

# Measurement Units (Chapters 2, 3)

## LENGTH

### Metric

- 1 kilometer (km) = 1,000 meters (m)
- 1 meter (m) = 100 centimeters (cm)
- 1 meter (m) = 1,000 millimeters (mm)
- 1 centimeter (cm) = 0.01 meter (m)
- 1 millimeter (mm) = 0.001 meter (m)

### English

- 1 foot (ft) = 12 inches (in)
- 1 yard (yd) = 3 feet (ft)
- 1 mile (mi) = 5,280 feet (ft)
- 1 nautical mile = 1.15 miles

### Metric-English

- 1 kilometer (km) = 0.621 mile (mi)
- 1 meter (m) = 39.4 inches (in)
- 1 inch (in) = 2.54 centimeters (cm)
- 1 foot (ft) = 0.305 meter (m)
- 1 yard (yd) = 0.914 meter (m)
- 1 nautical mile = 1.85 kilometers (km)

## AREA

### Metric

- 1 square kilometer (km<sup>2</sup>) = 1,000,000 square meters (m<sup>2</sup>)
- 1 square meter (m<sup>2</sup>) = 1,000,000 square millimeters (mm<sup>2</sup>)
- 1 hectare (ha) = 10,000 square meters (m<sup>2</sup>)
- 1 hectare (ha) = 0.01 square kilometer (km<sup>2</sup>)

### English

- 1 square foot (ft<sup>2</sup>) = 144 square inches (in<sup>2</sup>)
- 1 square yard (yd<sup>2</sup>) = 9 square feet (ft<sup>2</sup>)
- 1 square mile (mi<sup>2</sup>) = 27,880,000 square feet (ft<sup>2</sup>)
- 1 acre (ac) = 43,560 square feet (ft<sup>2</sup>)

### Metric-English

- 1 hectare (ha) = 2.471 acres (ac)
- 1 square kilometer (km<sup>2</sup>) = 0.386 square mile (mi<sup>2</sup>)
- 1 square meter (m<sup>2</sup>) = 1.196 square yards (yd<sup>2</sup>)
- 1 square meter (m<sup>2</sup>) = 10.76 square feet (ft<sup>2</sup>)
- 1 square centimeter (cm<sup>2</sup>) = 0.155 square inch (in<sup>2</sup>)

## VOLUME

### Metric

- 1 cubic kilometer (km<sup>3</sup>) = 1,000,000,000 cubic meters (m<sup>3</sup>)
- 1 cubic meter (m<sup>3</sup>) = 1,000,000 cubic centimeters (cm<sup>3</sup>)
- 1 liter (L) = 1,000 milliliters (mL) = 1,000 cubic centimeters (cm<sup>3</sup>)
- 1 milliliter (mL) = 0.001 liter (L)
- 1 milliliter (mL) = 1 cubic centimeter (cm<sup>3</sup>)

### English

- 1 gallon (gal) = 4 quarts (qt)
- 1 quart (qt) = 2 pints (pt)

### Metric-English

- 1 liter (L) = 0.265 gallon (gal)
- 1 liter (L) = 1.06 quarts (qt)
- 1 liter (L) = 0.0353 cubic foot (ft<sup>3</sup>)
- 1 cubic meter (m<sup>3</sup>) = 35.3 cubic feet (ft<sup>3</sup>)
- 1 cubic meter (m<sup>3</sup>) = 1.30 cubic yards (yd<sup>3</sup>)
- 1 cubic kilometer (km<sup>3</sup>) = 0.24 cubic mile (mi<sup>3</sup>)
- 1 barrel (bbl) = 159 liters (L)
- 1 barrel (bbl) = 42 U.S. gallons (gal)

## MASS

### Metric

- 1 kilogram (kg) = 1,000 grams (g)
- 1 gram (g) = 1,000 milligrams (mg)
- 1 gram (g) = 1,000,000 micrograms (μg)
- 1 milligram (mg) = 0.001 gram (g)
- 1 microgram (μg) = 0.000001 gram (g)
- 1 metric ton (mt) = 1,000 kilograms (kg)

### English

- 1 ton (t) = 2,000 pounds (lb)
- 1 pound (lb) = 16 ounces (oz)

### Metric-English

- 1 metric ton (mt) = 2,200 pounds (lb) = 1.1 tons (t)
- 1 kilogram (kg) = 2.20 pounds (lb)
- 1 pound (lb) = 454 grams (g)
- 1 gram (g) = 0.035 ounce (oz)

## ENERGY AND POWER

### Metric

- 1 kilojoule (kJ) = 1,000 joules (J)
- 1 kilocalorie (kcal) = 1,000 calories (cal)
- 1 calorie (cal) = 4.184 joules (J)

### Metric-English

- 1 kilojoule (kJ) = 0.949 British thermal unit (Btu)
- 1 kilojoule (kJ) = 0.000278 kilowatt-hour (kW-h)
- 1 kilocalorie (kcal) = 3.97 British thermal units (Btu)
- 1 kilocalorie (kcal) = 0.00116 kilowatt-hour (kW-h)
- 1 kilowatt-hour (kW-h) = 860 kilocalories (kcal)
- 1 kilowatt-hour (kW-h) = 3,400 British thermal units (Btu)
- 1 quad (Q) = 1,050,000,000,000 kilojoules (kJ)
- 1 quad (Q) = 293,000,000,000 kilowatt-hours (kW-h)

### Temperature Conversions

Fahrenheit (°F) to Celsius (°C):

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32.0) \div 1.80$$

Celsius (°C) to Fahrenheit (°F):

$$^{\circ}\text{F} = (^{\circ}\text{C} \times 1.80) + 32.0$$