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

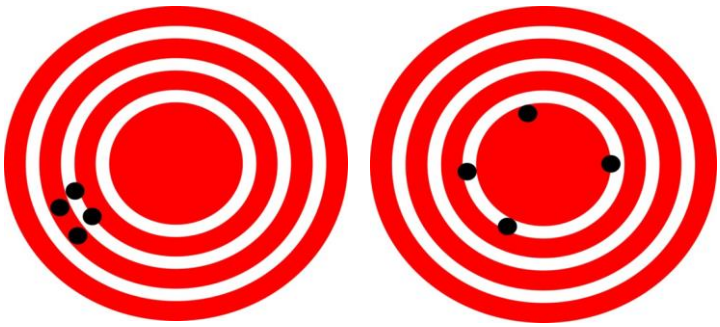
Convert 5 cg to kg

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) **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**