Refresher Math Problem Set C2 – Solving Percent Problems

(Finding What Percent One Number is of another, Finding a Number When a Percent of It Is Given)

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. Make sure you answer ALL parts of problems.
4. 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 Units A and B and Problem Set C1. 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.)

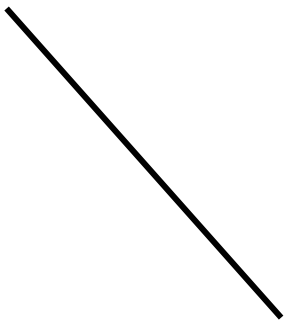
A. Answer the following questions about fractions and mixed numbers.

1. Use a sketch to represent the fraction $^{8}/_{12}$. [A3:1 p1]
2. Use a sketch to represent the mixed number $3^{4}/_{10}$. [A3:2 p1]
3. Reduce $^{8}/_{12}$ to lowest terms.
4. Reduce $3^{4}/_{10}$ to lowest terms.
5. Find the difference between $3^{4}/_{10}$ and $^{8}/_{12}$. [A3:2 p5]
6. Find the sum of $^{8}/_{12}$ and $3^{4}/_{10}$. [A3:2 p4]
7. Find the quotient of $3^{4}/_{10}$ divided by $^{8}/_{12}$. [A3:7]
8. Find the product of $3^{4}/_{10}$ and $^{8}/_{12}$. [A3:5]

B. Answer the following questions about decimals.

1. Convert $^{8}/_{12}$ to a decimal. [B1:5]
2. Convert $3^{4}/_{10}$ to a mixed decimal. [B1:7]
3. Convert five hundred eight ten-thousandths to a fraction in lowest terms. [B1:6]
4. Convert 657,843.148 to a mixed number in lowest terms. [B1:8]
5. Express 657,843.148 in words. [B1:2]
6. Round 657,843.148 to the indicated place values. [B1:3]
   a. nearest hundredth b. nearest ten thousand c. nearest tenth

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

1. 

2.

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D. Fill in the blanks of the fraction/decimal/percent equivalence table below. The first row is done for you, as an example.

Fraction	Decimal	Percent
7/8	0.875	87.5%
3/4		
	1.1	
		34.8%

E. [12] Simplify by performing the indicated operations. For fraction problems, give your answer as a proper fraction or mixed number in lowest terms.

1. $12.606 - 8.492 \div 2.2 =$
2. $4\,{}^{3}/_{8} + 2\,{}^{3}/_{4} \bullet {}^{4}/_{5} =$
3. $(12.606 - 8.492) \div 2.2 =$
4. $(4\,{}^{3}/_{8} + 2\,{}^{3}/_{4}) \bullet {}^{4}/_{5} =$

For Problems F through J, 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.

F. Gail has 21 coins, ${}^{3}/_{7}$ of which are quarters. How many quarters does Gail have?

G. After driving 322 miles it took 16.4 gallon's to fill the gas tank on Larry's truck. If the gas tank on Larry's truck holds a total of 19.2 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.

H. Mike needs three boards of lengths $13\,{}^{1}/_{4}$ inches, $15\,{}^{1}/_{2}$ inches, and $22\,{}^{7}/_{8}$ inches for a project he is working on. If he cuts the boards from one that is six feet long, what is the length of the remaining piece?

I. You buy five cans of soup at 69¢ each and a gallon of skim milk for $2.39. How much change should you get if you pay with a ten-dollar bill?

J. Use the Simple Interest Formula (***I = PRT***, where ***I*** = interest, ***P*** = principle, ***R*** = interest rate, and ***T*** = time) to answer the following.

Olif and Margaret invested $5000 for three years at an annual rate of 4.75% (simple interest). How much did they earn in interest?

II. Finding What Percent One Number Is of Another

When dealing with percent problems it is often helpful to use the proportion shown at the right. If we know any two of the three items (Part, Whole, or Percent) we can then use cross-multiplication to solve for the third. Sample Problems 1 (below) and 2 (in Section III: Finding a Number When a Percent Is Given) illustrate this approach to solving percent problems.

$$\frac{\text{Part}}{\text{Whole}} = \frac{\text{Percent}}{100}$$

or

$$\frac{P}{W} = \frac{\%}{100}$$

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SAMPLE PROBLEM 1 WITH SOLUTION

A. **Problem**: Twenty-four is what percent of sixty?

Solution:
1. Determine what is known about the Part, the Whole, and Percent.
2. Substitute the known information into the Percent Proportion ($\mathbf{{}^{P}/_{W} = {}^{\%}/_{100}}$).
3. Cross-Multiply.
4. Divide by the coefficient (number in front of) the unknown.

1. Part = 24, Whole = 60, Percent is unknown
2. $^{24}/_{60} = {}^{x}/_{100}$
3. $60 \bullet x = 24 \bullet 100$
   $60x = 2400$
4. $x = 40\%$

B. **Problem**: A stereo is on sale for $45 off the original price of $460. To the nearest tenth of a percent, what is the percent of the discount off the original price?

Solution:
1. Determine what is known about the Part, the Whole, and Percent.
2. Substitute the known information into the Percent Proportion ($\mathbf{{}^{P}/_{W} = {}^{\%}/_{100}}$).
3. Cross-Multiply.
4. Divide by the coefficient (number in front of) the unknown.
5. Round your answer to the nearest tenth of a percent.

1. Part = 45, Whole = 460, Percent is unknown
2. $^{45}/_{460} = {}^{x}/_{100}$
3. $460 \bullet x = 45 \bullet 100$
   $460x = 4500$
4. $x = 9.7826\%$
5. $x = 9.8\%$

A. Find the following, round your answers to the nearest tenth of a percent. Refer to Sample Problem 1A as needed. For more practice, see pages 110 and 111 of Contemporary's Number Power 2 work-text.

1. 15 is what percent of 25?
2. What percent of 96 is 14?
3. 120 is what percent of 310?
4. What percent of 8400 is 460?
5. 9000 is what percent of 5000?
6. What percent of 68 is 244?

B. Completely solve problems B1 through B4 using steps (*i*), (*ii*), and (*iii*) below. Refer to Sample Problem 1B on the previous page, as needed. For more practice, see pages 112–114 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.

1. In a class of 18 students there are 11 women. To the nearest hundredth of a percent, what percent of the class are women?

2. One year ago the population of Smalltown was 8,600. During the past year the population increased by 360. To the nearest tenth of a percent, the increase represents what percent of the population a year ago?
3. The Hendricks bought a used car for $8,500 last year. During the past year the value of the car decreased $1700. The decrease in value represents what percent of the original price?
4. On average, Jim spends $75 of his $525 weekly take-home on groceries. To the nearest tenth of a percent, what percent of his take-home pay does Jim spend on groceries?

III. FINDING A NUMBER WHEN A PERCENT OF IT IS GIVEN

SAMPLE PROBLEM 2 WITH SOLUTION

A. **Problem**: Sixty-five percent of what number is 52?

Solution:
1. Determine what is known about the Part, the Whole, and Percent.
2. Substitute the known information into the Percent Proportion ($\frac{P}{W} = \frac{\%}{100}$).
3. Cross-Multiply.
4. Divide by the coefficient (number in front of) the unknown.

1. Part = 52, Whole is unknown, Percent = 65
2. $\frac{52}{W} = \frac{65}{100}$
3. $65 \bullet W = 52 \bullet 100$
   $65W = 5200$
4. $W = 80$

B. **Problem**: Your bank requires a 15% down payment when purchasing a home. To the nearest thousand dollars, what is the most you could pay for a house if you have $11,000 to use as a down payment.

Solution:
1. Determine what is known about the Part, the Whole, and Percent.
2. Substitute the known information into the Percent Proportion ($\frac{P}{W} = \frac{\%}{100}$).
3. Cross-Multiply.
4. Divide by the coefficient (number in front of) the unknown.
5. Round to the nearest thousand dollars.

1. Part = 11,000, Whole is unknown, Percent = 15
2. $\frac{11{,}000}{W} = \frac{15}{100}$
3. $15 \bullet W = 11{,}000 \bullet 100$
   $15W = 1{,}100{,}000$
4. $W = \$73{,}333.33$
5. $W = \$73{,}000$

A. Find the following, round your answers to the nearest tenth of a unit. Refer to Sample Problem 2A on the previous page, as needed. For more practice, see pages 115 and 116 of Contemporary's Number Power 2 work-text.

1. 20% of what number is 90?
2. 350 is 85% of what number?
3. 145% of what number is 220?
4. 32.5% of what number is 12?
5. 10 is 200% of what number?
6. 65 is $33\frac{1}{3}$% of what number?

B. Completely solve problems B1 through B4 using steps (*i*), (*ii*), and (*iii*) below. Refer to Sample Problem 2B on the previous page, as needed. For more practice, see pages 117 and 118 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.

1. Ruth got 17 questions right on a test. If this is 85% of the questions, how many questions were on the test?
2. Drive-Away Auto requires 20% down on the purchase of a used car. If Jim has $1100 to use as a down payment, what is the most expensive car he could buy?
3. Lynn had to pay $450 in interest on a loan. If this is 9% of the total loan, how much was the loan?
4. Paul's weekly take-home pay is $348.46. If this is 82% of his gross pay, what is his gross pay?

IV. MIXED PERCENT PROBLEM PRACTICE

A. Find the following, round your answers to the nearest hundredth of a unit. Refer to Sample Problems 1A and 2A, as needed. For more practice, see page 119 of Contemporary's Number Power 2 work-text.

1. What is $12\frac{4}{5}\%$ of 130?
2. What percent of 95 is 75?
3. 1225 is what percent of 1500?
4. What number is 250% of 89?
5. 15.8% of what number is 43.7?
6. 6.5% of 85 is what number?

B. Completely solve problems B1 through B6 using steps (*i*), (*ii*), and (*iii*) below. Refer to Sample Problems 2A and 2B, as needed. For more practice, see page 120 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.

1. Maine sales tax is currently 5.5%. How much tax would you pay on a blouse costing $23.95?
2. Bill had to pay $262.50 on interest on a loan of $2500. The interest represents what percent of the loan?
3. On average, the Jones family spends 12% of their monthly income on groceries. If they typically spend $450 a months on groceries, what is their monthly income?
4. Paula got a 25-cent per hour raise in pay. To the nearest hundredth of a percent, what percent of her old pay is her raise if she was making $6.85 an hour before the raise?
5. A refrigerator that normally sells for $850 is on sale for $12\frac{1}{2}\%$ off. How much will you save if you buy the refrigerator while it is on sale?
6. Kurt has been dieting for three months. During that time he lost 16 pounds, which was $7\frac{1}{2}\%$ of his original weight. To the nearest pound, what was Kurt's original weight?

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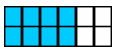
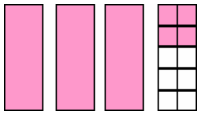
ANSWER KEY

SECTION I: REVIEW PROBLEMS

A1.  A2.  A3. $^{2}/_{3}$ A4. $3^{2}/_{5}$

A5. $2^{11}/_{15}$ A6. $4^{1}/_{15}$ A7. $5^{1}/_{10}$ A8. $2^{4}/_{15}$

B1. $0.\overline{6}$ B2. 3.4 B3. $^{127}/_{2,500}$ B4. $657{,}843^{37}/_{250}$

B5. six hundred fifty-seven thousand eight hundred forty-three and one hundred forty-eight thousandths B6a. 657,843.15 B6b. 660,000 B6c. 657,843.1

C1. 5.4 cm C2. 8.3 cm D.

Fraction	Decimal	Percent
7/8	**0.875**	**87.5%**
3/4	0.75	75.0%
11/10	**1.1**	110.0%
87/250	0.348	**34.8%**

E1. 8.746 E2. $6^{23}/_{40}$ E3. 1.87 E4. $5^{7}/_{10}$

F. 9 quarters G. 376.3 mi. H. $20^{3}/_{8}$ in. I. $4.16

J. I = $712.50

SECTION II: FINDING WHAT PERCENT ONE NUMBER IS OF ANOTHER

A1. 60% A2. 14.6% A3. 38.7% A4. 5.5%

A5. 180% A6. 358.8%

B1. 61.11% B2. 4.2% B3. 20% B4. 14.3%

SECTION III: FINDING A NUMBER WHEN A PERCENT OF IT IS GIVEN

A1. 450 A2. 411.8 A3. 151.7 A4. 36.9

A5. 5 A6. 195

B1. 20 B2. $5,500 B3. $5,000 B4. $424.95

SECTION IV: MIXED PERCENT PROBLEM PRACTICE

A1. 16.64 A2. 78.95% A3. 81.67% A4. 222.5

A5. 276.58 A6. 5.53

B1. $1.32 B2. 10.5% B3. $3,750 B4. 3.65%

B5. $106.25 B6. 213 lb.