

The Metric System

Much of the world uses the metric system (see Table 1-1). In the United States, we also use various non-metric units (feet, miles, pounds, etc.). Let's get familiar with some of the types of numbers we'll use in this class.

Text	Prefix	Symbol	Decimal	Scientific Notation	Common Examples
billion	giga	G	1,000,000,000	10^9	gigabyte
million	mega	M	1,000,000	10^6	megawatt
thousand	kilo	k	1,000	10^3	kilometer
hundred	hecto	h	100	10^2	hectare
ten	deca	da	10	10^1	decathlon
one			1	10^0	
tenth	deci	d	0.1	10^{-1}	decibel
hundredth	centi	c	0.01	10^{-2}	centimeter
thousandth	milli	m	0.001	10^{-3}	milligram
millionth	micro	μ	0.000001	10^{-6}	micrometer
billionth	nano	n	0.000000001	10^{-9}	nanosecond

Table 1-1. A list of commonly used numbers and prefixes in the International System of Units (SI).

- Which of these prefixes represents the **largest** value? ^A milli ^B mega ^C centi ^D micro ^E giga ^F nano
 - Which of these prefixes represents the **smallest** value? milli mega centi micro giga nano
- Which one of these is **INCORRECT**?
^A $k = \text{kilo} = \text{thousand}$ ^B $M = \text{mega} = \text{million}$ ^C $G = \text{giga} = \text{billion}$ ^D $m = \text{micro} = \text{millionth}$
- How many **centimeters** are in 1 **meter**? ^A 1 ^B 10 ^C 100 ^D 1,000
 - How many **meters** are in 1 **kilometer**? 1 10 100 1,000
 - How many **centimeters** are in 1 **kilometer**? 10,000 100,000 1,000,000
- T F 550 **nanometers** (the wavelength of visible light) is really **big** (like the size of a football field)
 - T F A **milligram** is 1 million grams.
- Earth's **radius** is 6,378 **kilometers**. What is this distance in **meters**? ^A 637,800 ^B 6,378,000 ^C 63,780,000
- Which one of the following is not equivalent to 10 kilometers? 10,000 m 1,000,000 cm 1×10^5 m
 - Which one of the following is not equivalent to 10 centimeters? 0.01 m 100 mm 1×10^{-2} m

English – Metric Conversions

We commonly use both the English system (feet, pounds, etc.) and metric system (meters, kilograms, etc.) in this course. Now, let's look at converting from one unit of measurement system to another. Some common distance conversions are listed in Table 1-2.

Unit	Conversion
1 inch (in)	2.5445 centimeters
1 centimeter (cm)	0.39 inches
1 foot (ft)	12 inches 0.3048 meters
1 yard (yd)	36 inches 0.914 meters
1 meter (m)	100 centimeters 39.4 inches 3.2808 feet
1 kilometer (km)	1000 meters 0.62 miles
1 mile (mi)	5280 feet 1.61 kilometers

Table 1-2. A list of commonly used distance units and their conversions.

8. Use Table 1-2 to provide the correct value for each of the following commonly used distances.

a) 1 mile = _____ kilometers c) 1 meter = _____ inches

b) 1 kilometer = _____ miles d) 1 inch = _____ centimeters

9. a) Which is a **longer** distance? ^A 1 in ^B 1 cm b) Which is a **longer** distance? ^A 1 mi ^B 1 km

One way to convert miles to kilometers is to multiply the number of miles by 1.61 km/mi to get kilometers. For the conversion from kilometers to miles, just multiply the numbers of kilometers by 0.62 mi/km to get miles.

Example 1 - 5 miles equal how many kilometers? Multiply the number of miles by 1.61 km/mi to get kilometers.

$$5 \text{ mi} \times \frac{1.61 \text{ km}}{1 \text{ mi}} = \mathbf{8.05 \text{ km}}$$

Example 2 - 10 kilometers equal how many miles? Multiply the numbers of kilometers by 0.62 mi/km to get miles.

$$10 \text{ km} \times \frac{0.62 \text{ mi}}{1 \text{ km}} = \mathbf{6.2 \text{ mi}}$$

10. a) In a 30-minute race to see who could get farther, you made it **2 miles** up the ^A you ^B your buddy South Kaibab trail and your buddy made it **2 kilometers**. Who won the race?
- b) The distance between **Phantom Ranch** and the **trailhead** of the North Kaibab trail is **13.6 miles**. What is this distance in **kilometers**? *Please show your work.*