Refresher Math Problem Set B3 – Mixed Decimal Operations

(Order of Operations and Introduction to Multi-Step Problem Solving)

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 and Problem Sets B1 and B2. 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 $^{9}/_{16}$. [A3:1 p1]
2. Use a sketch to represent the mixed number $3^{3}/_{10}$. [A3:2 p1]
3. Find the sum of $^{9}/_{16}$ and $3^{3}/_{10}$. [A3:2 p4]
4. Find the difference between $3^{3}/_{10}$ and $^{9}/_{16}$. [A3:2 p5]
5. Find the product of $3^{3}/_{10}$ and $^{9}/_{16}$. [A3:5]
6. Find the quotient of $3^{3}/_{10}$ divided by $^{9}/_{16}$. [A3:7]

B. Answer the following questions about decimals.

1. Convert $^{9}/_{16}$ to a decimal. [B1:5]
2. Convert $3^{3}/_{10}$ to a mixed decimal. [B1:7]
3. Convert eight hundredth to a fraction in lowest terms. [B1:6]
4. Convert 302.0508 to a mixed number in lowest terms. [B1:8]
5. Express 302.0508 in words. [B1:2]

C. Round 52,623.60897 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

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

D. $\begin{array}{r} 203.934 \\ +\ 85.053 \\ \hline \end{array}$

E. $\begin{array}{r} 63\frac{5}{12} \\ -\ 39\frac{13}{18} \\ \hline \end{array}$

F. $\begin{array}{r} 4,924.378 \\ -\ \ 710.153 \\ \hline \end{array}$

G. $2^{7}/_{9} \bullet {}^{15}/_{4} \bullet {}^{8}/_{25} =$

H. $7^{3}/_{8} \div 3^{7}/_{16} =$

I. $62.59 * 27

J. $17.095 + 42.8 + 9.7 =$

K. $3^{5}/_{8} - 1^{3}/_{4} =$

L. $^{5}/_{6} + 4^{3}/_{8} + 1^{7}/_{12}$

M. $130.51 \div 3.1$

N. $71.603 \bullet 2.55$

O. $13.845 \div 0.75$

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P. $27\frac{4}{15} - 17\frac{3}{5}$

Q.
$$\begin{array}{r} 5,397.34 \\ 659.077 \\ +\ 2,035.788 \\ \hline \end{array}$$

R. $58 - 19\frac{27}{100}$

S. $23.64(1{,}000)$

T. $8.35\overline{)1803.6}$

U. $(1.284)5.22$

V.
$$\begin{array}{r} 7.56 \\ -\ 3.573 \\ \hline \end{array}$$

W. $71\frac{7}{10} + 27\frac{2}{3}$

X.
$$\begin{array}{r} 576.2403 \\ -\ 381.0517 \\ \hline \end{array}$$

FOR PROBLEMS Y AND Z, COMPLETELY SOLVE ALL PARTS USING STEPS (*i*), (*ii*), AND (*iii*) BELOW.

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.

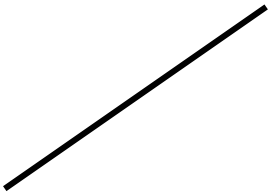
Y. Ellen is going to make muffins and cheesecake for the church supper. The muffin recipe uses $^3/_4$ cup of milk and makes 12 muffins and the cheesecake recipe serves 12 and calls for $1^1/_3$ cups of milk. She has a half-gallon (8 cups) on hand before she starts baking.

1. She wants to make 18 muffins, so she must multiply the recipe by $1^1/_2$. How many cups of milk does she need to make the muffins.
2. How many cups of milk does she need to make 18 muffins and one cheesecake?
3. How many cups of milk will she have left after making 18 muffins and one cheesecake?

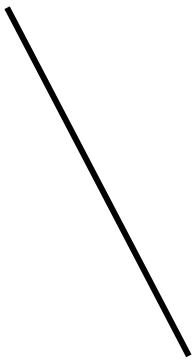
Z. Joey bought a 24-can case of cat food that was on sale for $7.99 (regular price $11.76) and a 7-pound bucket of dry cat food for $3.99 (regular price $5.99).

1. To the nearest cent, what was the cost per can of cat food while on sale?
2. If the tax on these items was 66¢, how much did Joey pay for the items he bought.
3. How much did he save on the case of cat food by buying it on sale?

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

1. 

2.

3. 

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II. Mixed Decimal Operations & the Order of Operations

Up to this point in the course we have dealt only with problems that involved one operation. (That is to say they have been all addition, all subtraction, all multiplication, or all division.) Unfortunately, most real-life problems involve more than one operation. For example, we may have to multiply then subtract or we may have to add then divide, and so on. Thus, we will now go over the rules for performing multiple operations within the same problem. These rules are known as the Order of Operations.

You should refer to the handout entitled "Order of Operations" as you work through the examples and practice problems. Don't let the "Advanced Examples" in the handout scare you – we will only deal with basic problems in this course, saving those involving exponents for later courses.

Sample Problem 1 with Solution

Simplify by performing the indicated operations using the proper Order of Operations.

a. $5 + 3 \bullet 2$

Solution: Following the Order of Operations, we ...

1. first multiply 3 times 2,
2. then add 5 to the result of our multiplication to get our final answer.

```
5 + 3 • 2 =
5 +   6   =
      11
```

b. $(5 + 3) \bullet 2$ [Compare to Problem (a).]

Solution: Following the Order of Operations, we ...

1. first add 5 and 3 since they are in parentheses,
2. then multiply the result of our addition by 2 to get our final answer.

```
(5 + 3) • 2 =
   8    • 2 =
      16
```

c. $28 - 12 \div 3 + 1$

Solution: Following the Order of Operations, we ...

1. first divide 12 by 3,
2. then subtract 4 from 28,
3. and finally, add 24 and 1 to get our final answer.

```
28 - 12 ÷ 3 + 1 =
28 -    4   + 1 =
    24      + 1 =
          25
```

d. $(28 - 12) \div (3 + 1)$ [Compare to Problem (c).]

Solution: Following the Order of Operations, we ...

1. do the operations inside the parentheses first,
2. then divide the resulting values to get our final answer.

```
(28 - 12) ÷ (3 + 1) =
   16     ÷    4    =
          4
```

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FOR PROBLEMS A THROUGH I, SIMPLIFY BY PERFORMING THE INDICATED OPERATIONS USING THE PROPER ORDER OF OPERATIONS. REFER TO SAMPLE PROBLEM 1 AND THE "ORDER OF OPERATIONS" HANDOUT, AS NEEDED. FOR MORE PRACTICE, SEE THE HANDOUT ENTITLED "SIMPLE ORDER OF OPERATIONS PRACTICE PROBLEMS".

A. $7 + 2 \bullet 6 =$ B. $(7 + 2)6 =$ C. $24 - 15 \div 3 =$

D. $(24 - 15) \div 3 =$ E. $3 + 5 - 4 * 2 =$ F. $3 + (5 - 4) * 2 =$

G. $6.4 \bullet 3.2 - 2.4 =$ H. $6.4(3.2 - 2.4) =$ I. $16.05 - 21.285 \div 3.3 =$

III. INTRODUCTION TO MULTI-STEP PROBLEM SOLVING

Now that we know how to simplify expressions involving mixed decimal operations we can use this skill to help solve multi-step word problems. Sample Problems 2 and 3 below demonstrate how to use mixed operation expressions and the Order of Operations to solve problems involving more than one step. We will continue to use the same three step approach that we have been using throughout the course to answer the questions.

SAMPLE PROBLEM 2 WITH SOLUTION

The Problem:

On his way home from work Paul stops at the local Qwik-Stop and buys three gallons of milk at $2.89 a gallon. If he pays for the milk with a twenty-dollar bill, how much change should he receive?

The Solution:

i. We are to find how much change Paul should get from the twenty-dollars he used to pay for the milk.

ii. We first need to figure out how much Paul will pay for the milk by multiplying the cost per gallon ($2.89) by the number of gallons (3). We then subtract this amount from the amount he gave the cashier ($20.00).

This process can be represented by the single expression **20.00 – 3 • 2.89**. The steps used to simplify this expression are shown in the box below.

(1) Write the expression needed to solve the problem.	`20.00 - 3 • 2.89 =`
(2) Multiply 3 and 2.89, as the Order of Operations says we should.	`20.00 - 8.67 =`
(3) Subtract 8.67 from 20.00, as the Order of Operations says we should.	`11.33 =`

iii. Paul should get $11.33 in change from the twenty-dollars he used to pay for the milk.

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SAMPLE PROBLEM 3 WITH SOLUTION

The Problem:

Sheri and her three business partners made profits of $2,563, $1,894, and $785 on the three jobs they completed last month. If they divide they divide the profits evenly, how much should each partner receive? Give your answer to the nearest dollar.

The Solution:

i. We are to find how much, to the nearest dollar, each partner is to get from last month's profits.

ii. We first need to figure out the total profits from last month by adding the profits from each job ($2,563, $1,894, and $785). We then divide this amount by the number of partners (4), rounding it to the nearest dollar.

This process can be represented by the single expression **(2563 + 1894 + 785) ÷ 4**. The steps used to simplify this expression are shown in the box below.

(1) Write the expression needed to solve the problem.	**(2563 + 1894 + 785) ÷ 4 =**
(2) Add the numbers in parentheses, as the Order of Operations says we should.	**5242 ÷ 4 =**
(3) Divide 5242 by 4.	**1310.5 ≈**
(4) Round this to the nearest dollar	**$1311**

iii. To the nearest dollar, each partner should get $1311 from last month's profits.

COMPLETELY SOLVE PROBLEMS A THROUGH E USING STEPS (*i*), (*ii*), AND (*iii*) BELOW. REFER TO SAMPLE PROBLEM 3, AS NEEDED. FOR MORE PRACTICE, SEE THE HANDOUT ENTITLED "SIMPLE MULTI-STEP DECIMAL WORD PROBLEM PRACTICE SHEET".

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.

A. Alice bought 4 cans of soup at 89¢ each. How much change should she receive if she pays for the soup with a ten-dollar bill?

B. After driving 236 miles it took 10.2 gallon's to fill the gas tank on Ralph's car. If the gas tank on Ralph's car holds a total of 15.9 gallons, how far could he drive on one tank of gas at this mileage? Round to the nearest tenth of a unit during your calculations.

C. Wilma bought six VCR tapes at $3.49 each and a gallon of milk for $2.89. If the sales tax came to $1.05, what was Wilma's total bill?

D. Harry uses a debit account to automatically pay for his car insurance and Internet access. His car insurance is $74.55 per month and his Internet access provider charges $21.95 per month. How much should Harry deposit to his debit account to cover these withdrawals for one year?

E. The balance in Jan's checking account was $245.86 before she deposited her bi-weekly pay of $725.63. She then wrote checks of $50.00 to each of her three children as Christmas gifts. What was Jan's new checking account balance?

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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. $3\frac{69}{80}$ A4. $2\frac{59}{80}$ A5. $1\frac{137}{160}$ A6. $5\frac{13}{15}$

B1. 0.5625 B2. 3.3 B3. $\frac{2}{25}$ B4. $302\frac{127}{2500}$

B5. three hundred two and five hundred eight ten-thousandths

C1. 52,623.6 C2. 52,620 C3. 52,623.61

C4. 52,600 C5. 53,000 C6. 52,623.609

D. 288.987 E. $23\frac{25}{36}$ F. 4,214.225 G. $3\frac{1}{3}$

H. $2\frac{8}{55}$ I. $1,689.93 J. 69.595 K. $1\frac{7}{8}$

L. $6\frac{19}{24}$ M. 42.1 N. 182.58765 O. 18.46

P. $9\frac{2}{3}$ Q. 8,092.205 R. $38\frac{73}{100}$ S. 23,640

T. 216 U. 6.70248 V. 3.987 W. $99\frac{11}{30}$

X. 195.1886 Y1. $1\frac{1}{8}$ cups Y2. $2\frac{11}{24}$ cups Y3. $5\frac{13}{24}$ cups

Z1. 33¢ Z2. $12.64 Z3. $3.77

AA1. 4.2 cm AA2. 1.8 cm AA3. 5.2 cm

SECTION II: MIXED DECIMAL OPERATIONS & THE ORDER OF OPERATIONS

A. 19 B. 54 C. 19 D. 3

E. 0 F. 5 G. 18.08 H. 5.12

I. 9.6

SECTION III: INTRODUCTION TO MULTI-STEP PROBLEM SOLVING

A. $6.44 B. 367.3 miles C. $24.88 D. $1158.00

E. $821.49