Number Sense Vocabulary

Periods: The groups of three place values on the number chart. Commas are used to separate the periods when writing large numbers.

Billions *millions* *thousands* *ones*

Standard Form - a way to write numbers using one digit in each place value.

Example: 324, 501

Word Form: A way to write the value of a number using words only.

Example: three hundred twenty-four **thousand** five hundred one

Short Word Form: a way to write numbers using both digits and words.

Example: 324 thousand 501

Expanded Form: A way to write numbers showing the value of each digit.

Example: 300, 000 + 20, 000 + 4, 000 + 500 + 1

Expanded Notation: a way to write numbers showing each digit times the corresponding place value

Example: (3 •100,000) + (2 • 10,000) + (4 •1,000) + (5 • 100) + (1 •1)

Symbols

- < less than
- > greater than
- = equal to
- ≠ not equal to
- ≈ is approximately equal to

BILLIONS			MILLIONS			THOUSANDS			ONES		
hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones

What were you doing 1 Million seconds ago?

1,000,000 ÷ 60 seconds in a minute= 16,666.66 minutes

16,667 ÷ 60 minutes in an hour= 277.78 hours

278 hours ÷ 24 hours in a day= 11.6 days ago

What were you doing 1 Billion seconds ago?

1 billion = 1,000 • 1,000,000 (1 million)

1,000 • 11.6 days = 11,600 days

11,600 days ÷ 365 days in a year = 31.78 years

.78 of a year = 9 months

1 Billion Seconds = 31 years 9 months ago

What were you doing then? ☺

Standard Form	35,692,184
Word Form	
Short Word Form	
Expanded Form	
Expanded Notation	

Number Forms HW

Standard Form to ***Word Form:***
362,007,402,619

Standard Form to ***Word Form:***
845,294,120,480

Standard Form to ***Short Word Form:***
719,418,002,012

Standard Form to ***Short Word Form:***
810,369,374,908

Word Form to ***Standard Form:***
Nine hundred forty-two billion three hundred seven million sixteen thousand eight hundred twenty-six

Word Form to ***Standard Form:***
Six hundred two billion seven hundred nineteen million four hundred twenty-two thousand thirty-one

Standard Form	48 1,035,692,184
Word Form	
Short Word Form	
Expanded Form	
Expanded Notation	

Name:_____ Date:_____

Expanded Notation

Write the following numerals in expanded notation.

1. 87,264,038,012

2. 52,008,364

3. 264,509,036

4. 7,264,108,672

Write the following numerals in standard form.

5. (9 • 1,000,000) + (4 • 100,000) + (8 • 1,000) + (2 • 100) + (1 • 10) + (7 • 1)

6. (7 • 1,000) + (2 • 1,000,000) + (4 • 10,000) + (9 • 10) + (3 • 100,000,000)

7. (6 • 100,000,000) + (4 • 10,000,000) + (8 • 100,000) + (2 • 1,000) + (9 • 100) + (3 • 1).

8. (5 • 10,000) + (3 • 10,000,000) + (7 • 100) + (1 • 1,000,000,000) + (8 • 100,000,000) + (2 • 1,000) + (4 • 10)

Write the following in *standard form.*

Seven hundred million forty-nine thousand eight hundred one

_____

9,000,000 + 30,000 + 4,000 + 200 + 40 + 9 _____

(5 • 10,000,000,000) + (7 • 100,000,000) + (9 • 1,000,000) + (5 • 100,000) + (4 • 10,000) + (3 • 1,000) + (8 • 10) + (4 • 1) _____

Write the following numerals in *word form.*

30,806,189 _____

_____

253,605,012,501 _____

_____

Write the following numerals in *expanded form.*

76,905,271 _____

_____

902,003,073,012 _____

_____

Write the following numerals in *expanded notation.*

7,650,093 _____

_____

6

9

Name:_____ Date:_____

Reading/Writing Decimals Homework

Write the numbers in words form.

1. 3,986,203.093 _____

2. 402,030.87 _____

3. 28,039,001.008 _____

4. 908.030 _____

5. 32,001.7 _____

Write the following in standard notation.

6. four hundred two thousand sixty-one and three hundredths

7. twelve million seven hundred nine thousand five hundred two and fifty-two thousandths _____

8. five hundred one million forty-three thousand and six tenths

9. three thousand six hundred forty-one and thirteen thousandths

10. sixty-two million four hundred nine thousand seven hundred two and five hundredths _____

Name:_____ Date:_____

Counting/Place Value Relationship

Use the following numeral to respond to the questions below:

538,120,476,009

1. What period is the 3 in? _____

2. What is the value of the 2? _____

3. What place value is the 5 in? _____

4. What period is the 7 in? _____

5. What is the value of the 8? _____

6. What place value is the 4 in? _____

Use the following numeral to respond to the questions below:

903,461,028,507

1. What period is the 2 in? _____

2. What is the value of the 6? _____

3. What place value is the 3 in? _____

4. What period is the 5 in? _____

5. What is the value of the 4? _____

6. What place value is the 2 in? _____

Name:_____ Date:_____

Counting/Place Value Relationship

Use the following numeral to respond to the questions below:

470,501,283,069

1. What period is the 3 in? _____

2. What is the value of the 8? _____

3. What place value is the 7 in? _____

4. What period is the 1 in? _____

5. What is the value of the 5? _____

6. What place value is the 3 in? _____

Use the following numeral to respond to the questions below:

45,092,016,783

1. What period is the 9 in? _____

2. What is the value of the 4? _____

3. What place value is the 1 in? _____

4. What period is the 7 in? _____

5. What is the value of the 2? _____

6. What place value is the 5 in? _____

Counting/Place Value Relationship HW

Use the following numeral to respond to the questions below:
6,709,584,213

1. What period is the 9 in? _____
2. What is the value of the 7? _____
3. What place value is the 8 in? _____
4. What period is the 3 in? _____
5. What is the value of the 6? _____
6. What place value is the 5 in? _____

Use the following numeral to respond to the questions below:
32,178,460,950

1. What period is the 4 in? _____
2. What is the value of the 2? _____
3. What place value is the 1 in? _____
4. What period is the 7 in? _____
5. What is the value of the 6? _____
6. What place value is the 8 in? _____

Use the following numeral to respond to the questions below:
4,168,702,953

1. What period is the 7 in? _____
2. What is the value of the 4? _____
3. What place value is the 1 in? _____
4. What period is the 6 in? _____
5. What is the value of the 5? _____
6. What place value is the 8 in? _____

Use the following numeral to respond to the questions below:
9,437,082,651

1. What period is the 1 in? _____
2. What is the value of the 0? _____
3. What place value is the 7 in? _____
4. What period is the 9 in? _____
5. What is the value of the 8? _____
6. What place value is the 6 in? _____

Place Value Relationships

1. What happens as you move one place to the left on the place value chart?

2. What happens as you move one place to the right on the place value chart?

3. What is the relationship between the ten-thousands place and the ten-millions place?

4. What is the relationship between the hundreds place and the hundred-millions place?

5. How many 10,000s are in 1,000,000?

6. How many 1,000,000s are in 1,000,000,000?

7 How many 100,000,000 are in 1,000,000,000?

Ten-to-One Relationships - HW

1. How many 1,000s are in 100,000? _____
2. How many 100s are in 1,000,000? _____
3. How many 10,000s are in 100,000? _____
4. How many 10s are in 1,000,000? _____
5. How many 1,000s are in 1,000,000,000? _____
6. How many 1,000,000s are in 10,000,000,000? _____
7. How many 10,000s are in 100,000,000,000? _____
8. How many 100,000,000s are in 10,000,000,000? _____
9. How many 100s are in 10,000,000? _____
10. How many 10,000,000s are in 100,000,000? _____
11. How many 100,000s are in 10,000? _____
12. How many 1,000,000s are in 100? _____

Exponents:

Definition: Exponent tells the base how many times to be a factor

Base ← 4^2 ↗ Exponent

Base: factor(s) that are used.
Exponent: "little voice" that tells the base how many times it has to multiply itself - Repeated multiplication.
$10^5 = 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 100{,}000$

$5^4 = 5 \cdot 5 \cdot 5 \cdot 5$
We say: 5 to the 4^{th} power.

SPECIAL EXPONENTS:
4^2 = ***4 squared*** or ***4 to the 2nd power.***
4^3 = ***4 cubed*** or ***4 to the 3rd power.***

Any number to the zero power ALWAYS equals 1 EXCEPT zero to the zero power is undefined. ***
Proof: Base 10

$10^4 = 10 \cdot 10 \cdot 10 \cdot 10$ (÷ 10)
$10^3 = 10 \cdot 10 \cdot 10$ (÷ 10)
$10^2 = 10 \cdot 10$ (÷ 10)
$10^1 = 10$ (÷ 10)
$10^0 = 1$

* As the EXPONENT decreases by one, you DIVIDE by the BASE. *

$6^3 = 6 \cdot 6 \cdot 6$ (÷ 6)
$6^2 = 6 \cdot 6$ (÷ 6)
$6^1 = 6$ (÷ 6)
$6^0 = 1$

$2^3 = 8$ (÷ 2)
$2^2 = 4$ (÷ 2)
$2^1 = 2$ (÷ 2)
$2^0 = 1$

Name:_____ Date:_____

Exponents

Define.

1. exponent - _____

_____

Write out the multiplication problem first, then compute (simplify).

2. 2^4 = _____
3. 9^2 = _____
4. 3^3 = _____
5. 6^0 = _____
6. 3^2 = _____
7. 2^6 = _____
8. 4^3 = _____
9. 7^1 = _____
10. 8^0 = _____
11. 6^3 = _____
12. 3^4 = _____
13. 2^5 = _____

Represent the following expressions using an exponent.

Example: $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 = 4^5$

1. $5 \cdot 5 \cdot 5 =$ _____
2. $6 \cdot 6 \cdot 6 \cdot 6 =$ _____
3. $7 =$ _____
4. $8 \cdot 8 =$ _____
5. $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 =$ _____
6. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 =$ _____
7. $9 \cdot 9 \cdot 9 =$ _____
8. $1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 =$ _____
9. $10 \cdot 10 \cdot 10 \cdot 10 =$ _____
10. $4 \cdot 4 \cdot 4 =$ _____
11. $12 \cdot 12 \cdot 12 \cdot 12 \cdot 12 =$ _____
12. $15 \cdot 15 =$ _____
13. $11 \cdot 11 \cdot 11 \cdot 11 \cdot 11 \cdot 11 \cdot 11 =$ _____
14. $18 =$ _____
15. $19 \cdot 19 \cdot 19 =$ _____

Name:_____ Date:_____

Ten-to-One Relationship/Powers of 10

1. How many 100,000's are in 1,000,000,000? _____

2. How many 100's are in 100,000?_____

3. How many 10,000's are in 100,000,000._____

4. How many 1,000,000's are in 100,000,000,000? _____

5. How many 100,000's are in 10,000,000?_____

6. How many 1,000's are in 100,000,000,000? _____

Compute (Simplify).

7. 10^2 =

8. 10^{12} =

9. 10^4 =

10. 10^1 =

11. 10^9 =

12. 10^6 =

13. 10^0 =

14. 10^5 =

Write the following numbers using exponents.

15. 1 =

16. 1,000,000 =

17. 100,000,000 =

18. 100,000,000,000 =

19. 100,000 =

20. 10,000,000 =

21. 1,000,000,000 =

22. 100,000 =

Place Value Chart with Decimal Place Values

hundred thousands	ten thousands	thousands	hundreds	tens	ones	•	tenths	hundredths	thousandths	ten-thousandths	hundred-thousandths
100,000	10,000	1,000	100	10	1		0.1	0.01	0.001	0.0001	0.00001
10^5	10^4	10^3	10^2	10^1	10^0		$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$	$\frac{1}{10000}$	$\frac{1}{100000}$

"THS" – means to the right of the decimal point

The value of each place is 10 times the place to its right.

Ex. Thousands – a thousand is 10 times one hundred.

The value of each place is $\frac{1}{10}$ of the place to the left.

Ex. Thousands – a thousand is $\frac{1}{10}$ of ten thousand.

Rounding- Rolling 9s

Rounding is a type of estimation, but in it, you have an EXACT answer to a specific place value.

When you round a number, you find the digit in the place value you are rounding to and underline it. Then you look at it's "right-hand man" - and circle it.

Round to the hundredths PV: 5, 7(3)0

the 3 tells the 7 to stay the same

If the "right hand man" is:

- 0,1,2,3, 4 = the digit stays the same
- 5,6,7,8,9 = the digit goes up by 1

THE ***RIGHT*** OF THE PV YOU ARE ROUNDING TO, ALL DIGITS BECOME "0". ALL DIGITS TO THE ***LEFT*** STAY THE SAME.

Round to the nearest hundred thousand:

57,984,320 = _____

- The 8 tells the nine to go up by 1, but if it goes up by 1, it becomes a 10. 10 doesn't fit in ONE PV so you have to "Roll Nine" by turning the 9(s) into 0. Then go to the next digit, the 7, and add the 1 to become 8. All the digits to the right of that new 8 become zero. **Sometimes there can be more than one 9 that you have to "roll over" and turn into zero. **

Practice: *Round to the nearest:*

million: 954,602,728 _____

hundred thousand: 579,957,321 _____

ten thousand: 689,996,017 _____

ten million: 10,589,990,451 _____

Name:_____ Date:_____

Round

Round to the nearest HUNDRED.

1) 7,699,964 _____ 2) 502,637 _____

3) 2,459,862 _____ 4) 54,673 _____

Round to the nearest TEN MILLION.

5) 5,642,589,124 _____ 6) 4,995,264,237 _____

7) 326,498,231 _____ 8) 234,567,192 _____

Round to the nearest THOUSAND.

9) 468,574 _____ 10) 726,182 _____

11) 89,997,216 _____ 12) 7,562,158 _____

Round to the nearest HUNDRED BILLION.

13) 875,292,428,370 _____ 14) 726,819,346,829 _____

15) 623,148,672,806 _____ 16) 967,234,506,812 _____

Round to the nearest BILLION.

17) 7,268,439,120 _____ 18) 692,861,0345,726 _____

19) 51,602,492,781 _____ 20) 2,976,426,283 _____

Round to the nearest TEN MILLION.

21) 568,216,934 _____ 22) 9,994,267,204 _____

Rounding

Round to the nearest THOUSAND.

25. 99,231 _____

26. 467,210 _____

27. 999,764 _____

28. 521,614 _____

Round to the nearest TEN MILLION.

29. 5,426,497,167 _____

30. 3,821,319,458 _____

31. 9,995,114,267 _____

32. 9,647,137 _____

Round to the nearest HUNDRED.

33. 617,937 _____

34. $42,657.67 _____

35. 9,431,992 _____

36. 6,372,816 _____

Round to the nearest HUNDRED MILLION.

37. 9,861,246 _____

38. 645,430,728 _____

39. 64,204,671 _____

40. 999,350,759 _____

Round to the nearest HUNDRED THOUSAND.

41. 9,921,483 _____

42. 2,964,730 _____

43. $3,492,037 _____

44. 3,826,149 _____

Round to the nearest HUNDRED DOLLARS.

45. $42,726,279.34 _____

46. $63,567 _____

47. $89.25 _____

48. $998 _____

Rounding Homework

Round to the nearest THOUSAND.

25. 56,728 _____

26. 398,412 _____

27. 7,203,468 _____

28. 438,625 _____

Round to the nearest HUNDRED MILLION.

29. 9,962,497,167 _____

30. 7,103,846,274 _____

31. 67,821,067 _____

32. 9,127,824,437 _____

Round to the nearest TEN THOUSAND.

33. 612,728 _____

34. 3,428 _____

35. 5,491,631 _____

36. 4,996,342 _____

Round to the nearest HUNDRED THOUSAND.

37. 7,234,819 _____

38. 9,598,548 _____

39. 6,972,648 _____

40. 999,850,759 _____

Round to the nearest THOUSAND DOLLARS.

41. $9,921.48 _____

42. $964,730 _____

43. $475.35 _____

44. $789,231.43 _____

Estimating

Estimate the sum of 43 + 12 + 24. Show your work:

Estimate the sum of 48 + 19 + 27. Show your work:

What did you notice as a difference between the two problems above?

_____

_____

When we use _____ numbers than the actual values, we will have an _____. The estimate is _____ than the actual answer.

When we use _____ numbers than the actual values, we will have an _____. The estimate is _____ than the actual answer.

Practice Makes Perfect!

Always show your work☺

1. Estimate: 123 x 34

This is an: overestimate or underestimate

because _____

_____

2. Estimate: 394 + 167

This is an: overestimate or underestimate

because _____

_____

3. Estimate: 189 x 76 x 278

This is an: overestimate or underestimate

because _____

_____

4. Estimate: 214 + 123 + 409

This is an: overestimate or underestimate

because _____

_____

5. **Challenge: Estimate: 378 + 199 + 42

This is an: overestimate or underestimate

because _____

_____

Comparing Numerals

$>$ _____

$<$ _____

$=$ _____

$\neq$ _____

$\approx$ _____

To compare whole numbers (0 and all positive numbers):

Step 1: ***Count the number of digits*** in each numeral and ***write it above the numeral***. If one number has ***more digits*** than the other, it is ***larger***.

$$\overset{5}{43{,}008} > \overset{4}{4{,}308}$$

521,456,302 *52,145,302*

Step 2: If they have the ***same*** *number of digits*, go to the ***largest place value*** *and compare each digit*; work from left to right. When you come to a place value where the *digits are* ***different***, **underline** the ***two digits and compare***. That will determine the larger number.

$$\overset{6}{532{,}\underline{7}53} > \overset{6}{532{,}\underline{5}73}$$

1,276,809 *1,276,908*

Ordering Numerals

To order whole numbers (0 and all positive numbers):
Read carefully to see if you are ordering from least to greatest or greatest to least.

Order the following numbers from LEAST to GREATEST:

420,572 4,987 58,123 402,978

Step 1: *Count the **number of digits*** in each numeral and ***write it** above the numeral*.

Step 2: If any number has less digits than all the other numbers, it is the **least.** If any number has more digits than all the other numbers, it is the **greatest.** Then compare all numbers that have the same number of digits.

Order the following numbers from GREATEST to LEAST:

646,109,322 664,892,322 646,892,401 664,732,219

Integers

Integers: The set of whole numbers {0, 1, 2, 3, 4, 5,...} and their opposites. The roster of the set of integers – {... -3, -2, -1, 0, 1, 2, 3,...}.

Opposites: Opposites are two numbers the same distance away from zero on opposite sides of the number line. 5 and -5 are opposites.

- What is the opposite of -3? _____
- What is the opposite of -8? _____

Positive Numbers: The further away from zero, the _____ the number.

Negative numbers: The further away from zero, the _____ the number.

Comparing Integers: < , >, =

38 42 2 -1 -22 -21 -25 -28

Real Life Applications of Integers

I. Business
- Loss (negative)
- Profit (positive)

II. Jeopardy
-Loss of money (negative)
-gain of money (positive)

III. Temperature
-below zero degrees (negative) -10°
-above zero degrees (positive) 10°

IV. Bank Accounts
-withdrawal (negative)
-deposit (positive)

V. Football
-gain yards (positive)
-lose yards (negative)

VI. Elevation
- below sea level (negative) -25 feet
-above sea level (positive) +15 feet

Integers

Objective: Ordering positive and negative integers

Order the integers from ***least to greatest***:

-7, 32, 41, -36, -27, -2

Order the integers from ***least to greatest***:

-26, 19, 0, -19, -7, -12

Order the integers from ***greatest to least***:

-24, 8, 41, -30, 9, -11