

Lesson 1.9 – Operations Using Numbers in Scientific Form (Multiplying/Dividing)

Recall that a number in scientific notation is expressed in the form of $a \times 10^b$, where a is any real number and $1 \leq a < 10$, and b is an integer. The numbers below are expressed in $a \times 10^b$ form, but need a little adjusting so that they are in proper scientific notation. Adjust the expressions so that they are in proper scientific notation.

12.34×10^6	435×10^{-9}	0.0357×10^{-11}	0.000062×10^{13}
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Also, recall that the commutative property of multiplication allows us to interchange terms connected by multiplication. We can use this property strategically to handle expressions. Let's discuss the examples below.

$5 \times 3.45 \times 2$	$(6x^3)(5x^8)$	$(m^2 \times 10^5)(m^4 \times 10^8)$
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Operations Using Numbers in Scientific Notation

$$(1.2 \times 10^8)(3.5 \times 10^{14})$$

Two scientific numbers that will be multiplied.

In order to properly multiply or divide scientific numbers we need to express our answer using proper scientific notation and strategically use the commutative property of multiplication.

Class Notes – Simplify and express your answer in scientific notation.

LP#1 $(7 \times 10^4) \times (3 \times 10^5) =$	$(4 \times 10^2) \times (8 \times 10^7) =$
LP#2 $(6.23 \times 10^5) \times (9.76 \times 10^3) =$	$(2.38 \times 10^{11}) \times (1.99 \times 10^{10}) =$
LP#3 $(2 \times 10^{10}) \div (8 \times 10^7) =$	$(1 \times 10^{14}) \div (4 \times 10^8) =$
LP#4 $(3.92 \times 10^7) \div (1.12 \times 10^{11}) =$	$(8.04 \times 10^4) \div (2.01 \times 10^{13}) =$
LP#5 $(0.00000072) \div (2.88 \times 10^5) =$	$(6,390,000,000) \times (4.26 \times 10^7) =$

Use the planet mass table^[1] below to complete the tasks.

Rank	Name	Mass (kg)
1	<u>Sun</u>	1.9891×10^{30}
2	<u>Jupiter</u>	1.8986×10^{27}
3	<u>Saturn</u>	5.6846×10^{26}
4	<u>Neptune</u>	10.243×10^{25}
5	<u>Uranus</u>	8.6810×10^{25}
6	<u>Earth</u>	5.9736×10^{24}
7	<u>Venus</u>	4.8685×10^{24}
8	<u>Mars</u>	6.4185×10^{23}
9	<u>Mercury</u>	3.3022×10^{23}
10	<u>Moon</u>	7.349×10^{22}
11	<u>Pluto</u>	1.25×10^{22}

LP#6 How many times greater is the mass of Jupiter compared to the mass of Earth? Express your answer using scientific notation.	LP#7 How many times greater is the mass of Earth compared to the mass of Pluto? Express your answer using scientific notation.
LP#8 What is the mass of Neptune expressed in proper scientific notation?	LP#9 Multiply the mass of Mars to the mass of Venus and express the result in scientific notation.

Review – Simplify and express your answer in scientific notation.

R#1 $(5 \times 10^3) \times (1 \times 10^2) =$	$(6 \times 10^9) \div (3 \times 10^5) =$
R#2 $(9 \times 10^6) \times (5 \times 10^7) =$	$(7 \times 10^{17}) \div (2 \times 10^9) =$
R#3 $(4 \times 10^1) \times (6 \times 10^8) =$	$(9 \times 10^2) \div (4 \times 10^6) =$

^[1]The table used for this activity is from http://www.smartconversion.com/otherInfo/Mass_of_planets_and_the_Sun.aspx