NAME:_____ Math _____ , Period_____

Mr. Rogove Date:_____

LEARNING OBJECTIVE: We will compare numbers written in scientific notation. (G8M1L11)

ACTIVATING PRIOR KNOWLEDGE:

What number is bigger?

99,999,999 or 111,111,111 8 digits 9 digits	1,000,100 or 889,999 1.0001×10^{6} v. 8.89999×10^{5}
328.000921 or 328.01 hundredth 9 ten thousandths	0.0009 or 0.001 9×10^{-4} 1×10^{-3}
9.76×10^{7} *or* 1.01×10^{8} 8 > 7 (Magnitude)	7.91×10^{-1} or 7.911×10^{-2} $-1 > -2$

CONCEPT DEVELOPMENT:

Comparing Numbers

If two whole numbers have different numbers of digits, the number with more digits is greater.

Given two numbers in scientific notation:
$a \times 10^{m}$ and $b \times 10^{n}$, if $m < n$, then $a \times 10^{m} < b \times 10^{n}$.

Examples:

$9.99 \times 10^{17} < 1.111 \times 10^{18}$ because $17 < 18$.

$4.5454 \times 10^{-34} < 4.5555 \times 10^{-31}$ because $-34 < -31$

Compare the following:

1) 9.9×10^{7} and 1.001×10^{9} 9.9×10^{7} 1.001×10^{9}	2) 873×10^{5} and 8.72×10^{7} Not Sci. Not. $8.73\times10^{7} > 872\times10^{7}$

NAME:_____ Math _____ , Period_____

Mr. Rogove Date:_____

Guided Practice:

Steps for Comparing Numbers Written in Scientific Notation

1. Read the description of the numbers carefully.
2. Express both numbers as a product with the same power of 10.
3. Look at the values of the products not raised to the power of 10 and compare them.

Among the closest galaxies to Earth, *M82* is about 1.15×10^7 light-years away and *Leo I Dwarf* is about 8.2×10^5 light-years away. Which is closer? Leo is closer than M82 M82 / Leo I 1.15 $\times 10^7$ / 8.2 $\times 10^5$	The Fornax Dwarf galaxy is 4.6×10^5 light-years away from Earth, while Andromeda I is 2.43×10^6 light-years away from Earth. Which is closer? Fornax Dwarf is closer. $\frac{2.43}{4.6}$ $\frac{10^6}{10^5}$ About 5x closer
The average lifespan of the tau lepton is 2.906×10^{-13} seconds and the average lifespan of the neutral pion is 8.4×10^{-17} seconds. Explain which subatomic particle has the longer lifespan. Tau lepton longer lifespan. $\frac{2.906 \times 10^{-13}}{8.4 \times 10^{-17}}$	The wavelength of the color red is about 6.5×10^{-9} meters long. The wavelength of the color blue is about 4.75×10^{-9} meters long. Which wavelength is longer? Longer means bigger number. $4.75 \times 10^{-9} < 6.5 \times 10^{-9}$ BLUE < RED
Which ~~is larger:~~ 9.3×10^{28} or 9.2879×10^{28}	Which is larger: 5.3×10^{421} or 5.301×10^{421} 5.301×10^{421} $- \; 5.3 \times 10^{421}$ 0.001×10^{421} 1×10^{418}

2.43×10^6
4.6×10^5
24.3×10^5
4.6×10^5
19.7 1.97×10^6

NAME:_____ Math _____ , Period_____

Mr. Rogove Date:_____

Independent Practice:

Compare the two numbers.

The mass of a neutron is approximately 1.674927×10^{-27} kg. The mass of a proton is 1.672622×10^{-27} kg. Explain which is heavier?

4>2

NEUTRON

The average lifespan of the *Z boson* is approximately 3×10^{-25} seconds and the average lifetime of a *neutral rho meson* is approximately 4.5×10^{-24} seconds. Which has a longer lifetime? Approximately how many times longer is the lifespan of the longer living subatomic particle?

Rho Meson

by 15 times $\frac{4.5 \times 10^{-24}}{3 \times 10^{-25}} = 1.5 \times 10$

Gross Domestic Product (GDP) is an economic measurement used to show the market value of all the goods and services from a country. Below are the GDP figures for 8 countries for 2012 according to the United Nations. **Arrange them in order from greatest to least**.

	Country	2012 GDP (in dollars)
2	China	8.3584×10^{12}
6	Italy	2.013392×10^{12}
7	Spain	1.322126×10^{12}
1	United States	1.62446×10^{13}
4	Brazil	2.254109×10^{12}
5	Russia	2.029812×10^{12}
8	Turkey	7.88299×10^{11}
3	France	2.611221×10^{12}

Approximately how many times larger is the largest economy on this list compared to the smallest (you can round to the nearest tenth before doing any calculations)?

USA / Turkey $\frac{1.6 \times 10^{13}}{7.9 \times 10^{11}}$ 2×10^{1} ≈ 20x

(use the back if you need more space)

NAME:_____ Math _____ , Period_____

Mr. Rogove Date:_____

Activating Prior Knowledge:

We know what that magnitude can be used to determine the size of a number. Identify the magnitude of the following numbers:

32×10^{22}	45.2×10^{3}

Closure:

Gross Domestic Product (GDP) is an economic measurement used to show the market value of all the goods and services from a country. Below are the GDP figures for 8 countries for 2012 according to the United Nations. **Arrange them in order from greatest to least**.

Country	**2012 GDP (in dollars)**
China	8.3584×10^{12}
Italy	2.013392×10^{12}
Spain	1.322126×10^{12}
United States	1.62446×10^{13}
Brazil	2.254109×10^{12}
Russia	2.029812×10^{12}
Turkey	7.88299×10^{11}
France	2.611221×10^{12}

Approximately how many times larger is the largest economy on this list compared to the smallest (you can round to the nearest tenth before doing any calculations)?

Teacher Notes:

Lesson should be fairly easy, Need to look at information on subatomic particles. Do students need to do the calculator information as stated in the lesson?