Refresher Math Problem Set B2 – Introduction to Decimal Operations
(Addition, Subtraction, Multiplication, Division, and Single-Step Word Problems)

Ground Rules for Problem Set Completion

1. Present your work in a neat and organized manner. Use <u>complete sentences</u> 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 and Problem Set B1. To help you review, I've noted related sample problems in brackets. (For example, [A3:1 p3] tells you that part 3 of Sample Problem 1 in Problem Set A3 is similar to the problem at hand.)

A. Answer the following questions about fractions and mixed numbers.
1. Use a sketch to represent the fraction $^5/_8$. [A3:1 p1]
2. Use a sketch to represent the mixed number $5^2/_3$. [A3:2 p1]
3. Find the sum of $^5/_8$ and $5^2/_3$. [A3:2 p4]
4. Find the difference between $5^2/_3$ and $^5/_8$. [A3:2 p5]
5. Find the product of $5^2/_3$ and $^5/_8$. [A3:5]
6. Find the quotient of $5^2/_3$ divided by $^5/_8$. [A3:7]

B. Answer the following questions about decimals.
1. Convert $^5/_8$ to a decimal. [B1:5]
2. Convert $5^2/_3$ to a mixed decimal. [B1:7]
3. Convert fifty-six thousandth to a fraction in lowest terms. [B1:6]
4. Convert 12.3005 to a mixed number in lowest terms. [B1:8]
5. Express 12.3005 in words. [B1:2]

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. $\begin{array}{r} 6\frac{17}{20} \\ +7\frac{1}{4} \\ \hline \end{array}$

D. $\begin{array}{r} 34\frac{1}{5} \\ -16\frac{5}{6} \\ \hline \end{array}$

E. $\begin{array}{r} 18 \\ -11\frac{8}{31} \\ \hline \end{array}$

F. $3^5/_8 \div 1^3/_4 =$

G. $^5/_8 \bullet 3^5/_6 \bullet ^6/_5 =$

H. $2^1/_9 + 6^5/_{12} + 5^3/_{16}$

I. Round 12,306.0814 to the indicated place values. [B1:3]

1. nearest tenth
2. nearest ten
3. nearest hundredth
4. nearest hundred
5. nearest thousand
6. nearest thousandth

J. Arrange the numbers 50.008, 5.9905, 5.599, 5.99 from smallest to largest. [B1:4]

K. Convert each of the following fractions and mixed numbers to decimals. [B1:5&7]

1. $^{63}/_{100}$
2. $5^7/_8$
3. $13^{275}/_{600}$

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L. Convert each of the following decimals to fractions or mixed numbers in lowest terms. [B1:6&8]

    1. 0.0094   2. 12,589.902   3. 9.10959

M. Jim and Alice are collecting old newspapers as part of their school's recycling effort. Jim collected $71\frac{1}{2}$ pounds and Alice collected $83\frac{5}{8}$ pounds.

    i. State what it is you are to find. Give your answer as a complete sentence.
    ii. Solve the problem, showing your work.
   *iii.* State the answer in a complete sentence.

    <u>COMPLETELY SOLVE</u> PARTS 1, 2, AND 3 BELOW USING STEPS (*i*), (*ii*), AND (*iii*) ABOVE.

    1. How many pounds of newspapers did they collect in all?
    2. Who collected more and by how much?
    3. If it took Alice $8\frac{2}{3}$ hours to collect her newspapers, what was the average number of pounds she collected each hour?

N. Measure each line below to the nearest tenth of a centimeter.

    1. —————————————   2. ╱
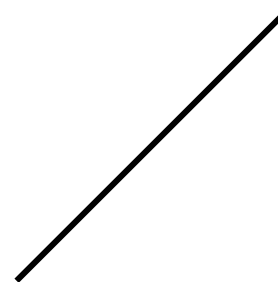
II. ADDING & SUBTRACTING DECIMALS

SAMPLE PROBLEM 1 WITH SOLUTION

Add each of the following sets of decimals.

    a. $12 + 7.025 + 0.52$

        Solution: Rewrite the problem in vertical form making sure that the decimal points are lined up, since we can only add digits of equal place value. (That is, one to one, tens to tens, tenths to tenths, etc.) [Remember, there is an implied decimal point at the far right of every whole number.] Then add the digits of equal place value.

```
  12.
   7.025
+  0.52
  19.545
```

    b. $181.02 + 5{,}500 + 32.195$

        Solution: The only difference between this and Problem (a) is that we have to carry when the sum of the digits in any given decimal place exceeds nine.

```
    1     1
    181.02
  5,500.
+    32.195
  5,713.215
```

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FOR PROBLEMS A THROUGH E, ADD EACH SET OF DECIMALS. REFER TO SAMPLE PROBLEM 1 ON THE PREVIOUS PAGE, AS NEEDED. FOR MORE PRACTICE, SEE PAGE 73 OF CONTEMPORARY'S NUMBER POWER 2 WORK-TEXT.

A.
```
  12.34
+  5.053
```

B.
```
  592.734
   59.007
+ 853.708
```

C.
```
  55,624.6307
+ 37,251.053
```

D. 5.36 + 12.1 + 31

E. 10,869 + 561.203 + 1,240.05

SAMPLE PROBLEM 2 WITH SOLUTION

Subtract each of the following sets of decimals. Use addition to check your answer.

a. 17.259 – 5.04

Solution:

1. Rewrite the problem in vertical form making sure that the decimal points are lined up, since we can only subtract digits of equal place value. (That is, one to one, tens to tens, tenths to tenths, etc.)

2. Fill in with zeros so that each number has the same number of digits to the right of the decimal point. Then subtract the bottom row digits from the digits of equal place value in the top row.

3. Check you answer by adding it to the original bottom row to get the original top row.

```
(1)  17.259
   –  5.04

(2)  17.259
   –  5.040
     12.219

(3)  12.219
   +  5.040
     17.259
```

b. 594.56 – 88.325

Solution:

1. Rewrite the problem in vertical form making sure that the decimal points are lined up.

2. Fill in with zeros so that each number has the same number of digits to the right of the decimal point.

3. Subtract the bottom row digits from the digits of equal place value in the top row, borrowing whenever the digit in the bottom row is larger than the one you are subtracting from in the top row.

4. Check you answer by adding it to the original bottom row to get the original top row.

```
(1)  594.56
   – 88.325

(2)  594.560
   – 88.325

        8    5
        14   10
(3)  594.560
   – 88.325
     506.235

(4)  506.235
   + 88.325
     594.560
```

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For problems F through J, subtract each set of decimals. Use addition to check your answers. Refer to Sample Problem 2 on the previous page, as needed. For more practice, see pages 75 & 76 of Contemporary's Number Power 2 work-text.

F.
```
  17.568
-  5.053
```

G.
```
  492.238
- 250.704
```

H.
```
   77,624.63
- 37,251.053
```

I. $5.36 - 3.685$

J. $10,869 - 561.203$

SAMPLE PROBLEM 3 WITH SOLUTION

The Problem:

Harry needs rods of lengths 5.25", 3.125" and 2.075". If he is to cut these from a single rod, what is the minimum length rod he can use?

The Solution:

i. We are to find the shortest rod that Harry can cut to get rods of lengths 5.25", 3.125" and 2.075". [Notice that rewording the problem helps us figure out what we are to find.]

ii. We determine that we must add the lengths of the smaller rods since we need to know the length of the rod they came from. It is a good idea to do a whole number estimate before doing the exact addition. We estimate the length to be 5" + 3" + 2" = 10". The exact length is given by 5.25" + 3.125" + 2.075" = 10.45", which closely agrees with our estimate (see vertical setup at right).

```
   5.25
   3.125
+  2.075
  10.450
```

iii. Harry needs a rod that is at least 10.45" long.

Completely solve Problems K through N using steps (*i*), (*ii*), and (*iii*) below. Refer to Sample Problem 3, as needed. For more practice, see pages 74, 77, & 78 of Contemporary's Number Power 2 work-text.

   i. State what it is you are to find. Give your answer as a complete sentence.
   ii. Solve the problem, showing your work.
   iii. State the answer in a complete sentence.

K. A developer bought four plots of land containing 25.75 acres, 24.625 acres, 27.875 acres, and 32.15 acres. How many acres did she buy?

L. In problem K, what was the difference in acreage between the largest and smallest plot the developer bought?

M. At the start of their trip the odometer on the Franklin's car read 23,547.6 miles. How far did the Franklins drive if the odometer read 23,822.3 miles when they reached their destination?

N. To get from one relay to another an electron travels the following distances along a circuit board: 1.1255 mm, 0.0032 mm, 0.50005 mm, and 1.008 mm. How far does the electron travel?

III. MULTIPLYING & DIVIDING DECIMALS

SAMPLE PROBLEM 4 WITH SOLUTION

Multiply each of the following sets of decimals.

a. $2.15 • 3

Solution:

1. Rewrite the problem in vertical form.

```
(1)  $2.15
      x   3
```

2. Multiply each digit in the top number by the bottom number, carrying whenever the result of your multiplication exceeds 9.

```
        1
(2)  $2.15
      x   3
      6 45
```

3. Count the total number of digits to the right of the decimal points of the numbers being multiplied (see boxed digits). Then count that many places from the right of your answer and insert a decimal point.

```
(3)  $2.[15]
      x   3
     $6.45
```

b. 5.261 • 2.3

Solution:

1. Rewrite the problem in vertical form.

```
(1)  5.261
     x 2.3
```

2. Multiply each digit in the top number by the rightmost number in the bottom row, carrying whenever the result of your multiplication exceeds 9.

```
        1
(2)  5.261
     x 2.3
     15783
```

3. Repeat Step-2 with each remaining digit of the bottom row, making sure that the rightmost resulting digit is placed one to the left of the above row to account for the difference in place value.

```
         1
(3)  5.261
     x 2.3
     15783
    10522
```

4. Add the resulting rows.

```
(4) 121003
```

5. Count the total number of digits to the right of the decimal points of the numbers being multiplied (see boxed digits). Then count that many places from the right of your answer and insert a decimal point.

```
(5)  5.[261]
     x 2.[3]
    12.1003
```

FOR PROBLEMS A THROUGH E, MULTIPLY EACH SET OF DECIMALS. REFER TO SAMPLE PROBLEM 4 ABOVE, AS NEEDED. FOR MORE PRACTICE, SEE PAGES 79–83 OF CONTEMPORARY'S NUMBER POWER 2 WORK-TEXT.

A. $6.35 x 8   B. 25.6 * 4.1   C. 102.93 • 0.025

D. 0.524(100)   E. (12.78)25.55

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SAMPLE PROBLEM 5 WITH SOLUTION

Divide the following set of decimals. Use multiplication to check your answer.

21.58 ÷ 5.2

Solution:

1. Rewrite the problem in standard long division form.

2. Since we only know how to divide by whole numbers we multiply both numbers by a power of ten that will convert the number outside the division symbol into a whole number. In this case we multiply by 10. The end result is that the decimal points move one place to the right.

3. Place the decimal point for your answer directly above the decimal point of the number inside the division symbol.

4. Finish the problem as you would a whole number long division problem.

5. Check you answer by multiplying it by the original number you are dividing by. If you did the problem correctly the result of your multiplication will be the original number you are dividing into.

$$(1)\quad 5.2\overline{)21.58}$$

$$(2)\quad 52.\overline{)215.80}$$

$$(3)\quad 52.\overline{)215.80}\;.$$

$$(4)\quad 52.\overline{)215.80} = 4.15$$

```
       4.15
(4) 52.)215.80
       208
        78
        52
        260
        260
          0
```

```
(5)    4.15
     x  5.2
        830
     20 75
     21.580
```

FOR PROBLEMS F THROUGH J, DIVIDE EACH PAIR OF DECIMALS. REFER TO SAMPLE PROBLEM 5, AS NEEDED. FOR MORE PRACTICE, SEE PAGE 86–91 OF CONTEMPORARY'S <u>NUMBER POWER 2</u> WORK-TEXT.

F. $8\overline{)56.848}$ G. $1.5\overline{)900}$ H. $2.36\overline{)9.558}$

I. 213.36 ÷ 12.7   J. 5.098 ÷ 0.25

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SAMPLE PROBLEM 6 WITH SOLUTION

The Problem:

Julia makes $9.65 an hour at her job. What is her gross pay (pay before taxes and deductions) for a week that she works 28.4 hours?

The Solution:

   i. We are to find Julia's gross pay.

  ii. To find gross pay multiply the pay per hour times the hours worked. A rough estimate can be found by rounding to numbers that are easy to deal with mentally: $10/hr • 30 hr = $300. The work for finding Julia's exact gross pay is shown at right.

 iii. Julia's gross pay for the week is $274.06.

```
   1  1
   5  4
   2  2
   9.65
 x 28.4
   3 860
  77 20
 193 0
 274.060
```

SAMPLE PROBLEM 7 WITH SOLUTION

The Problem:

If 3.2 pounds of beef cost $8.48, what is the cost per pound?

The Solution:

   i. We are to find the cost of one pound of beef.

  ii. The keyword in this problem is "per". It indicates division. Thus, to find the "cost per pound" we divide the total cost ($8.48) by the total number of pounds (3.2). A rough estimate can be found by rounding to whole numbers: $9 ÷ 3 = $3/lb. The work for finding the exact cost per pound is shown at right. [Remember, it is best to place the decimal point before doing your long division so you won't forget it.]

 iii. The beef cost $2.65 per pound.

```
3.2)8.48

      2.65
32.)84.80
    64
    208
    192
     160
     160
       0
```

COMPLETELY SOLVE PROBLEMS K THROUGH N USING STEPS (1), (2), AND (3) BELOW. REFER TO SAMPLE PROBLEMS 6 & 7, AS NEEDED. FOR MORE PRACTICE, SEE PAGES 84, 85, 92, & 93 OF CONTEMPORARY'S NUMBER POWER 2 WORK-TEXT.

   i. State what it is you are to find. Give your answer as a complete sentence.
  ii. Solve the problem, showing your work.
 iii. State the answer in a complete sentence.

K. One cubic foot of water weighs 62.5 pounds at standard temperature and pressure. How much does 6.12 cubic feet of water weigh under those same conditions?

L. One inch is equal to exactly 2.54 centimeters. How many inches are there in 54.61 centimeters?

M. Jessica makes $8.75 an hour. If her pay before taxes and deductions (known as gross pay) last week was $290.50, how many hours did she work?

N. If it costs 1.35¢ per hour to run a 100-watt light bulb, how much will it cost to run it for 12.8 hours?

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ANSWER KEY

SECTION I: REVIEW PROBLEMS

A1 & 2: See your teacher if you have any question that your sketches are right.

A3. $6^7/_{24}$ A4. $5^1/_{24}$ A5. $3^{13}/_{24}$ A6. $9^1/_{15}$

B1. 0.625   B2. $5.\overline{6}$ B3. $^7/_{125}$ B4. $12^{601}/_{2000}$

B5. twelve and three thousand five ten-thousandths   C. $14^1/_{10}$

D. $17^{11}/_{30}$ E. $6^{23}/_{31}$ F. $2^1/_{14}$ G. $2^7/_8$

H. $13^{103}/_{144}$ I1. 12,306.1   I2. 12,310   I3. 12,306.08

I4. 12,300   I5. 12,000   I6. 12,306.081

J. 5.599, 5.99, 5.9905, 50.008   K1. 0.63   K2. 5.875

K3. $13.458\overline{3}$ L1. $^{47}/_{5000}$ L2. $12,589^{451}/_{500}$ L3. $9^{10,959}/_{100,000}$

M1. $155^1/_8$ LB.   M2. Alice by $12^1/_8$ lb.   M3. $9^{135}/_{208}$ lb./hr.

N1. 8.1 cm   N2. 5.0 cm

SECTION II: ADDING & SUBTRACTING DECIMALS

A. 17.393   B. 1505.449   C. 92,875.6837   D. 48.46

E. 12,670.253   F. 12.515   G. 241.534   H. 40,373.577

I. 1.675   J. 10,307.797   K. 110.4 acres   L. 7.525 acres

M. 274.7 miles   N. 2.63675 mm

SECTION III: MULTIPLYING & DIVIDING DECIMALS

A. $50.80   B. 104.96   C. 2.57325   D. 52.4   E. 326.529

F. 7.106   G. 600   H. 4.05   I. 16.8   J. 20.392

K. 382.5 lbs.   L. 21.5 in.   M. 33.2 hr.   N. 17.28¢