

AP Physics C Summer Assignment 2026

Mr. Brandstaedter

Part 1: Derivatives

Purpose of Summer Assignment

This summer assignment is designed to teach students who have not taken calculus the basics they will need at the start of this course. For those of you who have taken calculus, the videos and reading are optional but you must complete the problems.

Submitting the assignment

Join our google classroom. Code: v5ognvk3

Submit your work electronically there by the first day of school.

Teacher's Note to students who have not taken calculus

We use calculus from the very beginning of this course. So, do this summer assignment thoroughly. Be sure you understand the concepts thoroughly. If you do not, seek other resources, talk to people who have taken calculus, or email me. Do not leave this assignment to the last minute.

Format of Assignment

Every lesson has a video, reading and problems. You can watch the video OR do the reading – your choice – you do not need to do both.

Sources

The assignments mainly follow the Khan Academy course. If you prefer to read rather than watch videos, I provided reading in the openstax calculus online textbook. If you are having trouble with something, try the other source from the one you originally used. The assignments are on basic calculus so ANY course or textbook on calculus will cover the material. There are many online videos and textbooks on calculus. Feel free to use anything that you like that enables you to complete the assignments. You do not have to use the videos or readings I provide. You can also discuss with friends who have already taken calculus.

Communication

I will check my email approximately once a week over the summer. If you have any questions or problems with this assignment, email me and we will figure out a way to help you.

- 1) Lesson 1: The concept of derivatives
 - a) Objective
 - i) The derivative is the rate of change (slope) of a function. It allows you to find the rate of change at one point. This lesson explains the derivative conceptually
 - b) Video
 - i) Khan Academy Calc 1: Unit 2: Definition of derivative

- ii) <https://www.khanacademy.org/math/calculus-1/cs1-derivatives-definition-and-basic-rules/cs1-derivative-definition/v/calculus-derivatives-1-new-hd-version>
 - (1) Rough outline: slope of straight line, slope of curve, define derivative as separation between 2 points $\rightarrow 0$.
- iii) Optional videos
 - (1) Khan Academy Calc 1: Unit 2: Estimating Derivative and Differentiability
 - (a) I'd say these are low priority but it is good to look at this Khan Academy Calc 1: Unit 2: Derivative definition topic of derivatives from a few different angles.
- c) Reading
 - i) Openstax Calculus Volume 1: Section 3.3
 - ii) <https://openstax.org/books/calculus-volume-1/pages/3-1-defining-the-derivative>
- d) Problems
 - i) Complete this worksheet (ws1: derivative concepts)
 - ii) <https://docs.google.com/document/d/1N2KlhdQKy5TjLuKb9ydaHGgRu9Jgpq1tvqbwCyYYSPc/edit?usp=sharing>

2) Lesson 2: Taking derivatives

- a) Objective: 1) Given a function, find a new function that is the derivative of the first function. 2) Evaluate the derivative at a single point
- b) Videos
 - i) Khan Academy Calc 1: Unit 2: Power rule and Derivative rules: constant, sum, difference, and constant multiple
 - ii) <https://www.khanacademy.org/math/calculus-1/cs1-derivatives-definition-and-basic-rules/cs1-power-rule/v/power-rule>
 - (1) Rough outline: power rule
 - iii) <https://www.khanacademy.org/math/calculus-1/cs1-derivatives-definition-and-basic-rules/cs1-derivative-rules-constant-sum-difference-and-constant-multiple/v/derivative-properties-and-polynomial-derivatives>
 - (1) Rough outline: Derivative of constant, sum, difference, and constant multiple
- c) Reading
 - i) Openstax Calculus Volume 1: Section 3.3
 - ii) <https://openstax.org/books/calculus-volume-1/pages/3-3-differentiation>
- d) Problems
 - i) Complete this worksheet (ws2: taking derivatives)
 - (1) https://drive.google.com/file/d/1qqpOxjMIXR3dL29OQyaejS6C8vvcz_xb/view?usp=drive_link
 - ii) Now evaluate the following for the same worksheet
 - (1) For #3, find $f'(2)$ – meaning find the derivative when $x=2$
 - (2) For #4, find $f'(3)$

- (3) For #11, find $f'(4)$
 - (4) For #14, find $f'(2)$
 - (5) For #18, find $f'(7)$
- iii) On this worksheet (ws3: higher order derivatives)
 - (1) do #1, 2, 7
 - (2) https://drive.google.com/file/d/1ObDzWGmfu7D6PIFtJ1uFsOXa-2y9uhYg/view?usp=drive_link
- iv) Complete this worksheet
 - (1) https://docs.google.com/document/d/1BXsWzMpAlf4qyn2OmPhmV3Wh0uMeUV_huJKvW2JzT7Y/edit?usp=sharing

3) Lesson 3: Applications of derivatives

- a) Video: Khan one-dimensional motion
 - i) <https://www.khanacademy.org/math/calculus-1/cs1-applications-of-derivatives/cs1-straight-line-motion/v/one-dimensional-motion-with-calculus>
- b) Problems
 - i) On this worksheet (ws4: motion)
 - (1) do #1, 5
 - ii) https://drive.google.com/file/d/10yuLbWYInqcQIKc0-ZDCGBLnzWaR2AZY/view?usp=drive_link

4) Lesson 4: Mins and Maxs

- a) Videos: Khan Unit 5 and 6
 - i) <https://www.khanacademy.org/math/calculus-1/cs1-analyzing-functions/cs1-relative-local-extrema/v/relative-minima-maxima>
 - ii) <https://www.khanacademy.org/math/calculus-1/cs1-analyzing-functions/cs1-relative-local-extrema/v/testing-critical-points-for-local-extrema>
 - iii) Watch other videos in unit 5 as needed.
 - iv) <https://www.khanacademy.org/math/calculus-1/cs1-analyzing-functions/cs1-concavity-and-inflection-points-intro/v/concavity-concave-upwards-and-concave-downwards-intervals>
 - v) <https://www.khanacademy.org/math/calculus-1/cs1-analyzing-functions/cs1-second-derivative-test/v/second-derivative-test>
- b) Reading
 - i) Openstax Calculus Volume 1: Section 4.3
 - ii) <https://openstax.org/books/calculus-volume-1/pages/4-3-maxima-and-minima>
- c) Problem
 - i) On this worksheet (ws5: mins and maxs)
 - do #3, 6, 7, 9, 10
 - ii) https://drive.google.com/file/d/19HJCMwip5F-CPLg_7QDcl3rkA1B-0Wks/view?usp=drive_link