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

Unit Conversions

Multiply by ______________ factors so that unwanted units ______________ out

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

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).
**Physics 01-01 Intro and Units**

**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 ________________

<table>
<thead>
<tr>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.000000602</td>
</tr>
<tr>
<td>1032000</td>
</tr>
<tr>
<td>1.023</td>
</tr>
</tbody>
</table>

**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 km². What is this in m²? (RW) 5.10072 × 10¹⁴ m²

9. Water covers approximately 361,132,000 km² of the Earth's surface. What is this in ft² (assuming 1 m = 3.2808 ft)? (RW) 3.8871 × 10¹⁵ ft²

10. The average density of Earth is 5.514 g/cm³. What is this in kg/m³? (RW) 5514 kg/m³

11. 148,940,000 km² 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 km². How many significant figures? (RW) 3

14. 0.21 km² 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 km², 3

16. If there are about 740 people per km² 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