

APES Math Diagnostic

Introduction:

AP Environmental Science (APES) is an interdisciplinary course. It will require basic knowledge of science (biology, chemistry, physics), math, geography, history and social sciences. About 15% of the work we will do in the class will require some mathematical calculations.

This diagnostic is designed to help you feel confident that you have mastered these math skills or help you identify skills you may need to review. The concepts that we will use as the foundation in APES this year are: Decimals, Averages, Percent, Metric Units, Scientific Notation, and Dimensional Analysis.

You have covered all of these in Middle School Math, Physical Science, Chemistry, but I recognize that you may need a refresher. In the past, APES students were not permitted to use a calculator. **YOU ARE PERMITTED TO USE A CALCULATOR ON THE AP EXAM AND ON TESTS IN CLASS.**

Questions:

Answer the following questions to the best of your ability using a calculator. Don't stress. We are going to practice all of this throughout the course. This will help you identify areas of practice early we will add more complex skills as we move through the course.

Decimals

1. A light uses 99.2 joules of energy every second it is turned on. How many joules of energy would the lightbulb use if it is on for 15 minutes? Round to the nearest whole number.

Averages

2. A student is seeking to calculate average insolation on their roof to evaluate the viability of installing solar panels. They took measurements of the amount of energy reaching a square meter of the roof in kWh at noon every day for 5 days. The data collected are: 3.7 kWh/m², 5.6 kWh/m², 6.1 kWh/m², 2.4 kWh/m², 4.7 kWh/m². Calculate the average energy per unit area (kWh/m²) over this 5 day period.

Percents

3. 270 Ha of a 700 Ha forest is destroyed by a forest fire. What percent of the forest remains?
4. What is 12% of 900?
5. What percentage is 25 of 1200?

Metric Units

- Convert 0.345 kilojoules (kj) to joules (j).
- Convert 1,245 mm to m.

Scientific Notation

- Convert 9700000 into scientific notation _____
- Convert 0.000025 into scientific notation _____
- Multiply 5.0×10^3 by 10×10^2 _____

Dimensional Analysis

- Convert 3 barrels of oil to gallons.
- Convert 300 miles into kilometers.

Conversion factors can be found here:

1000 J = 1 kJ
1 barrel = 42 gallons

1 kwh = 3.6×10^6 J
1 watt = 1 joule/1 second

1 km = 0.6 mi

Next Steps:

Check your work using this key:

- | | |
|-------------------------|-------------------------|
| 1. 8.93×10^4 j | 7. 1.245 m |
| 2. 4.5 w/m^2 | 8. 9.7×10^6 |
| 3. 61% | 9. 2.5×10^{-5} |
| 4. 108 | 10. 5×10^6 |
| 5. Approx. 2.1% | 11. 126 gal |
| 6. 345 j | 12. 500 km |

If you need help with any of the topics in this diagnostic, use the following resources to review and practice that topic:

1. Math Review Appendix of your Textbook (in the back cover)
2. [AP Environmental Science Math Review Packet](#) (scroll to the correct topic - there is a tutorial and practice problems)
3. [Calculating Averages Review Video](#)
4. [Percents Review Video](#)
5. [Metric Prefixes Review Video](#)
6. [Scientific Notation Review Video](#)
7. [Dimensional Analysis Review Video](#)

These math concepts will be the foundation from which we will work this year. Don't stress if you don't remember some of this well. Take some time this week to practice on your own and come to office hours to ask questions and work with me. Next week we will layer some new skills on top of this foundation.