

Name \_\_\_\_\_

**AP ENVIRONMENTAL SCIENCE  
SUMMER ASSIGNMENT  
CLASSICAL HIGH SCHOOL  
2020-2021**

**Instruction:** Print the following packet and complete all questions. Bring your completed packet on the first day of school. **It WILL be graded!** There will be an assessment of this assignment during the first week of classes, and it will count for your ***FIRST test grade of the school year.***

**Part I: Environmental Science and the Scientific Method**

1. Define environmental science

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2. What does an environmentalist do?

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3. List and describe the five key global indicators

a. \_\_\_\_\_

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b. \_\_\_\_\_

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c. \_\_\_\_\_

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d. \_\_\_\_\_

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e. \_\_\_\_\_

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4. Why do scientists follow the scientific method?

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5. What role do hypotheses play in scientific inquiry, and why are null hypothesis used sometimes?

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6. List and describe, in detail, the five steps of the scientific method

a. \_\_\_\_\_

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- b. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- c. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- d. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- e. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. What is the difference between inductive and deductive reasoning?

\_\_\_\_\_  
\_\_\_\_\_

8. What is required for an idea to be considered a theory, in a scientific sense?

\_\_\_\_\_  
\_\_\_\_\_

9. Why are both natural AND controlled experiments necessary to increasing scientific understanding?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Part II: Systems and Matter**

1. What is matter? \_\_\_\_\_

2. Define the following:

a. Atom \_\_\_\_\_

b. Element \_\_\_\_\_

c. Molecule \_\_\_\_\_

d. Compound \_\_\_\_\_

e. Isotope \_\_\_\_\_

3. Draw a diagram of an atom below, labeling the location of the neutrons, protons and electrons

4. What is the difference between covalent and ionic bonds?

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5. Water is a vital part of the environment. Describe why each of the following unique properties of water is important for life on Earth

a. Surface tension

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b. Capillary action

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c. Boiling and freezing points

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d. Use as a Solvent

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6. What is an acid?

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7. What is a base?

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8. What is the pH scale? What does it tell us?

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9. If a substance is under a pH of 7, it is considered a \_\_\_\_\_

10. If a substance is above a pH of 7, it is considered a \_\_\_\_\_

11. If a substance has a pH of 7, it is considered \_\_\_\_\_

12. Define a chemical reaction

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13. What is the law of conservation of matter?

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14. What is the difference between an organic and an inorganic compound?

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15. The four macromolecules are

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**Part III: Energy Flow**

1. Energy is the \_\_\_\_\_

2. Power is \_\_\_\_\_

3. What is the difference between potential energy and kinetic energy?

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4. Explain, in detail, the first law of thermodynamics. Use examples in your answer

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5. Explain, in detail, the second law of thermodynamics. Use examples in your answer

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6. What is the difference between an open and a closed system?

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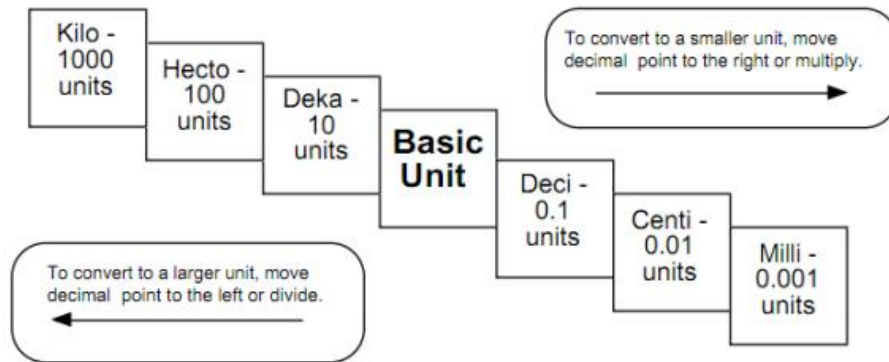
7. How does a system enter into a steady state?

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### Part IV: Math Review

**\*\*There are several math problems on the AP Environmental Exam. You must be able to do the following calculations.\*\***  
**You must show ALL of your work to receive credit!!**

**Conversions** Using the chart, complete the following conversions



1. 1200 kilograms = \_\_\_\_\_ milligrams

4. 6544 liters = \_\_\_\_\_ milliliters

2. 14000 millimeters = \_\_\_\_\_ meters

5. .078 kilometers = \_\_\_\_\_ meters

3. 670 hectometers = \_\_\_\_\_ centimeters

6. 17 grams = \_\_\_\_\_ kilograms

**Scientific Notation** Write the following numbers in scientific notation

1. 145,000,000,000 = \_\_\_\_\_

2. 13 million = \_\_\_\_\_

3. 435 billion = \_\_\_\_\_

4. .000348 = \_\_\_\_\_

5. 135 trillion = \_\_\_\_\_

6. 24 thousand = \_\_\_\_\_

**Scientific Notation** Complete the following calculations

1.  $3 \times 10^3 + 4 \times 10^3$

7. Three hundred thousand plus forty-seven thousand

2.  $4.67 \times 10^4 + 323 \times 10^3$

8. 13 million minus 11 thousand

3.  $7.89 \times 10^{-6} + 2.35 \times 10^{-8}$

9.  $1.32 \times 10^8 \times 2.34 \times 10^4$

4.  $9.85 \times 10^4 - 6.35 \times 10^4$

10.  $3.78 \times 10^3 \times 2.9 \times 10^2$

5.  $2.9 \times 10^{11} - 3.7 \times 10^{13}$

11.  $3.45 \times 10^9 / 2.6 \times 10^3$

6.  $1.278 \times 10^{-13} - 1.021 \times 10^{-10}$

12.  $1.98 \times 10^{-4} / 1.72 \times 10^{-6}$

**Dimensional Analysis** Use the following example to complete the dimensional analysis problems

Example: 50 miles per hour = ? feet per second

Step 1: Start with the value and units you are given. In this case there is a unit on top and on bottom.

$$\left[ \frac{50 \text{ miles}}{1 \text{ hour}} \right]$$

Step 2: Convert miles to feet first.

$$\left[ \frac{50 \text{ miles}}{1 \text{ hour}} \right] \left[ \frac{5280 \text{ feet}}{1 \text{ mile}} \right]$$

Step 3: Continue the problem by converting hours to seconds.

$$\left[ \frac{50 \text{ miles}}{1 \text{ hour}} \right] \left[ \frac{5280 \text{ feet}}{1 \text{ mile}} \right] \left[ \frac{1 \text{ hour}}{60 \text{ minutes}} \right] \left[ \frac{1 \text{ minute}}{60 \text{ seconds}} \right]$$

Step 4: Multiply across the top and bottom. Divide the top by the bottom. Be sure to include units on each step. Use scientific notation for large numbers.

$$\begin{aligned} 50 \times 5280 \text{ feet} \times 1 \times 1 &= 264000 \text{ feet} \\ 1 \times 1 \times 60 \times 60 \text{ seconds} &= 3600 \text{ seconds} \\ 264000 \text{ feet} / 3600 \text{ seconds} &= 73.33 \text{ feet/second} \end{aligned}$$

1. 134 miles = \_\_\_\_\_ inches

2.  $8.9 \times 10^5$  tons = \_\_\_\_\_ ounces

3. 1.35 kilometers per second = \_\_\_\_\_ miles per hour

4. A 340 million square mile forest is how many hectares?

5. Fifty eight thousand kilograms of solid waste is equivalent to how many metric tons?