in that time. Take photos and make them into a food web and label the trophic levels. If something is too fast to photograph you can sketch it. Be creative and resourceful, and don't forget the original source of most energy on Earth. Bozeman Science and Crash Course both have good videos on ecosystems and food webs. Try iNaturalist. (15 points) **DUE:** Wednesday, July 22 (12pm)
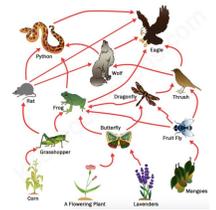
3. ***Eyes Wide Open: Going Behind the Environmental Headlines*** by Paul Fleischman (2014): Borrow a physical copy of the book *Eyes Wide Open* from the Berkeley Heights Public Library (there are 20 copies in the summer reading section) or rent it from Amazon for $0.99 (download the Kindle app). Please read the book and write a **short** summary of the **key points** in each section (Noticing, Perception, Defense Mechanisms, Systems, Attitudes, and Eyes Abroad & Ahead). The entire summary should not exceed one single-spaced typed page. Be sure to include the chapter title, important material restated in your own words, and examples. Bullet points are okay. Post your summary as an answer to the Google Classroom question (do not attach a doc). (30 points) **DUE:** Wednesday, July 29 (12pm)

4. ***Toms River: A Story of Science and Salvation*** by Dan Fagin (2013): Borrow a physical copy of *Toms River* from the Berkeley Heights Public Library (there are 20 copies in the summer reading section). This is a fascinating true story that occurred in a place many of us have been. I take my kids swimming at Ortley Beach and my son played baseball with the grandson of one of the environmental activists from Toms River. (25 points) **DUE:** Wednesday, **August 5** (12pm)
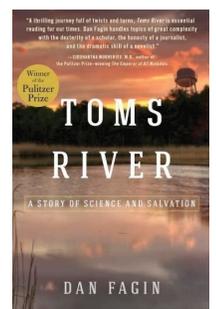
   a. Read the **Prologue** (*Marking Time*) (pp.x-xxiii), **Chapter One** (*Pirates*) (pp.4-21), **Chapter Two** (*Insensible Things*) (pp.22-40), and the ***Afterward*** (pp.461-466), to get a feel for the story and the complicated issues involved in Environmental Science.

   b. Choose **one** chapter to read and summarize. In the Slides presentation shared with you in Google Classroom, write your name (1st & last) next to the chapter in the list and on your slide to claim it. You may work alone or with **one** other person. You have **one** slide in which to provide the class with information from your chapter, and **one** slide in which to be creative. Write a **brief** overview and a timeline of key events - each of these should be **no more than five** bullet points. Focus on the key points, especially how your chapter relates to the larger story in Toms River and Environmental Science in general. This should be **brief** - add detail to share with the class in the "speaker notes" below the slide. Use **1-2 images** to tell the "story" of your chapter (check your classmates' work to ensure you are not duplicating their images). Post a brief description of the image(s) under them, and links to your source(s) in the "speaker notes".

5. **Plan your Citizen Science research:** During the school year you will be completing an original scientific study of your own design. Successful science starts with a good question. What interests you? What confuses or frustrates you? Read more about it. To be clear, this is NOT a research paper. You are designing and conducting a **scientific study**. You can read more about Citizen Science in <u>Nature</u>.   (25 points) **DUE:** Wednesday, **August 12** (12pm)
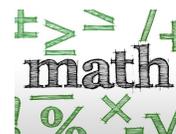
    Your task is to come up with a scientific study that you will enjoy working on for the next nine months. You can develop your own idea, build on existing Citizen Science work at <u>GL</u>, or participate in larger work (See: <u>Scientific American</u>, <u>Zooniverse</u>, <u>National Geographic</u>, <u>National Wildlife Federation</u>, <u>Monarch Watch</u>, <u>Dark Sky</u>, and <u>Freshwater Watch</u>. Search "Citizen Science" for more.)

    Your assignment for the summer is to determine what interests you and to write a preliminary research summary of what you would like to accomplish. Be sure to include the following: a. Your research question (What is your hypothesis or open question?); b. What you plan to do (What procedure will you use?); and c. What you will measure (What data will you collect?).

    This should be 200-300 words with an <u>MLA style</u> citation list of at least 4 <u>valid</u> sources, one of which is from a peer-reviewed scientific journal, such as <u>Nature Sustainability</u>. Each source should have an in-text citation. Post your summary as an answer to the Google Classroom question. The summer assignment portion should be completed individually, but you may work in groups of 1-2 during the school year.

6. **Summer Math Review:** Please complete the **Summer Math Review** found on the following pages. APES students have a wide range of math skills coming into the class and certain basics will be assumed as we move through the year. Be sure to **master** them before school starts. Videos are included with each section to help you with the content. You can complete this on paper (take pictures of your work) or using Notability. We will review the assignment in class and you will take a quiz on the material. Calculators are permitted during the APES exam and in class. The use of **dimensional analysis** for FRQs is required in class. (35 points) **DUE:** Wednesday, **August 19** (12pm)

Summer Math Review

DIRECTIONS

❏ **Show all work**: For this course you are required to **show all your work done by hand.** No work, no credit. AP essay questions award one point for the setup and one for the correct answer. Your work must be legible and understandable by AP Readers.

❏ **Dimensional analysis**: In problems involving unit conversions, always show the full initial set-up WITH UNITS. On the APES exam, the set-up with units is required so it will also be required on all your assignments, labs, quizzes, and tests. The use of **dimensional analysis** is required in class.

❏ **Check your work:** Go back through each step to make sure you didn't make any mistakes in your calculations. Also check to see if your answer makes sense. For example, a person probably will not eat 13 million pounds of meat in a year. If you get an answer that seems unlikely, it probably is.

A. WORKING WITH PERCENTAGES: *Demonstrate that you can work with percentages. Tutorial*

1. What percentage of 150 is 30?

2. Thirteen percent of a 12,000 acre forest is being logged. How many acres will be logged?

3. You have driven the first 150 miles of a 2000 mile trip. What percentage of the trip have you traveled?

4. Home prices have dropped 10% in the past three years. An average home in Indianapolis three years ago was $130,000. What's the average home price now? What would it be if the prices had fallen 5%?

5. A water heater tank holds 280 gallons. Twenty percent of the water is lost as steam. How many gallons *remain* to be used?

6. 240 acres, or 15%, of a forest is being logged. How large is the forest?

C. METRIC UNITS: *Demonstrate that you know how to work with metric units.* Tutorial

11. 14000 millimeters = ? meters

13. 100 megawatts = ? kilowatts

12. 1200 kilograms = ? grams

14. 17 m² = ? mm²

D. SCIENTIFIC NOTATION: *Demonstrate that you can work with very large and very small numbers. Tutorial*

15. Place the following in scientific notation:

    a.   145,000,000,000 =

    b.   13 million =

    c.   435 billion =

    d.   .000348 =

16. $(4 \times 10^3)(3 \times 10^2) =$

17. $(1.5 \times 10^8)(6.0 \times 10^4) =$

18. one thousandth of seven thousand =

19. $(3.6 \times 10^9) \div (9 \times 10^3) =$

20. $(1.9 \times 10^{-4}) \div (1.9 \times 10^{-6}) =$

21. The Greenland Ice Sheet contains 2,850,000 cubic kilometers of ice. It is melting at a rate of 0.005% per year. How many cubic kilometers are lost the first year?

E. DIMENSIONAL ANALYSIS: *Dimensional analysis is simply the "unit cancellation" method. It is a way to convert a quantity given in one unit to an equal quantity of another unit by lining up all the known values and multiplying. In APES it is often an integral part of a larger word problem. Write out the full setup with units to see places to simplify the math.* [*Tutorial*](#)

22. Sixty kilometers per hour = ? miles per hour (1 km = 0.62 mi)

23. A city that uses 34 billion BTUs of energy each month is using how many kilowatt-hours (kWh) of energy? (1 kWh = 3,400 BTUs)

24. A 2.5 million square mile forest is how many hectares?
    (1 square mile = 640 acres) (1 hectare (Ha) = 2.5 acres)

25. If one barrel of crude oil provides 1.6 million BTUs of energy, how many BTUs of energy will one liter of crude oil provide?
    (1 barrel of oil = 160 liters)

26. Fifty eight thousand kilograms of solid waste is equivalent to how many metric tons?
    (1 metric ton = 1000 kg)

27. 5 mm of rain falls in a 100 m² field. (1 cubic meter = 1000 liters) (1 gram water = 1 mL water)

    a. What volume of rain, in m³, fell in the field?

    b. If 20% of that rain ran off into the city stormwater drains, how many liters would that be?

    c. How many kg?

28. Between 1950 and 2000, global meat production increased from 52 billion kilograms to 240 billion kilograms. During this period, the global human population increased from 2.6 billion to 6.0 billion.

    a. Calculate the per capita (per person) meat production in 1950 and in 2000.

    b. Use your answers to calculate the change in global per capita meat production during this 50-year period as a percentage of the 1950 value.

    Percent Change

    $$\text{Percent Change} = \frac{\text{New Value} - \text{Old Value}}{\text{Old Value}} \times 100\%$$

    If the result is positive, it is an increase.
    If the result is negative, it is a decrease.

29. A new offshore wind project will consist of 200 wind turbines, each with a capacity of 4 megawatts (MW). Each turbine costs $1.2 million to build. Electrical demand in the area to be served by the project is expected to be 2.0×10^6 MWh per year. (MWh = MW x hours)

    a. Calculate how much electricity (in MWh) the wind project needs to generate per year in order to provide 80% of the annual electrical demand in the service area.

    b. Customers in the service area pay $0.20/kWh for electricity. Calculate how much revenue will be produced if the wind turbines provide 80% of the annual electrical demand in the service area.

    c. Assuming all turbines are operating, calculate how many hours the wind turbines must operate to provide 80% of the annual electrical demand in the service area.