NAME:_____   Math _____ , Period_____

Mr. Rogove   Date:_____

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

ACTIVATING PRIOR KNOWLEDGE:
What number is bigger?

1	99,999,999 or 111,111,111 8 digits 9 digits	2	1,000,100 or 889,999
3	328.000921 or 328.01	4	0.0009 or 0.001
5	9.76×10^7 or 1.01×10^8	6	7.91×10^{-1} or 7.911×10^{-2}

CONCEPT DEVELOPMENT:

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

$$99 < 101$$

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

magnitude of n is higher than m

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:

a) 9.9×10^7 and 1.001×10^9 1.001×10^9 is somewhere between 10 and 100 times bigger than 9.9×10^7	b) 873×10^5 and 8.72×10^7 $8.73 \times 10^7 > 8.72 \times 10^7$ Make sure #'s are in proper sci. notation.

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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 I Dwarf is closer. $115 \times 10^5 > 8.2 \times 10^5$	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. $\frac{2.43 \times 10^6}{4.6 \times 10^5}$ ~5× closer How many times closer? How many light years closer? $2.43 \times 10^6 - 4.6 \times 10^5$ $\frac{24.3}{4.6}$ $\boxed{1.97 \times 10^6}$ LY 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 $29060 \times 10^{-17} > 8.4 \times 10^{-17}$	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? Red
Which is larger: 9.3×10^{28} or 9.2879×10^{28} $\frac{9.3 \times 10^{28}}{9.2879 \times 10^{28}}$	Which is larger: 5.3×10^{421} or 5.301×10^{421} $.001 \times 10^{421}$ bigger 10^{418} $5.3 \times 10^{421} + 10^{418} = $

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?	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?

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)?

(use the back if you need more space)

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**.

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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?