

This summer, you have two assignments to complete, both of which are posted to Google Classroom and are due on the first day of school. Please submit your [scavenger hunt](#) work to Google Classroom and bring a completed paper copy of your [math work](#) to class.

Each assignment will be entered into the grade book as a 30 point formative and you will have a quiz on the mathematical skills in the first week of school.

Students are welcome to stop in to discuss the assignment with their teacher if needed.

Teacher	Period	Days	Code
Mrs. Frey	Block Period 1	1 / 3	xknkeqci
Mrs. Frey	Block Period 2	1 / 3	kkpk2ep5
Mr. Foster	Block Period 3	2 / 4	ciphbaej
Mr. Foster	Block Period 4	2 / 4	uil2qktj

Assignment 1- Experimentation and Math

Part 1: Experimental Design

Answer the following questions using the following statement, your knowledge of experimental design and the graph below. Need a refresh on experimental design? Watch [this video](#) or [this one](#).

A clam farmer has been keeping records concerning the water temperature and the number of clams developing from fertilized eggs. The data is recorded below.

Water Temperature (°C)	Number of developing clams
5	75
10	90
15	120
20	140
25	75
30	40
35	15
40	0

- Identify the independent variable of this experiment.
- Identify the dependent variable of this experiment.
- Identify the optimum (best) temperature for clam development.
- Identify the average temperature in this experiment.
- Identify at least two constants the scientists should maintain in this experiment.
- When graphing this data, should it be a bar graph or a line graph? Explain how you know. (here's a [source](#) if you're stuck)
- Graph this data in Google Sheets. Copy and paste the graph below. Do you have axis labels (with units) AND a descriptive title? (here's [info](#) or a [video](#) of how to graph in sheets)
- What can the farmer learn from this experiment? Refer to data numbers in your analysis.
- What is the scientific question being tested? The best format for your answer is, "What is the effect of"

**** COMPLETE THIS PART ON PAPER. Bring your completed math with you to your first APES class.**

Part 2: Math Skills (what this is a science class, why so much math?)

There are seven Science Practices that we will incorporate throughout the year, these are skills and a way to apply your content knowledge. You can check them all out [here](#).

Reminders

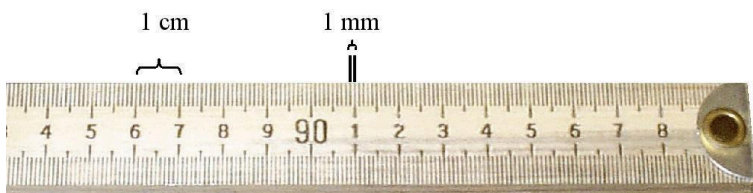
1. Write out all your work, even if it's something really simple. This is required on the APES exam so it will be required on all your assignments, labs, quizzes, and tests as well.
2. Include units in each step. Your answers always need units and it's easier to keep track of them if you write them in every step. No naked numbers!
3. 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. Go back and check your work.
4. You may use a calculator but will not be provided with a formula sheet.

Metric Units: YOU MUST MEMORIZE THE METRIC CONVERSION CHART

We usually see these units in class

Prefix	Symbol	Multiply Base Unit by	Example
tera	T	1,000,000,000,000	teragram = Tg = 10^{12} g
giga	G	1,000,000,000	gigaliter = GL = 10^9 L
mega	M	1,000,000	megagram = Mg = 10^6 g
kilo	k	1,000	kilogram = kg = 10^3 g
hecto	h	100	hectogram = hg = 10^2 g
deka	da	10	decagram = dag = 10 g
deci	d	1/10	deciliter = dL = 10^{-1} L
centi	c	1/100	centimeter = cm = 10^{-2} m
milli	m	1/1000	millimeter = mm = 10^{-3} m
micro	μ	1/1,000,000	microgram = μ g = 10^{-6} g

Base Unit (g, m, W, L, etc.)



1. How many mm are in a centimeter?
2. How many centimeters are in a meter? (The prefix *centi-* means 100. How many cents (pennies) are in a dollar?)

3. The prefix milli- means a thousand. How many millimeters are in a meter?

4. 400 kilograms = _____ milligrams

5. 600 mm = _____ cm

6. 25 MW = _____ W

Dimensional analysis - These problems come up all the time in this class. Please review how to complete these problems and then show all work to finish the problems that follow.



How to Do Dimensional Analysis (Unit Conversions)

Dimensional analysis is a powerful method that lets you convert from one unit to another step by step using conversion factors. Think of it as a math puzzle where you cancel out the units you don't want and keep the ones you do.

Basic Steps

Step 1: Identify your starting quantity.

Write down what you're given — this is your starting number and unit.

Step 2: Multiply by conversion factors.

Use known relationships (like $1 \text{ km} = 1,000 \text{ m}$) to build conversion fractions. You can multiply by as many as you need!

Each conversion factor is a fraction that equals 1 (like $1,000 \text{ m} = 1 \text{ km}$)

Step 3: Cancel units as you go.

Units that appear on the top and bottom of adjacent fractions cancel out. Keep going until you're left with the unit you want.

Step 4: Do the math.

Multiply and divide the numbers across the top and bottom.

Tips for Success

- Always write out units in every step.
- If a unit appears on the top and bottom, cross it out — it's gone!
- You can stack as many conversions as you need until you land on the right unit.
- Keep track of what the problem is asking for — that's your goal unit.

Sample problems

- a. Convert 2.5 kilometers to centimeters.

$$\frac{2.5 \text{ km}}{1} \times \frac{100,000 \text{ cm}}{1 \text{ km}} = 250,000 \text{ cm}$$

- b. A person drives 12,000 miles per year. Their car gets 30 miles per gallon. Each gallon of gas creates 8.89 kg CO₂. How much CO₂ do they emit in a year?

$$\frac{12,000 \text{ mi}}{1 \text{ year}} \times \frac{1 \text{ gal}}{30 \text{ mi}} \times \frac{8.8 \text{ kg CO}_2}{1 \text{ gal}} = \frac{3,556 \text{ CO}_2}{1 \text{ yr}}$$

** show all work, including how units cancel out

7. A car is traveling 90 kilometers per hour. How many meters per second is this?
8. A snail crawls at a speed of 1.5 centimeters per second. How many meters per hour is that?

9. A doctor prescribes a dose of 15 mg/kg of a medication. If a patient weighs 165 pounds, how many milligrams of medication should they receive?
10. A car gets 30 miles per gallon of fuel. Convert this to kilometers per liter. (*1 mile = 1.609 km, 1 gallon = 3.785 L*)
11. Burning 1 gallon of gasoline produces about 8.89 kg of CO₂. A person drives 15,000 miles per year, and their car gets 25 miles per gallon. How many kilograms of CO₂ does this person emit per year from driving?
12. A low-flow showerhead uses 9 liters per minute, while a standard showerhead uses 15 liters per minute. If someone showers for 10 minutes a day, how many gallons of water does the low-flow showerhead save in a month (30 days)? (*1 gallon = 3.785 liters*)

Write the following in scientific notation

13. 394 billion

14. 0.000070202

Percent Change = $\frac{\text{New} - \text{Original}}{\text{Original}} \times 100$

15. If you scored a 1090 on your first PSAT and 1210 on your second PSAT. What was your percent improvement (percent change)?

16. A town had 25,000 people in 2020. By 2024, the population dropped to 22,500. What is the percent decrease in population?

17. A pair of shoes originally cost \$80. They are now on sale for \$60. What is the percent decrease in price?

18. Jordan's salary increased from \$50,000 to \$55,000. What is the percent increase in salary?

Percent = $(\text{Part} / \text{Whole}) \times 100$

19. In 2020, a country had 1.5 million hectares of forest. By 2024, it had lost 300,000 hectares due to deforestation. What percent of forest was lost?
20. A beach cleanup group collected 2,400 pounds of trash. Of that, 1,800 pounds were plastic. What percent of the collected trash was plastic?
21. A town generates 60% of its electricity from renewable sources. If the total energy used is 200,000 kWh, how much of that is from renewable sources?

Practice FRQ (free response question)

Background: Shasta Lake is a large reservoir on the Sacramento River in Northern California. It is formed by a dam with a hydroelectric power plant. One million acre-feet (maf) is equivalent to 3.26×10^{11} gallons.

1. Current Water Levels

At full capacity, Shasta Lake holds **19.50 million acre-feet (maf)** of water. Currently, it is **42% full**. Calculate how many million acre-feet of water are currently in Shasta Lake. *Show your work below.*

2. Snowmelt Contributions

The watershed of the Upper Sacramento River contributes an average of **8.75 maf** of water to Shasta Lake each year. Melted mountain snow accounts for **55%** of this flow. In 2021, due to drought, the river flow was only **38%** of the average. Assume that snowmelt contributed the same proportion (55%) to the reduced flow. Calculate how much water (in maf) was contributed by melted mountain snow in 2021. *Show your work below.*

3. Water Use by Households

The average household in the United States uses **5.0×10^4 gallons** of water per year. Based on the average annual flow of **8.75 maf** into Shasta Lake, calculate how many households could be supported for one year. *Show your work below.*

Assignment 2- Scavenger Hunt

AP Environmental Science Summer Scavenger Hunt


Welcome to AP Environmental Science!

This summer, your mission is to explore your local environment and start thinking like an environmental scientist. Your task is to find and photograph yourself with 15 different items or locations that connect to key APES topics. You may choose from the 20 prompts below—pick the ones that inspire you most!

Wherever you are this summer—around town, on vacation, or at home—keep an eye out for science in the real world. Be ready to briefly describe how each photo connects to environmental science when we return in the fall.

Explore safely and responsibly—bring a friend, wear sunscreen, and always respect nature!

You are welcome to take pictures of the items together with a friend but you must make your own slideshow and reflection.

 **Your Scavenger Hunt List (Pick 15)**- You are expected to include a picture of the item/process and write a brief caption for each picture that explains what the pictures , where it is from, and how how it displays the intended topic/connection to our course.

1. Visible Erosion

Find a place where erosion is occurring—on a trail, beach, or roadside.

Topic: Soil degradation, land use

2. Wastewater Treatment Facility or Storm Drain

Snap a photo near the facility or labeled storm drain cover.

Topic: Water pollution, human infrastructure

3. Invasive Species

Find a non-native plant or animal and identify it (look it up if needed).

Topic: Biodiversity, species interactions

4. Composting or Organic Waste Bin

Locate a composting area, community garden, or your own compost bin.

Topic: Waste reduction, nutrient cycles

5. Native Plant or Pollinator Habitat

Look for a wildflower garden, pollinator zone, or native species in a wooded area.

Topic: Ecosystem services, biodiversity

6. Renewable Energy Source

Find a solar panel, wind turbine, or even geothermal heating/cooling.

Topic: Energy resources and consumption

7. Evidence of Climate Impact

Look for signs like beach erosion, saltwater intrusion, or high-tide lines.

Topic: Climate change, sea level rise

8. Sustainable Agriculture or Local Food Source

Visit a local farm stand, community garden, beehive, or even a backyard vegetable garden.

Topic: Agriculture, food systems, sustainability

9. Air Quality Monitoring or Transportation Emissions

Find a public transit station, traffic-heavy area, or biking/walking path.

Topic: Air pollution, urban planning

10. A Local Water Source

Visit a stream, pond, lake, or beach—note water clarity and surrounding land use.

Topic: Freshwater resources, human impact

11. Ecosystem Affected by Eutrophication

Find a pond, lake, or body of water that shows signs of nutrient pollution (algae growth, low clarity).

Topic: Aquatic ecosystems, nitrogen & phosphorus cycles

12. Carbon Cycle in Action

Capture a moment that represents part of the carbon cycle—photosynthesis, combustion, decay, etc.

Topic: Biogeochemical cycles

13. Water Cycle Component

Find an example of evaporation, condensation, precipitation, infiltration, or runoff.

Topic: Water cycle, Earth systems

14. Phosphorus Cycle Evidence

Photograph fertilizer use, soil erosion, rock weathering or other signs related to phosphorus movement in the environment.

Topic: Biogeochemical cycles

15. Food Web Dynamic

Take a photo of a predator-prey interaction, herbivory, decomposers, or trophic levels.

Topic: Ecology, energy flow

16. Energy Transfer

Capture an example of energy moving through an ecosystem—sunlight on plants, animals

eating, etc.

Topic: Energy pyramids, ecosystem dynamics

17. Interactions Between Earth Systems

Show a photo where two or more Earth systems (atmosphere, biosphere, hydrosphere, geosphere) interact—like flooding, wildfires, or erosion.

Topic: Earth system science

18. Interactions Between Species and Environment

Document an animal in its habitat, migration path, or shelter/nesting behavior.

Topic: Species adaptation, habitat use

19. Sustainability in Action

Find a sustainable practice—like a green building, rain barrel, reusable bag display, or eco-friendly transportation.

Topic: Human impact, resource conservation

20. Your Wild Card!

Take a photo that you believe connects to AP Environmental Science and explain your reasoning.

Topic: Your choice—surprise us with your scientific insight!

Reflection (Select 1 item and write a paragraph)

For your selected picture, include:

- What it is
- Where you found it (especially fun if it's from a unique travel location!)
- What APES topic it connects to and how it connects to one of the 4 big ideas in APES (energy transfer, interactions in Earth systems, interactions between different species and the environment, sustainability)

You can put this together in a google doc or slideshow and upload it to google classroom before the first day of school.

 Scavenger Hunt Rubric (30 points total)

Category	Points	Criteria
Completion	10 pts	15 unique photos with student clearly visible, includes brief explanation / caption of what the impact shows
Accuracy	10 pts	Items clearly match the assigned topics
Explanation	10 pts	Thoughtful and accurate connection to APES concepts