Name _____   Date_____

Scientific Notation

1. The approximate total surface area of Earth is 5.1×10^8 km^2. All the salt water on Earth has an approximate surface area of 352,000,000 km^2, and all the freshwater on Earth has an approximate surface area of 9×10^6 km^2. How much of Earth's surface is covered by water, including both salt and fresh water? Write your answer in scientific notation.

2. How much of Earth's surface is covered by land? Write your answer in scientific notation.

3. Approximately how many times greater is the amount of Earth's surface that is covered by water compared to the amount of Earth's surface that is covered by land?

1. Write the number 68,127,000,000,000,000 in scientific notation. Which of the two representations of this number do you prefer? Explain.

2. Here are the masses of the so-called inner planets of the Solar System.

   Mercury: 3.3022×10^{23} kg   Earth: 5.9722×10^{24} kg

   Venus: 4.8685×10^{24} kg   Mars: 6.4185×10^{23} kg

   What is the average mass of all four inner planets? Write your answer in scientific notation.

1. The approximate total surface area of Earth is 5.1×10^8 km^2. All the salt water on Earth has an approximate surface area of $352,000,000$ km^2, and all the freshwater on Earth has an approximate surface area of 9×10^6 km^2. How much of Earth's surface is covered by water, including both salt and fresh water? Write your answer in scientific notation.

$$3.52 \times 10^8 \ + \ 9 \times 10^6 \ = \ 3.52 \times 10^2 \times 10^6 \ + \ 9 \times 10^6$$
$$= \ 352 \times 10^6 \ + \ 9 \times 10^6$$
$$= \ 352 + 9 \ \times 10^6$$
$$= 361 \times 10^6$$
$$= 3.61 \times 10^8 \ km^2$$

2. How much of Earth's surface is covered by land? Write your answer in scientific notation.

$$5.1 \times 10^8 \ - \ 3.61 \times 10^8 \ = \ 5.1 - 3.61 \ \times 10^8$$
$$= 1.49 \times 10^8 \ km^2$$

3. Approximately how many times greater is the amount of Earth's surface that is covered by water compared to the amount of Earth's surface that is covered by land?

$$\frac{3.61 \times 10^8}{1.49 \times 10^8} \approx 2.4$$

About 2.4 times more of the Earth's surface is covered by water than by land.

Students practice working with numbers written in scientific notation.

1. Write the number $68,127,000,000,000,000$ in scientific notation. Which of the two representations of this number do you prefer? Explain.

$$68,127,000,000,000,000 = 6.8127 \times 10^{16}$$

Most likely, students will say that they like the scientific notation better because it allows them to write less. However, they should also take note of the fact that counting the number of zeros in $68,127,000,000,000,000$ is a nightmare. A strong reason for using scientific notation is to circumvent this difficulty: right away, the exponent 16 shows that this is a 17-digit number.

2. Here are the masses of the so-called inner planets of the Solar System.

Mercury: 3.3022×10^{23} kg   Earth: 5.9722×10^{24} kg

Venus: 4.8685×10^{24} kg   Mars: 6.4185×10^{23} kg

What is the average mass of all four inner planets? Write your answer in scientific notation.

$$\textit{average mass} = \frac{3.3022 \times 10^{23} \ + \ 4.8685 \times 10^{24} \ + \ 5.9722 \times 10^{24} \ + \ 6.4185 \times 10^{23}}{4}$$

$$= \frac{3.3022 \times 10^{23} \ + \ 48.685 \times 10^{23} \ + \ 59.722 \times 10^{23} \ + \ 6.4185 \times 10^{23}}{4}$$

$$= \frac{3.3022 + 48.685 + 59.722 + 6.4185 \ \times 10^{23}}{4}$$

$$= \frac{118.1277 \times 10^{23}}{4}$$

$$= 29.531925 \times 10^{23}$$

$$= 2.9531925 \times 10^{24}$$

The average mass of the inner planets is $= \ 2.9531925 \times 10^{24}$ *kg.*