Examining Digit Place Value—USE THE EXAMPLES!

Example #1:

962.69

The 6 in the tens place is ______________ the value of the 6 in the tenths place.

1. Show the jumps in the number from the 6 to the 6. How many jumps? __2____ This tells how many zeros are in the answer= __2__. (either 100X or 1/100)

2. What is being compared in the question? tens to tenths. Tens is larger than tenths, so multiply. (When the first one is larger, multiply)

3. Answer is 100 X
Example #2:

9,443.2

The 4 in the tens place is _____________ the value of the 4 in the hundreds place.

1. Show the jumps in the number from the 4 to the 4. How many jumps? ___ __ This tells how many zeros are in the answer= ___ __ (either 10X or 1/10)

2. What is being compared in the question? tens to hundreds. Tens is smaller than hundreds, so divide. (When the first one is smaller, divide)

3. Answer is 1/10

54.45

The 5 in the tens place is _____________ the value of the 5 in the hundredths place.

1. Show the jumps in the number from the 5 to the 5. How many jumps? _____ This tells how many zeros are in the answer= _____.

2. What is being compared in the question? _____________________________.

_______________ is smaller/larger than _________________, so multiply/divide.

3. Fill in answer in the problem above.

7,279.21

The 2 in the hundreds place is _____________ the value of the 2 in the tenths place.

1. Show the jumps in the number from the 2 to the 2. How many jumps? ______ This tells how many zeros are in the answer= _____.

2. What is being compared in the question? _____________________________.

_______________ is smaller/larger than _________________, so multiply/divide.

3. Fill in answer in the problem above.
29,392.46

The 9 in the tens place is _______________ the value of the 9 in the thousands place.

1. Show the jumps in the number from the 9 to the 9. How many jumps? _____ This tells how many zeros are in the answer= ____.

2. What is being compared in the question? _____________________________.
   __________________ is smaller/larger than ____________________, so multiply/divide.

3. Fill in answer in the problem above.

55.4

The 5 in the ones place is _______________ the value of the 5 in the tens place.

1. Show the jumps in the number from the 5 to the 5. How many jumps? _____ This tells how many zeros are in the answer= ____.

2. What is being compared in the question? _____________________________.
   __________________ is smaller/larger than ____________________, so multiply/divide.

3. Fill in answer in the problem above.

668.88

The 6 in the tens place is _______________ the value of the 6 in the hundreds place.

1. Show the jumps in the number from the 6 to the 6. How many jumps? _____ This tells how many zeros are in the answer= ____.

2. What is being compared in the question? _____________________________.
   __________________ is smaller/larger than ____________________, so multiply/divide.

3. Fill in answer in the problem above.
8,543.191

The 1 in the tenths place is ________________ the value of the 1 in the thousandths place.

1. Show the jumps in the number from the 1 to the 1. How many jumps? _____  This tells how many zeros are in the answer= ____.

2. What is being compared in the question? ________________________________.

__________________ is smaller/larger than ____________________ , so multiply/divide.

3. Fill in answer in the problem above.

53,765.873

The 3 in the thousands place is ________________ the value of the 3 in the thousandths place.

1. Show the jumps in the number from the 3 to the 3. How many jumps? _____  This tells how many zeros are in the answer= ____.

2. What is being compared in the question? ________________________________.

__________________ is smaller/larger than ____________________ , so multiply/divide.

3. Fill in answer in the problem above.
93,482.23
The 2 in the ones place is ________________ the value of the 2 in the tenths place.

5,528.783
The 8 in the ones place is ________________ the value of the 8 in the hundredths place.

418.85
The 8 in the ones place is ________________ the value of the 8 in the tenths place.

114.5
The 1 in the tens place is __________ ______ the value of the 1 in the hundreds place.

6,237.2
The 2 in the hundreds place is ________________ the value of the 2 in the tenths place.

14,219.92
The 9 in the ones place is ________________ the value of the 9 in the tenths place.
The 6 in the tens place is ________________ the value of the 6 in the tenths place.

The 5 in the tens place is ________________ the value of the 5 in the hundredths place.

The 8 in the ones place is ________________ the value of the 8 in the tens place.

The 7 in the ones place is ________________ the value of the 7 in the tenths place.

The 7 in the ones place is ________________ the value of the 7 in the tens place.

The 1 in the hundredths place is ________________ the value of the 1 in the ones place.

The 1 in the tens place is ________________ the value of the 1 in the ten thousands place.
I can explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. I can use whole-number exponents to denote powers of 10.

Vocabulary:

1. **Power of 10** - a number with a base number of 10 and an exponent
2. **Base** - the number used as a factor in exponential form
3. **Exponent** - the number of times the base is used as a factor
4. **Factor** - numbers multiplied together
5. **Scientific notation** - a way a scientist writes very large and very small numbers. Example: the average distance to the sun from Venus is $6.71 \times 10^7$ miles
6. **Number form / Number notation / Standard form / Standard notation** - numbers represented in the normal way with digits. Example: 4720
7. **Expanded form / Expanded notation** - numbers written out by showing each value of each digit. Example: 472 = 400 + 70 + 2 or $10^2$ = 10x10

They can be read two ways:

- $10^2$ 10 to the second power 10 to the power of 2
- $10^3$ 10 to the third power 10 to the power of 3
- $10^4$ 10 to the fourth power 10 to the power of 4
The exponent tells how many zeros are in the answer.

\(10^0 = 1\)
\(10^1 = 10\)
\(10^2 = 100\)
\(10^3 = 1,000\)
\(10^4 = 10,000\)

Write the powers of 10 in standard notation:

\(10^6 = \) ____________________________

\(10^8 = \) ____________________________

Write in powers of 10:

\(100,000 = \) ____________________________

\(10,000,000 = \) ____________________________

Write the powers of 10 in expanded notation:

\(10^3 = \) ____________________________

\(10^2 = \) ____________________________

Remember: \(10^5\) is the product of five factors of 10. That means it is the same as \(10 \times 10 \times 10 \times 10 \times 10\).
When using scientific notation, you can multiply or divide by powers of 10. When multiplying, keep the front number and use the exponent to see how many zeros you need.

\[ 7 \times 10^3 = 7000 \]
\[ 42 \times 10^2 = 4200 \]
\[ 16 \times 10^5 = 1,600,000 \]

When dividing and your number ends with zeros, the exponent tells you how many zeros to take away.

\[ 40,000 \div 10^2 = 40 \]
\[ 200 \div 10^2 = 2 \]
\[ 670,000,000 \div 10^3 = 670,000 \]

Solve.

\[ 51 \times 10^3 = \text{______________} \quad \text{hint: add zeros} \]
\[ 5,100 \div 10^2 = \text{______________} \quad \text{hint: remove zeros} \]
\[ 551 \times 10^2 = \text{______________} \quad \text{hint: add zeros} \]
\[ 510,000 \div 10^3 = \text{______________} \quad \text{hint: remove zeros} \]
Sometimes, a decimal is in the front number. The decimal must be moved first.

- If the problem is multiplication, move the decimal to the right. (number will get larger) The exponent tells you how many spaces to move. You will need to add zeros if there are extra spaces created.

\[
6.53 \times 10^2 = 6.53 \quad \text{so} \quad = 653
\]

\[
7.2054 \times 10^3 = 7.2054 \quad \text{so} \quad = 7205.4
\]

\[
3.4 \times 10^4 = 3.4000 \quad \text{so} \quad = 34000
\]

- If the problem is division, move the decimal to the left. (number will get smaller) The exponent tells you how many spaces to move. If you do not have enough zeros to remove, add the imaginary decimal point at the right side of the number and then move the decimal point to the left. You will need to add zeros when there are extra spaces created.

\[
37 \div 10^2 = 37. \quad \text{so} \quad = 0.37 \text{ or } 0.37
\]

\[
1320.9 \div 10^3 = 1320.9 \quad \text{so} \quad = 1.3209
\]

\[
51200 \div 10^3 = 51200 \quad \text{so} \quad = 51.200 \text{ or } 51.2
\]
○ Solve.
908.7 ÷ 10³= _____________________  hint: decimal to left

0.22 x 10²= _____________________  hint: decimal to right

30.05 x 10³= _____________________  hint: decimal to right

23.846 ÷ 10³= _____________________  hint: decimal to left

○ Apply It!
John says that 374, 287 ÷ 10²= 37,428.7 Explain the error that John made and then give the correct answer.

________________________________________
________________________________________

4,000 ÷ _____ = 40               a. 10¹     b. 10²     c. 10³     d. 10⁴

37.826 x _____ = 378.26         a. 10¹     b. 10²     c. 10³     d. 10⁴

88.4720 ÷ _____ = 0.0884720     a. 10¹     b. 10²     c. 10³     d. 10⁴
Numbers & Operations in Base Ten

5.NBT.A.3

I can read and write decimals to thousandths using base-ten numerals, number names, and expanded form.

Vocabulary:

1. Number form / Number notation / Standard form / Standard notation - numbers represented in the normal way with digits. Example: 472
2. Expanded form / Expanded notation - numbers written out by showing each value of each digit. Example: 472 = 400 + 70 + 2
3. Word form / Word notation - numbers written out in words. Do not forget to use the word "and" when including a decimal point
4. Base-ten numerals - showing the value of a number using base-ten blocks

Place Value Chart: Decimals

<table>
<thead>
<tr>
<th>hundred thousands</th>
<th>ten thousands</th>
<th>thousands</th>
<th>hundreds</th>
<th>tens</th>
<th>ones</th>
<th>.</th>
<th>tenths</th>
<th>hundredths</th>
<th>thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study how this number can be expressed: \(1.53\)

1. **Base-Ten:** (color in one whole block, and 50 on the second, and 3 on the third)

2. **Word Notation:** one and fifty three hundredths

3. **Number Notation or Standard Form:** 1.53

4. **Expanded Form:**
   
   \[1 + 0.5 + 0.03\]
   
   1 + 5 tenths + 3 hundredths
   
   \[1 + (5 \times \frac{1}{10}) + (3 \times \frac{1}{100})\]
   
   1 + (5 x 0.1) + (3 x 0.01)
Study how this number can be expressed: 3.754

1. Base-Ten: (color in 3 whole blocks, 7 on the next, 5 on the next, and 4 on the last one)

2. Word Notation: three and seven hundred fifty-four thousandths

3. Number Notation or Standard Form: 3.754

4. Expanded Form:
   \[ 3 + 0.7 + 0.05 + 0.004 \]
   \[ 3 + 7 \text{ tenths} + 5 \text{ hundredths} + 4 \text{ thousandths} \]
   \[ 3 + (7 \times \frac{1}{10}) + (5 \times \frac{1}{100}) + (4 \times \frac{1}{1000}) \]
   \[ 3 + (7 \times 0.1) + (5 \times 0.01) + (4 \times 0.001) \]
Apply It!

8.362
1. Word Notation ________________________________
2. Number Notation_____________________
3. Expanded Notation (2 ways)

2.947
1. Word Form ________________________________
2. Standard Notation_____________________
3. Expanded Form (2 ways)

12.608
1. Word Notation ________________________________
2. Number Form_____________________
3. Expanded Notation (2 ways)
Certain situations will require you to convert a number to a different form to solve a problem. Practice converting these numbers:

1. Write each fraction as a decimal:
   \( \frac{23}{100} \) 
   \( \frac{35}{100} \) 
   \( \frac{287}{1000} \) 
   \( \frac{65}{1000} \)

2. Write each decimal as a fraction:
   14.83 
   0.836 
   0.302 
   4.93 

Apply It!
Howard says that 0.500 is greater than 0.50 and 0.5. Is he correct? Explain your reasoning.
I can compare two decimals to thousandths based on meanings of the digits in each place, using >, <, and = symbols to record the results of comparisons.

Vocabulary:

1. > greater than
2. < less than

- To compare decimals:
  1. Write them in a list, lining up the decimal points
  2. Add zeros to any open spaces to make them "fair to compare"
  3. Starting in the whole numbers, compare one digit's place at a time until you find out which is greater, less or possibly they are equal.

- Compare using >, <, or =.

  1.121 and 1.211
  0.37 and 0.370
  0.298 and 0.289

  3.544 and 3.455
  0.109 and 0.190
  0.12 and 0.119

  0.355 and 0.36
  2.543 and 2.6
  0.07 and 0.070
I can use place value understanding to round decimals to any place.

- Rounding with decimals is just like rounding with whole numbers.
- Use the place value chart if you need help.

1. Read the directions to see what place the question is directing you to round. Underline that place.
2. Draw an arrow to the number to the right, its "right-hand man."
3. The right-hand man tells you if the underlined number is going to be rounded up or rounded down (stays the same). Remember: 5 or more, raise the score. 4 or less, let it rest.
4. Once the right-hand man tells the underlined place what to do, the numbers after it (to the right) all become zeros.

**Place Value Chart: Decimals**

<table>
<thead>
<tr>
<th>hundred thousands</th>
<th>ten thousands</th>
<th>thousands</th>
<th></th>
<th>hundreds</th>
<th>tens</th>
<th>ones</th>
<th></th>
<th>tenths</th>
<th>hundredths</th>
<th>thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
When directions say to round to "the nearest whole number," they mean the ones place.

Round to the nearest whole number:
46.72 ___________________ 16.36 ___________________
28.157 _________________ 729.63__________________

Round to the nearest tenth:
46.72 ___________________ 16.36 ___________________
28.157 _________________ 729.63__________________

Round to the nearest hundredth:
45.373 ________________ 45.317 ________________
2.469 ________________ 38.921 ________________

Apply It!
The teacher told the students to round 8.557
All three students got different, but correct answers. How can that happen? Explain.

Jim rounded 8.557 to 9 ________________________________

Arthur rounded 8.557 to 8.6 ______________________________

Paul rounded 8.557 to 8.56 ______________________________
I can multiply with multi-digit whole numbers and with decimals to hundredths using the standard algorithm.

3 digit x 1 digit

\[
\begin{align*}
538 \times 7 &= 3766 \\
538 \times 7 &= 3766 \\
538 \times 7 &= 3766
\end{align*}
\]
3 digit x 2 digit

Don’t forget to add a zero as a place marker before starting the second row of answers!
Multiplying decimal numbers is the same method as multiplying whole numbers.

You do not need to line the decimals up in any way. Multiply and do not do anything with the decimals until you are finished.

From the right, count over how many places the decimal or decimals are moved into the problem. From the right side of your answer, move over that many spaces and place your decimal.

1.006
x 3.2
2012
+30180
32192

Decimal goes here!

\[ \begin{array}{r}
0.67 \\
\times 0.4 \\
\hline
0.268
\end{array} \]

2 decimal places
1 decimal place
3 decimal places
Numbers & Operations in Base Ten

5.NBT.B.6

I can divide with multi-digit whole numbers and with decimals to hundredths using the standard algorithm. I can find whole-number quotients (answers) with up to four-digit dividends and two-digit divisors.

Vocabulary:

1. Divisors - numbers outside the division box, or written on the bottom of a fraction, or written second when written sideways
2. Dividends - numbers inside the division box, or written on the top of a fraction, or written first when written sideways
3. Quotient - answer to the division problem
4. Divisible - can be divided by

\[
\begin{align*}
\text{divisor} & \rightarrow 3 \\
\text{dividend} & \rightarrow 16 \\
\text{quotient} & \rightarrow 5 \\
\text{remainder} & \rightarrow 1
\end{align*}
\]
Does
Divide
McDonalds
Multiply
Sell
Subtract
Cheeseburgers
Check
Rare?
Remainder?

\[ \begin{array}{c}
015 \\
32 \underline{487} \\
-0 \\
\underline{48} \\
-32 \\
\underline{167} \\
-160 \\
\underline{7}
\end{array} \]

\[ \begin{array}{c}
025 \, r \, 3 \\
5 \) \underline{128} \\
-0 \\
\underline{12} \\
-10 \\
\underline{28} \\
-25 \\
\underline{3}
\end{array} \]
I can add, subtract multiply, and divide decimals to hundredths.

- In the last two lessons, you have multiplied and divided decimals to the hundredths place.

- Let’s review how to add and subtract them. When multiplying and dividing the decimals, it did not matter if the decimals were lined up. When you add and subtract, you must line up the decimals.

- Fill in any extra spaces with zeros.

- Add and subtract.

**A subtraction example:**

\[
\begin{array}{c}
12.03 \\
- 7.956 \\
\hline
\end{array}
\]

Use a zero to create an equal amount of decimal places.

\[
\begin{array}{c}
12.030 \\
- 7.956 \\
\hline
4.074 \\
\end{array}
\]

Note the placement of the decimal point.
An adding example:

Adding Decimal Numbers

Step 1: **Write** down the numbers, **one under the other** following the place value of the digits and by lining up decimal points.
Step 2: **Draw columns** for the place value of each digit and decimal point.
Step 3: **Put in zero** so both decimal numbers have same number of digits.
Step 4: **Now Add them** like you would add regular numbers.

Example 1:
Say you want to add
12.345 + 6.23 = ?

Step 1:

```
  1 2 3 4 5
+  6 2 3
```

Step 2:

```
  1 2 3 4 5
+  6 2 3
```

Step 3:

```
  1 2 3 4 5
+  0 6 2 3 0
```

Step 4:

```
  1 2 3 4 5
+  0 6 2 3 0
```

12.345 + 6.23 = 18.575

Example 2:
Now lets Add 1.3 + 2.567 = ?

Step 1:

```
  1 3
+ 2 5 6 7
```

Step 2:

```
  1 3
+ 2 5 6 7
```

Step 3:

```
  1 3 0 0
+ 2 5 6 7
```

Step 4:

```
  1 3 0 0
+ 2 5 6 7
```

1.3 + 2.567 = 3.867