

Dimensional Analysis

Name: _____

“Victory is won not in miles but in inches.”
Louis L’Amour

Student ID: _____

Date: _____

Reminders:

1 inch = 2.54 cm (exactly);
1 kg = 2.2 lbs (a measurement);
1 ml = 1 cm³ (by definition)

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$



exa	E	x 1,000,000,000,000,000,000	x 10 ¹⁸
peta	P	x 1,000,000,000,000,000	x 10 ¹⁵
tera	T	x 1,000,000,000,000	x 10 ¹²
giga	G	x 1,000,000,000	x 10 ⁹
mega	M	x 1,000,000	x 10 ⁶
kilo	k	x 1,000	x 10 ³
deci	d	x 0.1	x 10 ⁻¹
centi	c	x 0.01	x 10 ⁻²
milli	m	x 0.001	x 10 ⁻³
micro	μ	x 0.000001	x 10 ⁻⁶
nano	n	x 0.000000001	x 10 ⁻⁹
pico	p	x 0.000000000001	x 10 ⁻¹²
femto	f	x 0.000000000000001	x 10 ⁻¹⁵
atto	a	x 0.00000000000000001	x 10 ⁻¹⁸

Yes, you need to memorize these reminders! No, they will not be supplied on exams!

1. Convert 2.7×10^{-14} seconds into femtoseconds.

2. Convert 9.35×10^2 nanoseconds into microseconds.

3. How many cm in 72.34 inches?

4. How many kg in 72.34 pounds?

5. Convert 12.3 feet to meters.

6. Convert 12.3 lbs to grams.

7. How many cm^3 in 7.4 m^3 ?

8. You find your coffee cup holds 237 mL. Brewed coffee contains 0.84 mg of caffeine per 1 mL of coffee. If you drink (on average) 3.25 cups of coffee a day, how much caffeine do you consume in 5 years?
9. You measure 8.3 waves hitting a beach in one minute (8.3 1/min or 8.3 min^{-1}). What is that rate in Hertz? Hint Hertz means s^{-1} which can also be written $1/\text{s}$.
10. A car is moving 55 miles per hour. A mile is measured to be 5280 feet. What is the cars speed in meters per hour?

11. You can catch six fish an hour. The ferry takes 75 minutes to cross the bay. How many fish will you catch if you fish while crossing the bay twice?

12. It takes 5 quarters to do a load of laundry. You can earn \$8.00 an hour tutoring chemistry. You can solve seven chemistry problems per hour while tutoring. How many chemistry problems do you need to solve to do four loads of laundry?

13. A blue rock weighs 2.356 grams. When submerged in a liquid, the total volume of the liquid rises from 17.352 mL to 18.213 mL. (a) What is the density of the rock?
(b) Will it float in mercury? (Mercury has a density of 13.534 g/mL)

14. A commercial 747 holds 173,231 liters of fuel. The density of the fuel is 0.768 g/cm³.
How much does the fuel weigh in kilograms?