

AP Physics 1 Summer Assignment – Bellville HS

Name _____

The purpose of this summer assignment is to accomplish the following:

- 1) Familiarize yourself with the AP Physics 1 Curriculum and the Five Big Ideas.
- 2) Research different Universities & what score is needed for transferable credit in college.
- 3) Learn/Review a few vital Physics skills that will be needed for deeper understanding of the topics covered next school year.
- 4) Build a fun, physics based project to be tested at the start of school.

If you have questions over the summer, please email Mrs. McEnerney at

nmcenerney@bellvillebrahmas.org.

It is expected that you work independently on this assignment and any form of academic dishonesty will be considered for dismissal from the class. All research must be cited in APA format.

This assignment will be your first major grade of the 1st 9 weeks. The entirety of this assignment is due **the first day of school** so that we will be able to “hit the ground running”. This assignment is a compilation of necessary math/science skills that will guide you to victory over the AP Physics 1 test as well as a project. I look forward to teaching you next year!

The AP Physics Test has four free-response questions, so you will need to get comfortable with writing out your answers. You may **not** type these answers as this is to help get you working on writing neat scientifically based answers. Prepare all answers on scratch paper and only write your final draft of each answer on this sheet. All work must include units and significant digits where appropriate.

Definitions: The following are terms often used in free-response questions.

Compare-note the similarity between, **Contrast**-state of being different from something else

Explain-make (an idea, situation, or problem) clear to someone by describing it in more detail or revealing relevant facts or ideas

Justify-show or prove to be right

Predict-use scientific reasoning to state what will occur

PURPOSE 1:

Familiarize yourself with the AP Physics 1 Curriculum and the Big Ideas.

-Read the following AP Physics 1 Course Overview and answer the following questions.

<https://apcentral.collegeboard.org/pdf/ap-physics-1-course-and-exam-description.pdf>

1) What are the 7 units in the Course Overview?

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

2) List the Five Big Ideas of AP Physics 1.

1. _____

2. _____

3. _____

4. _____

5. _____

3) Explain how any of one Science Practice can be used to explain any of one Big Idea.

4) What is the expectation of Laboratory time in AP Physics 1 and how will Laboratory experiments be based?

5) Explain the Format of the AP Physics 1 Test. i.e. how much time, format of the test, % value, etc.

PURPOSE 2:

Research different Universities and what score is needed for transferable credit in college.

-Choose three Universities that you have interest in attending and research if they accept AP Physics 1 credit and if so, what is the minimum score on the AP Physics 1 Exam needed for credit. In addition, how much credit will be given if that minimum score is met.

University 1:

University 2:

University 3:

PURPOSE 3:

Learn/Review a few vital Physics skills that will be needed for deeper understanding of the topics covered next school year. Your answer should include, as needed, diagrams, graphs, equations, and perhaps calculations to support the line of reasoning. **MUST SHOW WORK!**

Convert the following:

1) 2.5 km to m

2) 3.25 km to cm

3) 2.5 mm to cm

4) 55.2 mm to m

5) 3.5 g to kg

6) 75 m/h to km/h

7) 25 m/s to cm/s

8) 550 cm to m

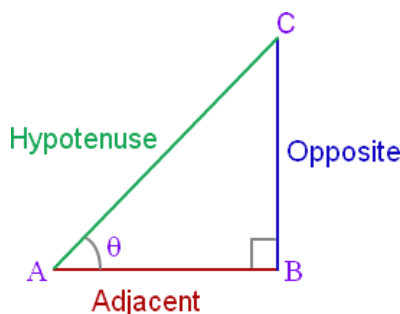
9) 5000 nm to m

10) 0.05 m to nm

11) 25 m/s to miles/hr

12) 10095 m/s to miles/s

Right Triangle Trigonometry



$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{a}{c}$$

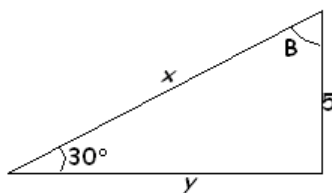
$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{b}{c}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{a}{b}$$

You must memorize and be able to use the above three trigonometric functions (sine, cosine, and tangent). To help memorize, remember the saying, “SOH CAH TOA.” This, of course, means “sine is opposite over hypotenuse,” “cosine is adjacent over hypotenuse,” and “tangent is opposite over adjacent.”

In physics, we will mostly measure angles with degrees. Therefore, make sure your calculator is in “degree” mode.

Example: Find the length of the missing sides.

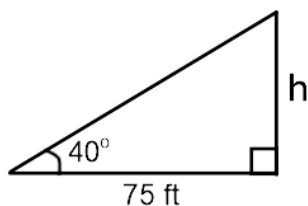


$$\tan 30^\circ = \frac{5}{y} \rightarrow y = \frac{5}{\tan 30^\circ} \rightarrow y = 8.66$$

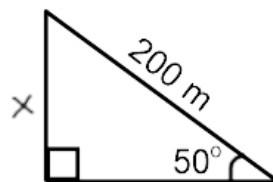
$$\sin 30^\circ = \frac{5}{x} \rightarrow x = \frac{5}{\sin 30^\circ} \rightarrow x = 10$$

Find the length of the unknown side(s).

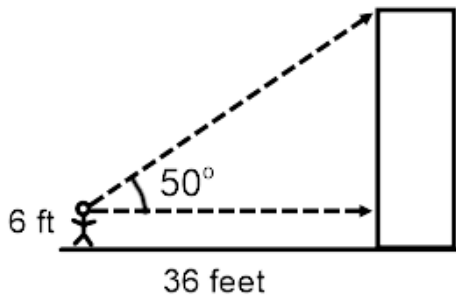
1)



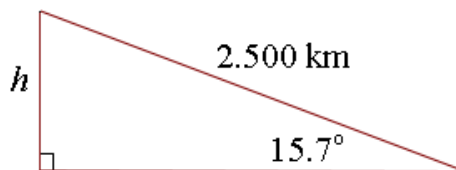
2)



3) How tall is the building?
(don't forget the height of the man)

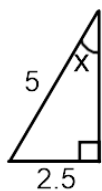


4)

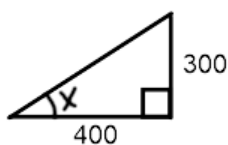


Find the unknown angle.

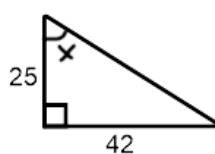
1)



2)



3)



Graphing

1. Find the slope of the line below. Be sure to include units. Interpret the meaning of the slope.



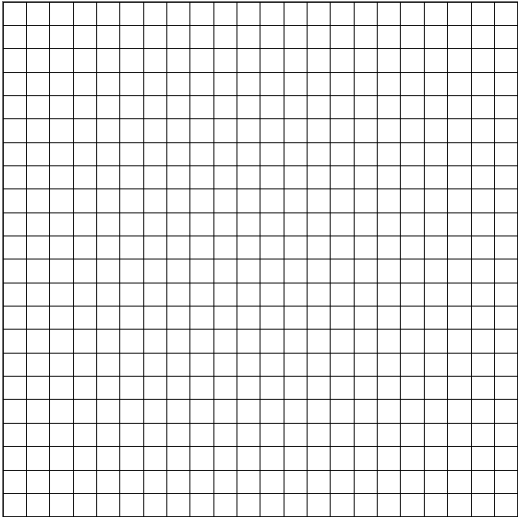
2) The heavier an object is the harder it is to push it. The amount of force (measured in pounds) applied by a machine to keep an object moving at a certain speed as the mass of the object increases is given in the table below. What is the rate of change of the force given mass? (a.k.a. slope of the line if the data were graphed)

Mass (kg)	Force (lb)
10	22.7
20	45.4
30	68.1
40	90.8
50	113.5

3) John attached a small parachute to his toy soldier and then dropped it from the top of a tall building. The height of the toy above the ground given a certain time is given below.

Time (seconds)	Height Above Ground (feet)
0	21
1	16.5
2	13.2
3	8.6
4	5

a) Create a graph for the above table. Plot the values given in the table and draw the line that best fits all the points.



b) What is the slope of your line? Interpret its meaning.

c) What is the y-intercept of your line? Interpret its meaning.

PURPOSE 4: Each student will research, design, and construct a kite made of recycled materials from their home. Projects will be due **ON THE FIRST DAY OF CLASS**. The style/shape of the kite will be weighted to encourage students to step out of their comfort zone. Diamond, Sled and Box kites will be worth 5 points less than all other styles. Kites **MUST** be made from materials that are not typical for kite. **NO parts except for kite string may come from a kite.** Points are not awarded for following this instruction, instead fifty points will be deducted if not followed. Pictures of materials used should help with any questions of materials. If you have a question about using something – ASK first! **Kites will have no required dimensions.**

There will be three parts to this project: 1. Research 2. Pictures 3. Build

Part 1: Research

Your research should answer the following questions. Use complete sentences for questions 2, 6, and 7.

1. What is the name of the style/design you chose? _____

2. Why did you choose the design? _____

3. What two forces are working against your kite (Hint: Air Resistance has a specific name when you are referred to flying objects)?

Vertical Force - _____ Horizontal Force - _____

4. What force helps your kite compensate for the force working against it in the Vertical Force? _____

5. What force helps your kite compensate for the force working against it in the Horizontal Force? _____

6. How does Newton's Third Law apply to kites? (What is the action; what is the reaction?)

7. What is Aerodynamics and in what way is your kite design affected by aerodynamics?

Part 2: Pictures

Students will take at **least 8** pictures of themselves building the kite with labels of what is happening in the picture. The pictures should show the process of the build. Pictures of the students practicing flying the kite may be included but only two may count towards the eight required. Students will send the pictures in a Google document to nmcenerney@bellvillebrahmas.org by the first day of school. All pictures must have a caption to be given points.

Part 3: Build

Again, kites may be any size. However, no kite kits will be allowed. Students will receive five less points for sled, box, and diamond kits.

Weather permitting; we will fly the kites on the first day of class. If the weather is not suitable, we will postpone flights and classwork will be done.☺ Kites **MUST** become airborne for more than 10 seconds to receive full points.

