Physics 01-01 Intro and Units Name: _____

## What is Physics?

Physics studies _____ that can be _____ with our five senses.

Model - _____
Theory - _____
Law - Uses _____ language to describe _____ patterns that have been verified _____ times

**Scientific Method** - used to solve many types of problems, not just science
- Usually begins with _____ and question about the phenomenon to be studied
- Next preliminary research is done and _____ is developed
- Then experiments are performed to _____ the hypothesis
- Finally the tests are analyzed and a _____ is drawn

## Units

Science uses _____ System (SI System)

Base Units
Length - _____ (m)
Time - _____ (s)
Mass - _____ (kg)

Others are _____ units

| Prefix | Symbol | Value | Prefix | Symbol | Value |
|---|---|---|---|---|---|
| *exa* | *E* | $10^{18}$ | *deci* | *d* | $10^{-1}$ |
| *peta* | *P* | $10^{15}$ | *centi* | *c* | $10^{-2}$ |
| *tera* | *T* | $10^{12}$ | *milli* | *m* | $10^{-3}$ |
| *giga* | *G* | $10^{9}$ | *micro* | *μ* | $10^{-6}$ |
| *mega* | *M* | $10^{6}$ | *nano* | *n* | $10^{-9}$ |
| *kilo* | *k* | $10^{3}$ | *pico* | *p* | $10^{-12}$ |
| *hecto* | *h* | $10^{2}$ | *femto* | *f* | $10^{-15}$ |
| *decka* | *da* | $10^{1}$ | *atto* | *a* | $10^{-18}$ |

## Unit Conversions

Multiply by _____ factors so that unwanted units _____ out

Convert 20 Gm to m

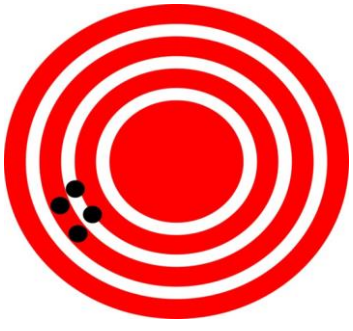
Convert 5 cg to kg

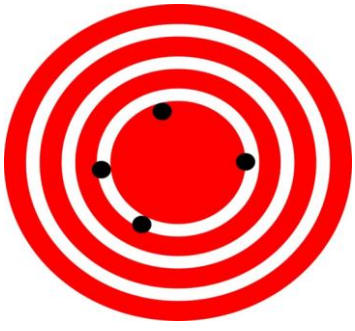
Convert 25 km/h to m/s

## Accuracy and Precision

Accuracy is how _____ a measurement is to the _____ value for that measurement.
Precision of a measurement system is refers to how _____ the agreement is between _____ measurements.

Accuracy and precision mean there is some _____.
A device can repeatedly get the same _____ (precise), but always be _____ (not accurate).





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## *Significant Figures*

Used to reflect _____ in measurements
Each measuring device can only measure so accurately
The _____ digit is always an _____

To find significant figures
Ignore _____ zeros between the decimal point and the first nonzero digit
Count the number of other _____

0.000000602

1032000

1.023

## *Rules for combining significant figures*

### Addition or subtraction

The answer can contain no more _____ places than the _____ precise measurement.

1.02 + 2.0223 =

**Multiplication or division**

The result should have the same number of _____ as the quantity having the _____ significant figures entering into the calculation.

1.002 · 2.0223 =

## *Homework*

1. Classify each as a **model**, **theory**, or **law**.
   a. _____Bohr model of atom
   b. _____Gravity
   c. _____Drawing a picture to represent a physics problem
   d. _____The Earth is round
   e. _____The Big Bang
   f. _____Creation
2. The altitude of the International Space Station is 409 km. What is this in meters? (RW) **409000 m**
3. The elevation of Berrien Springs is 209 m. What is this in cm? (RW) **20900 cm**
4. Convert 1 hour to seconds. (RW) **3600 s**
5. The speed limit on some highways is 100 km/h. How fast is that in m/s? (RW) **27.8 m/s**
6. The Earth orbits the sun at 29.78 km/s. What is this in km/h? (RW) **107200 km/h**
7. The Earth orbits the sun at 29.78 km/s. What is this in mph (assume 1 mile = 1.609 km)? (RW) **66630 mph**
8. The surface area of the Earth is 510,072,000 km$^2$. What is this in m$^2$? (RW) $\mathbf{5.10072 \times 10^{14}\ m^2}$
9. Water covers approximately 361,132,000 km$^2$ of the Earth's surface. What is this in ft$^2$ (assume 1 m = 3.2808 ft)? (RW) $\mathbf{3.8871 \times 10^{15}\ ft^2}$
10. The average density of Earth is 5.514 g/cm$^3$. What is this in kg/m$^3$? (RW) $\mathbf{5514\ kg/m^3}$
11. 148,940,000 km$^2$ of land are on Earth. How many significant figures are in this number? (RW) **5**
12. During the breeding season, an adult Monarch Butterfly will live 0.0760 yrs. How many significant figures? (RW) **3**
13. The village of Berrien Springs covers 2.64 km$^2$. How many significant figures? (RW) **3**
14. 0.21 km$^2$ of Berrien Springs is water. How many significant figures? (RW) **2**
15. Using the information from the previous two questions, how much land is there in Berrien Springs? How many significant figures should be in your answer? (RW) **2.43 km$^2$, 3**
16. If there are about 740 people per km$^2$ in Berrien Springs (living on the land), how many people live in Berrien Springs? How many significant figures should be in your answer? (RW) **1800 people, 2**