AP Physics C Summer Assignment for 2019-20

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Welcome to AP Physics C! I know you will spend much time this summer pondering physics…this summer assignment will help us to get off to quick start when we return in August. This summer you will need to study Chapters 1 and 2 in Physics for Scientists and Engineers (and feel free to read ahead further!). Chapter 1 (Physics and Measurement) is a background on physics, standards of measurement, and problem-solving techniques. Chapter 2 (Motion in One Dimension) is the introduction to linear motion. We studied many of these topics in Honors Physics but the problem-solving will also include calculus applications this year. In AP Physics it is very important that you take responsibility for your own learning and study content and problem-solving until you understand it (don't just complete assignments). If you have questions over the summer, feel free to e-mail (jradloff@mariemontschools.org). I will be pretty good about getting back to e-mails in June and August (you may have to wait if you e-mail in July as I go on camping trips with my family). When we return to school in August we will go over questions on the assignments, have a test over Chapter 1/2, and do some labs. ***Expect a test the first week we return in August!*** Questions on Chapter 1 and 2 will be taken in class but the content will not be formally taught in class—make sure you take the time to fully understand the content and problem-solving.

Summer Assignment: *Due the day you return to school in August*

Chapter 1 Physics and Measurement: Read the chapter for understanding and take notes.
(no problem assignment)
Chapter 2 Motion in One Dimension: Read the chapter for understanding and take notes.
Chapter 2 Problem Assignment (at the end of the chapter starting on p. 48)
#1,3-5,6,8,9,11-14,16-18, 24-26,29,30,32,38,40-42,45,48
(On the back of this page is a summary of the Calculus skills you should be comfortable using…review if you need to!)

Have a great summer! Ponder!

Calculus Skills

For those needing or wanting a review of Calculus, below are skills you will need to be comfortable applying in AP Physics C. As we go through the year, we will review some of these as needed for applications we are pondering.

1. Taking derivatives of functions such as
    a. Constants
    b. Variables raised to a power (Power Rule for Derivatives). This includes functions that result in a natural log equation.
    c. Trig. functions
    d. Ae^{bx} functions (where a and b and constants)
    e. Compound Functions (chain rule)
2. Explaining what is meant by a derivative (What does the new derivative function tell you both in mathematical terms and in physics terms. For example, the derivative of a displacement function gives you a new function that calculates the slope of the displacement function. In physics terms this new function allows you to calculate instantaneous velocity. You should also be able to go through any equation and explain the real world meaning of all constants in the equation—they aren't just numbers anymore!
3. Integrating functions (finding the antiderivative) such as
    a. Constants
    b. Variables raised to a power (Power Rule for Integration)
    c. Trig. functions
    d. Ae^{bx} functions (where a and b and constants)
    e. Integration by the Substitution Method
    f. Integrating equations with multiple variables by doing mathematical variable substitutions to re-write variables in terms of each other.
    g. Applying other integration rules for more complex functions.
    h. Setting up and solving differential equations.
4. Explaining the meaning of the integration process (summation) and the meaning of the new equation obtained by integration. For example, when a force function is integrated with respect to displacement the new function obtained allows you to calculate the area under the curve of a force vs. displacement graph. This new equation will also allow you to calculate the work done by the force through any given displacements. Again, you will also need to be able to explain the meaning of all constants in the equations.

Need to Review the Calculus some? Try these:

1. Physics for Scientists and Engineers (your textbook) Appendix B.6 – B.7 on pp. A-13 – A-19 in the back of the book.
2. Some Online resources:
    a. http://www.stat.wisc.edu/~ifischer/calculus.pdf
    b. http://ocw.mit.edu/ans7870/resources/Strang/Edited/Calculus/Calculus.pdf
    c. http://www.math.hawaii.edu/~heiner/calculus.pdf
    d. https://www.khanacademy.org/
3. Printed resources:
    a. Barron's College Review Series: Calculus by Elliot C. Gootman Review Ch 1,2,3.1,4,5,6.1,8,10
    b. Quick Calculus: A self-teaching guide by Daniel Kleppner and Normal Ramsey
    Review Chapters 1,2,3