NAME_____

Scientific Notation

Scientific Notation - a method of expressing very _____ and very _____ quantities.

Examples...

6.2×10^{5} 1.278×10^{12} 9.84×10^{-8} 8.914×10^{-20}

Circle the two numbers above that you think are really small. What is making them small?

Numbers written in scientific notation include three parts...

1. The first number is a number between _____ and _____.
2. The operation is multiplication.
3. The last number is a power with base _____.

For each of the following, decide if it is written in scientific notation. If it is not, state why.

1. 8.1×10^{-3}
2. 0.78×10^{12}
3. $4.34 + 10^{8}$
4. 13.2×10^{-20}
5. 6.124×10^{32}
6. 2.1×10^{212}
7. 3.9×6^{10}
8. 11.2×10^{52}
9. 9.73×10^{-14}

In order to convert a number to "scientific notation", use the steps written below...

1. Decide where the decimal point should go to make the number fall between 1 and 10. Write that number down.
2. Now count the number of spaces it takes to move the decimals back to it's original spot. This number becomes the exponent on your power of ten.
3. Finally decide if the exponent should be positive or negative.
   *If you had to move left, it will be negative.
   *If you had to move right, it will be positive.

Now let's try some examples together...

10. 365,000

11. 0.000000076

12. 6,725,000

13. 0.000000356

Which problems above ended up with a negative exponent?

Which problems above ended up with a positive exponent?

When using scientific notation, numbers less than one have a _____ exponent.
Numbers greater than or equal to one have a _____ exponent.

Now you try...

12. The weights of various sea creatures are shown in the table. Write each weight in scientific notation.

Sea Creature	**Blue Whale**	**Whale Shark**	**Eel**	**Minnow**
Weight (lbs) – Standard Notation	250,000	41,200	133.25	0.95
Weight (lbs) – Scientific Notation				

13. An estimate of the world's population in 2010 was 6,880,000,000. Write the world's population in scientific notation.

Did you have a positive or negative exponent? Why?

To translate from scientific notation to standard notation, you can move the decimal point the number of places indicated by the exponent.

When the exponent is positive, move _____.

When the exponent is negative, move _____.

Let's try some together...

1st, predict if the number will be really big or really small. Then write each number in standard notation...

14. 4.18549×10^{12}

15. 2.568×10^{-6}

16. 9.24×10^{8}

Comparing numbers in scientific notation.

17. The approximate weight of a whale shark is 4×10^4 pounds. The approximate weight of a common dolphin is 2×10^2 pounds. How many times as great as the weight of the whale shark is the weight of the dolphin?

Hints:

First compare the values between 1 and 10.

The "4" in 4×10^4 is _____ times as great as the "2" in 2×10^2.

Next compare the powers of 10.

10^4 is _____ times as great as 10^2.

Circle the most reasonable answer.

The weight of the whale shark is 2 / 20 / 200 / 2000 times as great as the weight of the dolphin.

18. Scientists captured ands released a whale shark that weighted about 6×10^5 units.
Circle the best choice for the units this measurement is given in: ounces / pounds / tons

Explain your choice.

PRACTICE

Write each number in scientific notation.

1. 58,927

2. 1,304,000,000

3. 0.000487

4. 0.000028

5. 0.000059

6. 6,730,000

7. 13,300

8. 0.0417

Write each number in standard notation.

9. 4×10^{5}

10. 1.8499×10^{9}

11. 8.3×10^{-4}

12. 3.582×10^{-6}

13. 2.97×10^{-2}

14. 6.41×10^{3}

15. 8.456×10^{7}

16. 9.06×10^{-5}

Circle the correct answer.

17. 8×10^{5} is 2 / 20 / 200 / 2,000 times as great as 4×10^{2}.

18. 9×10^{10} is 30 / 300 / 3,000 / 30,000 times as great as 3×10^{7}.

19. 4×10^{-5} is 0.02 / 0.2 / 2 / 20 times as great as 2×10^{-4}.

20. 4×10^{-12} is 0.00001 / 0.0001 / 10 / 1000 times as great as 4×10^{-8}.

21. The mass of a proton is about 1.7×10^{-24} g. The mass of a neutron is about the same as a proton. The nucleus of an atom of carbon has 6 protons and 6 neutrons. The mass of the nucleus is about 2×10^{-26} units. Circle the best choice for the units this measurement is given in: g / kg / tons

22. The air distance between Los Angeles, California, and New York City, New York, is about 3.9×10^{3} units. Circle the best choice for the units this measurement is given in: cm / m / km