

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, waves & sound, electrostatics, and DC circuits.

On my Google Classroom (code on page 3) you will find all of the materials we will use this year. All of the digital copies of documents, homework, and announcements will be made on this page.

There is a second separate Google Classroom for your Summer Assignment submissions.

The new few pages go over in detail about everything you need to complete for the first day of school. Please make sure you read it over carefully and note all due dates.

I hope you are looking forward to AP Physics 1 next year. Feel free to email me ([kagnostak@bhpsnj.org](mailto:kagnostak@bhpsnj.org)) if you have any questions!

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

Ms. Agnostak

## 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.

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## 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
- Notebook Tabs
  - Kinematics
  - Dynamics
  - Uniform Circular & Planetary Motion
  - Energy
  - Momentum
  - Rotation
  - Simple Harmonic Motion
  - Waves & Sound
  - Electrostatics
  - Circuits
  - AP Exam Review

*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 Google Classroom. **You only need to bring this to class when the calendar states we’ll be completing questions in class.**

*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).

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## **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
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## **Part III: iPad Tasks**

*Due on the first day of class.*

Download the following apps on your iPad:

- [SparkVue](#)
- [DataAnalysis](#)
- [MatchGraph!](#)
- [PhET](#)

Make sure you have enrolled in our Google Classrooms:

- Summer Assignment Google Classroom (Code: fghahir)
  - Regular Google Classroom (Code: rmuktek)
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## **Part IV: Khan Academy Enrollment**

*Due on the first day of class.*

Register for our course on Khan Academy via this code: HJEMQ3Z9. 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.*

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## **Part V: Penmanship Skills**

*(Optional) Due on the first day of class.*

If you need to improve your penmanship, please visit

[https://www.nala.ie/sites/default/files/publications/better\\_handwriting\\_for\\_adults.pdf](https://www.nala.ie/sites/default/files/publications/better_handwriting_for_adults.pdf). Print and complete pages 13 – 15, 20 – 26, 29, 33 – 35.

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

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**Part VI: Algebra, Right Triangle Trigonometry, and Proportional Reasoning Review**  
**Due on August 31 via Summer Assignment Google Classroom.**

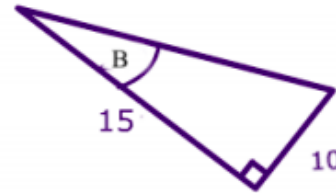
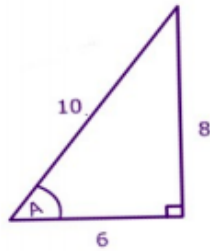
For questions 1 – 10, simplify any solutions that contain compound (complex) fractions.

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  $60.0^\circ$  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  $130^\circ$  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  $A = (BC)/D^2$ . How will  $A$  change in each of the following?
- $B$  is doubled,  $C$  is doubled,  $D$  is tripled
  - $B$  is doubled,  $C$  is halved,  $D$  is one-quartered
  - $B$  is halved,  $C$  is tripled,  $D$  is one-third
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**Part VII: Graphing & Linearization of Data**

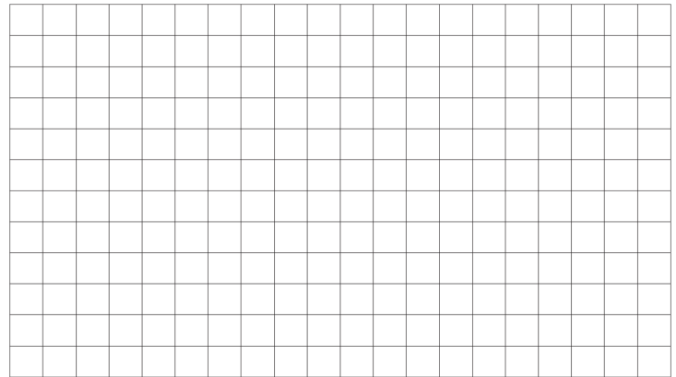
*Due on August 31 via Summer Assignment Google Classroom.*

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  $x = (25 \text{ cm/s}) t + 7 \text{ cm}$ , or  $v = 3 \text{ cm/s}$ .

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.

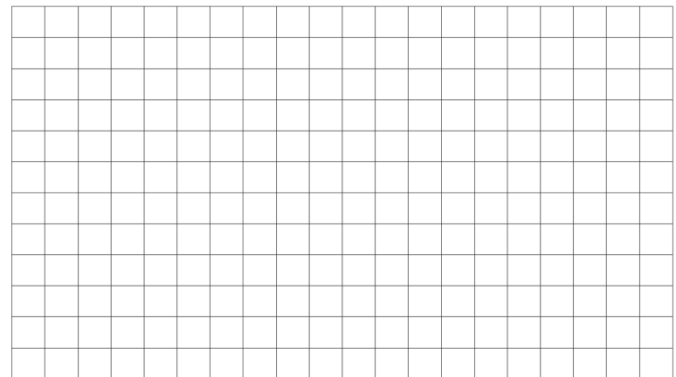
Here are some data relating the variables A and B (the blank column is for later): Our eventual goal is to make an equation that relates A and B.

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  $B = A^2$  relationship, you can create a column  $A^2$  and plot B vs  $A^2$ . 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	



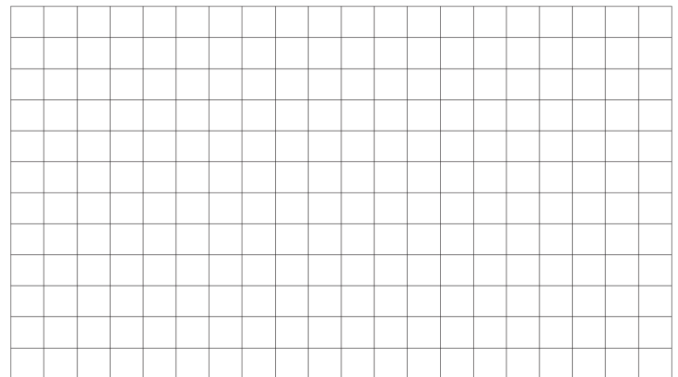
25. Try another: Plot the data. Put D on the horizontal axis.

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	$y^2 = mx + b$