1 Math Skills
Conversions

Armando stepped on the scale in his doctor's office and found out that his mass is 35 kg. What is his mass in grams?

1. List the given and unknown values.

Given: mass in kilograms = 35 kg

Unknown: mass in grams = ? g

2. Determine the relationship between units.
By using the table below, you know that 1 kg = 1000 g. You will multiply because it takes a lot of grams to make up each kilogram.

3. Write the equation for the conversion.

$$mass\ in\ g = mass\ in\ kg \times \frac{1000\ g}{1\ kg}$$

4. Insert the known values into the equation, and solve.

$$mass\ in\ g = 35\ kg \times \frac{1000\ g}{1\ kg}$$

$$mass\ in\ g = 35\ 000\ g$$

Prefix	Symbol	Meaning	Multiple of base unit
mega-	M	million	1 000 000
kilo-	k	thousand	1000
deci-	d	tenth	0.1
centi-	c	hundredth	0.01
milli-	m	thousandth	0.001
micro-	μ	millionth	0.000 001

Practice

1. On March 24, 1989, the *Exxon Valdez* struck a reef in Prince William Sound, Alaska, spilling 37 854 120 L of crude oil. What is this volume in milliliters?

2. The Tent meteorite, found in 1897 near Cape York, on the west coast of Greenland, is the largest meteorite exhibited by any museum. It has a mass of 30 883 kg. How much is the mass of this meteorite in milligrams?

3. Speed skater Kim Ki-hoon, of South Korea, won the 1000 m short-track race in the 1992 Olympics with a time of 90.76 s. How many milliseconds did it take him to finish the race? How many centimeters long was the race?

Sample Problem

At 553 m tall, the CN Tower, in Toronto, Canada, is one of the tallest structures in the world. What is the tower's height in kilometers?

1. List the given and unknown values.

Given:	height in meters = 553 m
Unknown:	height in kilometers = ? km

2. Determine the relationship between units. Using the table on the previous page, you can see that 1000 m = 1 km. You will divide because there are fewer kilometers than meters in a given distance.

3. Write the equation for the conversion.

$$height\ in\ km = height\ in\ m \times \frac{1\ km}{1000\ m}$$

4. Insert the known values into the equation, and solve.

$$height\ in\ km = 553\ m \times \frac{1\ km}{1000\ m}$$

$$height\ in\ km = 0.553\ km$$

Practice

4. One of the smallest species of insects in the world is *Caraphractus cinctus,* a type of wasp. The average mass of this wasp is 5 μg. Convert this mass into grams.

5. Scientists studying bull sperm whales off the coast of South Africa have calculated that these mammals can descend to depths of nearly 3000 m during their search for food. What is this depth in kilometers?

6. Laura runs a 100 m race in 20.0 s. What is her time in kiloseconds? How long is the race in kilometers?

7. It does not take a large electric current, the amount of charge that passes through a substance each second, to cause a fatal shock. The smallest deadly amount of electricity through the human body is 100 mA (milliamperes). What is this current in amperes?

8. Pikes Peak is a mountain in Colorado. Its height is 4301 m above sea level. What is this altitude in kilometers?

9. Yosemite Falls, in California, has a total height of 73 900 cm. What is this height in meters?

10. The Rio Grande is the river between Texas and Mexico, but not everyone realizes that it begins in Colorado and flows through New Mexico. The river's total length is 3 033 000 m. How many kilometers is this?

Sample Problem

There are 60 minutes in an hour. What is this amount of time in seconds?

1. List the given and unknown values.

Given: time in minutes = 60 min

Unknown: time in seconds = ? s

2. Determine the relationship between units. Although minutes do not fit strictly in the SI system, they can be used with it. Note that there are 60 seconds in a minute. You will multiply because there are many seconds in each minute.

3. Write the equation for the conversion.

$$time\ in\ s = time\ in\ min \times \frac{60\ s}{1\ min}$$

4. Insert the known values into the equation, and solve.

$$time\ in\ s = 60\ min \times \frac{60\ s}{1\ min}$$

$$time\ in\ s = 3600\ s$$

Practice

11. The purpose of the sport called *flight archery* is to shoot an arrow the greatest possible distance. One of the greatest distances achieved in flight archery is 624 m. What would this distance be in centimeters?

12. The French drink about 64 L of mineral water per person per year. How many milliliters does each person drink annually? How much mineral water, in milliliters, does each person drink each month?

13. In the United States' electrical system, the electric current in a 75 watt light bulb is 6250 mA. What is this current in amperes?

14. An acre is a common unit used to measure the area of a portion of land. An acre is equal to about 4046.9 m^2. What is this area in square kilometers (km^2)? (**Hint:** Because 1 km is equal to 1000 m, $1\ km^2 = (1000)^2\ m^2 = 1\ 000\ 000\ m^2$.)

15. One of the smallest nations in the world is Liechtenstein, a tiny country between Switzerland and Austria in Europe. If its area is 160 km^2, how many square meters is this area?