

Intro Worksheet: Physics as a Science, Problem Solving, and Review.

Show all work on this sheet. If you need additional room, please use a separate sheet of paper or the back.

1. Why do physicists use models to explain fundamental phenomena?

2. What types of data might a Physicist collect in each of the following situations? (List 2-3)
 - a. The Middlesex vs. St. George's soccer game

 - b. The Middlesex Holiday concert

 - c. Cooking a grilled cheese on the Panini press in the dining hall

3. What are the three basic physical quantities that must be measured in mechanics?

4. What are the three standard units for these quantities?

5. Why is it best to use the SI system of measurement for science?

6. If you divide a speed expressed in meters/second by a force measured in Newtons (1 kg m/s^2), in what units will the answer be expressed?
7. Using the proper prefixes, convert these hypothetical units of measure into their proper quantities (your answer should be in words!):
- a. 2000 mockingbirds
 - b. 10^{-6} phones
 - c. 10^{-2} pedes
 - d. 1000000 phones
 - e. 10^{-3} taries
8. If you square an acceleration expressed in meters per second squared, in what units will the answer be expressed?
9. Einstein's famous equation indicates that $E = mc^2$, where c is the speed of light and m is the object's mass. Given this, what is the SI unit for E ?
10. A human hair has a diameter of approximately $55 \mu\text{m}$. Express this diameter in meters (in proper scientific notation).
11. The average mass of a car in the United States is about $1.44 \times 10^6 \text{ g}$.
- a. Express this mass with the appropriate prefix
 - b. Express this mass in kg

12. If you are driving on I-95 (speed limit 65 mph) determine what the speed limit signs would read in:

a. km/hr

b. m/s

13. Estimate your age in seconds:

14. A billionaire offers to give you \$5 billion if you will count out the amount in \$1 bills, or a lump sum of \$5000. Which offer should you accept? Explain your answer. (Assume that you count at a rate of one bill per second, and be sure to allow for the fact that you need about 10 hours a day for eating and sleeping.)

15. The period of a pendulum, T is determined by the equation:

$$T = 2\pi \sqrt{\frac{L}{g}}$$

Where L is the length of the pendulum measured in meters and g is the local acceleration of gravity. How many centimeters long must a pendulum be to have a period of 8.0 seconds on earth, where the acceleration due to gravity is 10.0 m/s^2 ?