

AP Physics 1 2025-2026 Summer Assignment



Welcome to AP Physics 1!

In preparation for the upcoming school year, this packet and the required work within it will hopefully help with the following:

- I. Getting you oriented with regard to what an AP course is, what topics the AP Physics 1 exam will cover, and what kinds of questions there are.
- II. Sharpening up some necessary mathematical skills so you are ready for AP Physics in September
- III. Introducing you to simple uniform linear motion and motion graphs

Please print a copy and complete this entire packet on your own. Have it ready to hand in on the first day of class.

If you have any questions, e-mail me at ewatson@caschools.us

NAME: _____

Part 1: What is AP Physics 1?

Go to <https://apcentral.collegeboard.org/courses/ap-physics-1>

If you have never been on this site before, this is the place where you will create an online account which enables you to register for AP, PSAT and SAT testing. You will get periodic reminders and emails from the College Board after you register and you will be able to access your scores on this site when they are released.

One feature we will frequently use is AP Classroom. You will be given a code right away in August so you can join AP Classroom.

1. Go to the “[AP Physics 1 Course and Exam Description](#).” This is known as the CED.
2. On page 9 of pdf (page 2 at bottom of left hand column) and read “How AP Exams are Scored”.
 - a. How are the multiple-choice questions graded?
 - b. How are the free-response questions (FRQs) graded?
3. Go to page 13 of pdf (page 6, bottom of page). What is the college course equivalent of AP Physics 1?
4. The Course Content starts on page 22 of pdf. The Units we will cover and what percentages they make up of the Multiple Choice section of your AP Exam are listed in a table on page 23 of the pdf. **Copy that info into the following table.**

Unit	Exam Weighting
1	
2	
3	
4	
5	
6	
7	
8	

Between pages 24-149, there are Unit Guides for everything we will study in this course. Feel free to glance at it.

5. Go to page 184 of pdf (177 on page itself). Read “Exam Overview. **Fill in the following info:**

<u>Section</u>	<u>Number of Questions</u>	<u>Time (min)</u>
Multiple Choice		
Free Response		

6. Page 189 of pdf (182 on page itself) lists different task words which will be used in free response questions. You will be expected to answer questions posed in these ways in the correct manner. Write these task words and a brief description of their meaning here.

8. Go to pages 225-226 of pdf (218 and 219 on bottom of page). This is the equation document you will be using on homework assignments, quizzes, and tests throughout the year. You will be given a copy to use in August. You may want to print an additional copy on your own.

9. You will need a binder to keep class assignments, handouts, reference materials, and labs in for the course. You will also need pencils, a scientific calculator, lined paper, and graph paper for the course.

10. You will be given a textbook in August to use for the course. It is expected that you have the book, formula sheet, and the materials described in number 9 with you for each class.

Part II: Math Skill Review

1. Fill in the following table with the correct symbol and power of 10 for each metric prefix. You can use the formula sheet on page 225 of the CED or the internet to help you, just make sure they are correct! The first one is done for you. These are the prefixes that you will work with the most in AP Physics.

Prefix	Symbol	Factor
pico	p	10^{-12}
nano		
micro		
milli		
centi		
kilo		
mega		
giga		
tera		

2. Convert the following to the base unit by just multiplying the given number by the factor in the table above. The first one is done for you. *Use conversion factors. Do not just move the decimal point.* Use the CED to help you with prefix and unit abbreviations.

a. 10.6 mm to m

$$10.6 \text{ mm} \times \frac{1 \text{ m}}{1000 \text{ mm}} = 0.0106 \text{ m}$$

b. 578 ns to s

c. 24 pg to g

d. 38.5 cm to m

e. 1780 km to m

f. 18 Gm to m

3. Algebraically rearrange the following equations for the variable stated. The first one is done for you.

a. $a = \frac{F}{m}$ m

$$m = F/a$$

b. $a = \frac{v^2}{r}$ v

c. $K = \frac{1}{2}mv^2$ m

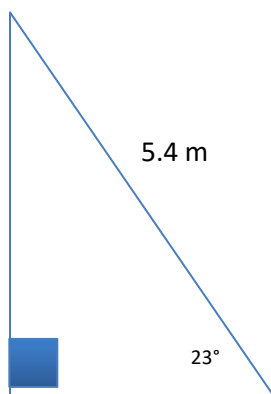
d. $T = 2\pi\sqrt{\frac{l}{g}}$ l

4. Fill in the missing words for these trig identities in terms of “adjacent” , “opposite” and “hypotenuse” of a right triangle. The trig functions are on the formula page in the CED.

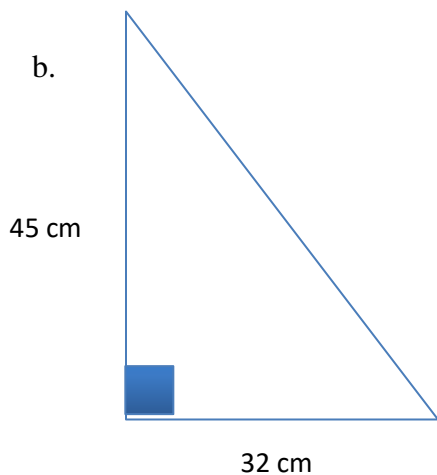
$$\sin\theta = \text{——} \quad \cos\theta = \text{——} \quad \tan\theta = \text{——}$$

5. Using trigonometry, fill in all the missing angles and sides for the following right triangles:

a.



b.



6. Practice doing the following calculations with your calculator:

a. $\frac{3.86 \times 10^{15}}{9.18 \times 10^{-19}} (2.97 \times 10^5)^2$

b. $\left(\frac{(8.3 \times 10^8)^2}{(7.7 \times 10^{-2})^7} \right)$

Part III: Analyzing Linear Motion

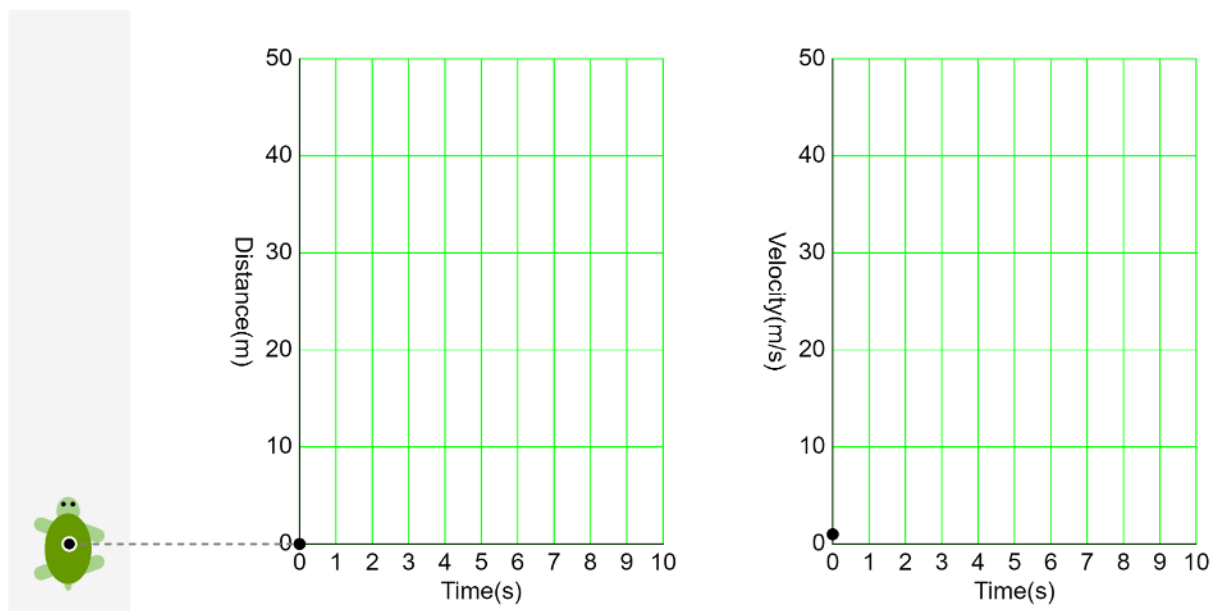
Objects have a position (d) at a time (t). If an object is changing its position over time, it is in MOTION. The rate of change in position per unit time is called VELOCITY.

In the following activity, you will watch a very simple simulation and then answer some questions about what you see on the screen:

1. Go to the following website: https://javalab.org/en/constant_velocity_en/.
2. Make sure the turtle's velocity is set to 1 m/s and click the RUN box. (Do not click on any other buttons or you will get ads that pop up!)
3. The screen shows you three different representations of motion, all of which are part of the AP Physics curriculum:
 - a. **a particle model** (This is a model that treats an object's center of mass as a single particle (represented by a dot), and shows its exact position at equal time intervals. It is also called a motion diagram or a [Ticker Tape Diagram](#))
 - b. **a position vs. time graph**
 - c. **a velocity vs. time graph**

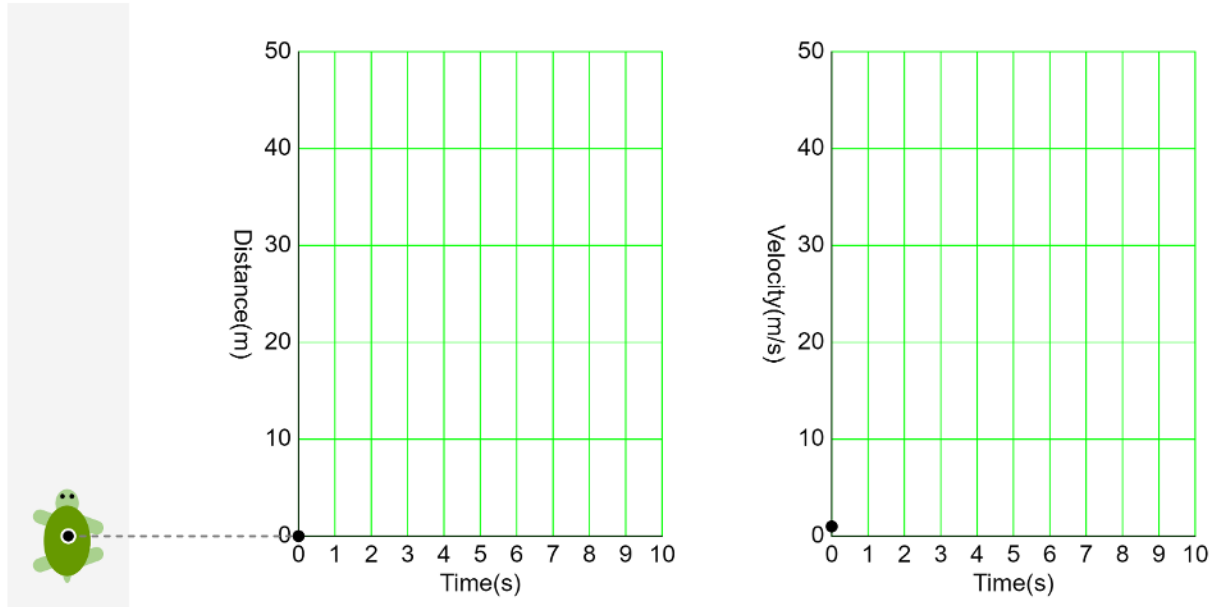
Please use a pencil to draw the particle model (the **dots** you see the turtle create) and use a pencil and a straight-edge to draw the line created on both graphs.

Trial 1: $v=1$ m/s



4. Hit “RESET” and change the turtle’s speed to 5 m/s and run the simulation again. Again, use a pencil to draw the particle model you see on the screen and use a pencil and a straight-edge to draw the line created on both graphs. Write an equation both graphs directly under

Trial 2: $v=5$ m/s



5. Briefly explain how the particle models (dots) in Trial 1 and 2 appear different.

6. Based on what you just wrote, try and use three or less words to describe *the speed* of the object moving from left to right depicted in the particle model below.



7. Briefly explain how the distance vs. time graphs for the two trials are the same, referring specifically to the slope.

8. Briefly explain how the distance vs. time graphs for the two trials are different, referring specifically to the slope.

9. Which of the following phrases **best describes** the slope of the d vs t graphs created by the simulation? (BE CAREFUL)

- A. Increasing and positive
- B. Decreasing and positive
- C. Constant and positive
- D. Constant and negative

Justify your answer:

10. Go to the following webpage: <http://www.physicsclassroom.com/class/1DKin/Lesson-3/The-Meaning-of-Shape-for-a-p-t-Graph> and, after reading, briefly **explain** the meaning of the slope for a position versus time (d-t) graph.

11. Which of the following phrases best **describes** the velocity of the turtle, if the positive direction is defined as up the screen?

- A. Increasing and positive
- B. Decreasing and positive
- C. Constant and positive
- D. Constant and negative

Justify your answer

12. Velocity, v , can be calculated with the simple equation

$$v = \frac{\Delta d}{\Delta t}$$

If Δd means change in position and Δt means change in time, what is the SI unit for velocity?

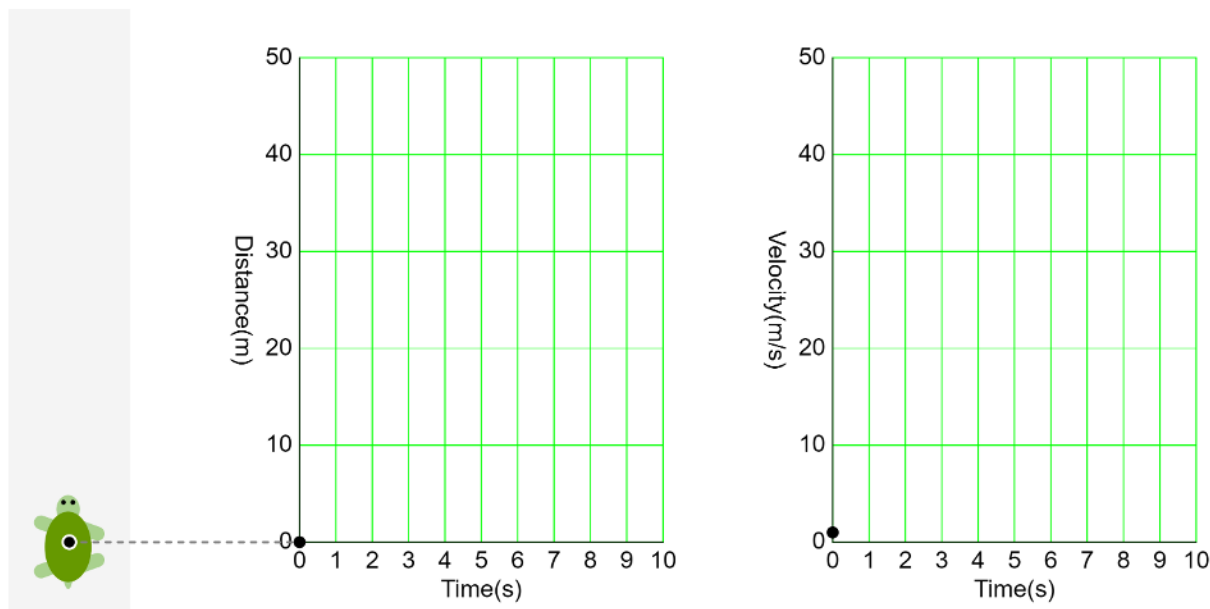
13. Briefly explain how the velocity vs. time graphs for the two trials are the same, referring specifically to the slope.

14. Briefly explain how the velocity vs. time graphs for the two trials are different.

15. Go to <http://www.physicsclassroom.com/class/1DKin/Lesson-4/Meaning-of-Shape-for-a-v-t-Graph> and, after reading, explain the meaning of slope on a v-t graph.

16. Define acceleration. What is the acceleration of the turtle during trial 1 and trial 2?

17. Now imagine a scenario where the turtle starts from rest at position $d = 0$ m and increases its velocity (or accelerates) at a uniform rate of 4 m/s every second. (A turtle is not capable of this kind of acceleration, but let's just imagine for the sake of graphing they are!) Sketch in the particle model and the lines you think you might see on these two graphs in this case of the turtle speeding up. *Hint: Remember what the slopes of these graphs represent and make sure your drawing accurately reflects what you learned.*



18. Go back to all 6 graphs you sketched and write the correct equations for the lines you drew directly on top of each graph. (Instead of using y's and x's, use the symbol for the variables on the y and x axes - like d and t or v and t)