**8.4: Use Scientific Notation**

**Goals:** \*Read and Write numbers in scientific notation

 \*Order numbers written in scientific notation

 \*Multiply and Divide numbers written in scientific notation

**Standard Form:** Numbers written in the form 1,000,000 or 625. “Normal”

**Scientific Notation:** Numbers written in the form: *c* x 10*n* where 1 < *c* < 10 and *n* is an integer.

**If the power of ten is positive, it tells you:** Move the decimal *n* spaces to the right to get into standard form

**If the power of ten is negative, it tells you:** Move the decimal *n* spaces to the left to get into standard form

**Write the following numbers in scientific notation:**

**Ex:** 42,590,000 = \_\_\_\_\_4.259\_\_\_\_\_\_\_ X 107 **Ex:** 0.0000574 = \_\_\_5.74\_\_\_\_\_\_\_\_ X 10−5

**Ex:** 539,000 = \_\_\_\_5.39 x 105\_\_\_\_\_\_\_\_\_\_\_ **Ex:** 267,500,000 = \_\_\_\_\_\_2.675 x 108\_\_\_\_\_\_\_\_\_

**Ex:** 0.000486 = \_\_\_\_4.86 x 10−4\_\_\_\_\_\_\_\_\_\_\_

**Write the following numbers in standard form:**

**Ex:** 2.0075 X 106 = \_\_\_\_\_2,007,5000\_\_\_\_ **Ex:** 1.685 X 10−4 =\_\_0.0001685\_\_\_\_\_\_

**Ex:** 7.0235 X 105 =\_\_\_\_702,340\_\_\_\_\_ **Ex:** 3.096 X 10−7 = \_\_\_0.000003096\_\_\_\_

**Ex:** 4.5 X 10−4 = \_\_\_\_\_\_\_0.00045\_\_\_\_\_\_\_

**Order numbers in scientific notation:**

**Ex:** Order 103,400,000; 7.8 X 108; 80,760,000 from least to greatest.

First write each number in scientific notation if necessary:

1.034 x 108, 7.8 x 108, 8.076 x 107

8.076 x 107, 1.034 x 108, 7.8 x 108

80,760,000, 103,400,000, 7.8 x 108

**Ex:** Order 93,000,000; 9.2 X 106; 9,028,000 from least to greatest.

First write each number in scientific notation if necessary:

9.3 x 107, 9.2 x 106, 9.028 x 106

9.028 x 106, 9.2 x 106, 9.3 x 107

9,028,000, 9.2 x 106, 93,000,000

**Multiply or divide numbers in scientific notation:**

**Ex:** (8.5 X 10²)(1.7 X 106) **Ex:** (1.5 X 10−3)²

14.45 x 108 = 1.445 x 109 2.25 x 10−6

**Ex:** (5.7 X 10³)(2.6 X 104) **Ex:** (2.4 X 10−4)²

14.82 x 107 = 1.482 x 108 5.76 x 10−8

**Ex:** (1.3 X 10−5)² **Ex:** (1.1 X 107)(4.2 X 10²)

1.69 x 10−10 4.62 x 1014

**Ex:** $\frac{1.2×10^{4}}{1.6×10^{-3}}$ **Ex:** $\frac{4.5×10^{5}}{1.5×10^{-2}}$

 0.75 x 107 = 7.5 x 106 3 x 107

**Ex:** $\frac{2.4×10^{5}}{2.5×10^{-4}}$

 0.96 x 109 = 9.6 x 108

**Ex:** Blood flow is partially controlled by the cross-sectional area of the blood vessel through which the blood is traveling. Three types of blood vessels are venules, capillaries and arterioles.



1. Let *r*1 be the radius of a venule, and let *r*2 be the radius of a capillary. Find the ratio of *r*1 to *r*2. What does the ratio tell you?

$\frac{r\_{1}}{r\_{2}}=\frac{1.0×10^{-2}}{5.0×10^{-3}}=0.2 × 10^{1}=2$ A venule’s radius is twice the size of a capillary’s.

1. Let *A*1 be the cross-sectional area of a venule and *A*2 be the cross-sectional area of a capillary. Find the ration of *A*1 to *A*2. What does the ratio tell you?

$\frac{A\_{1}}{A\_{2}}=\frac{πr^{2}}{πr^{2}}=\frac{3.14(1.0×10^{-2})²}{3.14(5.0 ×10^{-3})²}=\frac{3.14(1.0 ×10^{-4})}{3.14(25 ×10^{-6})}=\frac{3.14×10^{-4}}{7.85×10^{-5}}=0.4×10^{1}=4$

The area of a venule is 4 times the size the area of a capillary.