

8th Grade Math: ExPWN it! 14

Comparing in Scientific Notation

Friday, September 2⁴, 2016

AIMS:

- ✓ SWBAT compare numbers expressed in scientific notation.
- ✓ SWBAT apply the laws of exponents to interpret data and use technology to compute with very large numbers.

AGENDA:

- I. Do Now (2 min)
- II. Open/Do Now Review (3 min)
- III. Class Notes: Comparing in Scientific Notation
- IV. Guided Practice
- V. Independent Practice
- VI. Practicing our AIMS:
 - ✓ Exit Ticket
 - ✓ Homework: ExPWN it! 14
- VII. Close (2 min)

Will your choices help us STRIVE?

“*There is*
NO SUBSTITUTE
for **HARD WORK.**”

— THOMAS EDISON

AIMS:

- ✓ SWBAT compare numbers expressed in scientific notation.
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AIM CHECK:

- ✓ If both numbers are in scientific notation, what is the first place to check to compare their values?

✓ H

8th Grade Math

Comparing in Scientific Notation

Name: Key #:

Date: _____

Homeroom:  Cleveland State University



ExPWN It! 14

AIM(S):

- ✓ SWBAT compare numbers expressed in scientific notation.
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DO NOW

Directions: Complete the following questions.

Evaluate each of the following.

1. $5^2 = 25$

2. $2^3 = 8$

3. $\left(\frac{1}{2}\right)^2 = \frac{1}{4}$

4. $5^0 = 1$

5. $2^0 = 1$

6. $\left(\frac{1}{4}\right)^0 = 1$

7. $5^{-2} = \frac{1}{25}$

8. $2^{-3} = \frac{1}{8}$

9. $\left(\frac{1}{2}\right)^{-2} = 4$

Rewrite each of the following in scientific notation.

10. 5000 5×10^3

11. 25000 2.5×10^4

12. 300,000 3×10^5

Answer each of the following.

13. In the number 324,157.98 what number is in the tens place? 5

14. In the number 324,157.98 what number is in the ones place? 7

15. In the number 324,157.98 what number is in the tenths place? 9

16. In the number 324,157.98 what number is in the hundreds place? 8

Class Notes: Comparing in Scientific Notation

Directions: Board Equals Paper!

VOCAB

Compare: In mathematics, compare can mean a couple of things:

1. Create a ratio and explain how many times larger/smaller one quantity is than the other
2. Describe which value or quantity is larger or smaller using inequalities, such as $<$, $>$, $=$

We have already covered the first form in scientific notation, today we will cover the second!

Comparing in Scientific Notation

We have learned why scientific notation is very important in science. This means that we have to learn how to compute and compare numbers in scientific notation. We have already done some computations, so we are ready to take a closer look at

comparing the size of different numbers.

Comparing numbers written in scientific notation

Step 1. Compare the exponents in the power of 10. The number with the larger power of 10 is always the larger number

(Special case: unless the base is negative, of course!).

Step 2. If the exponents are the same, compare the leading digits. The quantity with the larger leading digit is the larger value.

Example 1:

$$7.334 \times 10^{-34} < 6.782 \times 10^{-32}$$

$$7.334 \times 10^{-34} > 6.782 \times 10^{-34}$$

You Try

Directions: Compare each number using $<$ for less than, $>$ for greater than, or $=$ for equal.

1.) $9.74 \times 10^{21} < 2.1 \times 10^{22}$

Explain

$$10^{22} > 10^{21}$$

2.) $3.53 \times 10^{37} > 3.2 \times 10^{37}$

Explain

$$3.53 > 3.2$$

3.) $6.274 \times 10^{-3} > 5.4 \times 10^{-5}$

Explain

$$10^{-3} > 10^{-5}$$

4.) $1.4 \times 10^{-7} > 6.2 \times 10^{-9}$

Explain

$$10^{-7} > 10^{-9}$$

5.) Tricky!

$4536.3 \times 10^{-3} > 0.0032 \times 10^3$

Explain:

$$4.5363 \times 10^0 \text{ vs } 3.2 \times 10^0$$

Guided Practice

Directions: Board=Paper!

Example 1. Among the galaxies closest 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?

	Leading Digits	Power of 10
M82	1.15	10^7
Leo I Dwarf	8.2	10^5

M82

Example 2. Write these numbers in order from **greatest to least**.

1.2×10^9

2.85×10^7

6.7×10^8

3×10^7

$2.85 \times 10^7, 3 \times 10^7, 6.7 \times 10^8, 1.2 \times 10^9$

Example 3. Use the table on the below to answer the following questions.

Planet	Diameter (km)
Mercury	4.87×10^3
Venus	1.21×10^4
Earth	1.28×10^4
Mars	6.79×10^3

a.) Which planet has the smallest diameter? Write it in standard form.

Mercury @ 4870 km

b.) Which planet has the largest diameter? Write it in standard form.

Earth at 12800 km

Independent Practice

Directions: Complete every question below! Do your best! When done, you may work on the ADVANCED WORK ONLY (not homework ☺)

- 1) The Fornax Dwarf galaxy is 4.6×10^5 light-years away from Earth, while Andromeda I is 2.430×10^6 light-years away from Earth. Which is closer to Earth?

The Fornax galaxy is closer;
Since $10^5 < 10^6$

- 2) The average lifetime of the tau lepton is 2.906×10^{-13} seconds, and the average lifetime of the neutral pion is 8.4×10^{-17} seconds. Explain which subatomic particle has a longer average lifetime.

The ^{tau lepton} ~~neutral pion~~ has a longer life expectancy since $10^{-13} > 10^{-17}$

- 3) Compare 9.3×10^{28} and 9.2879×10^{28} .

$$9.3 \times 10^{28} > 9.2879 \times 10^{28}$$

- 4) Chris said that $5.3 \times 10^{41} < 5.301 \times 10^{41}$ because 5.3 has fewer digits than 5.301. Show that even though his answer is correct, his reasoning is flawed. Show him an example to illustrate that his reasoning would result in an incorrect answer. Explain.

Chris is incorrect, since we must compare the leading digits left to right.
#3 is a good example

Keep going! There are more challenges ahead!

- 5) The major components of human blood are red blood cells, white blood cells, and plasma. A typical red blood cell has a diameter of approximately 7×10^{-6} meter. A typical platelet has a diameter of approximately 2.33×10^{-7} meter. Which has a greater diameter, a red blood cell or a platelet?

Answer: A red blood cell has a greater diameter.

- 6) Describe the process you would use to write 3,100,000 in scientific notation.

move the decimal until there is 1 leading digit & make the exponent that #.
 3.1×10^6

- 7) Bigfoot 5, the world's largest monster truck, is 15 feet 5 inches tall and weighs 38,000 pounds. Each tire is 10 feet tall and weighs 2.4×10^3 pounds.



- a.) Write the weight of the truck in scientific notation.

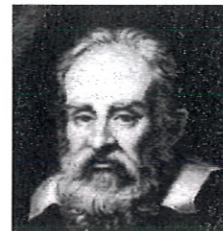
$$3.8 \times 10^4$$

- b.) Write the weight of one tire in standard form.

$$2400 \text{ lbs.}$$

- 8) Pythagoras, a Greek mathematician, was born about 2.6×10^3 years ago. Galileo, an Italian mathematician and astronomer, was born about 4.4×10^2 years ago. Who was born more recently?

Galileo
~~Pythagoras~~ because 440
is less than 2600



Galileo



Pythagoras

9) Name the Great Lake with the second greatest area.

Huron

Great Lakes	
Lake	Area (sq. mi.)
Erie	9.91×10^3
Huron	2.3×10^4
Michigan	2.23×10^4
Ontario	7.32×10^3
Superior	3.17×10^4

10) Let a and b be any two positive numbers, with no restrictions on their size. Is it **always** true that $a \times 10^{-5} < b \times 10^5$? Explain why or why not in complete sentences.

No, since we could have

500000×10^{-5} compared to 0.0005×10^5

11) Now, if $a \times 10^{-5}$ and $b \times 10^5$ **must be** written in scientific notation, is it **always** true that $a \times 10^{-5} < b \times 10^5$? Explain.

Yes, unless the base is negative.

8th Grade Math Advanced Work (Due 9/19/16)

Directions: Complete this for dollars! Turn in advanced work with your homework.

Name: _____ #: _____ HR: _____

You have been asked to determine the exact number of Google searches that are made each year. The only information you are provided is that there are 35,939,938,877 searches performed each week. Assuming the exact same numbers of searches are performed each week for the 52 weeks in a year, how many total searches will have been performed in one year? Your calculator does not display enough digits to get the exact answer. Therefore, you must break down the problem into smaller parts. Remember, you cannot approximate an answer because you need to find an exact answer.

Use the screen shots below to help you reach your answer.

$35\,939 \times 52 =$

1868828			
()	%	AC
7	8	9	÷
4	5	6	×
1	2	3	-
0	.	=	+

$938877 \times 52 =$

48821604			
()	%	AC
7	8	9	÷
4	5	6	×
1	2	3	-
0	.	=	+

Is this a re-submit? _____

Name and Number: _____

HOMEWORK

8th Grade Math

Ms. Huber
614-859-0019
Mshubersmath.weebly.com



ExPWN it! 14
Comparing in Scientific
Notation
TEST TUESDAY

_____/ 5 = _____ % DNG
A B C D F

STRIVE Due Date:
9/19/16

Accepted Until:
9/26/16

Directions: Complete all of the below problems (FRONT AND BACK). If you have questions, first check the examples in your packet. Then, check the class website or ask a classmate or guardian for help. Then, you can call your teacher if you still have questions.

1) The mass of a neutron is approximately 1.674927×10^{-27} kg. Recall that the mass of a proton is 1.672622×10^{-27} kg. Explain which is heavier.

2) The average lifetime 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.
a. Explain why the neutral rho meson has a longer average lifetime.

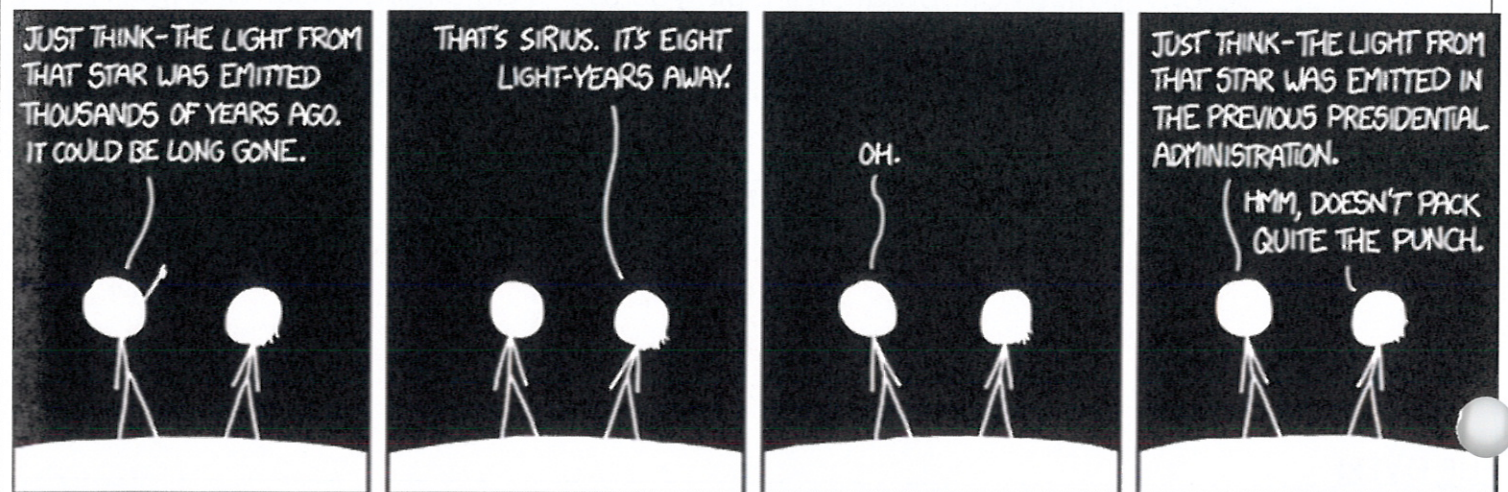
b. Approximately how much longer is the lifetime of a neutral rho meson than a Z boson? [hint: what operation should you use to determine which is longer?]

FLIP OVER!

3) Sarah says that the number 29,500,000 written in scientific notation is 29.5×10^6 . Is Sarah correct? Explain.

4) The Giganotosaurus weighed 1.4×10^4 pounds. Write this number in standard form.

5) The moon orbits Earth at a distance of 384,000 km from Earth. Write this number in scientific notation.



10/10/2019

10/10/2019

10/10/2019

10/10/2019

Name and Number:

Date:

Class:

Exit Ticket

8th Grade Math

Ms. Huber



ExPWN it! 14
Comparing in Scientific
Notation

____ / 5 = ____ % DNG

A B C D F

Directions: Complete all of the below problems. Do not use notes. This is an independent task, so you may not get help from your teacher either. Try your best! Work on Advanced work when done.

1) Compare 2.01×10^{15} and 2.8×10^{13} . Which number is larger?

2) The wavelength of the color red is about 6.5×10^{-9} m. The wavelength of the color blue is about 4.75×10^{-9} m.

Show that the wavelength of red is longer than the wavelength of blue.

Reflect on your **understanding** of **TODAY'S LESSON**, and circle the most true statement

I don't get it at all

I just need some help

I understand

I could teach it!

Reflect on your **effort** in **TODAY'S CLASS**, and circle the most true statement

I wasn't working hard today

I was trying but off-task a little

I was on task

I was laser-focused on learning