Physics 1 Unit 1 – 1D Kinematics and Error Analysis Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

IB 1.1 Measurement in Physics Practice

**Significant Figures, Scientific Notation and Measurement**


1. The length of the bold line measured here is: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Subtract: 7.987 m - 0.54 m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. How many significant figures are in the measurement 0.00130 cm? \_\_\_\_\_\_\_

4. 34.530 g + 12.1 g + 1 222.34 g = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Convert the following measurement to scientific notation: 101,000 grams. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. Solve: 923 g divided by 20 312 cm3 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. Solve: 123 000 m x 3 234 m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. How many significant figures are in the measurement 1.3000 meters? \_\_\_\_\_\_

9. Solve: 3.12 g + 0.8 g + 1.033 g = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. Solve: 1.23 m x 0.89 m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| **Measurement** | **Decimal Places** | **Significant Digits** | **Scientific Notation** |
| 4003 m |  |  |  |
| 160 N |  |  |  |
| 160. N |  |  |  |
| 30.00 kg |  |  |  |
| 0.00610 m |  |  |  |

**Factor Label Unit Conversions**

Useful Information:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1 foot (ft) | = | 12 inches (in) | 1 hour (hr) | = | 60 minutes (min) |
| 1 inch (in) | = |  2.54 centimeters (cm) | 1 mile (mi) | = | 1.61 kilometers (km) |
| 1 meter (m) | = | 1.1 yards (yd) | 1 kilogram (kg) | = | 2.2 pounds (lb) |
| 1 mile (mi) | = | 1610 meters (m) | 1 yard (yd) | = |  3 feet (ft) |

1. How long is a football field in meters? (From end-zone to end-zone is 100 yards.)

2. If your friend weighs 125 pounds, how many kilograms is that?

3. If you run a 10 K race (10 kilometers), how many miles have you run?

4. How many seconds are in one year? (Maybe reminds you of a Broadway tune?)

5. How fast are you driving in meters per second (m/s) if you drive 55 miles per hour (mph)?

6. What is the area of Missouri in cm2 if its area is 69,704 mi2? Express your answer in scientific notation.

7. The acceleration due to gravity on Jupiter is 24.79 m s-2. What is this acceleration in km h-2?

**Metric Units, Prefixes and Conversions**

 **Three methods to convert Metric units:**

1. **Move the decimal point**
2. **Substitute Power of 10 for a prefix**
3. **Use Factor Label Method**

|  |  |  |
| --- | --- | --- |
| **PREFIX** | **SYMBOL** | **NOTATION** |
| tera | T | 1012 |
| giga | G | 109 |
| mega | M | 106 |
| kilo | k | 103 |
| deci | d | 10-1 |
| centi | c | 10-2 |
| milli | m | 10-3 |
| micro | μ | 10-6 |
| nano | n | 10-9 |
| pico | p | 10-12 |

1. Convert 45.20 centimeters into meters.
2. Convert 1.9 m into μm (micrometers).
3. Convert 0.0340 pm (picometers) into kilometers.
4. Convert 12.8 cm2 into m2.
5. Convert 4700 kg/m3 into g/cm3
6. Convert 55 mph into m/s.
7. Convert 700 seconds into nanoseconds.
8. Convert 2.40 gigabytes into bytes.
9. Convert 10.25 Mℓ into mℓ.
10. Convert 45.0 m3 into mm3.
11. Convert 92.3 kg/cm3 into g/m3.
12. Convert 30. m/s in to mph.

**Estimation – Give estimate to one sigfig and order of magnitude. NO MORE. Do without a calculator as much as possible. Defend your answer with an argument.**

1. Estimate the volume of a nucleus in mL if the radius of a nucleus is approximately 10-15 m.

2. How much money is there in a fully loaded Brinks armored car containing $20s? (Order of magnitude estimate)