



What Is This Module About?

Decimals are frequently used in measuring values and quantities—a wall 7.25 meters long, a runner reaching the finish line at 15.34 seconds, or a 1.5 liter soft drink bottle. Money is also expressed in decimal form (₱15.25, ₱20.10, ₱107.25). It is important then that we learn mathematical operations involving decimals.

This module will deal with the multiplication and division of decimals. Before studying this module, you should have read and studied the module “*Addition and Subtraction of Decimals.*”

This module is divided into two lessons:

Lesson 1 – *Multiplication of Decimals*

Lesson 2 – *Division of Decimals*



What Will You Learn From This Module?

After studying this module, you should be able to:

- ◆ multiply and divide decimals; and
- ◆ solve word problems involving multiplication and division of decimals.



Let's See What You Already Know

Before you start studying this module, answer these test items first to determine what you already know about this topic.

1. Find the product of 4.38 and 3.6.

2. Aling Ludy is an Overseas Filipino Worker. She sent \$175.50 to her husband in the Philippines. If her husband had the money converted to Philippine peso, and the peso-dollar exchange rate is ₱52.00, how much money in pesos did her husband receive?

3. Divide 30.855 by 3.74.

4. Mang Pandoy cleans bottles for a local junkshop for ₱.75 each. How many bottles must he clean to earn ₱1,871.25?

Compare your answers with those in the *Answer Key* on pages 42 and 43.

Well, how was it? Were you able to answer all the questions correctly? If you did, then that's very good! This shows that you already know much about the topic. You may still study the module to review what you already know. Who knows, you might learn a few more new things as well.

If you got a low score, don't feel bad. That means this module is meant for you! It will help you understand important concepts that you can apply in your daily life. If you study this module carefully, you will learn the answers to the items in the test and a lot more! Are you ready?

You may now go to the next page and begin Lesson 1.

Multiplication of Decimals

Suppose you are in a store and you want to buy a box of pencils. If a pencil costs ₱ 11.25, how much will a box of pencils cost if it contains 12 pencils? We may come across this and other problems involving decimals in our everyday lives. They involve multiplication of decimals. It is important then that we learn how to multiply decimals.

After studying this lesson, you should be able to:

- ◆ multiply decimals; and
- ◆ solve word problems involving multiplication of decimals.



Let's Study and Analyze

Decimals are multiplied the same way whole numbers are. The only difference is that decimals have a decimal point while whole numbers don't. Take note also that the decimal point has its correct place in the product, the answer in multiplication.

Let's study and analyze the following examples to help you understand the process of multiplication of decimals.

EXAMPLE 1

A. What is the product of .7 and .8?

$$\begin{array}{r} \times \quad .7 \\ \quad .8 \\ \hline \end{array} \begin{array}{l} \longrightarrow \text{multiplicand} \\ \longrightarrow \text{multiplier} \end{array} \left. \vphantom{\begin{array}{r} \times \quad .7 \\ \quad .8 \\ \hline \end{array}} \right\} \text{or factors}$$

To illustrate to you how to arrive at the correct place of the decimal point in the product let's convert the factors into their fraction form. So we have:

$$\begin{array}{r} \times \quad .7 \\ \quad .8 \\ \hline \end{array} \left. \vphantom{\begin{array}{r} \times \quad .7 \\ \quad .8 \\ \hline \end{array}} \right\} \longrightarrow \frac{7}{10} \times \frac{8}{10} = \frac{56}{100} \text{ in decimal form is } .56$$

This time, let's multiply the factors:

◆
$$\begin{array}{r} .7 \\ \times .8 \\ \hline .56 \end{array}$$

— 1 decimal place
— 1 decimal place
— 2 decimal places

Place the decimal point by counting the decimal places from the first digit on the right going to the left.

B. Find the product of .25 and .6. Let's follow the illustration in Example A.

◆
$$\begin{array}{r} .25 \\ \times .6 \\ \hline \end{array} \rightarrow \frac{25}{100} \times \frac{6}{10} = \frac{150}{1000} \text{ in decimal form is } .150$$

◆
$$\begin{array}{r} .25 \\ \times .6 \\ \hline 150 \end{array}$$

Multiply: $6 \times 5 = 30$. Write 0 below the column of 6 and 5. Regroup 3 above digit 2 in the multiplicand.

Multiply: $6 \times 2 = 12$, add 3 that was regrouped: $12 + 3 = 15$. Write 15 to the left of 0 in the product.

◆
$$\begin{array}{r} .25 \\ \times .6 \\ \hline .150 \end{array}$$

— 2 decimal places
— 1 decimal place
— 3 decimal places

Put the decimal point 3 places from the right.

Notice in Examples 1A and B that the number of decimal places in the product is the same as the sum of the decimal places of the factors.

decimal place(s) sa PRODUCT	=	decimal place(s) sa FACTOR 1	+	decimal place(s) sa FACTOR 2
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EXAMPLE 2

Find the product of 3.7 and 1.68.

STEP 1 Write the multiplicand and multiplier (factors) in column with the first digits on the right aligned. (Note: Choose the number with less number of digits to be the multiplier for easier computation, in this case, 3.7.)

$$\begin{array}{r} 1.68 \\ \times 3.7 \\ \hline \end{array}$$

STEP 2 Compute for the first partial product using the multiplier 7.

$$\begin{array}{r} 4 \\ 1.68 \\ \times \underline{3.7} \\ \hline 1176 \end{array}$$

Multiply: $7 \times 8 = 56$. Write 6 below the column of 7 and 8 and regroup 5 above 6 in the multiplicand.

Multiply: $7 \times 6 = 42$, add 5 that was regrouped: $42 + 5 = 47$. Write 7 below the column of 6 in the multiplicand. Regroup 4 above 1 in the multiplicand.

Multiply: $7 \times 1 = 7$, add 4 that was regrouped: $7 + 4 = 11$. Write 11 to the left of 76 in the first partial product.

Therefore, 1176 is the first partial product.

STEP 3 Compute for the second partial product using the multiplier 3.

$$\begin{array}{r} 2 \\ 4 \\ 1.68 \\ \times \underline{3.7} \\ \hline 1176 \\ 504 \end{array}$$

Multiply: $3 \times 8 = 24$. Write 4 below the column of the multiplier 3. Regroup 2 above the digit 6 in the multiplicand.

Multiply: $3 \times 6 = 18$, add 2 that was regrouped: $18 + 2 = 20$. Write 0 below the digit 1 beside 7 in the first partial product. Regroup 2 above the digit 1 in the multiplicand.

Multiply: $3 \times 1 = 3$, add 2 that was regrouped: $3 + 2 = 5$. Write 5 below the other digit 1 in the first partial product.

Therefore, 504 is the second partial product.

STEP 4 Add the first and second partial products to get the final product.

$$\begin{array}{r}
 22 \\
 45 \\
 1.68 \\
 \times \underline{3.7} \\
 \hline
 1176 \\
 504 \\
 \hline
 6216
 \end{array}$$

Bring down 6 and write it in the same column.

Add: $7 + 4 = 11$. Write 1 below the column of 7 and 4. Regroup 1 in the hundreds place of the first partial product.

Add: $1 + 1 + 0 = 2$. Write 2 below the column of 1 and 0.

Add: $1 + 5 = 6$. Write 6 below the column of 1 and 5.

STEP 5 Put the decimal point in its proper place by counting the total number of decimal places of the factors starting from the first digit on the right going to the left.

$$\begin{array}{r}
 22 \\
 45 \\
 1.68 \text{ ——— 2 decimal places} \\
 \times \underline{3.7} \text{ ——— 1 decimal place} \\
 \hline
 1176 \\
 504 \\
 \hline
 6.216 \text{ ——— 3 decimal places}
 \end{array}$$

Put the decimal point three places from the right in the final product.

Therefore, the product of 3.7 and 1.68 is 6.216.

EXAMPLE 3

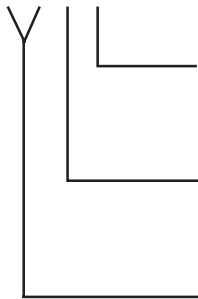
What is the product of 235 and .146?

STEP 1 Write the factors in column with the first digits on the right aligned. (Note: Since the numbers to be multiplied are both three-digit numbers, either of them can be used as multiplier, with the other becoming the multiplicand.)

$$\begin{array}{r}
 235 \\
 \times \underline{.146}
 \end{array}
 \quad \text{or} \quad
 \begin{array}{r}
 .146 \\
 \times \underline{235}
 \end{array}$$

STEP 2 Compute for the first partial product using the multiplier 6.

$$\begin{array}{r}
 23 \\
 235 \\
 \times .146 \\
 \hline
 1410
 \end{array}$$



Multiply: $6 \times 5 = 30$. Write 0 below the column of 6 and 5. Regroup 3 above the digit 3 in the multiplicand.

Multiply: $6 \times 3 = 18$, add 3 that was regrouped: $18 + 3 = 21$. Write 1 below the column of the digit 3 in the multiplicand. Regroup 2 above the digit 2 in the multiplicand.

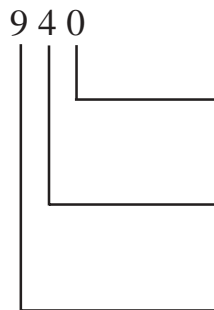
Multiply: $6 \times 2 = 12$, add 2 that was regrouped: $12 + 2 = 14$. Write 14 to the left of 10 in the first partial product.

Therefore, 1410 is the first partial product.

STEP 3 Compute for the second partial product using the multiplier 4.

$$\begin{array}{r}
 12 \\
 23 \\
 235 \\
 \times .146 \\
 \hline
 1410
 \end{array}$$

1410 — first partial product



Multiply: $4 \times 5 = 20$. Write 0 below the column of the multiplier 4. Regroup 2 above the digit 3 in the multiplicand.

Multiply: $4 \times 3 = 12$, add 2 that was regrouped: $12 + 2 = 14$. Write 4 to the left of 0 in the second partial product. Regroup 1 above the digit 2 in the multiplicand.

Multiply: $4 \times 2 = 8$, add 1 that was regrouped: $8 + 1 = 9$. Write 9 to the left of 40 in the second partial product.

Therefore, 940 is the second partial product.

STEP 4 Compute for the third partial product using the multiplier 1.

$$\begin{array}{r}
 12 \\
 23 \\
 235 \\
 \times .146 \\
 \hline
 1410 \quad \leftarrow \text{first partial product} \\
 940 \quad \leftarrow \text{second partial product} \\
 235
 \end{array}$$

- Multiply: $1 \times 5 = 5$. Write 5 below the column of digit 1 in the multiplier.
- Multiply: $1 \times 3 = 3$. Write 3 on the left of digit 1 in the third partial product.
- Multiply: $1 \times 2 = 2$. Write 2 on the left of 31 in the third partial product.

Therefore, 231 is the third partial product.

STEP 5 Add the first, second, and third partial products to get the final product.

$$\begin{array}{r}
 12 \\
 23 \\
 235 \\
 \times .146 \\
 \hline
 1410 \quad \leftarrow \text{first partial product} \\
 940 \quad \leftarrow \text{second partial product} \\
 235 \quad \leftarrow \text{third partial product} \\
 \hline
 34310
 \end{array}$$

- Bring down 0 and write it in the same column.
- Add: $1 + 0 = 1$. Write 1 below the column of the addends.
- Add: $4 + 4 + 5 = 13$. Write 3 below the column of the addends. Carry 1 to the column of digit 1 or the left in the partial product.
- Add: $1 + 1 + 9 + 3 = 14$. Write 4 below the column of the addends and carry 1 above the digit 2 in the third partial product.
- Add: $1 + 2 = 3$. Write 3 below the column of the addends.

Notice that 1 multiplied by any number is the same number.

STEP 6 Put the decimal point in its proper place by counting the number of decimal places in the multiplier starting from the first digit on the right going to the left.

$$\begin{array}{r}
 12 \\
 23 \\
 235 \\
 \times .146 \quad \leftarrow 3 \text{ decimal places} \\
 \hline
 1410 \\
 940 \\
 235 \\
 \hline
 34.310 \\
 \leftarrow \leftarrow \leftarrow \\
 \text{Put the decimal point three places from the right in the final product.}
 \end{array}$$

Therefore, the product of 235 and .146 is 34.310.

Take note in Examples 2 and 3 that the number of digits in the multiplier is also the same number of partial products. In Example 2, the two-digit multiplier has the first and second partial products. Similarly, in Example 3, the three-digit multiplier has the first, second, and third partial products.

Notice also in Example 1 that the computed product of one-digit multiplier is the final product; there are no partial products.

Let's also study and analyze the following examples with a zero in the multiplier.

EXAMPLE 4

What is the product of 386 and 1.50.

STEP 1 Write the factors with the first digits on the right aligned.

$$\begin{array}{r}
 386 \\
 \times 1.50 \\
 \hline
 \end{array}$$

STEP 2 Use the multiplier 0.

$$\begin{array}{r}
 386 \\
 \times 1.50 \\
 \hline
 000
 \end{array}$$

Multiply: $0 \times 6 = 0$. Write 0 below the column of 0 and 6.
 Multiply: $0 \times 8 = 0$. Write 0 below the column of the digit 8 in the multiplicand.
 Multiply: $0 \times 3 = 0$. Write 0 below the column of the digit 3 in the multiplicand.

Notice that the first partial product is all zeros because 0 multiplied by any number is 0.

Notice also in the first three examples that the partial products are added to get the final product. Since when 0 is added to any number, the sum is the same number. This means that 0 added to any number does not change the value of that number. Therefore, in our example, we can drop the two zeros on the left and retain the first 0 on the right. This 0 will be part of the first partial product. So we have:

$$\begin{array}{r}
 386 \\
 \times 1.50 \\
 \hline
 0
 \end{array}$$

Multiply: $0 \times 6 = 0$. We stop here and move on to the next multiplier, 5.

STEP 3 Compute for the first partial product using the multiplier 5.

$$\begin{array}{r}
 43 \\
 386 \\
 \times 1.50 \\
 \hline
 19300
 \end{array}$$

Multiply: $5 \times 6 = 30$. Write 0 below the column of the digit 5 in the multiplier. Regroup 3 above the digit 8 in the multiplicand.
 Multiply: $5 \times 8 = 40$, add 3 that was regrouped: $40 + 3 = 43$. Write 3 below the column of digits 3 and 1. Regroup 4 above digit 3 in the multiplicand.
 Multiply: $5 \times 3 = 15$, add 4 that was regrouped: $15 + 4 = 19$. Write 19 to the left of digit 3 in the first partial product.

Therefore, the first partial product is 19300.

STEP 4 Compute for the second partial product using the multiplier 1.

$$\begin{array}{r}
 43 \\
 386 \\
 \times 1.50 \\
 \hline
 19300 \\
 386
 \end{array}$$

We have learned that any number multiplied by 1 is the number itself. So, why bother to multiply them individually? You can just write down the multiplicand as the second partial product.

STEP 5 Add the partial products to get the final product.

$$\begin{array}{r}
 43 \\
 386 \\
 \times 1.50 \\
 \hline
 19300 \\
 386 \\
 \hline
 57900
 \end{array}$$

Bring down the two zeros and write them below their same column.

Add: $3 + 6 = 9$. Write below the addends.

Add: $9 + 8 = 17$. Write 7 below the addends and regroup 1 above the digit 1 in the first partial product.

Add: $1 + 1 + 3 = 5$. Write 5 below the addends.

STEP 6 Put the decimal point in its proper place by counting the number of decimal places in the multiplier starting with the first digit going to the left.

$$\begin{array}{r}
 43 \\
 386 \\
 \times 1.50 \quad \leftarrow 2 \text{ decimal places} \\
 \hline
 19300 \\
 386 \\
 \hline
 57900
 \end{array}$$

Put the decimal point two places from the right.

EXAMPLE 5

What is 5.28 multiplied by 2.07?

STEP 1 Write the multiplicand and the multiplier in column with the first digit on the right aligned.

$$\begin{array}{r} 5.2\overset{!}{8} \\ \times 2.0\overset{!}{7} \\ \hline \end{array}$$

STEP 2 Compute for the first partial product using the multiplier 7.

$$\begin{array}{r} 1\ 5 \\ 5.2\ 8 \\ \times 2.0\ 7 \\ \hline 3\ 6\ 9\ 6 \end{array}$$

Multiply: $7 \times 8 = 56$. Write 6 below the column of 7 and 8. Regroup 5 above digit 2 in the multiplicand.

Multiply: $7 \times 2 = 14$, add 5 that was carried over: $14 + 5 = 19$. Write 9 below the column of digit 2 in the multiplicand. Regroup 1 above the digit 5 in the multiplicand.

Multiply: $7 \times 5 = 35$, add 1 that was carried over $35 + 1 = 36$. Write 36 on the left of 96 in the first partial product.

STEP 3 Compute for the second partial product using the multiplier 0 first and then multiplier 2.

$$\begin{array}{r} 1 \\ 1\ 5 \\ 5.2\ 8 \\ \times 2.0\ 7 \\ \hline 3\ 6\ 9\ 6 \\ 1\ 0\ 5\ 6\ 0 \end{array}$$

Multiply: $0 \times 8 = 0$. Write 0 below the column of the digit 0 in the multiplier. Move on to the next multiplier: 2.

Multiply: $2 \times 8 = 16$. Write 6 below the column of digit 2 in the multiplier. Regroup 1 above the digit 2 in the multiplicand.

Multiply: $2 \times 2 = 4$, add 1 that was regrouped: $4 + 1 = 5$. Write 5 below the digit 3 in the first partial product.

Multiply: $2 \times 5 = 10$. Write 10 on the left of 56 in the second partial product.

STEP 4 Add the first and second partial products to get the final product.

$$\begin{array}{r}
 1 \\
 1.5 \\
 5.28 \\
 \times 2.07 \\
 \hline
 3696 \quad \leftarrow \text{first partial product} \\
 10560 \quad \leftarrow \text{second partial product} \\
 \hline
 109296
 \end{array}$$

Bring down 6 in the same column.
 Add: $9 + 0 = 9$. Write 9 below the column of the addends.
 Add: $6 + 6 = 12$. Write 2 below the column of the addends. Regroup 1 above digit 3 in the first partial product.
 Add: $1 + 3 + 5 = 9$. Write 9 below the addends.
 Bring down 10 in the same column.

STEP 5 Put the decimal point in its proper place by counting the total number of decimal places of the factors starting from the first digit on the right going to the left.

$$\begin{array}{r}
 1 \\
 1.5 \quad \leftarrow 2 \text{ decimal places} \\
 5.28 \quad \leftarrow 2 \text{ decimal places} \\
 \times 2.07 \\
 \hline
 3696 \\
 10560 \\
 \hline
 10.9296
 \end{array}$$

Put the decimal point 4 places from the right.

Notice in Examples 4 and 5 that we have only the first and second partial products even if we used three-digit multipliers. Why? The reason is that the product of 0 multiplied only by the first digit on the right in the multiplicand is part of either the first or second partial product depending on its position in the multiplier. If the 0 is the first digit on the right of the multiplier, like 1.50 its product is part of the first partial product. If the 0 is the second digit from the right in the multiplier, like 2.07, its product is part of the second partial product.



Let's Try This

Try working on your own and do the following:

1. Find the product of 4.7 and 2.9 using the step by step process.

STEP 1 Write the multiplicand and multiplier in column form with the first digit on the right aligned. (Note: Since the numbers to be multiplied are both two-digit numbers either of them can be a multiplier or multiplicand.)

STEP 2 Compute for the first partial product using the multiplier

_____.

STEP 3 Compute for the second partial product using the multiplier

_____.

STEP 4 Add the first and second partial products to get the final product.

STEP 5 After computing the final product, put the decimal point in its proper place.

2. Let's compute together $3.45 \times 2.1 = \boxed{}$ following the step by step process without necessarily showing the direction of the process itself – just your solution.

$$\begin{array}{r} 3.45 \leftarrow \text{multiplicand} \\ \times 2.1 \leftarrow \text{multiplier} \\ \hline .345 \leftarrow \text{first partial product} \\ 690 \leftarrow \text{second partial product} \\ \hline 7.245 \leftarrow \text{final product} \end{array}$$

Try solving the following on your own using the short method – the same way we computed item number 2 above.

3. Solve for the product of 23.75 and 2.5.

4. Find the product of 3.75 and 12.5

Compare your answers and solution with those in the *Answer Key* on pages 44–45.



Let's Solve This Problem

Your knowledge and skill in multiplying decimals are very useful in solving problems involving money. We do a lot of computations involving money in our day to day activities.

Now we are ready to move on to solving word problems involving money. You are now going to apply your knowledge on multiplication of decimals. Remember money values are expressed in decimals.

EXAMPLE 1 Aling Beth wrote her husband a letter. Her husband is an Overseas Filipino Worker in the U.S. Aling Beth's letter weighed 6 grams. How much would it cost her to mail the letter if she is charged ₱9.75 per gram?



Steps in Problem-solving:

STEP 1 Write the given information.

- a. 6 grams – weight of Beth's letter
- b. ₱9.75 – cost per gram of mail to the U.S.

STEP 2 Determine what is asked.

How much will it cost Beth to mail her letter to the U.S.?

STEP 3 Identify the operation to be used.

Multiplication

STEP 4 Write the number sentence to solve the problem.

$$\text{P } 9.75 \times 6 = \underline{\hspace{4cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r} 43 \\ \text{P } 9.75 \\ \times \quad 6 \\ \hline \text{P}58.50 \end{array}$$

Aling Beth has to pay P58.50 to mail her letter.

EXAMPLE 2 Mother bought $3 \frac{1}{2}$ kilos of mangoes at P 48.65 per kilo. How much did she pay for the mangoes?

Steps in Problem-solving.

STEP 1 Write the given information.

- a. $3 \frac{1}{2}$ kilos of mangoes mother bought
- b. P 48.65 price per kilo of mangoes

STEP 2 Determine what is asked.

How much is the cost of $3 \frac{1}{2}$ kilos of mangoes?

STEP 3 Identify the operation to be used.

Multiplication

STEP 4 Convert $3 \frac{1}{2}$ kilos to decimals. Do you remember the decimal form of $\frac{1}{2}$? Yes, that's .5. Therefore, $3 \frac{1}{2}$ in decimal is 3.5.

STEP 5 Write the number sentence to solve the problem.

$$\text{P } 48.65 \times 3.5 = \underline{\hspace{4cm}}$$

STEP 6 Solve for the answer.

$$\begin{array}{r} 211 \\ 432 \\ \text{P } 48.65 \\ \times \quad 3.5 \\ \hline 124325 \\ 14595 \\ \hline \text{P } 170.275 \text{ or P } 170.30 \end{array}$$

Mother paid P 170.30 for the $3 \frac{1}{2}$ kilos of mangoes.



Let's Try This

Solve the following word problems.

1. Mario is measuring the length of the rolls of cloth he wants to use in his tailoring shop. If a roll of cloth measures 16.405 meters, how many meters of cloth does he have if there are 5 rolls of cloth?

2. Rosalie spends ₦ 25.65 daily for her snack in the factory where she works. If she spends the same amount for 14 days, how much will she have spent?

Compare your answers with those in the *Answer Key* on pages 45–46.



Let's Remember

- ◆ Decimals are multiplied just like whole numbers; the only difference is that decimals have a decimal point while whole numbers don't.
- ◆ In multiplication, the answer is called the product. The multiplicand is the number to be multiplied by another and the multiplier is the number by which the multiplicand is multiplied. The multiplicand and the multiplier are called factors.

- ◆ The number of decimal places in the product is the same as the sum of the decimal places of the factors.
- ◆ The position of the decimal point in the product is determined by counting the total number of decimal places starting from the first digit on the right going to the left.
- ◆ The number of digits in the multiplier determines the number of partial products. If there is a 0 in the multiplier, its product becomes part of the partial product of the digit that follows it.
- ◆ In a one-digit multiplier, the computed product is the final product.
- ◆ In solving word problems involving multiplication of decimals, the steps to follow are:
 - STEP 1** Write the given information.
 - STEP 2** Determine what is asked.
 - STEP 3** Identify the operation to be used.
 - STEP 4** Write the number sentence to solve the problem.
 - STEP 5** Solve for the answer.



Let's See What You Have Learned

At last, you have come to the last part of the lesson. All you have to do now is take a test. Let's see if you can apply what you have learned to some everyday situations. Good luck!

1. Mang Anding's wife is an Overseas Filipino Worker. One day, his wife sent them \$ 150. If Mang Anding had the money converted to Philippine peso, and the dollar-peso exchange rate is ₱ 48.95, how much money in pesos did Mang Anding receive? (5 points)

2. Mang Jepoy is a construction worker. He worked for 28 days on a road construction project. If the minimum wage per day is ₱ 211.75, how much will Mang Jepoy get for the 28 days he worked? (5 points)

3. Aling Judy plans to store drinking water in 1.5 liter plastic bottles. If she was able to fill 17 plastic bottles with water, how many liters of water did she store? (5 points)

4. The circumference of the track and field oval is 400.75 meters. If a runner circles the oval 8 times, what is the total distance the runner has traveled? (5 points)

Compare your answers with those in the *Answer Key* on pages 46–48.

If your test score is from:

16–20 Excellent! You have understood the lesson well.

11–15 Review the parts of the lesson which you did not understand.

0–10 You should study the whole lesson again.

If you have understood the lesson well, you may now go to the next lesson.

Division of Decimals

We have so far learned about multiplication of decimals and how this skill can help us in solving some everyday problems. Now we move on to learning about division of decimals.

Learning this skill is important because division is used in many daily problems, like finding the average of your school grades or finding the average speed of a vehicle or dividing money to equal parts.

After studying this lesson, you should be able to:

- ◆ divide decimals; and
- ◆ solve word problems involving decimals.



Let's Study and Analyze

The different parts of a division sentence are the following:

$$\begin{array}{c} \text{divisor} \longrightarrow 5 \overline{)10} \longleftarrow \text{dividend} \\ \phantom{5 \overline{)10}} 2 \longleftarrow \text{quotient} \end{array}$$

The **dividend** is the number to be divided. The **divisor** tells you into how many parts the dividend is to be divided. The answer in division is called the **quotient**.

EXAMPLE 1 Dividing decimals by whole number.

a. $143.60 \div 4$

STEP 1 Divide the hundreds.

$$4 \overline{)143.60}$$

- ◆ $1 \div 4$, this is not possible because we cannot have a fraction when we divide using this method. So, we include the tens digit.

STEP 2 Divide the hundreds and tens.

$$\begin{array}{r} \times 3 \\ 4 \overline{)143.60} \\ - 12 \\ \hline 2 \end{array}$$

- ◆ $14 \div 4 = 3$. Write 3 above the digit 4 in the dividend.
- ◆ $3 \times 4 = 12$. Write 12 below 14. Draw a line below 12. Subtract: $14 - 12 = 2$. Write 2 below the column of 4 in the dividend.

STEP 3 Divide the ones.

$$\begin{array}{r} \times 35 \\ 4 \overline{)143.60} \\ - 12 \\ \hline 23 \\ - 20 \\ \hline 3 \end{array}$$

- ◆ Bring down 3 from the dividend. Divide $23 \div 4 = 5$. Write 5 above digit 3 in the dividend.
- ◆ Multiply: $5 \times 4 = 20$. Write 20 below 23. Draw a line below 20 and subtract: $23 - 20 = 3$. Write 3 below the column of 3 and 0.

STEP 4 Divide the tenths.

$$\begin{array}{r} \times 35.90 \\ 4 \overline{)143.60} \\ - 12 \\ \hline 23 \\ - 20 \\ \hline 36 \\ 36 \\ \hline 0 \end{array}$$

- ◆ Put the decimal point in the same column as the decimal point in the dividend.
- ◆ Bring down 6. Divide: $36 \div 4 = 9$. Write 9 above digit 6 in the dividend.
- ◆ Multiply: $9 \times 4 = 36$. Write 36 below 36. Draw a line and subtract $36 - 36 = 0$. Write 0 below the column of 6.
- ◆ Divide: $0 \div 4 = 0$. Write 0 above the digit 0 in the dividend.

b. $5.075 \div 25$

STEP 1 Divide the ones.

$$25 \overline{)5.075}$$

- ◆ Divide: $5 \div 25$, this is not possible again. So, include the tenths.

STEP 2 Divide the ones and tenths.

$$\begin{array}{r} \times \\ 1 \quad 25 \overline{) 5.075} \\ \underline{- 50} \end{array}$$

- ◆ Put the decimal point in same column as the decimal point in the dividend
- ◆ Divide: $50 \div 25 = 2$. Write 2 above digit 0 in the dividend.
- ◆ Multiply: quotient 2×5 (in the divisor) = 10. Write 0 below 0 in the dividend and regroup 1 above digit 2 in the divisor.
- ◆ Multiply: quotient 2×2 (in the divisor) = 4, add 1 that was regrouped: $4 + 1 = 5$. Write 5 below digit 5 in the dividend.
- ◆ Draw a line below 50. Subtract $50 - 50 = 0$. No need to write 0 below the line.

STEP 3 Divide the hundredths.

$$\begin{array}{r} \times \\ 25 \overline{) 5.075} \\ \underline{- 50} \\ 7 \end{array}$$

- ◆ Bring down 7. Divide: $7 \div 25$ is not possible using this method. Write 0 above digit 7 in the dividend. So, include the thousandths.

STEP 4 Divide the thousandths.

$$\begin{array}{r} \times \\ 1 \quad 25 \overline{) 5.075} \\ \underline{- 50} \\ 75 \\ \underline{- 75} \\ 0 \end{array}$$

- ◆ Bring down 5. Divide $75 \div 25 = 3$. Write 3 above digit 5 in the dividend.
- ◆ Multiply: quotient 3×5 (in the divisor) = 15. Write 5 below digit 5 below the line. Regroup 1 above digit 2 in the divisor.
- ◆ Multiply: quotient 3×2 (in the divisor) = 6, add 1 that was regrouped: $6 + 1 = 7$. Write 7 to the left of 5.
- ◆ Draw a line below 75. Subtract: $75 - 75 = 0$. Write 0 below the line.

The quotient is .203.

Notice in Examples 1 A & B that if the first digit in the dividend is less than the divisor, include the digit to its right and proceed with the division steps.

EXAMPLE 1 Dividing decimals by decimals

a. Divide 19.44 by .4

STEP 1 Convert the divisor into a whole number by multiplying both the divisor and dividend by 10.

$$\begin{array}{r} .4 \\ \times 10 \\ \hline 4.0 \end{array} \qquad \begin{array}{r} 19.44 \\ \times 10 \\ \hline 194.40 \end{array}$$

$$4 \overline{)194.4}$$

◆ Notice that the decimal point was moved one place to the right.

STEP 2 Divide the hundreds.

◆ Divide: $1 \div 4$. This is not possible because the dividend is less than the divisor. Include the tens.

STEP 3 Divide the hundreds and tens.

$$4 \overline{)194.4}$$

$$\begin{array}{r} 4 \\ 4 \overline{)194.4} \\ - 16 \\ \hline 3 \end{array}$$

◆ Divide: $19 \div 4 = 4$. Write 4 above digit 9 in the dividend.

◆ Multiply: quotient 4×4 (divisor) = 16. Write 16 below 19. Draw a line below 16.

◆ Subtract: $19 - 16 = 3$. Write 3 below the column of 9 and 6.

STEP 4 Divide the ones.

$$\begin{array}{r} 48. \\ 4 \overline{)194.4} \\ - 16 \\ \hline 34 \\ 32 \\ \hline 2 \end{array}$$

◆ Bring down 4 (ones). Divide: $34 \div 4 = 8$. Write 8 above digit 4 in the dividend.

◆ Multiply: quotient 8×4 (divisor) = 32. Write 32 below 34. Draw a line.

◆ Subtract: $34 - 32 = 2$. Write 2 below the column of 4 and 2 below the line.

◆ Put the decimal point in the quotient in same column as the decimal point in the dividend.

STEP 5 Divide the tenths.

$$\begin{array}{r} 48.6 \\ 4 \overline{)194.4} \\ \underline{16} \\ 34 \\ \underline{32} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

- ◆ Bring down 4 (tenths). Divide: $24 \div 4 = 6$. Write 6 above digit 4 in the dividend.
- ◆ Multiply: quotient 6×4 (divisor) = 24. Write 24 below 24. Draw a line and subtract: $24 - 24 = 0$. Write 0 below the column of 4 and 4 below the line.

The quotient is 48.6.

b. Divide 4.984 by .14

STEP 1 Convert the divisor into a whole number by multiplying both the divisor and dividend by 100.

$$\begin{array}{r} .14 \\ \times 100 \\ \hline 14.00 \end{array} \qquad \begin{array}{r} 4.984 \\ \times 100 \\ \hline 498.400 \end{array}$$

$$14 \overline{)498.4}$$

- ◆ Notice again that the decimal point was moved 2 places to the right.

STEP 2 Divide the hundreds. Since 4 is less than the divisor, include the next digit, 9.

STEP 3 Divide the hundreds and tens.

$$\begin{array}{r} 3 \\ 14 \overline{)498.4} \\ \underline{42} \\ 7 \end{array}$$

- ◆ Divide: $49 \div 14 = 3$. Write 3 above digit 9 in the dividend.
- ◆ Multiply: quotient 3×14 in the divisor = 42. Write 2 below digit 9. Regroup 1 above digit 1 in the divisor. Multiply: quotient 3×1 in the divisor = 3, add 1 that was regrouped: $3 + 1 = 4$. Write 4 below 4. Draw a line below 42.
- ◆ Subtract: $49 - 42 = 7$. Write 7 below the column of 9 and 2.

STEP 4 Divide the ones.

$$\begin{array}{r} 2 \\ - 42 \\ \hline 78 \\ - 70 \\ \hline 8 \end{array}$$

- ◆ Bring down 8. Divide $78 \div 14 = 5$. Write 5 above digit 8 in the dividend.
- ◆ Multiply: quotient 5×4 in the divisor = 20. Write 0 below digit 8 in the dividend. Regroup 2 above digit 1 in the divisor.
- ◆ Multiply: quotient 5×1 in the divisor = 5, add 2 that was regrouped: $5 + 2 = 7$. Write 7 beside on the left of 0. Draw a line.
- ◆ Subtract: $78 - 70 = 8$. Write 8 below the column of 8 and 0.

STEP 5 Divide the tenths.

$$\begin{array}{r} 2 \quad 35.6 \\ 14 \overline{)498.4} \\ - 42 \\ \hline 78 \\ - 70 \\ \hline 84 \\ 84 \\ \hline 0 \end{array}$$

- ◆ Put the decimal point in the quotient in same column as the decimal point in the dividend.
- ◆ Bring down 4. Divide $84 \div 14 = 6$. Write 6 in the quotient above digit 4.
- ◆ Multiply: quotient 6×4 (in the divisor) = 24. Write 4 below the digit 4 that was brought down. Regroup 2 above digit 1.
- ◆ Multiply: quotient 6×1 in the divisor = 6, add 2 that was regrouped: $6 + 2 = 8$. Write 8 on the left of 4.
- ◆ Subtract: $84 - 84 = 0$. Write 0 below the line.

The quotient is 35.6.

$$14 \overline{)498.4} \quad \begin{array}{r} 35 \\ \hline 0 \end{array}$$

c. Divide 129.5 by .12

STEP 1 Convert the decimal into a whole number by multiplying both divisor and dividend by 100.

$$\begin{array}{r} .12 \\ \times 100 \\ \hline 12.00 \end{array} \qquad \begin{array}{r} 129.5 \\ \times 100 \\ \hline 12950.0 \end{array}$$

$$12 \overline{)12950.}$$

STEP 2 Divide the ten thousands. Since 1 is less than the divisor, include the next digit in the thousands, 2.

STEP 3 Divide the ten thousands and thousands.

$$\begin{array}{r} 1 \\ 12 \overline{)12950} \\ \underline{12} \end{array}$$

- ◆ Divide: $12 \div 12 = 1$. Write 1 above digit 2 in the dividend.
- ◆ Multiply: $1 \times 12 = 12$. Write 12 below 12 in the dividend. Draw a line.
- ◆ Subtract: $12 - 12 = 0$. No need to write 0.

STEP 4 Divide the hundreds.

$$\begin{array}{r} \\ \hline 9 \end{array}$$

- ◆ Bring down 9. Divide: $9 \div 12$ is not possible using this method. Write 0 in the quotient above digit 9 in the dividend.

STEP 5 Divide the tens.

$$\begin{array}{r} 107 \\ 12 \overline{)12950} \\ \underline{12} \\ 95 \\ \underline{84} \\ 11 \end{array}$$

- ◆ Bring down 5. Divide: $95 \div 12 = 7$. Write 7 above digit 5 in the dividend.
- ◆ Multiply: quotient 7×2 in the divisor = 14. Write 4 below 5 that was brought down. Regroup 1 above digit 1 in the divisor.
- ◆ Multiply: quotient 7×1 in the divisor = 7, add 1 that was regrouped: $7 + 1 = 8$. Write 8 beside 4 on the left. Draw a line below 84.
- ◆ Subtract: $95 - 84 = 11$.

STEP 6 Divide the ones.

$$\begin{array}{r}
 1079 \\
 12 \overline{)12950} \\
 \underline{12} \\
 95 \\
 \underline{84} \\
 110 \\
 \underline{108} \\
 \text{remainder} \longrightarrow 2
 \end{array}$$

- ◆ Bring down 0. Divide: $110 \div 12 = 9$. Write 9 above digit 0 in the dividend.
- ◆ Multiply: quotient 9×2 in the divisor = 18. Write 8 below 0 that was brought down. Regroup 1 above digit 1 in the divisor.
- ◆ Multiply: quotient 9×1 in the divisor = 9, add 1 that was regrouped: $9 + 1 = 10$. Write 10 beside 8 to its left.
- ◆ Subtract: $110 - 108 = 2$. Write 2 below the column of 0 and 8, 2 is the remainder.

The quotient is 1,079, remainder 2.



Let's Try This

Let's see how well you can work on your own. Find the quotient of the following. You may refer to the examples in the preceding pages if you get confused. The first one has been done for you.

1. $9 \overline{)7.2}$

$$\begin{array}{r}
 .8 \\
 9 \overline{)7.2} \\
 \underline{7.2} \\
 0
 \end{array}$$

* You may look in the *Answer Key* on page 48 if you are confused on how this item was solved.

2. $4.1 \overline{)27.47}$

3. $1.08 \overline{)2.6784}$

4. $0.7 \overline{)28.47}$

5. $0.32 \overline{)43.8}$

Compare your answers with those in the *Answer Key* on pages 48–52.



Let's Review

How do you know if your answer is correct or not? To check your answer, multiply the quotient with the divisor. The product should be equal to the dividend.

You can now apply the knowledge and skills you gained in Lesson 1 of this module. Let's see how well you can do the following.

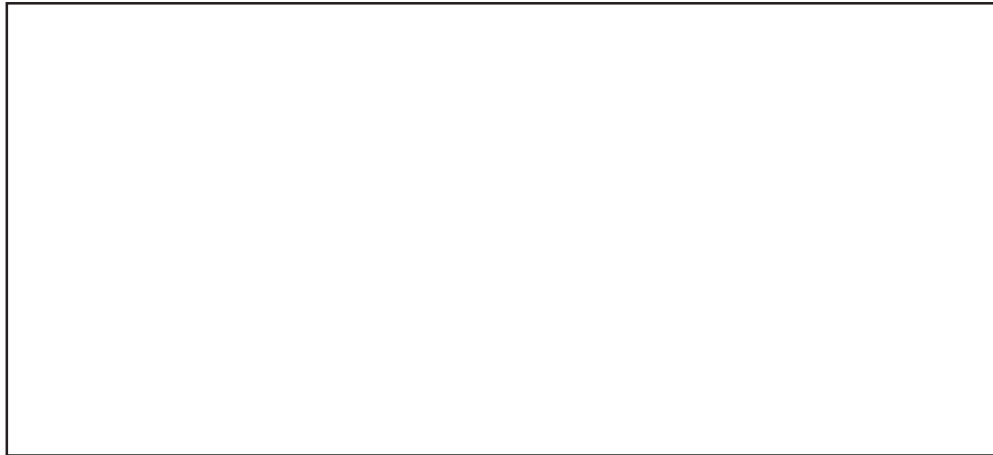
Check if the quotients are correct. The first one has been done for you.

1.
$$41 \overline{)274.7} \begin{array}{r} 6.7 \\ \times 41 \\ \hline 67 \\ 268 \\ \hline 274.7 \end{array}$$

$$\begin{array}{r} 2 \\ 6.7 \\ \times 41 \\ \hline 67 \\ 268 \\ \hline 274.7 \end{array} \longleftarrow \text{product} = \text{dividend}$$

2.
$$13 \overline{)35.1} \begin{array}{r} 2.7 \\ \times 13 \\ \hline 41 \\ 54 \\ \hline 171 \end{array}$$

3.
$$\begin{array}{r} 32.4 \\ 124 \overline{)4017.6} \end{array}$$



Compare your answers with those in the *Answer Key* on page 52.



Let's Solve This Problem

After mastering the skill of dividing decimals, we are now ready to solve word problems involving division of decimals.

EXAMPLE 1

Aling Minda bought a box of instant noodles. Each pack costs ₱5.75. If she paid ₱201.25 for the instant noodles, how many packs of noodles did she buy?



SOLUTION:

STEP 1 Write the given information.

- a. Cost of one pack of noodles: ₱ 5.75
- b. Cost of a box of noodles : ₱ 201.25

STEP 2 Determine what is asked.

Find the number of individual noodle packs that Aling Minda bought.

STEP 3 Identify the operation to be used.

Division

STEP 4 Write the number sentence to solve the problem.

$$201.25 \div 5.75 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer. (Use the short method)

$$\begin{array}{r} \longrightarrow 2012 \div 575 = 3 \\ \overline{) 2012} \longrightarrow 2012 - 1725 = 287 \\ 2875 \longrightarrow \text{bring down } 5 = 2875 \div 575 = 5 \\ \underline{2875} \longrightarrow 5 \times 575 = 0 \\ 0 \end{array}$$

Aling Minda bought 35 packs of noodles.

$$\begin{array}{r} 35 \\ 575 \overline{) 20125} \end{array}$$

EXAMPLE 2

A liter of gasoline costs ₱18.20. If Mang Lino had his taxicab fueled and paid ₱282.10, how many liters of gasoline did he buy?



Solution:

STEP 1 Write the given information.

- a. Cost of one liter of gasoline: ₱18.20
- b. Cost of fueling taxicab: ₱282.10

STEP 2 Determine what is asked.

Find how many liters of gasoline was loaded in the taxicab.

STEP 3 Identify the operation to be used.

Division

STEP 4 Write the number sentence to solve the problem.

$$282.10 \div 18.20 = \underline{\hspace{10em}}$$

STEP 5 Solve for the answer.

(Cancel the last zero in both divisor and dividend for easier computation).

a. $182\cancel{0}\overline{)2821\cancel{0}}$ ♦ Cancel the zero in both divisor and dividend for easier computation

	15	
	$182\cancel{0}\overline{)2821\cancel{0}}$	$285 \div 182 = 1$
$1 \times 182 =$	$\rightarrow -182$	$\rightarrow 282 - 182 = 100$, bring down 1 =
	$\hline 1001$	$\rightarrow 1001 \div 182 = 5$
$5 \times 182 =$	$\rightarrow -910$	$\rightarrow 1001 - 910 = 91$
	$\hline 91$	

	15.5	
	$182\cancel{0}\overline{)2821\cancel{0}}$	\rightarrow Put a decimal point and cipher 0 in the dividend (use the cancelled 0)
	$\hline 1001$	
	$\rightarrow -910$	
	$\hline 910$	\rightarrow Bring down 0. $910 \div 182 = 5$
$5 \times 182 =$	$\rightarrow 910$	$\rightarrow 910 - 910 = 0$
	$\hline 0$	

♦ Put the decimal point in the quotient.

15.5 liters of gasoline were loaded in Mang Lino's taxicab.



Let's Review

Answer the following word problems.

1. The average speed of an object is obtained by dividing the distance traveled by the time taken to travel. If the distance traveled by a jeep is 18.25 kilometers in 0.25 hours, what is the average speed of the jeep?

2. If a cupcake costs ₱7.75 and Melissa bought cupcakes with a total worth of ₱85.25, how many cupcakes did Melissa buy?

Compare your answers with those in the *Answer Key* on pages 52–53.



Let's Remember

- ◆ In dividing decimals with a decimal point in the divisor, convert first the divisor into a whole number before performing division.
- ◆ A divisor with a decimal point is converted into a whole number by multiplying both divisor and dividend by the powers of ten (10, 100, 1000, etc.). The effect of this is that the decimal point will move in both the divisor and dividend.
- ◆ The position of the decimal point is very important in division because a decimal point not in its proper place will give a different value.
- ◆ In dividing decimals, the number of decimal places in the quotient equals the number of decimal places in the dividend.
- ◆ In dividing a 1-digit divisor, consider the first digit with the highest value in the dividend. If it is less than the divisor, consider the next digit then proceed with the division steps.
- ◆ In dividing by a two-digit divisor, consider the first two digits in the dividend. If it is less than the divisor, consider the next digit then proceed with the division steps.
- ◆ In dividing by a three-digit divisor, consider the first three digits in the dividend. If it is less than the divisor, consider the next digit then proceed with the division steps.
- ◆ To check the quotient, multiply it by the divisor. If the product is equal to the dividend, then the quotient is correct.
- ◆ Cancel out the equal number of zeros on the right end of both divisor and dividend if there are any for easier computation.



Let's See What You Have Learned

At last, you have come to the last part of the lesson. All you have to do now is take a test. Good luck!

A. Answer the following items below. (3 points each)

1.

$$5.6 \overline{)482.72}$$

2.

$$4.76 \overline{)6.188}$$

B. 1. If Shirley earns ₱97.80 a day, in how many days will she earn ₱2,347.20? (5 points)

2. If 6.5 hectares of land produced 344.5 cavans of rice, how many cavans of rice were produced by each hectare of land? (5 points)

Compare your answers with those in the *Answer Key* on pages 54–55.

If your test score is from:

14–16 Excellent! You have understood the lesson well.

9–13 Review the parts of the module which you did not understand.

0–8 You should study the whole lesson again.



Let's Sum Up

- ◆ Decimals are multiplied just like whole numbers; the only difference is that decimals have a decimal point while whole numbers don't.
- ◆ In multiplication, the answer is called the product, the multiplicand is the number to be multiplied by another and the multiplier is the number by which the multiplicand is multiplied. The multiplicand and the multiplier are called factors.
- ◆ The number of decimal places in the product is the same as the sum of the decimal places of the factors.
- ◆ The position of the decimal point in the product is determined by counting the total number of decimal places starting from the first digit on the right going to the left.
- ◆ The number of digits in the multiplier determines the number of partial products except when there's a 0 in the multiplier. In this case, its product becomes part of the partial product of the digit that follows it.
- ◆ In a one-digit multiplier, the computed product is the final product.
- ◆ In solving word problems involving multiplication of decimals, the steps to be followed are:

STEP 1 Write the given information.

STEP 2 Determine what is asked.

STEP 3 Identify the operation to be used.

STEP 4 Write the number sentence to solve the problem.

STEP 5 Solve for the answer.

- ◆ In dividing decimals with a decimal point in the divisor, first convert the divisor into a whole number before performing division.
- ◆ A divisor with a decimal point is converted into a whole number by multiplying both divisor and dividend by the powers of ten (10, 100, 1000, etc.). By doing this, the decimal moves in both the divisor and dividend.
- ◆ The position of the decimal point is very important in division because a decimal point not in its proper place will give a different value.
- ◆ In dividing decimals, the number of decimal places in the quotient equals the number of decimal places in the dividend.
- ◆ In dividing by a 1-digit divisor, consider the first digit with the highest value in the dividend. If it is less than the divisor, consider the next digit then proceed with the division steps.
- ◆ In dividing by a two-digit divisor, consider the first two digits in the dividend. If it is less than the divisor, consider the next digit then proceed with the division steps.
- ◆ In dividing by a three-digit divisor, consider the first three digits in the dividend. If it is less than the divisor, consider the next digit then proceed with the division steps.
- ◆ To check if the quotient is correct, multiply it by the divisor. If the product is equal to the dividend, then the quotient is correct.
- ◆ Cancel out equal number of zeros on the right end of both divisor and dividend if there are any for easier computation.



What Have You Learned?

1. A man can travel 41.5 kilometers in one hour. How far can he go in 5.5 hours? (4 points)

2. Aling Sally is an Overseas Filipino Worker. She sent \$ 275 to her family before Christmas. If the peso-dollar exchange rate is ₱ 49.75, how much money in pesos did her family receive? (4 points)

3. Mang Tomas sells pandesal for ₱ .50 each. If a customer orders ₱ 225.75 worth of pandesal, how many pieces of pandesal should Mang Thomas give him? (4 points)

4. The average speed of an object is obtained by dividing the distance traveled by the time taken to travel. If the distance covered by a bus is 15.4 kilometers and it took the bus 0.4 hours to travel the distance, what is the average speed of the bus? (4 points)

Compare your answers with those in the *Answer Key* on pages 56–58.

If your test score is from:

14–16 Excellent! You have understood the module well.

9–13 Review the parts of the module which you did not understand.

0–8 You should study the whole module again.



Answer Key

A. Let's See What You Already Know (page 2)

1. 4.38×3.6

$$\begin{array}{r}
 12 \\
 24 \\
 4.38 \\
 \times 3.6 \\
 \hline
 2628 \\
 1314 \\
 \hline
 15.768
 \end{array}$$

2. Steps in Problem-solving.

a. Write the given information

\$175.50 – amount Aling Ludy sent her husband
 52.00 – exchange rate of a dollar to peso.

b. Determine what is asked.

Find the amount in pesos Aling Ludy sent her husband.

c. Identify the operation to be used.

Multiplication

d. Write the number sentence to solve the problem.

$$\text{\$ } 175.50 \times 52.00 = \text{\P } \underline{\hspace{2cm}}$$

e. Solve for the answer.

$$\begin{array}{r}
 322 \\
 111 \\
 \text{\$ } 175.50 \\
 \times \text{\P } 52 \\
 \hline
 35100 \\
 + 87750 \\
 \hline
 \text{\P } 9,126.00
 \end{array}$$

Aling Ludy sent her husband $\text{\P } 9,126.00$.

3.

$$\begin{array}{r}
 8.25 \\
 3.74 \overline{)30.85.50} \\
 \underline{-29.92} \\
 93.5 \\
 \underline{-74.8} \\
 18.70 \\
 \underline{-18.70} \\
 0
 \end{array}$$

$(8 \times 374 =) \rightarrow 3085 \div 374 = 8$
 $(3085 - 2992 = 93)$
 $(2 \times 374 =) \rightarrow$ bring down 5 = $935 \div 374 = 2$
 $(5 \times 374 =) \rightarrow$ bring down 0 = $1870 \div 374 = 5$
 $(1870 - 1870 = 0)$

The quotient is 8.25

4. **STEP 1** Write the given information.

- The amount Mang Pandoy gets to clean each bottle: ₱ .75
- The amount he must earn: ₱ 1,871.25

STEP 2 Determine what is asked.

Find the number of bottles that he must clean

STEP 3 Identify the operation to be used.

Division

STEP 4 Write the number sentence to solve the problem.

$$1,871.25 \div .75 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r}
 2495 \\
 .75 \overline{)1871.25} \\
 \underline{150} \\
 371 \\
 \underline{300} \\
 712 \\
 \underline{675} \\
 375 \\
 \underline{375} \\
 0
 \end{array}$$

$$\begin{array}{l}
 \rightarrow (187 \div 75 = 2) \\
 \rightarrow (75 \times 2 = 150) \\
 \rightarrow (187 - 150 = 37); \text{ bring down } 1 = 371 \\
 \rightarrow (75 \times 4 = 300) \\
 \rightarrow (371 - 300 = 71); \text{ bring down } 2 = 712 \\
 \rightarrow (75 \times 9 = 675) \\
 \rightarrow (712 - 675 = 37); \text{ bring down } 5 = 375 \\
 \rightarrow (75 \times 5 = 375) \\
 \rightarrow (375 - 375 = 0)
 \end{array}$$

The quotient is 2,495.

Mang Pandoy needs to clean 2,495 bottles to earn ₱ 1,871.25.

B. Lesson 1

Let's Try This (pages 15–16)

1. **STEP 1**

$$\begin{array}{r} 4.7 \\ \times 2.9 \\ \hline \end{array}$$

or

$$\begin{array}{r} 2.9 \\ \times 4.7 \\ \hline \end{array}$$

STEP 2 ♦ If your multiplier is 9 we have:

$$\begin{array}{r} 6 \\ 4.7 \\ \times 2.9 \\ \hline 423 \end{array}$$

♦ If your multiplier is 7 we have:

$$\begin{array}{r} 6 \\ 2.9 \\ \times 4.7 \\ \hline 203 \end{array}$$

STEP 3 ♦ If your multiplier is 2 we have:

$$\begin{array}{r} 4.7 \\ \times 2.9 \\ \hline 423 \\ 94 \end{array}$$

first partial product

second partial product

♦ If your multiplier is 4 we have:

$$\begin{array}{r} 2.9 \\ \times 4.7 \\ \hline 203 \\ 116 \end{array}$$

STEP 4 AND STEP 5

$$\begin{array}{r} 4.7 \\ \times 2.9 \\ \hline 423 \\ + 94 \\ \hline 13.63 \end{array}$$

one decimal place

one decimal place

two decimal places

$$\begin{array}{r} 2.9 \\ \times 4.7 \\ \hline 203 \\ + 116 \\ \hline 13.63 \end{array}$$

Notice that we got the same answer.

3.

$$\begin{array}{r} 11 \\ 132 \\ 23.75 \\ \times 2.5 \\ \hline 11875 \\ + 4750 \\ \hline 59.375 \end{array}$$

first partial product

second partial product

4. Since the numbers to be multiplied are both three-digit numbers, either of them can be multiplier or multiplicand.

$\begin{array}{r} 11 \\ 32 \\ 3.75 \\ \times 12.5 \\ \hline 1875 \\ 750 \\ + 375 \\ \hline 46.875 \end{array}$	$\begin{array}{l} \text{m} \\ \text{m} \\ \text{m} \\ \text{m} \end{array}$	$\begin{array}{l} \text{first partial product} \\ \text{second partial product} \\ \text{third partial product} \\ \text{first product} \end{array}$	$\begin{array}{r} 1 \\ 11 \\ 13 \\ 12.5 \\ \times 3.75 \\ \hline 1625 \\ 875 \\ 375 \\ \hline 46.875 \end{array}$	$\begin{array}{l} \text{m} \\ \text{m} \\ \text{m} \\ \text{m} \end{array}$	$\begin{array}{l} \text{first partial product} \\ \text{second partial product} \\ \text{third partial product} \\ \text{first product} \end{array}$
--	---	--	---	---	--

Notice that we got the same answer.

Let's Try This (page 19)

1. **STEP 1** Write the given information.
 - a. length of a roll of cloth: 16.405 meters
 - b. number of rolls of cloth: 5

STEP 2 Determine what is asked.

Find how many meters of cloth Mang Mario has.

STEP 3 Identify the operation to be used.

Multiplication

STEP 4 Write the number sentence to solve the problem.

$$16.405 \times 5 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r} 32 \\ 16.405 \\ \times \quad 5 \\ \hline 82.025 \end{array}$$

82.025 or 82 meters of cloth

2. **STEP 1** Write the given information.
 - a. amount Rosalie spends daily for her merienda: ₱ 25.65
 - b. number of days Rosalie takes merienda: 14 days

STEP 2 Determine what is asked.

Find the total amount Rosalie spent in 14 days.

STEP 3 Identify the operation to be used.

Multiplication.

STEP 4 Write the number sentence to solve the problem.

$$\text{P } 25.65 \times 14 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r} 222 \\ \text{P } 25.65 \\ \times \quad 14 \\ \hline 10260 \\ 2565 \\ \hline \text{P } 359.10 \end{array}$$

Rosalie spent P 359.10 in 14 days.

Let's See What You Have Learned (pages 20–21)

1. **STEP 1** Write the given information.

- a. Amount Mang Anding received from his wife: \$150
- b. Peso-dollar exchange rate: P 48.95

STEP 2 Determine what is asked.

Find the equivalent amount in pesos Mang Anding received.

STEP 3 Identify the operation to be used.

Multiplication

STEP 4 Write the number sentence to solve the problem.

$$\text{P } 48.95 \times \$ 150 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r} 442 \\ \text{P } 48.95 \\ \times \quad 150 \\ \hline 244750 \\ + \quad 4895 \\ \hline \text{P } 7342.50 \end{array}$$

Mang Anding received ₱ 7,342.50 from his wife.

2. **STEP 1** Write the given information.
- a. Number of days Mang Jepoy worked: 28 days
 - b. Minimum daily wage: ₱ 211.75

STEP 2 Determine what is asked.

Find the total amount Mang Jepoy earned for 28 days of work.

STEP 3 Identify the operation to be used.

Multiplication

STEP 4 Write the number sentence to solve the problem.

$$\text{₱ } 211.75 \times 28 \text{ days} = \underline{\hspace{4cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r} \\ 6 \\ \text{₱ } 211.75 \\ \times 28 \\ \hline 169400 \\ + 42350 \\ \hline \text{₱ } 5,929.00 \end{array}$$

Mang Jepoy earned ₱ 5,929.00 for 28 days of work.

3. **STEP 1** Write the given information.
- a. drinking water stored in 1.5 liter plastic bottles
 - b. 17 plastic bottles

STEP 2 Determine what is asked.

Find how many liters of water Aling Judy was able to collect and store.

STEP 3 Identify the operation to be used.

Multiplication

STEP 4 Write the number sentence to solve the problem.

$$\begin{array}{l} 1.5 \times 17 = \underline{\hspace{4cm}} \\ \text{or } 17 \times 1.5 = \underline{\hspace{4cm}} \end{array}$$

STEP 5 Solve for the answer.

$$\begin{array}{r} 1.5 \\ \times 17 \\ \hline 105 \\ + 15 \\ \hline 25.5 \end{array} \quad \text{or} \quad \begin{array}{r} ^3 \\ 17 \\ \times 1.5 \\ \hline 85 \\ 17 \\ \hline 25.5 \end{array}$$

Aling Judy stored 25.5 liters of drinking water.

4. **STEP 1** Write the given information.

- a. circumference of the track: 400.75 m
- b. runner circles the oval 8 times

STEP 2 Determine what is asked.

Find the distance traveled by the runner.

STEP 3 Identify the operation to be used.

Multiplication

STEP 4 Write the number sentence to solve the problem.

$$400.75 \times 8 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r} ^6 ^4 \\ 400.75 \\ \times 8 \\ \hline 3,206.00 \end{array}$$

The runner traveled 3,206 m.

C. Lesson 2

Let's Try This (pages 29–30)

1. **STEP 1** Divide the ones. Since this is less than the divisor, division is not possible. Include the next digit, 2.

$$9 \overline{)7.2}$$

STEP 2 Divide the ones and tenths.

$$\begin{array}{r} 8 \\ 9 \overline{)7.2} \\ \underline{-7.2} \\ 0 \end{array}$$

STEP 3 Put the decimal point in the same column as the decimal point in the dividend.

$$\begin{array}{r} .8 \longrightarrow \text{quotient} \\ 9 \overline{)7.2} \end{array}$$

2. **STEP 1** Convert the divisor into a whole number.

$$\begin{array}{r} 4.1 \\ \times 10 \\ \hline 410 \end{array}$$

$$\begin{array}{r} 27.47 \\ \times 10 \\ \hline 274.70 \end{array}$$

STEP 2 Divide the hundreds, tens, and ones.

$$41 \overline{)274.7}$$

$$\begin{array}{r} \overline{)274.7} \\ \underline{-246} \\ 287 \\ \underline{-287} \\ 0 \end{array}$$

STEP 3 Put the decimal point in the same column as in the dividend.

$$\begin{array}{r} 6.7 \longrightarrow \text{quotient} \\ 41 \overline{)274.7} \end{array}$$

3. **STEP 1** Convert the divisor into a whole number.

$$\begin{array}{r} 1.08 \\ \times 100 \\ \hline 108.00 \end{array}$$

$$\begin{array}{r} 2.6784 \\ \times 100 \\ \hline 267.8400 \end{array}$$

STEP 2 Divide the hundreds, tens, and ones.

$$\begin{array}{r} \overline{) 216} \\ - 216 \\ \hline 51 \end{array}$$

STEP 3 Divide the tenths.

$$\begin{array}{r} 24 \\ 108 \overline{) 267.84} \\ - 216 \\ \hline 518 \\ - 432 \\ \hline 86 \end{array}$$

STEP 4 Divide the hundredths.

$$\begin{array}{r} 248 \\ 108 \overline{) 267.84} \\ - 216 \\ \hline 518 \\ - 432 \\ \hline 864 \\ 864 \\ \hline 0 \end{array}$$

STEP 5 Put the decimal point in the same column as the decimal point in the dividend.

$$\begin{array}{r} 2.48 \longrightarrow \text{quotient} \\ 1.08 \overline{) 267.84} \end{array}$$

4. **STEP 1** Convert the divisor to whole number.

$$\begin{array}{r} .07 \\ \times 10 \\ \hline 0.70 \text{ or } 7 \end{array}$$

$$\begin{array}{r} 28.47 \\ \times 10 \\ \hline 284.70 \text{ or } 284.7 \end{array}$$

STEP 2 Divide the hundreds, tens and ones.

$$\begin{array}{r} 40.0 \\ 7 \overline{)284.7} \\ \underline{28} \\ 4 \\ \underline{0} \\ 4 \end{array}$$

STEP 3 Divide the tenths.

$$\begin{array}{r} 40.6 \\ 7 \overline{)284.7} \longrightarrow \text{quotient} \\ \underline{28} \\ 4 \\ \underline{0} \\ 47 \\ \underline{42} \\ 5 \longrightarrow \text{remainder} \end{array}$$

STEP 4 Put the decimal point in the same column as the decimal point in the dividend.

$$\begin{array}{r} 40.6 \\ 32 \overline{)1318.0} \end{array}$$

Take note that 5 will be considered as a remainder since no exact value can be arrived at easily.

5. **STEP 1** Convert the divisor into a whole number.

$$\begin{array}{r} .32 \\ \times 100 \\ \hline 32.00 \text{ or } 32 \end{array} \qquad \begin{array}{r} 43.8 \\ \times 100 \\ \hline 4380.0 \text{ or } 4,380 \end{array}$$

STEP 2 Divide the thousands and hundreds.

$$\begin{array}{r} 32 \\ \hline 11 \end{array}$$

STEP 3 Divide the tens.

$$\begin{array}{r} 13 \\ 32 \overline{)4380} \\ \underline{32} \\ 118 \\ \underline{96} \\ 22 \end{array}$$

STEP 4 Divide the ones.

$$\begin{array}{r} 136 \longrightarrow \text{quotient} \\ 32 \overline{)4380} \\ \underline{32} \\ 118 \\ \underline{-96} \\ 220 \\ \underline{192} \\ 28 \longrightarrow \text{remainder} \end{array}$$

There would be a decimal point in the quotient also.

Let's Review (pages 31–32)

2.

$$\begin{array}{r} 2 \\ 2.7 \\ \times 13 \\ \hline 81 \\ 27 \\ \hline 35.1 \longrightarrow \text{product} = \text{dividend} \end{array}$$

Quotient 2.7 is correct.

3.

$$\begin{array}{r} 1 \\ 32.4 \\ \times 124 \\ \hline 1296 \\ 648 \\ 324 \\ \hline 4017.6 \longrightarrow \text{product} = \text{dividend} \end{array}$$

Quotient 32.4 is correct.

Let's Review (page 35)

1. **STEP 1** Write the given information.

- a. Distance traveled by a jeep: 18.25 kilometers
- b. Time taken to cover the distance: 0.25 hours

STEP 2 Determine what is asked.

Find the average speed of the jeep.

STEP 3 Identify the operation to be used.

Division

STEP 4 Write the number sentence to solve the problem.

$$18.25 \div .25 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{l} (7 \times 25 =) \longrightarrow \overset{\curvearrowright}{-175} \longrightarrow (182 - 175 = 7); \text{ bring down } 5 = 75 \div 25 = 3 \\ (3 \times 25 =) \longrightarrow \begin{array}{r} 75 \\ \underline{75} \\ 0 \end{array} \longrightarrow (75 - 75 = 0) \end{array}$$

The average speed of the jeep is 73 kilometers per hour.

2. **STEP 1** Write the given information.

a. Cost of one cupcake: ₱ 7.75

b. Total cost of cupcakes Melissa bought: ₱ 85.25.

STEP 2 Determine what is asked.

Find how many cupcakes Melissa bought.

STEP 3 Identify the operation to be used.

Division

STEP 4 Write the number sentence to solve the problem.

$$8525 \div 775 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{l} (1 \times 775 =) \longrightarrow \begin{array}{r} 11 \\ 775 \overline{)8525} \\ \underline{-775} \end{array} \longrightarrow (852 \times 775 = 77): \text{ bring down } 5 = 775 \div 775 = 1 \\ (1 \times 775 =) \longrightarrow \begin{array}{r} 775 \\ \underline{775} \\ 0 \end{array} \longrightarrow (775 - 775 = 0) \end{array}$$

Melissa bought 11 cupcakes.

$$\begin{array}{r} 73 \\ 25 \overline{)1825} \end{array}$$

Let's See What You Have Learned (page 37)

1. Solution:

$$\begin{array}{r}
 86.2 \\
 56 \overline{)4827.2} \\
 \underline{(8 \times 56) \rightarrow - 448} \quad \rightarrow (482 - 448 = 34); \text{ bring down } 7 = 347 \div 56 = 6 \\
 347 \\
 \underline{(6 \times 56) \rightarrow - 336} \quad \rightarrow (347 - 336 = 11); \text{ bring down } 2 = 112 \div 56 = 2 \\
 112 \\
 \underline{(2 \times 56) \rightarrow - 112} \quad \rightarrow (112 - 112 = 0) \\
 0
 \end{array}$$

The quotient is 86.2.

2. Solution:

$$\begin{array}{r}
 1.3 \\
 476 \overline{.)618.8} \\
 \underline{(1 \times 476) \rightarrow - 476} \quad \rightarrow (618 - 476 = 142); \text{ bring down } 8 = 1428 \div 476 = 3 \\
 1428 \\
 \underline{(3 \times 476) \rightarrow - 1428} \quad \rightarrow (1428 - 1428 = 0) \\
 0
 \end{array}$$

The quotient is 1.3

B. 1. **STEP 1** Write the given information.

- a. Amount Shirley earns a day: ₱ 97.80
- b. Total amount Shirley needs to earn: ₱ 2,347.20

STEP 2 Determine what is asked.

Find the number of days it will take Shirley to earn ₱ 2,347.20

STEP 3 Identify the operation to be used.

Division

STEP 4 Write the number sentence to solve the problem.

$$2347.20 \div 97.80 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

(Both zeros in the divisor and dividend can be cancelled for easier computation).

$$\begin{array}{r}
 24 \\
 978 \overline{) 23472.} \\
 \underline{19560} \\
 3912 \\
 \underline{-3912} \\
 0
 \end{array}
 \begin{array}{l}
 \longrightarrow 2347 \div 978 = 2 \\
 \longrightarrow (2347 - 1956 = 3912); \text{ bring down } 2 = 3912 \div 978 = 4 \\
 \longrightarrow 3912 \div 978 = 4 \\
 \longrightarrow (3912 - 3912 = 0)
 \end{array}$$

(2 × 978) →
(4 × 978) →

Shirley will earn ₱ 2,347.20 in 24 days.

2. **STEP 1** Write the given information.

- a. Size of land: 6.5 hectares
- b. Quantify of rice harvested from the land: 344.5 cavans.

STEP 2 Determine what is asked.

Find how many cavans of rice are produced by a hectare of land.

STEP 3 Identify the operation to be used.

Division

STEP 4 Write the number sentence to solve the problem.

$$344.5 \div 6.5 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r}
 53 \\
 65 \overline{) 3445.} \\
 \underline{325} \\
 195 \\
 \underline{-195} \\
 0
 \end{array}
 \begin{array}{l}
 \longrightarrow 344 \div 65 = 5 \\
 \longrightarrow (344 - 325 = 19); \text{ bring down } 5 = 195 \div 65 = 3 \\
 \longrightarrow 195 \div 65 = 3 \\
 \longrightarrow (195 - 195 = 0)
 \end{array}$$

(5 × 65) →
(3 × 65) →

Each hectare of land yields 53 cavans of rice.

D. What Have You Learned? (pages 40–41)

1. **STEP 1** Write the given information.

a. Speed of man travelling: 41.5 kilometers/hour

STEP 2 Determine what is asked.

Find the distance the man can travel in 5.5 hours.

STEP 3 Identify the operation to be used.

Multiplication.

STEP 4 Write the number sentence to solve the problem.

$$41.5 \times 5.5 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r} 41.5 \quad \longrightarrow 1 \text{ decimal place} \\ \times 5.5 \quad \longrightarrow 1 \text{ decimal place} \\ \hline 2075 \\ 2075 \\ \hline 228.25 \quad \longrightarrow 2 \text{ decimal places} \end{array}$$

The man can cover a distance of 228.25 kilometers.

2. **STEP 1** Write the given information.

a. Amount Aling Sally sent to her family: \$275

b. Peso—dollar exchange rate: ₱ 49.75

STEP 2 Determine what is asked.

Find the amount in pesos Aling Sally sent to her family.

STEP 3 Identify the operation to be used.

Multiplication.

STEP 4 Write the number sentence to solve the problem.

$$\text{₱ } 49.75 \times 275 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r}
 \text{P}49.75 \longrightarrow 2 \text{ decimal places} \\
 \times \quad 275 \longrightarrow \text{no decimal place} \\
 \hline
 24875 \\
 34825 \\
 9950 \\
 \hline
 \text{P} 13681.25 \longrightarrow 2 \text{ decimal places}
 \end{array}$$

Aling Sally sent her family P 13,681.25.

3. **STEP 1** Write the given information.

- a. Price of each pandesal: P:50
- b. the worth of pandesal that the customer ordered from Mang Thomas: P 225.75

STEP 2 Determine what is asked.

The number of pieces of pandesal that Mang Thomas should give to his customer.

STEP 3 Identify the operation to be used.

Division

STEP 4 Write the number sentence to solve the problem.

$$225.75 \div .50 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

Multiply both divisor and dividend by 10:

$$\begin{array}{r}
 .50 \\
 \times \quad 10 \\
 \hline
 5.00 \text{ or } 5
 \end{array}
 \qquad
 \begin{array}{r}
 225.75 \\
 \times \quad 10 \\
 \hline
 2257.5
 \end{array}$$

	$ \begin{array}{r} 451.5 \\ 5.0 \overline{)2257.5} \\ \underline{-20} \\ 25 \\ \underline{25} \\ 7 \\ \underline{5} \\ 25 \\ \underline{25} \\ 0 \end{array} $	$\longrightarrow 22 \div 5 = 4$ $\longrightarrow 22 - 20 = 2$ \longrightarrow bring down 5; $25 \div 5 = 5$ $\longrightarrow 25 - 25 = 0$ (no need to write 0) \longrightarrow bring down 7. $7 \div 5 = 1$ $\longrightarrow 7 - 5 = 2$ \longrightarrow bring down 5. $25 \div 5 = 5$ $\longrightarrow 25 - 25 = 0$ Put the decimal point in the quotient.
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Mang Tomas should give his customer 451.5 pieces of pandesal.

4. **STEP 1** Write the given information.
- Distance covered by the bus: 15.4 kilometers
 - Time taken to travel the distance: 0.4 hours
 - Average speed = distance \div time

STEP 2 Determine what is asked.

Find the average speed of the bus.

STEP 3 Identify the operation to be used.

Division.

STEP 4 Write the number sentence to solve the problem.

$$15.4 \div 0.4 = \underline{\hspace{2cm}}$$

STEP 5 Solve for the answer.

$$\begin{array}{r}
 38.5 \\
 4 \overline{)154.0} \\
 \underline{-12} \\
 34 \\
 \underline{32} \\
 20 \\
 \underline{20} \\
 0
 \end{array}
 \begin{array}{l}
 \longrightarrow (15 \div 4 = 3) \\
 \longrightarrow (3 \times 4 = 12) \\
 \longrightarrow (15 - 12 = 3): \text{bring down } 4 = 34 \\
 \longrightarrow (8 \times 4 = 32) \\
 \longrightarrow (34 - 32 = 2): \text{bring down } 0 = 20 \\
 \longrightarrow (5 \times 4 = 20) \\
 \longrightarrow (20 - 20 = 0)
 \end{array}$$

The average speed of the bus is 38.5 kilometers/hour.



References

Brownstein, Samuel C., et. al. *Barron's How To Prepare for the Scholastic Aptitude Test*. Manila, Philippines: Global Publishing, 1991.

Gonzales, Esperanza A. *Mathematics 1: First Year High School*. Manila, Philippines: Capitol Publishing House, Inc. 1991.