**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_\_\_\_**

**U13 CWK #1** *Scientific Notation*

Think about the following question: Why do you text?

Most of us would agree that texting is a fast and efficient way of communicating. In fact, texting allows us to abbreviate many common phrases. Mathematicians and scientists have a way of expressing really large and really small numbers in a fast and efficient way; it is called **Scientific Notation**. Just like texting allows you to communicate quickly, scientific notation is a special way of writing a number that would otherwise be tedious to write if it were left in standard form.

The table below includes numbers written in standard form or scientific notation. Change the numbers written in scientific notation into standard form and vice versa. Use a calculator if needed.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Scientific Notation** | **Standard Form** |  | **Scientific Notation** | **Standard Form** |
|  | Calculator Notation | Exponent Notation | Standard Number |  | Calculator Notation | Exponent Notation | Standard Number |
| Follow the Pattern |  |
|  | $$10\^0$$ |  |  | $$2×10\^0$$ |  |  |
|  | $$10\^1$$ |  |  | $$2×10\^1$$ |  |  |
|  | $$10\^2$$ | $$10^{2}$$ |  | $$2×10\^2$$ | $$2×10^{2}$$ |  |
|  |  |  | 1,000 |  |  | 2,000 |
|  |  |  | 10,000 |  |  | 20,000 |
| Watch for Patterns |
|  | $$4∙10\^3$$ | $$4×10^{3}$$ |  |  | $$4.2∙10\^3$$ |  |  |
|  | $$6∙10\^5$$ |  |  | $$6.9∙10\^5$$ |  |  |
|  | $$7∙10\^8$$ |  |  | $$7.12∙10\^8$$ |  |  |
|  | $$8.1∙10\^3$$ |  |  | $$8.1∙10\^4$$ |  | 81,000 |
|  |  | $$4×10^{9}$$ | 4,000,000,000 |  |

1. From the table above, write two things you learned about scientific notation.
2. Complete the following statements:
3. In scientific notation, as the exponent power goes up by 1, the standard number’s decimal is…
4. In scientific notation, as the exponent power goes down by 1, the standard number’s decimal is…

The definition for scientific notation

A number that is in Scientific Notation takes on the form  where *a* is called the *significant figure* and  and *n* is an integer. The number after the , or , is called the *order of magnitude*.

Change these LARGE scientific notation numbers to standard notation and vice versa.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Scientific Notation | Standard Notation |  | Scientific Notation | Standard Notation |
| a. $6.345×10^{8}$ |  |  | 5,320 |
| b. $8.04×10^{4}$ |  |  | 420,000 |
| c. $4.26×10^{5}$ |  |  | 9,040,000,000 |

Now try these SMALL numbers. See if you can figure out the method (one example is given).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Scientific Notation | Standard Notation |  | Scientific Notation | Standard Notation |
| Example:$$3.2×10^{-3}$$ | 0.0032 | Example:$$5.4×10^{-6}$$ | 0.0000054 |
| a. $4.2×10^{-8}$ |  | e.  | 0.00075 |
| b. $8.12×10^{-7}$ |  | f.  | 0.004005 |
| c. $7.625×10^{-3}$ |  | g.  | 0.00000000092 |
| d.  |  |  | h.  |  |

1. Express 4,532,344 in scientific notation with 3 significant figures.
2. Express 0.00045323 in scientific notation with 2 significant figures.
3. Type the following into a calculator: 5,555,555,555 multiplied by 5,555,555,555. What does the answer say?

Some calculators can give you answers in scientific notation. Other calculators have different ways of displaying scientific notation. One way they can display scientific notation is 3.08E19. This means the same this as $3.08 ×10^{19}$.

1. Write the number above in standard form.
2. A calculator gives you an answer of 5.025E$-3$, write this number in scientific notation and standard form.
3. A calculator gives you an answer of 9.22E8. Write this number in scientific notation and standard form.
4. Enter the following problems into your calculator, write the answer in scientific notation and standard form. Express your answer with three significant figures.

|  |  |  |
| --- | --- | --- |
| 1.
 | 1.
 | 1.
 |

1. Explain why the numbers$ 402.2×10^{21} $and $0.217×10^{4}$ are not written in scientific notation.

Look at the numbers given below, if the number is written in scientific notation circle it. If it is not written in scientific notation change it to scientific notation. You will need to think about how many spaces you will have to move the decimal and how that will affect the exponent.

|  |  |  |
| --- | --- | --- |
| 1.
 | 1.
 | 1.
 |
| 1.
 | 1.
 | 1.
 |

1. In September 2014 Facebook was worth $2,000,000,000. Write this number in scientific notation.
2. The diameter of a human hair is 0.000099 meters long. Write this number in scientific notation.
3. A computer at a radio station stores all of the station’s music digitally. The computer can display the amount of time it will take to play through its entire library of music. The DJ can choose if she wants to display this total amount of playing time in seconds, minutes, hours, and years. The radio station has about 7,000 songs on the computer that have an average playing time of 3 minutes for each song.
4. Calculate the total amount of music in minutes that is on the radio station’s computer. Write this number in scientific notation.
5. If the D.J. is planning a playlist for the entire week, should she display the total amount of time in seconds, minutes, hours, days, or years?
6. Convert the playing time into each unit of time.
7. The mass of a snowflake is approximately 0.000003 kilograms.
8. Write this number in scientific notation.
9. If you are only concerned about the mass of one snowflake circle the unit below that would best represent this quantity. Convert the mass of the snowflake to your chosen unit of measurement.

 Milligrams Grams Kilograms

1. Suppose there are approximately 1,000,000 snowflakes in one giant snowball. What unit should you choose to represent the weight of the snowball? Find the mass of the snowball with your chosen unit.