

COMPARE NUMBERS WRITTEN IN SCIENTIFIC NOTATION

$$a \times 10^b$$

where

$$1 \leq |a| < 10$$

GRADE **6**

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Classroom Procedure:

1. Begin by talking about how difficult it can be to read a tiny number, mainly because there are no commas! Talk about inequalities and comparing numbers in math.
2. While reading the content pages, reinforce vocabulary, and give students additional examples of Compare Numbers Written in Scientific Notation problems to help them practice. Use the additional resources to enhance understanding.
3. Introduce notes on Compare Numbers Written in Scientific Notation. Have students practice problems putting numbers in ascending and descending order.
4. Follow the Activity page with students. Have students work individually or with a partner on the activity. Once students have their cards in order, have them raise their hands and check the answer.
5. Distribute the Practice page. Check and review the students' responses as a class.
6. Distribute the Homework page. Have students work a few problems at the beginning of the next class to reinforce their understanding.
7. In closing, ask students to think about things they have learned in science that might compare numbers in scientific notation. Allow for responses and discussion.

Lesson Title: **Compare Numbers Written in Scientific Notation**

Subject: Math

Approximate Grade Level: **6**

Objectives: Students will be able to compare numbers written in scientific notation.

State Educational Standards*

LB.MATH.CONTENT.6-Advanced Lesson

Class Sessions (*45 minutes*): 1

Teaching Materials/Worksheets:

Compare Numbers Written in Scientific Notation content pages

Activity pages

Practice page

Homework page

Student Supplies:

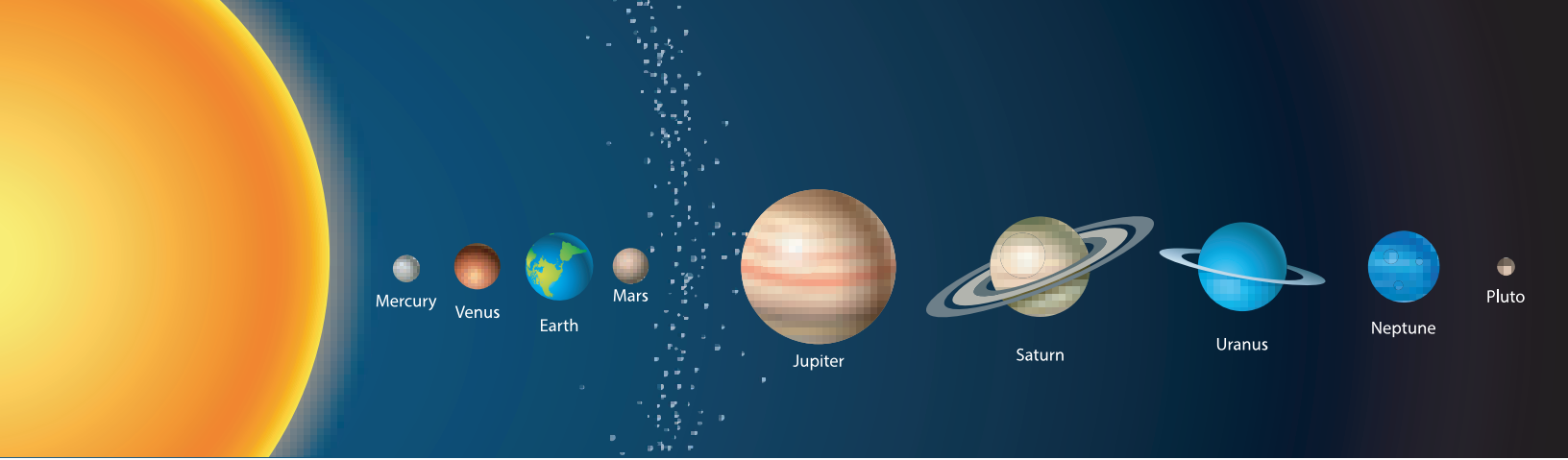
Scissors

Prepare Ahead of Time:

Copy Materials

Options for Lesson: Have students research an area of science and collect large or small numbers to put in order. Each student in the class can also be handed a card during the activity, and the class can put themselves in ascending order. If many cards are created, the activity can be repeated without repetition several times.

*Lessons are aligned to meet the education objectives and goals of most states. For more information on your state objectives, contact your local Board of Education or Department of Education in your state.



Compare Numbers Written in Scientific Notation

Scientific notation allows us to write very large and very small numbers in an easy to understand format. It is called scientific notation because scientists often deal with very large numbers, like how far away Saturn is from Earth, and very small numbers, like the diameter of a proton.

Scientific notation is written as:

$$a \times 10^b \quad \text{where } 1 \leq |a| < 10$$

The exponent **b** is an integer, and the coefficient **a** is any real number greater than or equal to one and less than ten. The coefficient is also referred to as the significand.

When we compare two numbers, there are three possible outcomes:

Greater than	Less than	Equal to
>	<	=

When we compare numbers written in scientific notation, we use the same symbols to show how the numbers are related to one another. The difference in comparing numbers in scientific notation is that we have to determine that the number is written in the correct notation. Then we look at the exponent, also called the power of 10. The last step is to compare the coefficient.

1. Determine that both numbers are correctly written in the “ $a \times 10^b$ ” form.
2. Compare the exponents or powers of 10. The larger exponent is the greater number. If they are equal, compare the coefficients.
3. Compare the coefficients using place value. The larger coefficient is the greater number.
4. Write the correct symbol between the numbers.

Let's look at how this works in a few examples.

Compare 4.7×10^5 to 4.3×10^8

1. Determine that both numbers are correctly written in the $a \times 10^b$ form.

Yes, they are!

2. Compare the exponents or powers of 10. The larger exponent is the greater number. If they are equal, compare the coefficients.

5 and 8 → 8 is larger, so 4.3×10^8 is the greater number

3. Compare the coefficients using place value. The larger coefficient is the greater number.

No need to compare coefficients because the exponents were different values.

4. Write the correct symbol between the numbers.

$$4.7 \times 10^5 < 4.3 \times 10^8$$

Compare 8.40×10^2 to 8.04×10^2

1. Determine that both numbers are correctly written in the $a \times 10^b$ form.

Yes, they are!

2. Compare the exponents or powers of 10.

2 and 2 → They are equal, so we must compare the coefficients.

3. Compare the coefficients using place value. The larger coefficient is the greater number.

8.40 and 8.04 → the one's place is the same, but the tenths are different, 4 is larger than 0.

4. Write the correct symbol between the numbers.

$$8.40 \times 10^2 > 8.04 \times 10^2$$

Let's look at how this works in a few examples.

Compare 3.62×10^{11} to 3.62×10^{11}

1. Determine that both numbers are correctly written in the $a \times 10^b$ form.

Yes, they are!

2. Compare the exponents or powers of 10.

11 and 11 → They are equal, so we must compare the coefficients.

3. Compare the coefficients using place value. The larger coefficient is the greater number.

3.62 and 3.62 → Each place value is the same, so they are equal.

4. Write the correct symbol between the numbers.

$$3.62 \times 10^{11} = 3.62 \times 10^{11}$$



Activity

Name _____ Date _____

Instructions: Cut out and place in ascending order.

$$4.63 \times 10^4$$

$$4.1 \times 10^6$$

$$6.7 \times 10^3$$

$$1.5 \times 10^{-2}$$

$$3.08 \times 10^2$$

$$8.211 \times 10^{-4}$$

$$2.112 \times 10^5$$

$$5.7 \times 10^{-3}$$

$$7.9 \times 10^6$$

$$9.33 \times 10^{-5}$$



Instructions: Cut out and place in ascending order.

$$9.33 \times 10^{-5}$$

$$8.211 \times 10^{-4}$$

$$5.7 \times 10^{-3}$$

$$1.5 \times 10^{-2}$$

$$3.08 \times 10^2$$

$$6.7 \times 10^3$$

$$4.63 \times 10^4$$

$$2.112 \times 10^5$$

$$4.1 \times 10^6$$

$$7.9 \times 10^6$$



Practice

Name _____ Date _____



Instructions: Write the Approx. diameter in miles using scientific notation.

Planet	Approx. diameter (miles)	Diameter, using scientific notation
Earth	7,930	
Jupiter	88,900	
Mars	4,220	
Mercury	3,030	
Neptune	30,800	
Pluto	1,450	
Saturn	74,900	
Uranus	31,800	
Venus	7,520	

List the planets in order from largest to smallest, using scientific notation.

Planet	Diameter, using scientific notation



Instructions: Write the Approx. diameter in miles using scientific notation.

Planet	Approx. diameter (miles)	Diameter, using scientific notation
Earth	7,930	7.93×10^3
Jupiter	88,900	8.89×10^4
Mars	4,220	4.22×10^3
Mercury	3,030	3.03×10^3
Neptune	30,800	3.08×10^4
Pluto	1,450	1.45×10^3
Saturn	74,900	7.49×10^4
Uranus	31,800	3.18×10^4
Venus	7,520	7.52×10^3

List the planets in order from largest to smallest, using scientific notation.

Planet	Diameter, using scientific notation
Jupiter	8.89×10^4
Saturn	7.49×10^4
Uranus	3.18×10^4
Neptune	3.08×10^4
Earth	7.93×10^3
Venus	7.52×10^3
Mars	4.22×10^3
Mercury	3.03×10^3
Pluto	1.45×10^3



Homework

Name _____ Date _____



Instructions: Write the Approx. distance in miles using scientific notation.

Planet	Approx. distance from the sun (miles)	Distance, using scientific notation
Earth	93,000,000	
Jupiter	484,000,000	
Mars	142,000,000	
Mercury	36,300,000	
Neptune	2,800,000,000	
Pluto	3,670,000,000	
Saturn	888,000,000	
Uranus	1,780,000,000	
Venus	67,200,000	

Order the planets by distance from the sun, least to greatest, using scientific notation.

Planet	Distance from the sun, using scientific notation



Instructions: Write the Approx. distance in miles using scientific notation.

Planet	Approx. distance from the sun (miles)	Distance, using scientific notation
Earth	93,000,000	9.3×10^7
Jupiter	484,000,000	4.84×10^8
Mars	142,000,000	1.42×10^8
Mercury	36,300,000	3.63×10^7
Neptune	2,800,000,000	2.8×10^9
Pluto	3,670,000,000	3.67×10^9
Saturn	888,000,000	8.88×10^8
Uranus	1,780,000,000	1.78×10^9
Venus	67,200,000	6.72×10^7

Order the planets by distance from the sun, least to greatest, using scientific notation.

Planet	Distance from the sun, using scientific notation
Pluto	3.67×10^9
Neptune	2.8×10^9
Uranus	1.78×10^9
Saturn	8.88×10^8
Jupiter	4.84×10^8
Mars	1.42×10^8
Earth	9.3×10^7
Venus	6.72×10^7
Mercury	3.63×10^7