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

ACTIVATING PRIOR KNOWLEDGE:

What number is bigger?

99,999,999 or <u>111,111,111</u> 8 digits 9 dysts	1,000,100 or 889,999 1.0001×16 U. 8.89999×16
328,000921 or 328.01) hundredth	$0.0009 \text{ or } 0.001$ 9×10^{-4} 1×10^{-3}
$\frac{9.76 \times 10^{7} \text{ or } 1.01 \times 10^{8}}{8 > 7 \text{ (Magnitude)}}$	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.

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:

	B·	
$\bigcirc 9.9 \times 10^7$ and 1.001	$\times 10^{9}$	(2) 873 × 1 0^{5} and 8.72 × 1 0^{7}
		Not Sci. Nat.
	A	
9.9 x10 +	1.001×109	8.73×10 ⁷ > 872×10 ⁷

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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?

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?

2.43 ×10⁶-4.6×10⁵

24.3 ×10⁵

4.6 ×10⁵

19.7 192400⁶

The average lifespan of the <u>tau lepton</u> is 2.906×10^{-13} seconds and the average lifespan of the <u>neutral pion</u> is 8.4×10^{-17} seconds. Explain which subatomic particle has the longer lifespan.

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 begger

Which is larger:
$$9.3 \times 10^{28}$$
 or 9.2879×10^{28}

Which is larger: $5.3 \times 10^{421} \text{ or } 5.301 \times 10^{421}$ 5.301×10^{421} -5.3×10^{421} 0.001×10^{421} 1×10^{418}

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INDEPENDENT PRACTICE:

Compare the two numbers.

The mass of a neutron is approximately 1.674927×10^{-27} kg. The mass of a proton is 1.672522×10^{-27} kg. Explain which is heavier?

4>2

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?

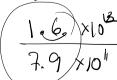
Approximately how many times longer is the lifespan of the longer living subatomic particle?

Kho Meson $\frac{4.5 \times 10^{-24}}{3 \times 10^{-25}} = 1.5 \text{ nb}$

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)?



2 ×10 × 20x

(use the back if you need more space)

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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?