Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

Objective

*Add and subtract numbers in scientific notation

*Introduce the prefix system

- **Common Core State Standards** *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…Interpret scientific notation that has been generated by technology.

- **Mathematical Practices** 1.Solve problems/presevere 6. Attend to precision.

Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

A popular social networking site has the most members between the ages of 15 and 28. Within this age group, there are $5.11 \cdot 10^7$ student members and $9.55 \cdot 10^7$ nonstudent members. What is the total number of members in this age group?

To add or subtract numbers in scientific notation, the powers of 10 must be the same.

Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

A popular social networking site has the most members between the ages of 15 and 28. Within this age group, there are $5.11 \cdot 10^7$ student members and $9.55 \cdot 10^7$ nonstudent members. What is the total number of members in this age group?

Ask yourself....
What operation is the problem asking me to complete?

What do I notice about the bases?

Can I factor out the same base and exponent using parenthesis?

Is my answer written in scientific notation?
If not, then rewrite!!!!

A popular social networking site has the most members between the ages of 15 and 28. Within this age group, there are $5.11 \cdot 10^7$ student members and $9.55 \cdot 10^7$ nonstudent members. What is the total number of members in this age group?

Add nonmembers and members

Student members + Nonstudent members

$= 5.11 \cdot 10^7 + 9.55 \cdot 10^7$ Substitute.

$= (5.11 + 9.55) \cdot 10^7$ Factor 10^7 from each term.

$= 14.66 \cdot 10^7$ Add within parentheses.

$= 1.466 \cdot 10^1 \cdot 10^7$ Write 14.66 in scientific notation.

$= 1.466 \cdot 10^{1+7}$ Use the product of powers property.

$= 1.466 \cdot 10^8$ Write in scientific notation.

To add or subtract numbers in scientific notation, the powers of 10 must be the same.

Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

A popular social networking site has the most members between the ages of 15 and 28. Within this age group, there are $5.11 \cdot 10^7$ student members and $9.55 \cdot 10^7$ nonstudent members. What is the total number of members in this age group?

Suppose you want to find how many more nonstudent members than student members. To answer this question, you can subtract.	What operation is the problem asking me to complete? What do I notice about the bases? Can I factor out the same base and exponent using parenthesis? Is my answer written in scientific notation? If not, then rewrite!!!!

Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

Example 1 (continued)

Add and Subtract Numbers in Scientific Notation with the Same Power

Suppose you want to find how many more nonstudent members than student members. To answer this question, you can subtract.

Nonstudent members − Student members

$= 9.55 \cdot 10^7 - 5.11 \cdot 10^7$ Substitute.

$= (9.55 - 5.11) \cdot 10^7$ Factor 10^7 from each term.

$= 4.44 \cdot 10^7$ Add within parentheses.

So, there are $4.44 \cdot 10^7$ more nonstudent members than student members.

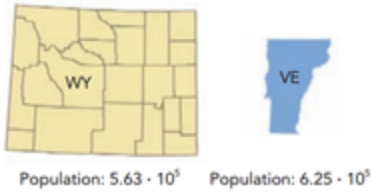
Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

Example 2

Add and Subtract Numbers in Scientific Notation with the Same Power

As of the 2010 census, the population of Wyoming was approximately $5.63 \cdot 10^5$. The population of Vermont was approximately $6.25 \cdot 10^5$.

a) Find the total population of the two states.



Population: $5.63 \cdot 10^5$ Population: $6.25 \cdot 10^5$

What operation is the problem asking me to complete?

What do I notice about the bases?

Can I factor out the same base and exponent using parenthesis?

Is my answer written in scientific notation?
If not, then rewrite!!!!

To add or subtract numbers in scientific notation, the powers of 10 must be the same.

Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

Example 2

Add and Subtract Numbers in Scientific Notation with the Same Power

Total population of the two states

$= \text{Population of Wyoming} + \text{Population of Vermont}$

$= 5.63 \cdot 10^5 + 6.25 \cdot 10^5$ Substitute.

$= (5.63 + 6.25) \cdot 10^5$ Factor 10^5 from each term.

$= 11.88 \cdot 10^5$ Add within parentheses.

$= 1.188 \cdot 10^1 \cdot 10^5$ Write 11.88 in scientific notation.

$= 1.188 \cdot 10^{1+5}$ Use the product of powers property.

$= 1.188 \cdot 10^6$ Write in scientific notation.

The total population of the two states is $1.188 \cdot 10^6$.

To add or subtract numbers in scientific notation, the powers of 10 must be the same.

Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

Example 2

Add and Subtract Numbers in Scientific Notation with the Same Power

b) Find the difference in the population of the two states.

Population: $5.63 \cdot 10^5$

Population: $6.25 \cdot 10^5$

What operation is the problem asking me to complete?

What do I notice about the bases?

Can I factor out the same base and exponent using parenthesis?

Is my answer written in scientific notation?
If not, then rewrite!!!!

To add or subtract numbers in scientific notation, the powers of 10 must be the same.

Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

Example 2

Add and Subtract Numbers in Scientific Notation with the Same Power

Difference in the population of the two states

$= \text{Population of Vermont} - \text{Population of Wyoming}$

$= 6.25 \cdot 10^5 - 5.63 \cdot 10^5$ Substitute.

$= (6.25 - 5.63) \cdot 10^5$ Factor 10^5 from each term.

$= 0.62 \cdot 10^5$ Subtract within parentheses.

$= 6.2 \cdot 10^{-1} \cdot 10^5$ Write 0.62 in scientific notation.

$= 6.2 \cdot 10^{-1+5}$ Use the product of powers property.

$= 6.2 \cdot 10^4$ Write in scientific notation.

The difference in the population of the two states is $6.2 \cdot 10^4$.

To add or subtract numbers in scientific notation, the powers of 10 must be the same.

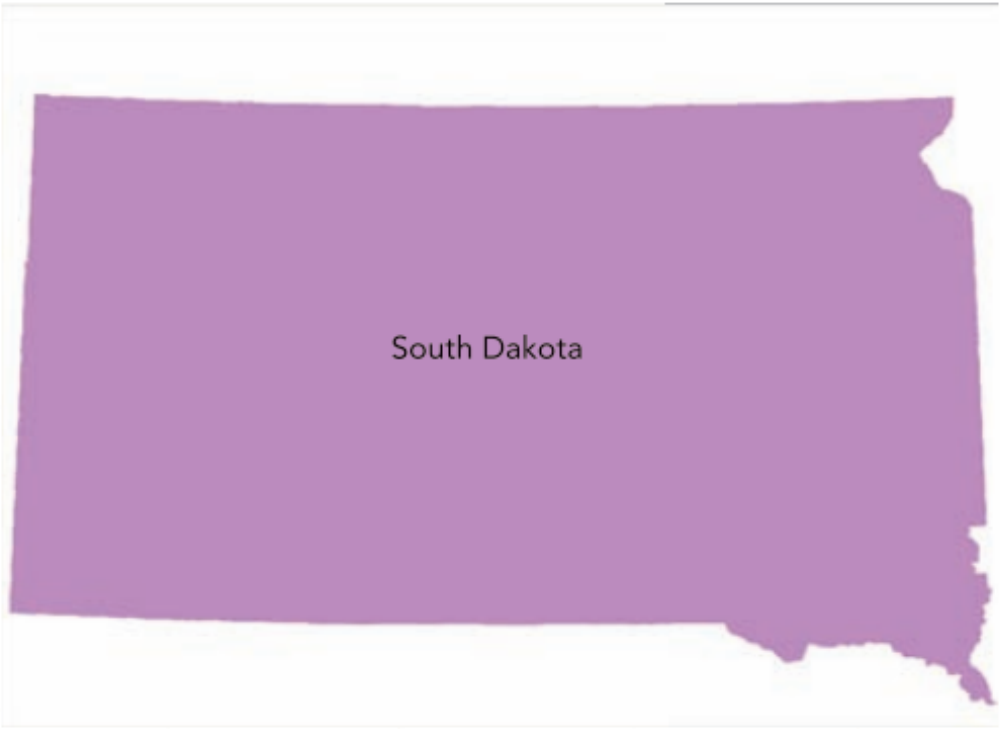
Your Turn-

What type of numbers are we adding and subtracting?

Very Large or Very Small?

1 The population of Washington, D.C., is about $5.9 \cdot 10^5$. South Dakota has a population of approximately $8 \cdot 10^5$.

Population: $5.9 \cdot 10^5$



Population: $8 \cdot 10^5$

a) Find the sum of the populations.

To add or subtract numbers in scientific notation, the powers of 10 must be the same.

Lesson 2.2 Adding and Subtracting in Scientific Notation (Day 1)

Independent Practice #2, 6, and 8 (Save #1 for tomorrow)

Homework

2.2 Independent Practice

Solve. Show your work. Round the coefficient to the nearest tenth.

1. $6.3 \cdot 10^{-2} + 4.9 \cdot 10^{-2}$

2. $7.2 \cdot 10^{2} - 3.5 \cdot 10^{2}$

The table shows the amounts of energy, in Calories, contained in various foods.

Food (per 100 g)	Energy (Cal)
Chicken breast	$1.71 \cdot 10^{5}$
Raw potato	$7.7 \cdot 10$
Cabbage	$2.5 \cdot 10^{4}$
Salmon	$1.67 \cdot 10^{5}$

6. How many more Calories are in chicken breast than in salmon?

Solve. Show your work.

8. A flight from Singapore to New York includes a stopover at Hawaii. The distance between Singapore and Hawaii is about $6.7 \cdot 10^{3}$ miles. The distance between New York and Hawaii is about $4.9 \cdot 10^{3}$ miles. Write each sum or difference in scientific notation.

   a) Find the total distance from Singapore to New York.

   b) Find the difference in the length of the two flights.

Name:_____ Period_____

Monday Homework

Tell whether each number is written correctly in scientific notation. If it is incorrectly written, state the reason.

1. A Brazilian gold frog is about $9.6 \cdot 10^{0}$ millimeters long.

2. The wavelength of green light is about $4.15 \cdot 10^{-7}$ meter.

3. Mars is approximately $0.2244 \cdot 10^{7}$ kilometers from the Sun.

Write each number in scientific notation.

4. 856.2

5. 0.06

Write each number in standard form.

6. $9 \cdot 10^{4}$

7. $2.5 \cdot 10^{-2}$

Complete.

An actor has 75,126 fans on a social network. A musician has $8.58 \cdot 10^{4}$ fans. Who has more fans on the social network?

Lesson Check #2 (add and subtract numbers in scientific notation)