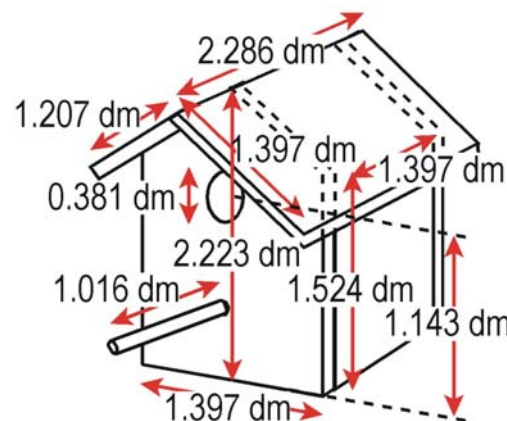


Converting among Metric Units

Michelle has directions to build a birdhouse. She has a metric ruler marked off in centimeters. All of the dimensions in the blueprint for the birdhouse are in decimeters. What can she do?

Decimeters and centimeters are both units of length or distance in the metric system. They are both based on the meter. Centi and deci are prefixes that are used together with the unit meter. Deci means 0.1, so 1 decimeter is 0.1 meters. Centi means 0.01, so 1 centimeter is 0.01 meters. Below is a list of seven common metric prefixes. Each of the prefixes can be used with any metric unit.

The definitions for the metric prefixes can be turned into conversion factors and combined with the factor label method to do metric conversions. The process of making conversion factors from the prefixes is illustrated below with the prefix *milli*.



Kilo (k)	=	1,000		$1 \text{ mg} = 0.001 \text{ g}$	$so \frac{1 \text{ mg}}{0.001 \text{ g}} = 1 \text{ and } \frac{0.001 \text{ g}}{1 \text{ mg}} = 1$
Deci (d)	=	0.1			
Centi (c)	=	0.01			
Milli (m)	=	0.001		$1 \text{ mm} = 0.001 \text{ m}$	$so \frac{1 \text{ mm}}{0.001 \text{ m}} = 1 \text{ and } \frac{0.001 \text{ m}}{1 \text{ mm}} = 1$
micro (μ)	=	0.000001			
nano (n)	=	0.000000001			
pico (p)	=	0.000000000001			
				$1 \text{ mL} = 0.001 \text{ L}$	$so \frac{1 \text{ mL}}{0.001 \text{ L}} = 1 \text{ and } \frac{0.001 \text{ L}}{1 \text{ mL}} = 1$

It is not unusual for a simple unit conversion to require two steps. Consider Michelle's problem. The length of the dowel used to make the perch of the birdhouse is 1.016 dm. How many centimeters is this? You have definitions relating decimeters to meters and centimeters to meters, but none relating decimeters to centimeters. As a result, you must convert 1.016 dm to meters and then to centimeters as follows:

$$\frac{1.016 \text{ dm}}{1} \times \frac{0.1 \text{ m}}{1 \text{ dm}} \times \frac{1 \text{ cm}}{0.01 \text{ m}} = 10.16 \text{ cm}$$

Answer the questions below using the procedures above.

- | | | |
|-----------------------------|---------------------------|--------------------------|
| 1) 35 mg = _____ g | 5) 6.3 dm = _____ mm | 9) 0.002 cg = _____ mg |
| 2) 0.14 dL = _____ μ L | 6) 72.1 mg = _____ cg | 10) 468 dm = _____ km |
| 3) 832.5 nm = _____ μ m | 7) 365 μ s = _____ ms | 11) 5,012 pL = _____ nL |
| 4) 0.0003 L = _____ pL | 8) 2.4 dm = _____ cm | 12) 12,987 ns = _____ ks |