

1. How many seconds are in 1 week?

$$\frac{7 \text{ days}}{1 \text{ wk}} \times \frac{24 \text{ hrs}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{60 \text{ s}}{1 \text{ min}} = 604,800 \text{ s} = 6.05 \times 10^5 \text{ s}$$

2. Given that the average density of the Earth is 5.52 g/cm^3 and the mean radius is 6370 km, find the mass of the earth in kilograms.

$$\frac{5520 \text{ kg}}{\text{m}^3} \times \frac{(1000 \text{ m})^3}{\text{km}^3} \times \frac{4}{3} \pi (6370 \text{ km})^3 = 5.98 \times 10^{24} \text{ kg}$$

3. How long, in minutes, does it take an earthquake surface wave to travel around the world if the wave's average speed is 6 km/sec? Assume the Earth's circumference is 40,000 km.

$$40,000 \text{ km} \div \frac{6 \text{ km}}{\text{s}} \div \frac{60 \text{ s}}{\text{min}} = 111 \text{ min}$$

4. Water emerging from sea floor hydrothermal vents may be as hot as 750 °F. Convert this to both °C and K.

$$^{\circ}\text{C} = \frac{5}{9} (750 \text{ }^{\circ}\text{F} - 32 \text{ }^{\circ}\text{F}) = 399 \text{ }^{\circ}\text{C}$$

$$\text{K} = 399 \text{ }^{\circ}\text{C} + 273 \text{ }^{\circ}\text{C} = 672 \text{ K}$$

5. Given that the Colorado River Basin covers 637,000 km² and that the average rainfall is approximately 12 inches (1 ft) per year, calculate how many Maf of water this represent?

$$6.37 \times 10^5 \text{ km}^2 \times \frac{247 \text{ ac}}{\text{km}^2} \times 1 \text{ ft} = 1.573 \times 10^8 \text{ af} = 157 \text{ Maf}$$

6. If 1 calorie is required to heat 1 gram of water 1 °C, how much energy, in joules, is required to heat the top 100 cm of a pond with a surface area of 1 hectare?

$$\frac{4.2 \text{ J}}{\text{cal}} \times \frac{1 \text{ cal}}{\text{cm}^3 \text{ }^{\circ}\text{C}} \times \frac{(100 \text{ cm})^3}{\text{m}^3} \times (100 \text{ m})^2 \times 1 \text{ m} = 4.2 \times 10^{10} \text{ J}$$

7. Why is it important to use the correct units in your calculations?

To properly communicate magnitudes.