

1.4 Units & Conversions

- ▶ Use unit analysis to “balance” both sides of a formula.
- ▶ Convert within a given system of measure.
- ▶ Convert between different systems of measure.

Using Unit Analysis when Evaluating Formulas

Everything you measure has a number with some sort of **unit of measure** attached. The unit can be feet, pounds, dollars per hour, people, degrees, or any of countless other ways in which real-life objects are measured.

Study Tip

Many people have found that unit analysis is the most useful “trick” they were ever taught in math. Using it and understanding it can open your eyes to all sorts of math that appears mysterious without it.

Unit Analysis

Unit analysis is the process of changing from one unit of measure to another. Change occurs when units are multiplied or divided. Addition and subtraction always preserve units.

Examples: $2 \text{ ft} + 3 \text{ ft} = 5 \text{ ft}$	Addition preserves units.
$8 \text{ oz} - 2 \text{ oz} = 6 \text{ oz}$	Subtraction preserves units.
$\left(18 \frac{\$}{\text{hr}}\right)(10 \text{ hr}) = \180	Multiplication changes units.
$\frac{320 \text{ mi}}{8 \text{ gal}} = 40 \frac{\text{mi}}{\text{gal}}$	Division changes units.

EXAMPLE 1 Using Unit Analysis

In 2010, the average hourly billing rate for attorneys in the United States was \$413 per hour for litigation, \$302 per hour for labor or employee cases, and \$294 per hour for real estate cases.

- a. What would you expect to pay for 1200 hours of litigation?
- b. You paid \$2850 for 9.5 hours of legal work on a mortgage. What hourly rate did your attorney charge?
- c. Your attorney represented you for 25% contingency on a personal injury case in which you were awarded \$600,000. Your attorney spent 1000 hours on the case. What was the hourly billing rate?

SOLUTION

a. $\left(413 \frac{\$}{\text{hr}}\right)(1200 \text{ hr}) = \$495,600$	b. $\frac{\$2850}{9.5 \text{ hr}} = 300 \frac{\$}{\text{hr}}$
c. $\frac{25\% \text{ of } \$600,000}{1000 \text{ hr}} = \frac{\$150,000}{1000 \text{ hr}} = 150 \frac{\$}{\text{hr}}$	

✓ Checkpoint

An attorney at a law firm billed an average of 55 hours in litigation fees per week for a year. Estimate the amount of revenue the attorney brought into the law firm during the year.

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