**Physics 1 Honors Required Summer Work**

 Welcome to Physics 1 Honors! In the world around you, physics is everywhere! Your goal this upcoming school year is to be able to understand and describe the world around you. Physics is a vast subject that uses the same principles to describe the interaction between two planets and the motion of a soccer ball that is kicked towards a goal. This means that the understanding you have of a soccer ball in motion also applies to how Jupiter and Saturn interact with one another! Don’t worry, we will start small and move through a few areas within physics during this course. Your first task is to become familiar with measurements and why it is important to practice these skills now for your future experiments.

 Let’s say you are going to record the amount of time it takes for your fidget spinner to stop spinning. You use the stopwatch on your phone and find out that it takes 1:53:45. What is the importance of each number? Well for starters, the first number is in **minutes**, the second number is in **seconds** and the third number is in **hundreds of seconds**. If you did not know this, you may have thought the time above is 1 hour, 53 minutes and 45 seconds. Units are very important when making measurements in any science course so that others can understand what you are trying to communicate.

 The system that will be used extensively in this course is called the Metric System. The official name is the International System of Units, which is abbreviated to SI. This system builds on a base unit that corresponds to a certain kind of measurement. The three fundamental measurements and what they are used for are listed below:

* Length = meter
* Volume = liter
* Mass = gram

Prefixes are included with the base unit to easily identify the number of units. Each prefix has a value that is then attached to the corresponding base unit. The chart below lists some of the prefixes with their labels, decimal values, and scientific notation. They are multiples of ten!

|  |  |  |  |
| --- | --- | --- | --- |
| **Prefix** | **Label** | **Decimal Value** | **Scientific Notation** |
| tera | T | 1 000 000 000 000 | 1012 |
| giga | G | 1 000 000 000 | 109 |
| mega | M | 1 000 000 | 106 |
| kilo | k | 1 000 | 103 |
| --- | --- | 1 | 100 |
| deci | d | 0.1 | 10-1 |
| centi | c | 0.01 | 10-2 |
| milli | m | 0.001 | 10-3 |
| micro | µ | 0.000 001 | 10-6 |
| nano | n | 0.000 000 001 | 10-9 |
| pico | p | 0.000 000 000 001 | 10-12 |

 Imagine you are going to measure the length of a tree branch and then you measure the length of your room. You might record your data as follows:

* Length of a tree branch: 1.5 meters
* Length of my room: 5 meters

Now you are going to measure the distance from your house to school. You find that you live 2 miles away from your school. The ratio (or amount of one unit to another) can help us determine how far you live in an SI unit.

$1.0 mile=1.6 kilometers$, **which you then use to find:**

$2.0 miles x \frac{1.6 kilometers}{1 mile}$ = 3.2 *kilometers*

Now if you wished to convert this to meters, you would look to your chart and see that for every 1000 meters you have 1 kilometer, or *1000 meters = 1 kilometer.*

Then, $3.2 kilometers x \frac{1000 meters}{1 kilometer}$ = *3,200 meters.*

This means the length of your room (5 meters) would fit into the distance from your house to school almost 644 times! See if you can find out how to do this!

 Without the conversions from milers to kilometers and then kilometers to meters, we would not be able to compare the length of your room and the distance from your house to school. Practice with the SI system will be necessary to exceed in the course. Below you will find a set of sample problems solved for you.



Below is a set of problems that you need to complete prior to the first day of school. It will be due on the **FIRST** Monday of the school year. Answer the multiple-choice questions by circling the best answer. For any questions without an answer choice, you **must show your work!** This will be a **TEST** grade for the first Marking Period worth **100 points!** *5 points/question*

1. Convert 1000 cm2 to m2.
2. Convert 2000 m to km.
3. 0.2 km
4. 200 km
5. 2 km
6. 10 km
7. How many inches are in 34 cm. 1 in = 2.54 cm
8. 13.38
9. 86.36
10. 36.25
11. 32.33
12. What SI unit would you use to measure the length of your thumb?
13. Feet
14. Inches
15. Meters
16. Centimeters
17. Which SI unit measures mass?
18. Gram
19. Celsius
20. Meter
21. Liter
22. Which SI unit measures length?
23. Liter
24. Gram
25. Celsius
26. Meter
27. Of the choices below, which is the greatest prefix?
28. Kilo
29. Micro
30. Milli
31. Tera
32. The height of a building is 25.5 meters. What is the height of the building in centimeters?
33. What is the SI system based on?
34. Multiples of 5
35. Multiples of 10
36. Multiples of 20
37. Multiples of 100
38. Find the number of seconds in a single day.

1 day = 24 hours, 60 minutes = 1 hour, 60 seconds = 1 minutes

1. If you were going to measure the distance from New Jersey to California, you would use which?
2. Centimeters
3. Millimeters
4. Kilometers
5. Nanometers
6. Convert 30o C to oF using the following: $\left(number of degrees\right)℃ ×1.8+32=℉ $
7. Where is 7 ½ centimeters? Draw a line pointing to the mark.



1. Convert 100000 g to kg.
2. Convert your height in inches to centimeters. 1 inch = 2.54 centimeters
3. The base units in the SI system are
4. Meter
5. Liter
6. Gram
7. All the above
8. Convert an astronaut’s weight in pounds to mass in kilograms. He weighs 180 lbs.

1 pound = 0.45359237 kilograms

1. How many milliliters are in 8 liters?
2. 1/8
3. 8
4. 80
5. 800
6. 8000
7. What is the SI prefix for 1,000?
8. Milli
9. Mega
10. Centi
11. Kilo
12. Convert 75 mph (miles/hour) to m/s (meters per second).

1 mph = 0.44704 m/s