Unit 5 Study Guide
Big Numbers, Estimation and Computation

UNDERSTANDING MULTIPLICATION
* Parts of the Algorithm: factor/factor/product

* Multiplication Methods:
    1. **Traditional**
    2. **Partial-product**
    3. **Lattice**
(You need to be secure in using the traditional method. However, you may use any method you like, unless the directions say to use a specific method.)

* **Extended Multiplication Facts** – Examples: $5 \times 7 = 35$
$50 \times 7000 = 350,000$

ESTIMATION
* What does estimate mean?

* Ways to make rough estimates:
    Ballpark or Rough estimate – round the numbers to "close-but-easier" numbers
    Example: $439 + 71$ becomes $450 + 70 = 520$
    Magnitude estimate – rounding to determine an answer in a multiple of ten (tens, hundreds, thousands, etc.) or other powers of ten.
    Example: 9×17 becomes $10 \times 20 = 200$

* Depending on the situation, sometimes the answer may need to be an estimate and other times it must be exact. Reviewing the number data and then carefully determining what is being asked, will help you to determine whether to estimate or go with an exact number answer. Large numbers that are always changing call for magnitude estimates.

ROUNDING
* The Rounding Process
1st Step: Find the place value digit to be rounded.
2nd Step: Look at the digit to the right. If it is 5 or more... round up. If it is 4 or less... don't change the digit.
3rd Step: Change all digits to the right of the rounded digit to 0s.)

Example: Round 234,789 to the nearest ten thousand. 230,000
Example: Round 1,579,996 to the nearest hundred. 1,580,000 (Notice how more than one place value changed because of the 9s. Sometimes more than once place value my be bumped up.)

PLACE VALUE
* The first 6 whole number (to the left of the decimal) place value groups are

_____ _____ _____ _____ _____ _____ .
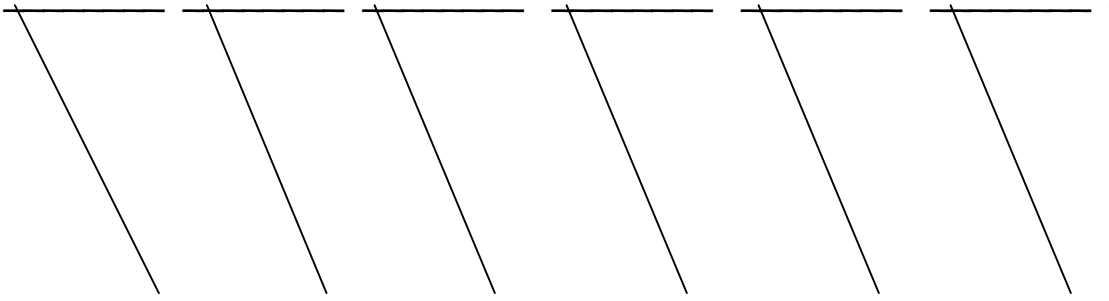
POWERS of 10
* Numbers like 10, 100, 1,000, 10,000, that are products whose factors are 10, 100, 1,000, 10,000 and so on…)

* **Exponential Notation** – a way of representing repeated multiplication by the same factor.
Example: Instead of 10x10x10x10, you can write 10^4

* **Exponent** – the small raised number used in exponential notation (The 4, in 10^4, is an exponent.)

Examples: Town Budget $8 million $8 x 10^6
                    World Population in 2002   6 billion people   6 x 10^9 people
                    Light-Year (Distance Light travels in a year.)
                                                                    6 trillion miles   6 x 10^{12} miles
                    Wavelength of ultraviolet radiation (shortest)
                                                                    4 nanometers   4 x 10^{-9} meters
                                  (A nanometer is one billionth of a meter.)

* **Standard Notation** – a number written in the usual place value way.
Examples: 10,000 or 5,500,000,000,000

* **Scientific Notation** is when exponential notation is written along with another number to express very large numbers.
Example: The approximate weight (mass) of Earth is listed as 6.6 X 10^{21} tons.
The number is read as "6 point 6 times 10 to the 21st power."
6,600,000,000,000,000,000,000   (6 sextillion, 600 quintillion)
DON'T WORRY… THIS WILL NOT BE ON THE TEST… JUST THOUGHT IT MIGHT BE INTERESTING TO SHARE!

SECURE GOALS

Students should be able to:

1. Estimate sums
2. Multiply multidigit whole numbers
3. Add and subtract decimals
4. Measure to the nearest ¼ in. and 0.5 cm
5. multiply using "What's My Rule?" tables

DEVELOPING GOALS:

Student is learning to:

1. Estimate products
2. Multiply multidigit whole numbers
3. Multiply using extended facts
4. Measure to the nearest ¼ inch and 0.5 cm when the 0-mark of the ruler is not positioned at the end of an object