# Scientific Notation

-a way to represent large and small numbers

-a way to indicate significant figures

Form:

$$a.aaa.... \times 10^{a}$$

(always ONE nonzero digit before the decimal)

$$3.6 \times 10^{4}$$

means

$$3.6 \times 10 \times 10 \times 10 \times 10$$

OR

**36000**

$$6.21 \times 10^{-3}$$

means

$$6.21 \times \frac{1}{10} \times \frac{1}{10} \times \frac{1}{10}$$

OR

**0.00621**

Scientific notation removes the need for placeholder zeros, and that's good when you're dealing with very large and very small numbers!

$$4.70 \times 10^{-6} = 0.00000470$$

Scientific notation indicates significant figures without extra decimal points or lines.  All numbers in front of the power of ten are significant!

$$3700 = 3.70 \times 10^{3}$$

To write a number in scientific notation, move the decimal point so that it is behind the first nonzero number.  The power of ten will be the number of places you moved the decimal.  If the number is less than 1, the power of ten is negative.  If it's greater than one, the power of ten is positive.

$$0.00765$$
$$3$$
$$7.65 \times 10^{-3}$$

$$14\,000$$
$$4$$
$$1.400 \times 10^{4}$$

$6.38 \times 10^5$

6.3800000000

$\boxed{638000}$

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$4.20 \times 10^{-6}$

0000000004.20

$\boxed{0.00000420}$

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Using scientific notation on a calculator:

$6.38 \times 10^5$

on a TI-83:

enter

6.38 $\boxed{\text{EE}}$ 5

calculator displays:

6.38 E 5 — this E means "x10 raised to"

$4.20 \times 10^{-6}$

enter:

4.20 $\boxed{\text{EE}}$ $\boxed{(-)}$ 6

calculator displays:

4.2 E⁻6 — means "$\times 10^{-6}$"