Standards Plus® – Mathematics – Grade 8		
Domain: Expressions and Equations	Focus: Operations Using Scientific Notation	Lesson: #5
Standard: 8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.		

Lesson Objective: Students will perform operations with numbers in scientific notation.

Introduction: "Today you will add and subtract with numbers in scientific notation."

Instruction: "We have multiplied and divided with decimals and numbers in scientific notation. You applied the Properties of Exponents when you multiplied and divided. For multiplying, the digits are multiplied and the exponents are added. For dividing, the digits are divided and the exponents are subtracted. Today we will focus on adding and subtracting with numbers in scientific notation. Unlike multiply or dividing, when adding and subtracting, all the numbers are changed to the same power of 10 and the digits are added or subtracted. The sum or difference is then rewritten in scientific notation. Follow along as I complete the first example. You follow this same process for adding. Sometimes the last step is not needed if the result is already in scientific notation. You can choose either power of 10 of the two numbers you are adding or subtracting, but usually it is easier if you choose the power of 10 of the larger number."

Guided Practice: "Let's complete the second example together. We need to find the result of $9.8 \times 10^5 + 5.3 \times 10^4$. First we convert to the same power of 10. We will rewrite the second number to 0.53×10^5. Next we group the digit terms together by factoring out the exponential term. We write $(9.8 + 0.53) \times 10^5$. Next we add the digit terms and we get 10.33×10^5. Since this is not written correctly in scientific notation, we rewrite the number into scientific notation as 1.033×10^6."

Independent Practice: "It's your turn to apply the same process to finding the sum or difference of decimals and numbers in scientific notation. Write your answers in scientific notation."

Review: When the students are finished, go over the problems.

Closure: "Today you added and subtracted decimals and numbers in scientific notation. You first had to change the numbers to the same power of 10 then you added or subtracted the digit terms. You converted the result back into scientific notation if you needed to."

Answers:

1. $7.7 \times 10^{15} + 9 \times 10^{14} = (7.7 + 0.9) \times 10^{15} = 8.6 \times 10^{15}$
2. $2.3 \times 10^{-8} - 9 \times 10^{-9} = (2.3 - 0.9) \times 10^{-8} = 1.4 \times 10^{-8}$
3. $0.398 + 6.7 \times 10^{-3} = (398 + 6.7) \times 10^{-3} = 404.7 \times 10^{-3} = 4.047 \times 10^{-1}$
   OR
   $0.398 + 6.7 \times 10^{-3} = (3.98 + 0.067) \times 10^{-1} = 4.047 \times 10^{-1}$
4. $5{,}510{,}000 - 4.5 \times 10^5 = (5.51 - 0.45) \times 10^6 = 5.06 \times 10^6$
5. $6.7 \times 10^{-4} + 0.00035 = (6.7 + 3.5) \times 10^{-4} = 10.2 \times 10^{-4} = 1.02 \times 10^{-3}$

Standards Plus® – Mathematics – Grade 8		
Domain: Expressions and Equations	Focus: Operations Using Scientific Notation	Lesson: #5
Standard: 8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.		

Example:

1. Find the difference. Write the answer in scientific notation.
   $1.7 \times 10^{-3} - 9.2 \times 10^{-4}$

$1.7 \times 10^{-3} - 9.2 \times 10^{-4}$	given problem
$1.7 \times 10^{-3} - 0.92 \times 10^{-3}$	converted to the same power of 10
$(1.7 - 0.92) \times 10^{-3}$	grouped the digit terms together by factoring
0.78×10^{-3}	subtracted the digit terms
7.8×10^{-4}	rewrote into scientific notation

Find the sum. Write the answer in scientific notation.

2. $9.8 \times 10^{5} + 5.3 \times 10^{4}$

Directions: Find the sum or difference. Write answers in scientific notation.

1. $7.7 \times 10^{15} + 9 \times 10^{14}$

2. $2.3 \times 10^{-8} - 9 \times 10^{-9}$

3. $0.398 + 6.7 \times 10^{-3}$

4. $5{,}510{,}000 - 4.5 \times 10^{5}$

5. $6.7 \times 10^{-4} + 0.00035$

Standards Plus® – Mathematics – Grade 8		
Domain: Expressions and Equations	Focus: Operations Using Scientific Notation	Lesson: #6
Standard: 8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology).		

Lesson Objective: Students will perform operations with numbers in scientific notation.

Introduction: "Today you will add and subtract with numbers in scientific notation."

Instruction: "Today we will continue to add and subtract with numbers in scientific notation. For adding and subtracting, all the numbers are changed to the same power of 10 and the digit terms are added or subtracted. The sum or difference is then rewritten in scientific notation."

Guided Practice: "Let's complete the example together. We are reminded that there are 6 quadrillion gallons of water in the Great Lakes. How do we write that in scientific notation? Yes, 6×10^{15}. We are also given a table of values. These values represent the number of gallons of water in each of the Finger Lakes in the state of New York. Notice all the numbers are written in scientific notation. The example problem asks us how many more gallons of water are in the Great Lakes than in Lake Owasco? Owasco has 2.12×10^{11} gallons of water. We must subtract to find the answer. We need to change the power of 10 of the lesser number to match the power of 10 of the greater number. We write: $6 \times 10^{15} - 2.12 \times 10^{11} = (6 - 0.000212) \times 10^{15} = 5.999788 \times 10^{15}$. If we write this difference to 3 significant figures we get 6.00×10^{15}. This is the same number of gallons in the Great Lakes. What does this mean? It means that the number of gallons in Lake Owasco is insignificant compared to the number of gallons in the Great Lakes and subtracting out the number of gallons in Owasco makes little difference. We may find this to be the case when we work with very large numbers. Adding or subtracting a number that is many times smaller will have little effect to the greater number."

Independent Practice: "It is your turn to apply the skills we have been practicing. Continue to use the data in the Finger Lakes table to answer the questions. You will be asked to think back to the work you did last week as well."

Review: When the students are finished, go over the problems.

Closure: "Today you added and subtracted numbers in scientific notation. You first had to change the numbers to the same power of 10 then you added or subtracted the digit terms. You converted the result back into scientific notation if needed. You also applied some of the skills you practiced last week by dividing with numbers in scientific notation and writing very large numbers in words."

Answers:

1. 28.7 billion gallons
2. $4.455 \times 10^{11} - 3.9 \times 10^{11} =$
   $(4.455 - 3.9) \times 10^{11} = 0.555 \times 10^{11} = 5.55 \times 10^{10}$ gallons
3. Honeoye. Though this lake has the largest digit term value, it has the smallest exponential term value**.** The exponential term determines the value of the number.
4. The 4 largest lakes are Seneca, Cayuga, Canandaigua, and Skaneateles. $4.2 \times 10^{12} + 2.5 \times 10^{12} + 4.455 \times 10^{11} + 4.25 \times 10^{11} =$
   $(4.2 + 2.5 + 0.4455 + 0.425) \times 10^{12} = 7.5705 \times 10^{12}$ gallons
5. $2.5 \times 10^{12} - (9.5 \times 10^{9} + 3.7 \times 10^{11}) =$
   $2.5 \times 10^{12} - (0.095 + 3.7) \times 10^{11} = 2.5 \times 10^{12} - (3.795 \times 10^{11})$
   $= 2.5 \times 10^{12} - 0.3795 \times 10^{12} = (2.5 - 0.3795) \times 10^{12} =$
   2.1205×10^{12} gallons
6. $\frac{4.2 \times 10^{12}}{9.5 \times 10^{9}} = 0.44 \times 10^{3} = 440$ times
7. Answers will vary. You are looking for a valid math process and the correct reasoning. One example: Add up all the digit terms of the numbers with the same exponential terms. You will have four numbers. Then rewrite the four numbers so that they have the same exponential term and add. Write the sum into scientific notation if not already. If the exponential term of the sum is less than 10^{15}, then the number of gallons is less than the Great Lakes. The approximate total of all the Finger Lakes is 8.7×10^{12} gallons, which is considerably less than the Great Lakes.

Standards Plus® – Mathematics – Grade 8

Domain: Expressions and Equations Focus: Operations Using Scientific Notation Lesson: #6

Standard: 8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology).

Example: The Great Lakes and the connecting channels contain 6 quadrillion gallons of water. The number of gallons in each of the Finger Lakes in New York is listed in the table below. The lakes are listed in the order they lie from West to East geographically.

Finger Lakes

Name	Gallons of Water
Conesus	4.26×10^{10}
Hemlock	2.87×10^{10}
Canadice	1.16×10^{10}
Honeoye	9.5×10^{9}
Canandaigua	4.455×10^{11}
Keuka	3.9×10^{11}
Seneca	4.2×10^{12}
Cayuga	2.5×10^{12}
Owasco	2.12×10^{11}
Skaneateles	4.25×10^{11}
Otisco	2.12×10^{10}
Onondaga	3.5×10^{10}
Oneida	3.7×10^{11}

Use the information in the Finger Lakes table above to answer the question.

How many more gallons of water are in the Great Lakes than in Lake Owasco?

Directions: Use the information in the Finger Lakes table above to answer the questions. Write answers in scientific notation as appropriate.

1. Write out in a word/number combination the number of gallons in Hemlock.
2. What is the difference of the number of gallons in Canandaigua and Keuka?
3. Which lake is the smallest (fewest number of gallons)? Explain how you know.
4. What is the total number of gallons in the 4 largest lakes?
5. What is the difference in the number of gallons of water between the *sum* of Honeoye and Oneida and the gallons in Cayuga?
6. How many times greater is the number of gallons in the largest lake compared to the smallest lake?
7. Explain the process you would use to determine if the total gallons of water in all the Finger Lakes is less than or more than the Great Lakes.

Standards Plus® – Mathematics – Grade 8		
Domain: Expressions and Equations	Focus: Operations Using Scientific Notation	Lesson: #7
Standard: 8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.		

Lesson Objective: Students will perform operations with numbers in scientific notation.

Introduction: "Today you will perform all four operations with numbers in scientific notation."

Instruction: "We will continue to add and subtract with numbers in scientific notation. For adding and subtracting, all the numbers are changed to the same power of 10 and the digit terms are added or subtracted. The sum or difference is then rewritten in scientific notation. You will also multiply and divide with numbers in scientific notation. By applying the Properties of Exponents. For multiplying, the digit terms are multiplied, and the exponents are added. Write your answer in scientific notation. For dividing, the digit terms are divided and the exponents are subtracted. Write your answer in scientific notation."

Guided Practice: "Let's complete the example together. You are given a table of the area, in square miles of nine selected states and the District of Columbia. The states are given in alphabetical order. What is the total area of the District of Columbia and the smallest state? First determine which state has the smallest area. Besides the District of Columbia, the state with the smallest area is Rhode Island. It has the smallest digit and exponential term. We write: $6.83 \times 10^1 + 1.54 \times 10^3 = 0.0683 \times 10^3 + 1.54 \times 10^3 = (0.0683 + 1.54) \times 10^3 = 1.6083 \times 10^3 mi^2 = 1{,}608.3\ mi^2$. Notice once we rewrite the smallest number in terms of the largest power of 10, we can factor out the exponential term and group the digit terms."

Independent Practice: "It's your turn to complete the practice problems. Use the data in the table of the Area of Selected States and the District of Columbia. Be sure to show your work."

Review: When the students are finished, go over the problems.

Closure: "Today you performed all four operations with numbers in scientific notation."

Answers:

1. $1.5410^3 - 6.8310^1 = (1.54 - 0.0683) \times 10^3 = 1.4717 \times 10^3 = 1{,}471.7\ mi^2$
2. $1.64 \times 10^5 - 1.14 \times 10^5 = (1.64 - 1.14) \times 10^5 = 0.5 \times 10^5 = 50{,}000\ mi^2$
3. $6.58 \times 10^4 + 5.79 \times 10^4 = (6.58 + 5.79) \times 10^4 = 12.37 \times 10^4 = 1.237 \times 10^5\ mi^2$
4. $\frac{6.65 \times 10^5}{2.69 \times 10^5} = \frac{6.65}{2.69} \times \frac{10^5}{10^5} = 2.47 \times 1 = 2.47$ times
5. Area of 2 Connecticut's is greater than the area of one Hawaii.
   $2(5.54 \times 10^3) = 11.08 \times 10^3 = 1.108 \times 10^4\ mi^2 > 1.09 \times 10^4$
   $(1.108 - 1.09) \times 10^4 = 0.018 \times 10^4 = 180\ mi^2$

Standards Plus® – Mathematics – Grade 8

Domain: Expressions and Equations Focus: Operations Using Scientific Notation Lesson: #7

Standard: 8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Example: Below is a table of the area, in square miles of nine selected states and the District of Columbia.

Area of Selected States and the District of Columbia

Name	Square Miles
Alaska	6.65×10^5
Arizona	1.14×10^5
California	1.64×10^5
Connecticut	5.54×10^3
District of Columbia	6.83×10^1
Florida	6.58×10^4
Hawaii	1.09×10^4
Illinois	5.79×10^4
Rhode Island	1.54×10^3
Texas	2.69×10^5

What is the total area of the District of Columbia and the smallest state? Write your answer in both scientific and standard notation.

Directions: Use the data in the table of the Area of Selected States and the District of Columbia to answer the following questions. Show your work.

1. What is the difference in the area of Rhode Island and the District of Columbia? Write your answer in standard notation.

2. How much larger, in square miles, is California than Arizona? Write your answer in standard notation.

3. What is the total area of Florida and Illinois? Write your answer in scientific notation.

4. How many times larger is Alaska than Texas?

5. Is the area equal to the size of two Connecticut's greater or lesser than the area of one Hawaii? What is the difference? Write your answer in standard notation.

Standards Plus® – Mathematics – Grade 8		
Domain: Expressions and Equations	Focus: Using Technology w/ Scientific Notation	Lesson: #8
Standard: 8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.		

Lesson Objective: Students will use technology to perform operations with numbers in scientific notation and interpret scientific notation that has been generated by technology.

Introduction: "Today you will use the exponent key on a calculator to perform operations with numbers in scientific notation. You will also interpret scientific notation that has been generated by a calculator."

Teacher Note: You will need to use a calculator that has an exponent key for this lesson. The directions may change slightly depending on the model of calculator you are using in the classroom. Refer to the directions that accompany your calculator. Graphing calculators are different than scientific calculators.

Instruction: "Find the exponent key on your calculator now. (This could be EE or EXP) You will use this key to enter exponents. On your student page, you are given the steps to enter numbers in scientific notation. Let's read them. (Read the steps aloud.) You will follow these steps to enter the numbers given to you in scientific notation. If your answer is too big to fit on the screen, the calculator will give the answer in scientific notation but the form looks slightly different than how we write it on our paper."

Guided Practice: "Let's apply these calculator steps to a problem. Check yourself by multiplying 8×10^5 times 4×10^3on your calculator. Your answer should be 3.2×10^9. If the result is a very large or very small number, your calculator may represent the number as 3.2E9 which means 3.2×10^9."

Independent Practice: "It's your turn to practice using your calculator to enter and interpret numbers in scientific notation."

Review: When the students are finished, go over the problems.

Closure: "Today you used the exponent key on your calculator to perform operations with numbers in scientific notation. You also interpreted scientific notation that has been generated by your calculator."

Answers:

1. $\frac{4.2 \times 10^{11}}{9.8 \times 10^{12}} \approx 4.3\%$
2. $\frac{15.8 \times 10^{12}}{313 \times 10^6} = \$50{,}479$
3. $4.25 \times 10^{11} - 2.12 \times 10^{10} = 4.038 \times 10^{11}$gallons
4. $\frac{3 \times 10^8}{3 \times 10^1} = 1 \times 10^7$Seconds in a year = 31,536,000 $\frac{10^7}{31{,}536{,}000} = 0.317$ year
   $0.317 \times 12 \approx 3.8$ months
5. $20 \times 60 \times 16 \times 365 \times 85 \approx 6 \times 10^8$ blinks= 600 million blinks

Standards Plus® – Mathematics – Grade 8		
Domain: Expressions and Equations	Focus: Using Technology w/ Scientific Notation	Lesson: #8
Standard: 8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.		

Example:

How to use your scientific calculator to work with numbers in scientific notation:

1. Punch the number (the digit number) into your calculator.
2. Push the EE or EXP button. Do **NOT** use the x (times) button!!
3. Enter the exponent number. Use the +/- button to change its sign.
4. Treat this number normally in all subsequent calculations.

To check yourself, multiply 8×10^5 times 4×10^3 on your calculator. Your answer should be 3.2×10^9.

If the result is a very large or very small number, your calculator may represent the number as 3.2E9 which means 3.2×10^9.

Directions: Complete the following problems using the exponent button on your calculator.

1. The state of California has an area of $4.2 \times 10^{11}\ m^2$. The United States has an area of $9.8 \times 10^{12}\ m^2$. What percent of area, to the nearest tenth, is California of the United States?

2. The United States national debt in June 2012 was about 15.8 trillion dollars. The population of the United States at the same time was estimated at 313 million. What was each citizen's share of the debt?

3. How many more gallons of water does Lake Skaneateles contain than Lake Otisco?

Finger Lake Name	Number of Gallons
Skaneateles	4.25×10^{11}
Otisco	2.12×10^{10}

4. Light travels 3×10^8 m/s. If you travel at 30 m/s (about 67 miles per hour), how long will it take you, in months, to cover the distance light travels in one second?

5. If people blink on average once every 3 seconds while awake, how many times has an 85 year old blinked in her lifetime? Assume she sleeps for 8 hours a day. Write your answer in scientific notation to 1significant figure and write your answer in number/word form.

Standards Plus® – Mathematics – Grade 8	
Domain: Expressions and Equations	Focus: Radicals, Integer Exponents, Scientific Notation
Assessment: #2	

This assessment may be used in the following ways:

- As a formative assessment of the students' progress.
- As an additional opportunity to reinforce the vocabulary, concepts, and knowledge presented in the previous 4 lessons.

Standard: 8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Procedure: Read the directions aloud and ensure that students understand how to respond to each item.

- If you are using this as a formative assessment, have the students complete the evaluation independently.
- If you are using this to reinforce instruction, determine the items that will be completed as guided practice, and those that will be completed as independent practice.

Review: Review the correct answers with students as soon as they are finished.

Answers:

1. (8.EE.4) 10
2. (8.EE.4) $\frac{4}{11}$
3. (8.EE.4) $2\sqrt{2}$
4. (8.EE.4) $2\sqrt{2}$
5. (8.EE.4) 1
6. (8.EE.4) $\frac{9}{4}$
7. (8.EE.4) $4^{-5+3} = 4^{-2} = \frac{1}{16}$
8. (8.EE.4) $7^{3-(-2)} = 7^5$
9. (8.EE.4) 1.3×10^8, 2×10^5; $\frac{1.3 \times 10^8}{2 \times 10^5} = \frac{1.3}{2} \times 10^{8-5} = 0.65 \times 10^3 = 650$ times
10. (8.EE.4) Ohio; $(10.3 - 1.54) \times 10^9 = 8.76 \times 10^9$ m^2

Standards Plus® – Mathematics – Grade 8	
Domain: Expressions and Equations	Focus: Radicals, Integer Exponents, Scientific Notation
Assessment: #2	

Directions: Complete the following problems independently.

Simplify. Keep answers in exact form.

1. $\sqrt[3]{10^3}$

2. $\sqrt{\frac{16}{121}}$

3. $\sqrt{8}$

Solve for x. Show all work vertically. Line up equal signs.

4. $2x^3 = 32$

Simplify the following expressions using the Properties of Exponents.

5. 3^0

6. $\left(\frac{2}{3}\right)^{-2}$

7. $4^{-5} \bullet 4^3$

8. $\frac{7^3}{7^{-2}}$

9. Ants are 130 million years old. Humans are 200 thousand years old. How many times older are ants than humans? Convert the numbers to scientific notation, show work, and write answer in standard form.

10. Which state from the table below has more water surface area and by how many square meters? Write answer in scientific notation.

State	Water Area in Square Meters
Indiana	1.54×10^9
Ohio	1.03×10^{10}

Standards Plus® High Impact Standards – Mathematics – Grade 8
Performance Lesson – Domain: Expressions and Equations

Standard Reference: **8.EE.3:** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.*
8.EE.4: Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Required Student Materials:
- **Student Pages: St. Pgs. 15-17** (Student Worksheets)

Lesson Objective: The students will use scientific notation to read, evaluate, calculate, write, and solve numerical and word problems.

Overview: Students will use their knowledge of scientific notation as addressed in the Standards Plus Expressions and Equations Daily Lessons 9-16, E3-E4.

Students will:
- Evaluate numbers written in scientific notation.
- Find the sum or difference of numbers written in scientific notation.
- Write numbers in scientific notation.
- Write and solve word problems using given information and scientific notation.

Guided Practice: *(Required Student Materials: St. Pg. 15)*
- Review vocabulary.
- Review how to write very large and very small numbers using scientific notation.

Independent Practice: *(Required Student Materials: St. Pgs. 15-17)*

Have the students:
- Analyze and explain the use of scientific notation and how to calculate using numbers written in scientific notation.
- Find the sum or difference of numbers written in scientific notation.
- Write benchmark numbers in scientific notation.
- Interpret numbers in standard form to write in scientific notation.
- Write and solve word problems using given information and scientific notation.

Review & Evaluation:
- Have students review their answers with a partner.
- Project a few of the students' word problems and solve as a class.
- Review student worksheets to check for understanding.

Standards Plus® High Impact Standards – Mathematics – Grade 8
Performance Lesson – Domain: Expressions and Equations

Vocabulary:

Properties of exponents: The rules we follow when performing operations with exponents.

Exponential form: A number written with an exponent (e.g., - 4^5). The large number (4) is the base. The small number (^{5}) is the exponent. The exponent indicates the number of times a base multiplies itself $4^5 = 4 \times 4 \times 4 \times 4 \times 4$.

Scientific notation: Powers of ten are used to show very large or very small numbers. Scientific notation is the product of two numbers: the digit term and the exponential term. 7.5×10^{12} equals 7,500,000,000,000 because we moved the decimal point to the right 12 times. 7.5×10^{-12} equals 0.0000000000075 because we moved the decimal point to the left 12 times.

1. When do we use scientific notation? Why not just use standard notation?

2. Explain the difference between these two numbers: 7.3×10^6 and 7.3×10^{-6}.

3. Why is it helpful to use a calculator when computing with numbers in scientific notation?

4. Complete the table using numbers in scientific notation.

Number in Words	Number in Scientific Notation
One Thousand	1×10^3
One Million	
One Billion	
One Trillion	
One Quadrillion	
One Quintillion	
One Sextillion	
One Septillion	
One Octillion	
One Nonillion	

Directions: Find the sum or difference. Write the answers in scientific notation.

5. $8{,}900{,}000 - 3.2 \times 10^3$

6. $1.4 \times 10^9 + 76{,}000{,}000$

7. $3.2 \times 10^3 - 560$

8. $123{,}000{,}000 + 2.9 \times 10^7$

Directions: Write the following distances using scientific notation.

9. The Earth is 238,900 miles from the moon.

10. The Earth is 92,960,000 miles from the sun.

11. The Earth is 34,000,000 miles from Mars.

12. The Earth is 483,000,000 miles from Jupiter.

Standards Plus® High Impact Standards – Mathematics – Grade 8
Performance Lesson – Domain: Expressions and Equations

Directions: Use the information in problems 9-12 to write three word problems. Trade your problems with a partner and solve each other's problems. Then check each other's answers.

13.

14.

15.