For the most recent version of this assignment, [click here](#).

June 2021

To the incoming class of AP Physics 1 students:

Welcome to your first year of physics! Next year we will concentrate on preparing for the AP Physics 1 exam in May. Topics on the exam include kinematics, Newton's laws of motion, uniform circular & planetary motion, energy, momentum, rotation, and simple harmonic motion.

Course Services:
On my [website](https://sites.google.com/bhpsnj.org/ThePhysicsShow) (https://sites.google.com/bhpsnj.org/ThePhysicsShow), you will find links to various electronic services I will utilize next year.

- Main Website for Calendars & Google Classroom: At the bottom of the main site, links for the class calendar and drop-in extra help calendar can be found. Please subscribe to these calendars and get in the habit of checking the extra help calendar to see when and where I am available. Additionally, the enroll code for your specific Google Classroom will be listed. The calendars are available to the public, but Google Classroom is limited to students.

- AP Physics 1 Website: Digital versions of documents distributed in class can be found in the appropriate course (linked from the main site) and unit page. Also, links to required iPad apps are accessible on the main course page. These apps are free for BHPS students and should already be on your iPad. If you are missing apps, you'll need to visit the Tech Dojo in September. Access to this page is limited to students.

Please join the AP Physics 1 Summer Assignment Google Classroom via code 3pbncxv. As schedules are finalized over the summer, the code for your individual block will be shared with you.

I hope you are looking forward to AP Physics 1 next year. Feel free to email me (dmcgovern@bhpsnj.org) if you have any questions. Please also feel free to follow me on Twitter and Instagram (@mcgphysics) – no worries, I will not follow you back.

Enjoy the summer and I'll see you in September!

Mr. McGovern

Part I: Signed Course Syllabus
Due on the first day of class.

Please print, read, and sign the course syllabus (on the course website). Please submit this on the first day of class.

Part II: Required Supplies
Due on the first day of class.

Please have the following supplies for the first day of school:
- [Minimum 2" Three-Ring Binder](#) **devoted** to AP Physics 1
- Loose Leaf Paper
- Pencils
- Black/Blue Pens
- A Green or Purple Pen
- Block Eraser
- [Post-It Tabs](#)
  - Kinematics
  - Dynamics
  - Uniform Circular & Planetary Motion
  - Energy
  - Momentum
  - Rotation
  - Simple Harmonic Motion
  - Waves
  - AP Exam Review
  - Electrostatics
  - Circuits

  Please do not use a spiral or composition notebook for class. You will receive many handouts that are meant to be placed chronologically in your notebook. Also, you will most likely run out of free pages in a spiral/composition notebook.

Please purchase "5 Steps to a 5: AP Physics 1 Algebra-Based 2019 (or 2020, or 2021) Elite Student Edition" by Greg Jacobs. This is the ONLY AP Physics 1 review book I suggest. It is written by an AP Physics 1 teacher that participates in AP grading annually. He knows how to write great review questions. Links to purchase on Amazon and Barnes & Noble will be posted on my AP Physics 1 website.

Do NOT purchase "5 Steps to a 5: 500 Questions to Know by Test Day" as it's written by someone else and it's absolutely terrible. None of those 500 questions will help you. You might as well just burn your money. You'd get the same out of it in terms of AP preparation.

I have found a book that is quite interesting that provides an insight into physics beyond just some formulas if you are interested (this is optional)– a short biography of Isaac Newton ([Isaac Newton](#) by James Gleick, ISBN: 1-4000-3295-4).

Part IIA: Remote Learning Supplies
This is a suggested list of materials to have in your house if we need to move to remote learning so that we can conduct some of the laboratory experiments.
- Small ball
- Meter stick/Tape Measure
- Spring Scale
- String
- Slinky
- Scotch Tape
- Stopwatch/Smartphone

Part III: iPad Tasks
Due on the first day of class.

Make sure you have bookmarked the following websites:
- My Homepage
- The AP Physics 1 Course Page
- The Absent Protocol

Make sure you have subscribed to the following calendars:
- Class Calendar (my website will have the link for specific blocks)
- Drop-In Extra Help Calendar

Make sure you have enrolled in our Google Classroom:
- Google Classroom (my website will have the link for specific blocks)

Part IV: Khan Academy Enrollment
Due on August 31.

Register for our course on Khan Academy via this code: E9T4YVBW. Khan Academy provides you with tools to supplement class and better prepare for unit tests. *If you haven't created a Khan Academy account yet, please use your @bhpsnj.org email address to do so. Your username should be your actual name. If it is not, please email me so I know who you are.*

Part V: New Student Form
Due on August 31.

Please complete the New Student Form.

Part VI: Concept Map File Sharing
Due on the first day of class.

Next year in AP Physics 1, you will begin work on the yearlong concept map utilizing Google Slides. Each topic will get a minimum of 10 slides devoted to conceptual content, mathematical relationships, and maybe even a few examples illustrating the logic behind how to solve a problem.

As we progress throughout the year, you will add "connections" slides to your concept map that illustrate how topics interconnect – specifically a minimum of 3 connections per unit. This is actually the most important part of your concept map because one of the challenges of the AP Physics 1 exam is how you will be tested on a variety of concepts in a single free response question. You need to be able to see how these topics connect together in order to perform well on the exam and the concept map is meant to help to do just that.

The "study guide" slides will be due **by 7:50 am the day before** the unit test. The "connection" slides for all units will be due after we complete the last unit test in March/April.

Create a Google Slide file to be used for your Concept Map. Name the file using this format: AP1_BlockLetter_LastName_FirstName. For example, if I was enrolled in Block J, my file name would be "AP1_J_McGovern_Daniel." Make sure that in the share settings, link sharing is **turned off**. Having link sharing turned on will be considered an act of academic dishonesty as you are allowing your work to be accessed by your peers.

Do not submit your Concept Map via Google Classroom. You just need to share the file with me. If you submit to Google Classroom, it creates multiple versions of your concept map. You simply need to share the file with me in Google Drive and then just make sure you've updated it by the deadline.

Part VII: Penmanship Skills
(Optional) Due on the first day of class.

If you need to improve your penmanship, please visit https://www.nala.ie/publications/handwriting-book/. Print and complete pages 13 – 15, 20 – 26, 29, 33 – 35.

Students deemed to possess poor penmanship skills after the first test will be required to complete this assignment.


Part VIII: Algebra, Right Triangle Trigonometry, and Proportional Reasoning Review
Due on August 31 via Google Classroom.

For questions 1 – 10, simplify any solutions that contain compound (complex) fractions.

1. Solve the following for d: $a = b + cd$

2. Solve the following for c: $a = bc + cd + e$

3. Solve the following for m: $z = \frac{a}{m} + by^2$

4. Solve the following for y: $z = \frac{a}{m} + by^2$

5. Solve the following for d: $a = bc + \frac{1}{2}dc^2$

6. Solve the following for w: $g^2 = h^2 + 2wh$

7. Solve the following for n: $\frac{k}{n} = p^2 + \frac{2j}{h}$

8. Solve the following for v: $\Delta x = \frac{1}{2}(v_i + v)t$

9. Solve the following for t if v_i is equal to zero: $\Delta x = v_i t + \frac{1}{2}at^2$

10. Solve the following for d: $a + b = \frac{c+de}{f}$

11. A vector is 20.0 m long and makes an angle of 60.0° counterclockwise from the y-axis (on the side of the –x axis). What are the x- and y-components of this vector?

12. The velocity vector of a sprinting cheetah has x- and y-components v_x = +16.4 m/s and v_y = -26.3 m/s. (a) What is the magnitude of the velocity vector? (b) What angle does the velocity vector make with the +x-axis?

13. A vector has a magnitude of 22.2 cm and makes an angle of 130° with the positive x-axis. What are the x- and y-components of this vector?

For questions 14 – 16, write out the mathematical relationship between the variables in the problem. Then write down what you know about the relationship between the quantities for object 1 and object 2. Finally, substitute the quantities and compare.

14. Rectangle A has base B and height H, while rectangle B has base B/2 and height 3H. How does the area of rectangle B compare to the area of rectangle A?

15. The right triangles shown below have angles A and B and sides with lengths as shown. What is the ratio of tan(A) to tan(B)?
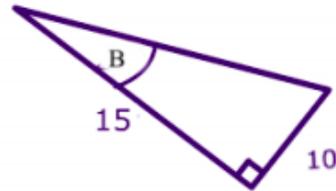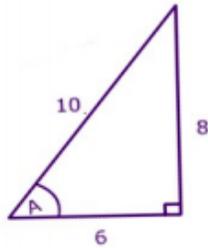
16. Two cylinders have the same volume, but cylinder B has twice the radius of cylinder A. If cylinder A has height H, what is the height of cylinder B, in terms of H?

17. By what factor does the volume of a sphere increase if the radius is tripled?

18. By what factor is a 12-inch pizza larger (in area) than a 10-inch pizza?

19. Three variables are related by the equation P = F/A. How does the variable F change if P triples and A doubles?

20. Four variables are related by the equation A = (BC)/D². How will A change in each of the following?
    a. B is doubled, C is doubled, D is tripled
    b. B is doubled, C is halved, D is one-quartered
   c. B is halved, C is tripled, D is one-third

Part IX: Graphing & Linearization of Data
Due on August 31 via Google Classroom.

At this point, you have graphed linear data sets and represented them with equations. You started with the generic form y = mx+b and we can use that to write equations for constant velocity like x = (25 cm/s) t + 7 cm, or v = 3 cm/s.

The equation for a line is easy to make, and it's easy to tell when we need it (graph shape looks linear). What about when it doesn't apply? Try to use another way to mathematically represent the graph shape.

Here are some data relating the variables A and B (the blank column is for later): Our eventual goal is to make an equation that relates A and B.

A	B	C =
0	0	
1	2	
2	8	
3	18	
4	32	
5	50	
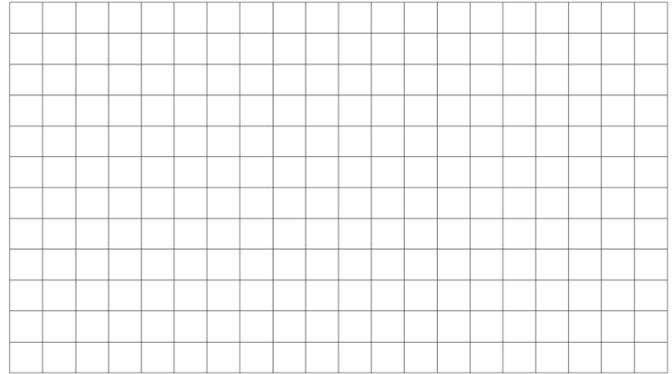
21. Plot B vs. A on the first grid. Put A on the horizontal axis.

22. This graph doesn't look linear- it looks more like y = x^2 we've seen in math classes. Let's see if B is proportional to A^2. Make a new column C and have C = A^2. Fill in the values for C.

23. Plot B vs. C in the next blank grid. If B and A have a B=A^2 relationship, what will this new graph shape look like?

24. Write an equation that describes how B and C are related.

As you get more and more comfortable with this technique you may not need to create a new variable like C. If after plotting B vs. A you suspect they have a B = A² relationship, you can create a column A² and plot B vs A². It's the same thing.

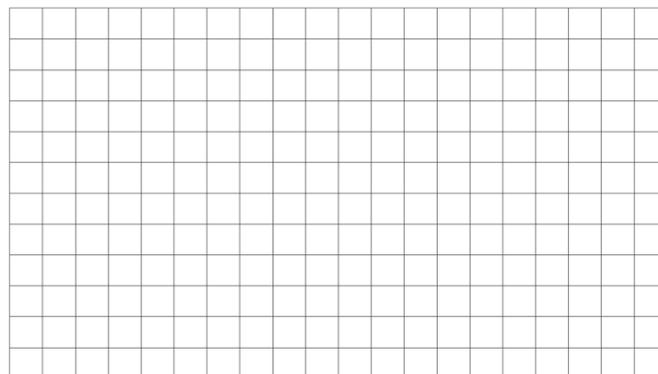| D	E	F =
6	0.5	
3	1	
2	1.5	
1.5	2	
1.2	2.5	
1	3	
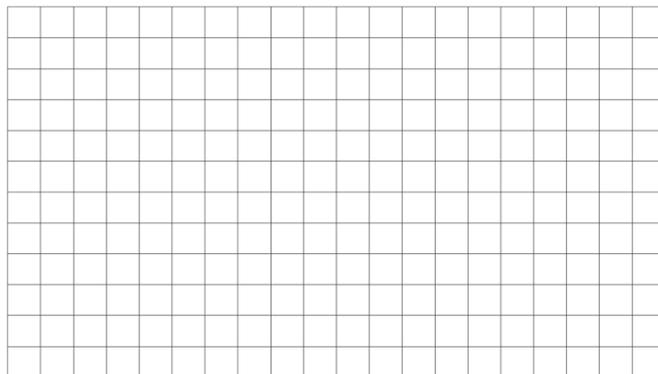
25. Try another: Plot the data. Put D on the horizontal axis.

26. Make a best guess about the relationship between D and E. Check out the bottom chart for hints.

27. Based on that best guess, make a new column that you think would **linearize** the data.

28. Plot the new data. What does this mean about your guess?

29. Write a new equation that relates E and F.

Graph shape	Written relationship	Modification required to linearize graph	Algebraic representation
	As x increases, y remains the same. There is no relationship between the variables.	None	$y = b$, or y is constant
	As x increases, y increases proportionally. Y is directly proportional to x.	None	$y = mx + b$
	As x increases, y decreases. Y is inversely proportional to x.	Graph y vs. $\frac{1}{x}$, or y vs. x^{-1}	$y = m\frac{1}{x} + b$
	Y is proportional to the square of x.	Graph y vs x^2	$y = mx^2 + b$
	The square of y is proportional to x.	Graph y^2 vs x	$y^2 = mx + b$