6/17/2023

Decimals:
Place values, written forms and rounding vs. estimating
Operations on Decimals
(like terms)
Converting fractions to decimals

51,478.9142

$$5(10,000) + 1(1,000) + 4(100) + 7(10) + 8(1) \; and \; 9\left(\frac{1}{10}\right) + 1\left(\frac{1}{100}\right) + 4\left(\frac{1}{1000}\right) + 2\left(\frac{1}{10,000}\right)$$

Fifty-one thousand four hundred seventy-eight and nine thousand one hundred forty-two ten-thousandths $\left(\frac{9142}{10,000}\right)$

4.95

Four and ninety-five hundredths

0.0000032 195 612 814

Thirty-two billion one hundred ninety-five million six hundred twelve thousand eight hundred fourteen ten quadrillionths

0.000000003

3 billionths

Negative five thousand seven hundred forty-eight and three thousand two hundred ninety-one ten thousandths.

$$-5,748.3291$$

Two and four thousandths

$$2.004$$

2.4 is two and four tenths
2.04 is two and four hundredths
2.004 is two and four thousandths

Four thousandths $= \frac{4}{1000} = 0.004$

$$\frac{3291}{10000} = 0.3291$$

In written form:

0.004 *and* $.004$ are exactly the same number.

.3 is a decimal, 0.3 is just a little more obvious that this is not 3.

Rounding and estimating.

If a problem asks you to round to a certain number of decimal places or a certain position, you do that at the end of the calculation.

If the problem asks you to estimate to a certain number of digits (or a certain position), you round first all the values, and then do the operation.

Rounding:

Round to two decimal places.
Round to the hundredths place. ****

51,478.9142

Round to the nearest tenth

51,478.9|142

Round to 51,478.9

$$5,748.3291$$

Round to the nearest hundredth

5,748.32|91

Rounds to 5,748.33

Operations on decimals: how they differ from working with whole numbers.

Addition.

The rules for adding by hand are basically the same. Line up the corresponding digits and then add.
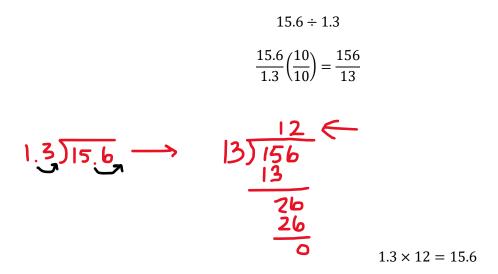11
34.920
+5.718
40.638

Subtraction

5.800
-2.146

3.654

Multiplication

```
  271
   5.82
  x3.19
  ‾‾‾‾‾
  5238
  582
1746
‾‾‾‾‾
18.5658
```

After multiplying (where you basically ignore the decimals), add up the number of digits in both numbers and place the decimal place that many digits from the right end.

Division

$$15.6 \div 1.3$$

$$\frac{15.6}{1.3}\left(\frac{10}{10}\right) = \frac{156}{13}$$

$$1.3 \times 12 = 15.6$$

Exponents don't really change.
Roots also work the same. You can check in your calculator to see if they are perfect squares (will come out with nice decimals, and if they aren't nice, they probably aren't perfect squares).

Round $\sqrt{11}$ to the hundredth place (or two decimal places).
3.31|6624…
3.32

$$\sqrt{1.44} = 1.2$$

Converting fractions to decimals.
$\frac{3}{7}$ this is a fraction, same for $\frac{1}{4}$.

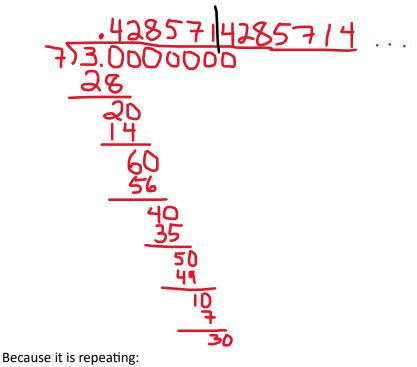Fractions are another way of writing division problems.

After we set up our division problem, if we can't do the division with the number available, then we add a 0 after the decimal place so that we can do the division. And then that decimal place goes into our answer.

Keep going until:
1) There is no remainder (the decimal terminates)
2) You are able to establish a pattern (repeating decimal)

Divide ¼ and write as a decimal

$$
\begin{array}{r}
.25 \\
4\overline{)1.00} \\
-.8 \\
\hline
20 \\
20 \\
\hline
0
\end{array}
$$

Divide $\frac{3}{7}$ and turn it into a decimal.

$$
\begin{array}{r}
.428571|428571\,4\ldots \\
7\overline{)3.0000000} \\
28 \\
\hline
20 \\
14 \\
\hline
60 \\
56 \\
\hline
40 \\
35 \\
\hline
50 \\
49 \\
\hline
10 \\
7 \\
\hline
30
\end{array}
$$

Because it is repeating:

$$0.\overline{428571}$$

0.428571428571428571 ....

Like terms

Is a pair of expressions with the same variable with the same power or other operation and the only difference between them in the coefficient (the number multiplying the variable)

$$2a + 5a$$

Like terms
To simplify, we add the two numbers together: $(2 + 5)a = 7a$

Terms that are not alike:

$$2a + 2b$$
$$2a + 5a^2$$
$$2a + \frac{5}{a}$$

Can have more than one pair of like terms: combine the pairs are alike:

$$2a - 7b + 5a + 3b$$

$$2a + 5a + 3b - 7b$$

$$(2 + 5)a + (3 - 7)b$$

$$7a - 4b$$