**AP Physics 1 Summer Assignment**

This packet is designed to prepare you for the rigors of Advanced Placement Physics. Because of the amount of material covered, it is necessary that students arrive to class in September with a strong understanding of the relevant algebra/trigonometry skills as well as a base level understanding of units and kinematics.

This packet is meant to be challenging – do your best. I realize that some sections may seem like “busy work” but understand that these concepts will be used extensively throughout the year and this practice will help create a solid foundation for the year. Use the resources located on the assignments page of my PV Bears website to help you with completing the assignments.

[http://www.pvbears.org/Page/1014](http://www.pvbears.org/Page/1014)

This will be turned in on the first day of school and will be your first graded assignment. Be sure to follow all directions regarding showing work. A test on these concepts will follow.

I recommend getting started on the assignment immediately. While it should not take you too much time, if any questions or concerns come up it would be helpful to have enough time to email me for clarification. I can be reached at: murphy.patrick@pvbears.org Good luck and have a safe and relaxing summer! Mr. Murphy
Pythagorean Theorem $a^2 + b^2 = c^2$
Solve for the unknown information. Round to the nearest tenth.

1. $a = 9$ $b = 9$ $c = ____$
2. $a = 4$ $b = ____$ $c = 12$
3. $a = 4$ $b = 6$ $c = ____$
4. $a = ____$ $b = 20$ $c = 25$
5. $a = ____$ $b = 10$ $c = 13$

Trigonometry SOH CAH TOA
Solve for the unknown information. Ensure calculator is in degree mode, round to the nearest tenth.

$$\sin \theta = \frac{a}{h} \quad \cos \theta = \frac{a}{h} \quad \tan \theta = \frac{a}{a}$$

1. $\theta = 50^0$ $o = ____$ $a = 10$ $h = ____$
2. $\theta = 60^0$ $o = ____$ $a = ____$ $h = 2$
3. $\theta = 37^0$ $o = 6$ $a = ____$ $h = ____$
4. $\theta = 50^0$ $o = ____$ $a = ____$ $h = 13$
5. $\theta = 53^0$ $o = ____$ $a = 12$ $h = ____$
6. $\theta = 18^0$ $o = ____$ $a = ____$ $h = 10$
7. $\theta = 56^0$ $o = 6$ $a = ____$ $h = ____$
8. $\theta = 21^0$ $o = 9$ $a = ____$ $h = ____$
9. $\theta = 22^0$ $o = ____$ $a = ____$ $h = 10$
10. $\theta = 45^0$ $o = ____$ $a = ____$ $h = 17$
Formula Solving
Rearrange formulas to solve for the specified variable.

Example: \( v = \frac{\Delta x}{\Delta t} \) \quad \Delta x = v \Delta t \quad \Delta t = \frac{\Delta x}{v} \n
1. \( a = \frac{F}{m} \) \quad F = \underline{\ \ \ \ \ \ \ } \quad m = \underline{\ \ \ \ \ \ \ } \n
2. \( v = v_o + a t \) \quad v_o = \underline{\ \ \ \ \ \ } \quad a = \underline{\ \ \ \ \ \ } \quad t = \underline{\ \ \ \ \ \ } \n
3. \( x = x_o + v_o t + \frac{1}{2} a t^2 \) \quad x_o = \underline{\ \ \ \ \ \ } \n
\quad v_o = \underline{\ \ \ \ \ \ } \n
\quad a_o = \underline{\ \ \ \ \ \ } \n
\quad t_o = \underline{\ \ \ \ \ \ } \) (quadratic formula) \n
4. \( v^2 = v_o^2 + 2a(x - x_o) \) \quad v_o = \underline{\ \ \ \ \ \ } \n
\quad a_o = \underline{\ \ \ \ \ \ } \n
\quad x = \underline{\ \ \ \ \ \ } \n
\quad x_o = \underline{\ \ \ \ \ \ } \)
**Unit Conversions**
Complete the following unit conversions, write your final answer in the blank and show all work.

1. 12.0 miles to feet __________
2. 850 in to meters __________
3. $8.6 \times 10^5$ cm to km __________
4. 60 mi/hr to km/hr __________
5. 8.2 m/s to ft/min __________
6. $3.10 \times 10^8$ cm to feet __________
7. 45 ft/s to mi/hr __________
8. $6.20 \times 10^4$ m to nm __________
9. 290 kg to mg __________
10. $4.0 \times 10^3$ cm to nm __________
11. $6.0 \times 10^{-9}$ m to nm __________
12. $9.0 \times 10^8$ ng to g __________
13. 100 mm to cm __________
14. $5.4 \times 10^6$ nm to mm __________
15. 65 cm/s to km/hr __________
16. 100 cm/hr to mm/min __________
**Significant Figures**

Identify the number of significant figures in the following values.

1. _____ 489  
2. _____ 4.89  
3. _____ 5.390  
4. _____ 53.19  
5. _____ 3.091  
6. _____ 34.10  
7. _____ 1.000  
8. _____ 3.1x10^{-4}  
9. _____ 8.50x10^{12}  
10. _____ 3000001  
11. _____ 3193.00  
12. _____ 12  
13. _____ 1.0x10^{6}  
14. _____ One dozen  
15. _____ 9.800x10^{1}  
16. _____ 1000000  
17. _____ 1268x10^{-3}  
18. _____ 7  
19. _____ 3.4x10^{7}  
20. _____ 183x10^{5}  

Using proper rules for significant figures, complete the following calculations:

21. 8.4 + 3 = _____  
22. 11.72 – 9.3 = _____  
23. 23 + 5.5 = _____  
24. 3.42 – 2 = _____  
25. 5.69 + 9.32 = _____  
26. 18.4 – 12.96 = _____  
27. 3.40 x 2.3 = _____  
28. 9.0 x 3.0 = _____  
29. 5.0 x 4 = _____  
30. 12 x 6.40 = _____  
31. 8.4 / 4.2 = _____  
32. 1.2 / 0.3 = _____  
33. 86 / 3.45 = _____  
34. 22.10 / 1.35 = _____  
35. 2.3 x 1 / 5.81 = _____

**Scientific Notation**

Convert the following values into proper scientific notation with the specific number of significant figures.

1. 473 (2 SF) __________  
2. 4819 (3 SF) __________  
3. 195.8 (4 SF) __________  
4. 49101 (2 SF) __________  
5. 3810030 (2 SF) __________  
6. 0.00490 (2 SF) __________  
7. 0.0190 (2 SF) __________  
8. 0.000058 (2 SF) __________  
9. 935.0x10^{2} (4 SF) __________  
10. 183x10^{5} (3 SF) __________  
11. 50 (2 SF) __________  
12. 0.1341 (2 SF) __________  
13. 6000 (1 SF) __________  
14. 4.382 (4 SF) __________  

Convert the following values into decimal form.

15. 8.340x10^{5} __________  
16. 3.8x10^{2} __________  
17. 6.290x10^{-4} __________  
18. 1x10^{4} __________  
19. 5.90x10^{-2} __________  
20. 8.4x10^{3} __________  
21. 9.040x10^{1} __________  
22. 2.8900x10^{5} __________
**Displacement and Average Velocity**
Solve for the unknown information. Show all work and write answer in the blank provided.

1. Heather and Matthew walk with an average velocity of 0.98 m/s eastward. If it takes them 34 min to walk to the store, what is their displacement?

2. If Joe rides his bicycle in a straight line for 15 min with an average velocity of 12.5 km/h south, how far has he ridden?

3. It takes you 9.5 min to walk with an average velocity of 1.2 m/s to the north from the bus stop to the museum entrance. What is your displacement?

4. Simpson drives his car with an average velocity of 48.0 km/h to the east. How long will it take him to drive 144 km on a straight highway?

5. Look back at item 4. How much time would Simpson save by increasing his average velocity to 56.0 km/h to the east?

**Instantaneous Velocity and Acceleration**
Solve for the unknown information. Show all work and write answer in the blank provided.

1. As the shuttle bus comes to a sudden stop to avoid hitting a dog, it accelerates uniformly at −4.1 m/s² as it slows from 9.0 m/s to 0.0 m/s. Find the time interval of acceleration for the bus.

2. A car traveling at 7.0 m/s accelerates uniformly at 2.5 m/s² to reach a velocity of 12.0 m/s. How long does it take for this acceleration to occur?

3. With an average acceleration of −1.2 m/s², how long will it take a cyclist to bring a bicycle with an initial velocity of 6.5 m/s to a complete stop?

4. Turner’s treadmill runs with a velocity of −1.2 m/s and speeds up at regular intervals during a half-hour workout. After 25 min, the treadmill has a velocity of −6.5 m/s. What is the average acceleration of the treadmill during this period?

5. Suppose a treadmill has an average acceleration of $4.7 \times 10^{-3}$ m/s². a. How much does its velocity change after 5.0 min? b. If the treadmill’s initial velocity is 1.7 m/s, what will its final velocity be?