Positive and Negative Decimals

Basics about Decimals

What you should know:

- The *place value of decimal* places out to the hundred-thousandths place.

Hundred-thousands	Ten-thousands	thousands	hundreds	tens	ones	Decimal point	tenths	hundredths	thousandths	Ten-thousandths	Hundred-thousandths
						.					

- Place values to the right of the decimal place always end with the suffix "*ths*."
- Each place value is 10 times bigger than the place value to the right.
- You should be able to identify the place value of a digit. Use the chart above.
- You should be able to write a decimal number as a fraction. The numerator consists of the digits to the right of the decimal point. The denominator equals the place value of the last decimal digit.
- You should be able to write a decimal number in words.

Problems:

1. Consider the number 5.4072
    a. What is the digit in the tenths place?
    b. What is the digit in the ones place?
    c. What is the digit in the thousandths place?
    d. What is the digit in the hundredths place?
2. Write the decimal in words. 12.125
3. Write a decimal with the specified place values. "7 tens, 2 ones, 5 tenths, 2 hundredths, 3 ten-thousandths."
4. Write the decimal as a fraction in lowest terms. 0.85
5. Write the decimal as a mixed number in lowest terms. 15.12
6. Write the decimal as a mixed number in lowest terms. 105.0016
7. Write the decimal using numbers. "Nine and 15 thousandths."

Rounding Decimals

What you should know:

- To *round decimals*: underline the place value that you are told to round to. Look at the digit to the right of the underlined place. If the digit to the right is 0, 1, 2, 3, or 4, then round down. This means the underlined digit stays the same, and you delete all digits to the right. If the digit to the right is 5, 6, 7, 8, or 9, then round up. This means you add one to the underlined digit and delete all digits to the right.
- *Money* is often rounded to the nearest dollar or nearest cent.

- To round money to the nearest dollar, underline the ones place. Follow the rounding steps above.
- To round money to the nearest cent, underline the hundredths place. Follow the rounding steps above.

Problems:

1. Round 15.491 to the tenths place.
2. Round 2.943 to the tenths place
3. Round 42.601 to the ones place
4. Round 1.00375 to the ten-thousandths place
5. Round 4.32499 to the hundredths place
6. Round 51.99347 to the thousandths place
7. Round $64.75 to the nearest dollar.
8. Round $1.995 to the nearest cent.

Adding and Subtracting Decimals

What you should know:

- How to *add decimals*. Write the decimals in columns, with the same decimal places lined up vertically. Add vertically, carrying when necessary.
- Remember, "find the *sum*" indicates to *add*.
- How to *subtract decimals*. Write the decimals in columns, with the same decimal places lined up vertically. Subtract vertically, borrowing when necessary.
- Remember, "find the *difference*" indicates to *subtract*.
- If you are adding or subtracting decimals with a different number of decimal places, add zeros to the number with fewer decimal places until both numbers match.
- Decimals follow the same rules for adding and subtracting signed numbers as before.
- To *estimate* the solution to a decimal addition or subtraction problem, first round all numbers to the highest possible place value. Then add or subtract the rounded numbers. The answer is the estimate. Remember, round first, then add or subtract. This is sometimes called *front-end rounding*.

Problems:

1. Find the sum. $2.75 + 0.147 + 5.8$
2. Find the sum. $75.504 + 2.7 + 12.48$
3. Find the difference. $14.1 - 2.45$
4. Find the difference. $36 - 0.47$
5. Subtract 6.51 from 10.68.
6. Find the sum or difference. $-9.65 + (-1.025)$
7. Find the sum or difference. $-6 - 5.04$
8. Find the sum or difference. $600 - (45.92 - 44.10)$

9. Round first to estimate the difference (use front-end rounding). $19.2 - 9.5$
10. Round first to estimate the sum (use front-end rounding). $22.99 - 3.95$
11. Fredericka has $1,695.42 in her checking account. She has to pay her cell phone bill of $69.95. How much will be left in her account after paying the cell phone bill?

Multiplying Decimals

What you should know:

- Multiply the two decimals as if they were two whole numbers. Then count up the total number of decimal places in BOTH original numbers. Move the decimal place in the answer over to the left the same number of decimal places as the total.
- If you cannot move the decimal place over in the answer enough spaces, add some zeros up front so you can move the decimal point the correct number of places.
- Front-end rounding can also be used to estimate the result of multiplying decimals. First, round both numbers to the highest place value. Then multiply.

Problems:

1. Multiply. 0.015×3.4
2. Multiply. 5.691×0.25
3. Multiply. $(-3.61)(-4.07)$
4. Multiply. $(-1.012)(5.3)$
5. Use front-end rounding to estimate the answer. 8.95×21.6
6. Use front-end rounding to estimate the answer. 6.98×54.31
7. Palomar College charges students $0.10 a page to print. How much will it cost to print 47 pages?

Dividing Decimals

What you should know:

- What the parts of a division problem are called: the dividend, the divisor, the quotient, and the remainder.

dividend

- $\frac{16}{8} = 2 \leftarrow \text{quotient}$ $\qquad$ $\text{divisor} \rightarrow 8\overline{)16} \leftarrow \text{dividend}$, with $2 \leftarrow \text{quotient}$ above

divisor

- To divide by a decimal (the divisor is a decimal), move the decimal point to the right in the divisor until it is an integer. Move the decimal point the same number of spaces to the right in the dividend, adding extra zeros if needed. Put the decimal point in the quotient directly over the decimal point in the dividend. Divide as for whole numbers.

- If the remainder is not zero (the numbers do not divide evenly), you may be asked to either round the quotient to a given place, or to write the answer as a repeating decimal (with a bar over the repeating part).
- When dividing numbers with the same sign, the quotient is positive. When dividing numbers with different signs, the quotient is negative.
- To estimate the answer to a division problem, round first, then divide.

Problems:

1. Find the quotient. $-16.1 \div 7$
2. Find the quotient. $(-13.44) \div (-5.6)$
3. Divide. $5\overline{)111.5}$
4. Divide. $0.0005\overline{)8.9515}$
5. Divide. Round the quotient to the nearest hundredths place when necessary. $2.3\overline{)4.995}$
6. Divide. Write the quotient as a repeating decimal. $1 \div 9$
7. Use front-end rounding to estimate the answer. $419.86 \div 9.8$
8. Simplify. $(-3.2)^2 - 4.8 \div 4 + 2(-1.6)$

Fractions and Decimals

What you should know:

- To rewrite a fraction as a decimal, divide the numerator by the denominator. If needed, round to the given number of decimal places. $\frac{a}{b} = a \div b$
- To compare decimals, add zeros if needed to rewrite the decimals with the same ending place value. Compare the digits, working left to right.

Problems:

1. Write the fraction or mixed number as a decimal. Round to the hundredths place if necessary.
   $\frac{4}{5}$
2. Write the fraction or mixed number as a decimal. Round to the hundredths place if necessary.
   $2\frac{1}{6}$
3. Write the fraction or mixed number as a decimal. Round to the hundredths place if necessary.
   $\frac{3}{8}$
4. Fill in the chart with the decimal or fraction equivalent.

Fraction form	Decimal form

$\frac{1}{2}$	
	0.25
$\frac{1}{3}$	
	0.2
$\frac{1}{8}$	
	0.75

5. Fill in the blank with the appropriate inequality, > , =, or <. $0.33 \qquad \frac{1}{2}$
6. Fill in the blank with the appropriate inequality, > or <. $0.105 \qquad 0.1051$
7. Fill in the blank with the appropriate inequality, > or <. $\frac{12}{12} \qquad 1$
8. Put the numbers in order, from smallest to largest $0.54,\ 0.5399,\ 0.5405$

Pythagorean Theorem, Square Roots, and Applications

What you should know:

- Think of a square root as "undoing" a square. We say $\sqrt{25} = 5$ because $5^2 = 25$.
- Numbers that have whole number square roots are called perfect squares. The first 9 perfect squares are:

Perfect Squares	Why?
1	$\sqrt{1} = 1$
4	$\sqrt{4} = 2$
9	$\sqrt{9} = 3$
16	$\sqrt{16} = 4$
25	$\sqrt{25} = 5$
36	$\sqrt{36} = 6$
49	$\sqrt{49} = 7$
64	$\sqrt{64} = 8$
81	$\sqrt{81} = 9$
100	$\sqrt{100} = 10$