

## Refresher Math Problem Set B1 -- Introduction to Decimals

(Place Value, Rounding, Comparing, Converting Between Decimals & Fractions, Reading a Metric Ruler)

### Ground Rules for Problem Set Completion

1. Present your work in a neat and organized manner. Use complete sentences whenever you are asked to make a statement.
2. SHOW YOUR WORK: Credit is awarded for all reasonable attempts based on the work shown.
3. Complete and submit ALL Problem Sets for the unit prior to taking the Unit Test.

#### I. REVIEW PROBLEMS

The problems below provide practice with skills and concepts covered in Unit A.

- A. You may find it helpful to refer to Sample Problems 1 & 2 of Problem Set A3 when answering this problem.

1. Sketch a figure that represents the fraction  $\frac{2}{9}$  by drawing a rectangle, dividing it into nine equal portions, and shading two of the nine portions.
2. Sketch a figure that represents the mixed number  $3\frac{4}{15}$  by drawing a filled-in rectangle for each whole unit; then, drawing another rectangle, dividing it into fifteen equal portions, and shading four of the fifteen portions.
3. Find the Least Common Denominator (LCD) of  $\frac{2}{9}$  and  $\frac{4}{15}$ .
4. Find the sum of  $\frac{2}{9}$  and  $3\frac{4}{15}$ .
5. Find the difference between  $\frac{2}{9}$  and  $3\frac{4}{15}$ .

- B. State whether each of the following is divisible by (a) 2, (b) 3, and (c) 5:

1. 200
2. 294
3. 1260

FOR PROBLEMS C THROUGH H, ADD, SUBTRACT, MULTIPLY, OR DIVIDE AS INDICATED. GIVE YOUR ANSWER AS A PROPER FRACTION OR MIXED NUMBER IN LOWEST TERMS.

|  |  |  |
|--|--|--|
| C. $\frac{8}{7} * \frac{7}{5} * 4\frac{3}{4} =$                              | D. $5\frac{5}{8} \div 2\frac{1}{7} =$  | E. $\frac{8}{5} + 4\frac{1}{10} + 17\frac{9}{25} =$              |
| F. $\begin{array}{r} 19\frac{3}{16} \\ - 7\frac{2}{3} \\ \hline \end{array}$ | G. $\begin{array}{r} 15\frac{13}{20} \\ + 9\frac{5}{12} \\ \hline \end{array}$ | H. $\begin{array}{r} 12 \\ - 6\frac{5}{7} \\ \hline \end{array}$ |

COMPLETELY SOLVE PROBLEMS I THROUGH M USING STEPS (1), (2), AND (3) BELOW.

1. State what it is you are to find. Give your answer as a complete sentence.
  2. Solve the problem, showing your work.
  3. State the answer in a complete sentence.
- I. Hamburger labeled 80%-lean is one-fifth fat. How much fat is contained in  $3\frac{1}{2}$  pounds of hamburger?
- J. Joyce is making a set of curtains. She wants them to be 66 inches long when finished. The top hem needs to be  $1\frac{1}{2}$  inches and the bottom hem will be  $\frac{3}{4}$  of an inch. To what length should she cut the cloth to have enough material for the hems?

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- K. John needs to deliver 54 cubic yards of concrete to a customer. If he delivered  $27\frac{1}{4}$  cubic yards in his first trip, how many cubic yards does he still need to deliver?
- L. The circumference of a circle is about  $3\frac{1}{7}$  times its diameter. How many feet of border are needed to enclose a 15-foot diameter circular flowerbed?
- M. Ms. Clymer has  $23\frac{3}{4}$  pounds of peanuts that she wants her class to divide evenly among 15 containers. How many pounds of peanuts should be placed in each container?

### II. DECIMAL PLACE VALUE

Refer to the “Decimal Place Value Summary” below, as needed, in answering the problems in this section.

| Decimal Place Value Summary |                                |                           |                      |                             |                        |                   |                |           |          |                               |             |                  |                    |                         |                              |                      |                           |                                |                         |
|-----------------------------|--------------------------------|---------------------------|----------------------|-----------------------------|------------------------|-------------------|----------------|-----------|----------|-------------------------------|-------------|------------------|--------------------|-------------------------|------------------------------|----------------------|---------------------------|--------------------------------|-------------------------|
| billions – 1,000,000,000    | hundred millions – 100,000,000 | ten millions – 10,000,000 | millions – 1,000,000 | hundred thousands – 100,000 | ten thousands – 10,000 | thousands – 1,000 | hundreds – 100 | tens – 10 | ones – 1 | decimal point – is read “and” | tenths – .1 | hundredths – .01 | thousandths – .001 | ten-thousandths – .0001 | hundred-thousandths – .00001 | millionths – .000001 | ten-millionths – .0000001 | hundred-millionths – .00000001 | billionths – .000000001 |
|                             |                                |                           |                      |                             |                        |                   |                |           |          |                               |             |                  |                    |                         |                              |                      |                           |                                |                         |
| ,                           | ,                              | ,                         | ,                    | ,                           | ,                      | ,                 | ,              | ,         | ,        | ,                             | ,           | ,                | ,                  | ,                       | ,                            | ,                    | ,                         | ,                              | ,                       |
|                             |                                |                           |                      |                             |                        |                   |                |           |          |                               |             |                  |                    |                         |                              |                      |                           |                                |                         |

### SAMPLE PROBLEM 1 WITH SOLUTION

Write each of the following in decimal form. Answer

- a. eighteen thousandths ..... .018
- b. twenty-two million five hundred ten and five tenths..... 22,000,510.5
- c. four hundred thirty-six thousand seventy eight ten-millionths..... 0.0436078
- d. one thousand three hundred forty-nine and eighty-five hundredths. . 1,349.85

- A. Write each of the following in decimal form. Refer to Sample Problem 1, as needed. For more practice, see pages 62, 65, & 66 of Contemporary’s Number Power 2 work-text.
1. sixty-eight hundredths
  2. two hundred eight ten-thousandths
  3. four tenths
  4. three thousand ten hundred-thousandths
  5. five hundred twelve and ninety-five thousandths
  6. eleven million fifty-four thousand four hundred twenty and three thousand eighty-five ten-thousandths
  7. one hundred four and ninety-three hundredths

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### SAMPLE PROBLEM 2 WITH SOLUTION

Write each of the following decimals in words.

Answer

- a. 0.0057..... fifty-seven ten-thousandths
- b. 12,008.034..... twelve thousand eight and thirty-four thousandths
- c. .905738..... nine hundred five thousand seven hundred thirty-eight millionths
- d. 13,000,002.96..... thirteen million two and ninety-six hundredths

B. Write each of the following decimals in words. Refer to Sample Problem 2, as needed. For more practice, see pages 63 & 64 of Contemporary's Number Power 2 work-text.

- 1. 0.7                      2. 0.056                      3. 0.5036                      4. 0.00008
- 5. 8.2006                      6. 10,205.0036                      7. 135,050,623.29

### III. ROUNDING & COMPARING DECIMALS

### SAMPLE PROBLEM 3 WITH SOLUTION

Round each of the following decimals to the indicated place value.

- a. 54,876.15726 ; nearest thousandth

Step 1: Underline the digit in the place you are rounding to:

**54,876.15726**

Step 2: Look at the digit just to the right of the one you underlined:

**54,876.15726**

If it is less than 5, round down. If it is 5 or more, round up.

Since the digit to the right of our underlined digit is less than 5 we round down to **54,876.157**. Notice that when we round down the last digit stays as it was.

- b. 54,876.15726 ; nearest thousand

Step 1: Underline the digit in the place you are rounding to:

**54,876.15726**

Step 2: Look at the digit just to the right of the one you underlined:

**54,**8**76.15726**

If it is less than 5, round down. If it is 5 or more, round up.

Since the digit to the right of our underlined digit is 5 or more we round up to **55,000**. Notice that when we round to a whole number value we need to fill the places between the decimal point and the place we are rounding to with zeros.

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- A. Round each of the following decimals to the indicated place value. Refer to Sample Problem 3, as needed. For more practice, see pages 71 & 72 of Contemporary's Number Power Review work-text.

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| 1. 510.268 ; nearest tenth           | 2. 510.268 ; nearest ten            |
| 3. 1,783.526 ; nearest hundredth     | 4. 1,783.526 ; nearest hundred      |
| 5. 388.1425 ; nearest tenth          | 6. 388.1425 ; nearest ten           |
| 7. 12,849.093 ; nearest hundredth    | 8. 12,849.093 ; nearest hundred     |
| 9. 32,389.05977 ; nearest thousandth | 10. 32,389.05977 ; nearest thousand |

### SAMPLE PROBLEM 4 WITH SOLUTION

Arrange each of the following sets of numbers from smallest to largest.

- a. 0.036, 0.306, 0.0095

Step 1: Write each number so that it has the same number of digits to the right of the decimal point as the others by adding zeros at the end. This will not change the value of the numbers and it makes it easier to compare them.

**0.0360, 0.3060, 0.0095**

Step 2: Now we can see that 95 is less than 360, which is less than 3060, so we would arrange the numbers as follows:

**0.0095, 0.036, 0.3060**

- b. 5.0066, 5.01, 3.99999

Step 1: Write each number so that it has the same number of digits to the right of the decimal point as the others by adding zeros at the end. This will not change the value of the numbers and it makes it easier to compare them.

**5.00660, 5.01000, 3.99999**

Step 2: Since the whole number 3 is less than the whole number 5, we know that 3.99999 is the smallest number. Now, comparing the two numbers with the same whole number digit, we see that 660 is less than 1000, so 5.00660 must be less than 5.01000. Thus, we would arrange the numbers as follows:

**3.99999. 5.0066, 5.01**

- B. Arrange each of the following sets of numbers from smallest to largest. Refer to Sample Problem 4 above, as needed. For more practice, see page 70 of Contemporary's Number Power 2 work-text.

- |                     |                    |                          |
|---------------------|--------------------|--------------------------|
| 1. 0.005, 0.05, 0.5 | 2. 2.12, 3.2, 1.99 | 3. 11.025, 11.25, 11.009 |
|---------------------|--------------------|--------------------------|

## Refresher Math Problem Set B1 -- Introduction to Decimals

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### IV. CONVERTING BETWEEN DECIMALS & FRACTIONS

#### SAMPLE PROBLEM 5 WITH SOLUTION

Convert each of the following fractions to decimals.

a.  $\frac{6}{25}$

Solution: Since the fraction bar always indicates division, we can think of the fraction  $\frac{6}{25}$  as “**6 divided by 25.**” Setting this up as a long division problem (see work at right) we see that  $\frac{6}{25} = .24$

$$\begin{array}{r} \underline{\phantom{0} .24} \\ 25 \overline{) 6.00} \\ \underline{50} \phantom{0} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

b.  $\frac{2}{3}$

Solution: Thinking of the fraction  $\frac{2}{3}$  as “**2 divided by 3**” we set up the long division problem shown at the right. In this case we keep getting the same remainder and the long division would go on repeating forever. This is called a “**repeating decimal.**” A repeat decimal is written by placing a line above the part that repeats. Thus,  $\frac{2}{3} = 0.\overline{6}$ .

$$\begin{array}{r} \underline{\phantom{0} .666} \\ 3 \overline{) 2.000} \\ \underline{18} \phantom{00} \\ 20 \\ \underline{18} \phantom{0} \\ 20 \\ \underline{18} \phantom{0} \\ 2 \end{array}$$

A. Convert each of the following fractions to decimals. Refer to Sample Problem 5, as needed. For more practice, see pages 68 & 69 of Contemporary’s Number Power 2 work-text.

1.  $\frac{3}{10}$

2.  $\frac{5}{8}$

3.  $\frac{1}{3}$

4.  $\frac{27}{300}$

5.  $\frac{126}{800}$

#### SAMPLE PROBLEM 6 WITH SOLUTION

Problem:

Convert the decimal 0.375 to a fraction in lowest terms.

Solution:

(1) Re-write the number as a fraction with a denominator of 1.

$$(1) \quad 0.375 = \frac{0.375}{1}$$

(2) Multiply the numerator and denominator by a power of ten that will change the numerator to a whole number. (Use a 1 followed by the same number of zeros as there are digits to the right of the decimal point.)

$$(2) \quad \frac{0.375}{1} \times \frac{1000}{1000} =$$

(3) Reduce the fraction to lowest terms.

$$(3) \quad \frac{375}{1000} = \frac{15}{40} = \frac{3}{8}$$

B. Convert each of the following decimals to fractions. Refer to Sample Problem 6, as needed. For more practice, see page 67/1–3 of Contemporary’s Number Power 2 work-text.

1. 0.4

2. 0.12

3. 0.356

4. 0.008

5. 0.0105

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### SAMPLE PROBLEM 7 WITH SOLUTION

Problem:

Convert the mixed number  $4\frac{4}{15}$  to a mixed decimal.

Solution:

(1) Convert the fraction portion to a decimal by dividing the numerator by the denominator. [Notice that we again have a repeating decimal.]

(2) Write the mixed decimal by writing the whole number followed by the decimal portion just calculated.

$$\begin{array}{r} \underline{.266} = .2\bar{6} \\ 15 \overline{)4.000} \\ \underline{30} \phantom{00} \\ 100 \phantom{0} \\ \underline{90} \phantom{0} \\ 100 \\ \underline{90} \\ 10 \end{array}$$

Answer:  $4\frac{4}{15} = 4.2\bar{6}$

C. Convert each of the following mixed numbers to decimals. Refer to Sample Problem 7, as needed.

1.  $7\frac{3}{10}$       2.  $2\frac{5}{8}$       3.  $11\frac{2}{3}$       4.  $7\frac{24}{110}$       5.  $9,245\frac{8}{2500}$

### SAMPLE PROBLEM 8 WITH SOLUTION

Problem:

Convert the mixed decimal 6.0688 to a mixed number in lowest terms.

Solution:

(1) Convert the decimal portion (the part right of the decimal point) to a fraction in lowest terms by:

- (a) Re-write the number as a fraction with a denominator of 1.
- (b) Multiply the numerator and denominator by a power of ten that will change the numerator to a whole number.
- (c) Reduce the fraction to lowest terms.

(2) Write the mixed number by writing the whole number followed by the fraction portion just calculated.

(1a)  $.0688 = \frac{.0688}{1}$

(1b)  $\frac{.0688}{1} \times \frac{10,000}{10,000} =$

(1c)  $\frac{688}{10,000} = \frac{43}{625}$

(2)  $6.0688 = 6\frac{43}{625}$

D. **START HERE** Convert each of the following mixed decimals to mixed numbers. Refer to Sample Problem 8 above, as needed. For more practice, see page 67/4–7 of Contemporary's Number Power 2 work-text.

1. 65.5      2. 17,562.68      3. 872.10025      4. 7.000006      5. 1,478.258

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## V. READING A METRIC RULER

### SAMPLE PROBLEM 9 WITH SOLUTION

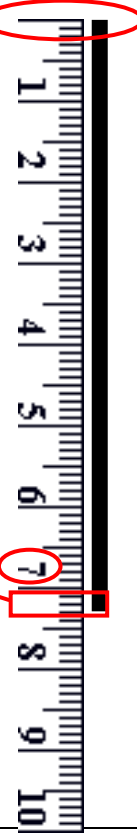
Problem:

Use a metric ruler to measure the line shown along the right edge of this box to the nearest centimeter.

Solution:

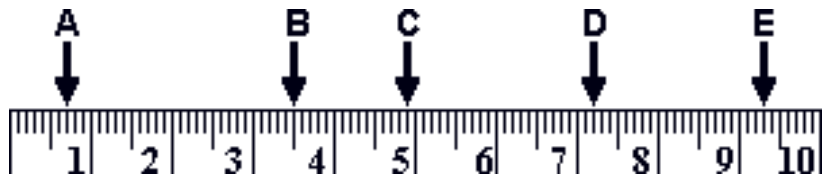
- (1) Line the left edge of the ruler up with the left side of the object being measured.
- (2) Note the value of the whole number at or just to the left of the right side of the object being measured. This will be the number of whole centimeters in our answer. [ 7 cm ]
- (3) Count the number of small tick-marks between the whole centimeter mark determined in step (2) and the right side of the object being measured. This will be the number of tenth-centimeters in our answer. [ .3 cm ]
- (4) Combine the whole number and decimal values determined in steps (2) and (3) to arrive at the final answer.

**ANSWER: 7.3 cm**



A-E. Using Figure 1 below, state how far each of the indicated points is from the left edge of the ruler. Give your answers to the nearest tenth of a centimeter. For more practice, see page 135 of Contemporary's Number Power 2 work-text.

**FIGURE 1:** THIS FIGURE REPRESENTS A 10-CENTIMETER PORTION OF A METRIC RULER. THE DISTANCE BETWEEN EACH LARGE (NUMBERED) TICK-MARK IS 1 CM AND THE DISTANCE BETWEEN EACH SMALL TICK-MARK IS 0.1 CM (ALSO KNOWN AS A MILLIMETER).



F - J. Use a metric ruler to measure each line below to the nearest tenth of a centimeter. Refer to Sample Problem 9 above, as needed.

F.

G. H.

I.



J.

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### ANSWER KEY

#### SECTION I: REVIEW PROBLEMS

A1:  A2:  A3: LCD = 45      A4:  $3\frac{22}{45}$       A5:  $3\frac{2}{45}$

B1: (a) yes, (b) no, (c) yes      B2: (a) yes, (b) yes, (c) no      B3: (a) yes, (b) yes, (c) yes

C:  $7\frac{3}{5}$       D:  $2\frac{5}{8}$       E:  $23\frac{3}{50}$       F:  $11\frac{25}{48}$

G:  $25\frac{1}{15}$       H:  $5\frac{2}{7}$       I:  $\frac{7}{10}$  lb.      J:  $68\frac{1}{4}$  in.

K:  $26\frac{3}{4}$  cu. yd.      L:  $47\frac{1}{7}$  ft.      M:  $1\frac{7}{12}$  lb.

#### SECTION II: DECIMAL PLACE VALUE

A1: 0.68      A2: .0208      A3: 0.4      A4: 0.03010

A5: 512.095      A6: 11,054,420.3085      A7: 104.93

B1: seven tenths      B2: fifty-six thousandths

B3: five thousand thirty-six ten-thousandths      B4: eight hundred-thousandths

B5: eight and two thousand six ten-thousandths

B6: ten thousand two hundred five and thirty-six ten-thousandths

B7: one hundred thirty-five million fifty thousand six hundred twenty-three and twenty-nine hundredths

#### SECTION III: ROUNDING & COMPARING DECIMALS

A1: 510.3      A2: 510      A3: 1,783.53      A4: 1,800

A5: 388.1      A6: 390      A7: 12,849.09      A8: 12,800

A9: 32,389.060      A10: 32,000

B1: 0.005, 0.05, 0.5      B2: 1.99, 2.12, 3.2      B3: 11.009, 11.025, 11.25

#### SECTION IV: CONVERTING BETWEEN DECIMALS & FRACTIONS

A1: 0.3      A2: .625      A3:  $0.\bar{3}$  0.3      A4: 0.09      A5: 0.1575

B1:  $\frac{2}{5}$       B2:  $\frac{3}{25}$       B3:  $\frac{89}{250}$       B4:  $\frac{1}{125}$       B5:  $\frac{21}{2000}$

C1: 7.3      C2: 2.625      C3:  $11.\bar{6}$       C4:  $7.2\bar{18}$       C5: 9,245.0032

D1:  $65\frac{1}{2}$       D2:  $17,562\frac{17}{25}$       D3:  $872\frac{401}{4000}$       D4:  $7\frac{3}{500,000}$       D5:  $1,478\frac{129}{500}$

#### SECTION V: READING A METRIC RULER

A: .7      B: 3.5      C: 4.9      D: 7.2      E: 9.3

F: 5.6      G: 2.7      H: 3.0      I: 7.1      J: 3.8