What Is This Module About?

Values or quantities used in everyday life may involve decimals. Money is expressed in decimals e.g., ₱12.50. Some measurements also involve decimals e.g. a book 7.5 centimeters long, or a 1.75 kilogram chicken. It is therefore important to know how to compare, add and subtract decimals.

This module is divided into 3 lessons:

Lesson 1 – *Learning About Decimals*

Lesson 2 – *Addition of Decimals*

Lesson 3 – *Subtraction of Decimals*

What Will You Learn From This Module?

After studying this module, you should be able to:

- identify the place value and value of the digits of a decimal;
- write decimals in words and symbols;
- compare the value of the digits of a decimal;
- add and subtract decimals; and
- solve word problems involving the addition and subtraction of decimals.

Wait!

Before studying this module, you should have studied the module: *Addition and Subtraction in Daily life.*

Let's See What You Already Know

Before starting with the lessons of this module, take this simple test first. This will determine what you already know about the topic.

1. Write 14.509 in words.

   _____

2. Write in symbols "forty two and sixty eight thousandths."

   _____

3. Convert 0.043 to a fraction.

4. Convert 12/25 to a decimal number.

5. What is the place value of the digit 7 in the following decimals.

   a. 0.10$\underline{7}$ b. 0.1$\underline{7}$4 c. $\underline{7}$.01 d. 1.$\underline{7}$2

6. Arnel bought a pair of pants (₱ 375.35), a polo shirt (₱ 175.60), a pair of socks (₱ 34.85) and three handkerchiefs (₱54.25). How much did he spend?

7. Mang Mario is putting up a wall that should be 2.36 meters high when finished. If Mang Mario has so far built the wall 1.47 meters high, how much height of wall does he need to build?

Well, how was it? Do you think you fared well? Compare your answers with those found in the *Answer Key* on pages 39–41 to find out.

If all your answers are correct, very good! This shows that you already know much about the topics in this module. You may still study the module to review what you already know. Who knows, you might learn a few more things as well!

If you got a low score, don't feel bad. This only means that this module is 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 all the items in the test and a lot more. Are you ready?

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

LESSON 1

Learning About Decimals

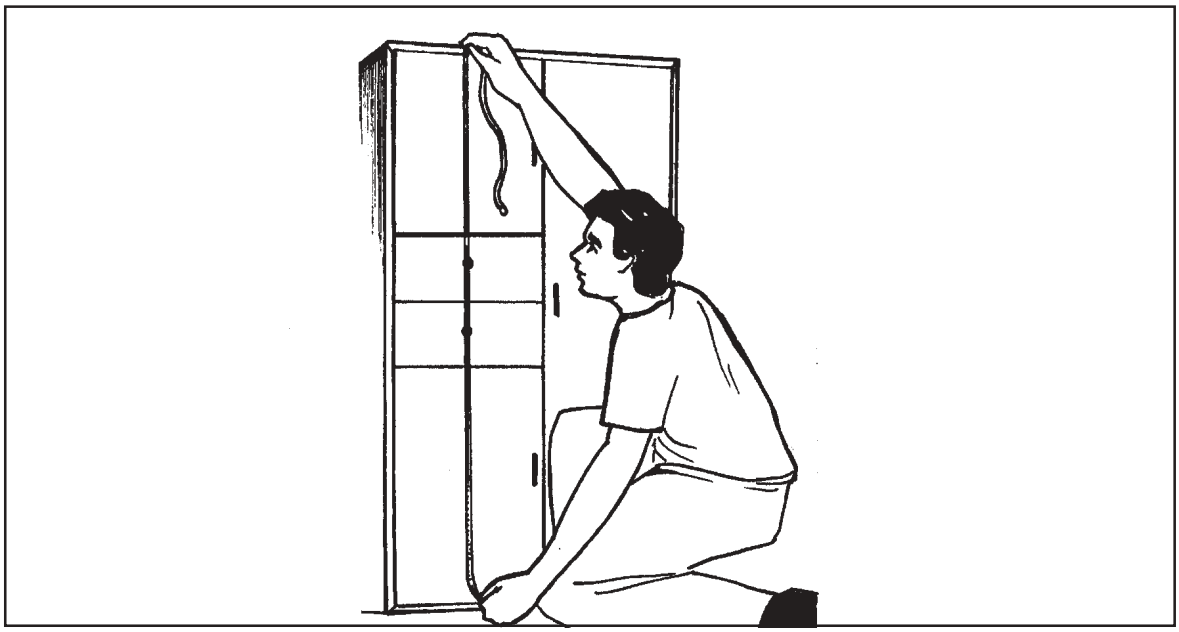
People like to measure things. They want to know how much a thing costs, how far a place is, or how heavy a certain object weighs. In most cases, the values of these measurements are not exact whole numbers. This is where decimals come in.

This lesson will teach the basics of decimals. Learning about the basics of decimals is important in performing mathematical operations (e.g. addition and subtraction) on decimals. After studying this lesson, you should be able to:

- identify the place value and the value of the digits of a decimal;
- write decimals in words and symbols; and
- convert decimals to fractions and vice versa;

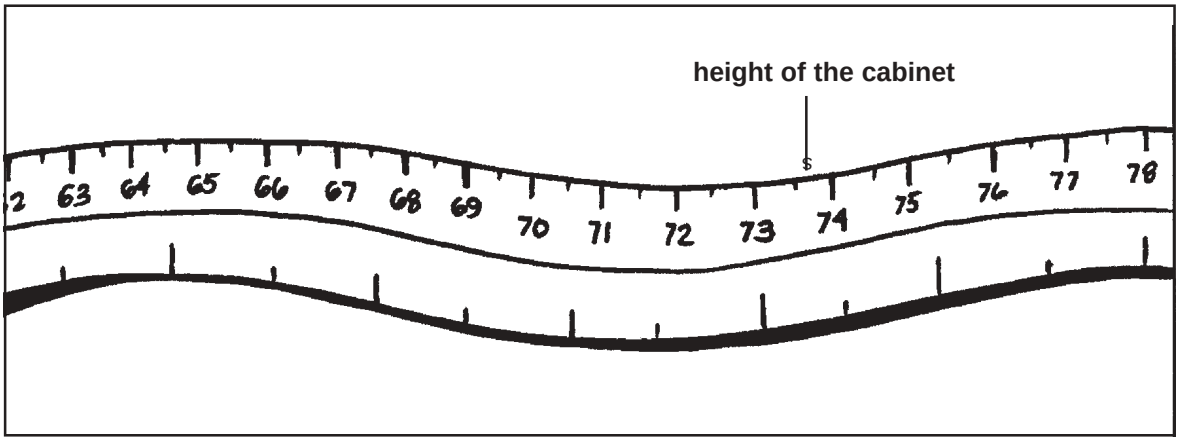
Let's Solve This Problem

Bernard was asked to measure the height of a cabinet. His tape measure is in centimeters. When he measured the height of the cabinet, it was between 73 and 74 centimeters.



Bernard is having a difficult time reading the measurement because it does not fall exactly on 73 or on 74 centimeters. Can you help him read the measurement? What is the height of the cabinet? _____.

If your answer is 73.6 centimeters, then you are correct. Take note that 73.6 is an example of a decimal. As you can see, there are 10 divisions between 73 cm and 74 cm. The first division represents 73.1 cm, the second division represents 73.2 cm, and so on. The tenth division coincides with the whole number 74 so this represents 74 cm.



Let's Study and Analyze

What are *decimals*? *Decimals* are fractions expressed in tenths, hundredths, thousandths, ten thousandths, etc. with a combination of the digits 0–9. Decimals are either expressed in fraction only like .059, .8, or .62,. Or they can be also be expressed with a whole number and a fraction like 2.5, 47.07 or 100.68. The decimal point (.) is used to separate the whole no. from the fraction part or to express that the decimal is only a fraction. To clearly show this, a place value chart is given below.

Decimals	Whole Numbers			Decimal Point	Fractions		
	hundreds	tens	ones		tenths (1/10)	hundredths (1/100)	thousandths (1/1000)
15.378		1	5	.	3	7	8
0.46			0	.	4	6	
8.01			8	.	0	1	
421.9	4	2	1	.	9		

All the digits to the right of the decimal point indicate a number less than one or a fraction. On the other hand, all digits to the left of the decimal point indicate a whole number. Each digit of the decimals has its own place value depending on its position from the decimal point as shown on the place value chart.

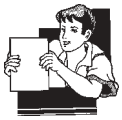
Let us analyze the place value of each digit of the decimal: 15.378. Let us start with the digits to the right of the decimal point (fractions):

- The place value of 3 is tenths.
- The place value of 7 is hundredths.
- The place value of 8 is thousandths.

Now, let's look at the place value of the digits to the left of the decimal points (whole number).

- The place value of 5 is ones.
- The place value of 1 is tens.

The decimal, 15.378 is read as fifteen and three hundred seventy eight thousandths. The decimal point is read as "and". Notice that the fraction part is read like a whole number except that the place value of the last digit to the right is also read.



Let's Learn

Let's identify the place value of the digits of the other decimals in the place value chart and write them in words.

In 0.46, the place value of 4 is tenths and that of 6 is hundredths. It is read as forty six hundredths.

In 8.01, the place value of 0 is tenths, 1 is hundredths, and 8 is ones. It is read as eight and one hundredths.

In 421.9, the place value of 9 is tenths, 1 is ones, 2 is tens, and 4 is hundreds. It is read as four hundred twenty one and nine tenths.

Let's Try This

1. Given the following decimals, put each of their digits in the place value chart.

Decimals	Whole Numbers			Decimal Point	Fractions		
	hundreds	tens	ones		tenths (1/10)	hundredths (1/100)	thousandths (1/1000)
0.375							
57.21							
1.49							
976.3							

2. Identify the place value of the underlined digit in the following decimals.

   a. 0.34<u>5</u> – _____

   b. 57.<u>2</u>1 – _____

   c. 1.4<u>9</u> – _____

   d. <u>9</u>76.3 – _____

3. Write the decimals in words or in symbols.

In words	In symbols
1. _____	24.63
2. one hundred three and fifty seven hundredths	_____
3. five hundred twenty nine thousandths	_____
4. _____	60.2

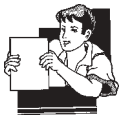
Compare your answers on the next page:

Decimals	Whole Numbers			Decimal Point	Fractions		
	hundreds	tens	ones		tenths (1/10)	hundredths (1/100)	thousandths (1/1000)
0.345			0	.	3	4	5
57.21		5	7	.	2	1	
1.49			1	.	4	9	
976.3	9	7	6	.	3		

2. a. 0.34<u>5</u> – thousandths
   b. 57.<u>2</u>1 – tenths
   c. 1.4<u>9</u> – hundredths
   d. <u>9</u>76.3 – hundreds

3.

In Words	In Symbols
1. twenty four and sixty three hundredths	24.63
2. one hundred three and fifty seven hundredths	103.57
3. five hundred twenty nine thousandths	0.529
4. sixty and two tenths	60.2



Let's Learn

You're now familiar with the place value of the digits of decimals. With this skill, you are now ready to learn to identify the value of the digits of a given decimal. In identifying the value of a particular digit, always think first of its place value.

EXAMPLE 1 What is the value of each digit in the decimal, 21.55? Let's start with the digits to the right of the decimal point or the fractions. Then with the digits to the left of the decimal point or the whole numbers.

- The value of the first digit to the right of the decimal point .5.
- The value of the second digit to the right of the decimal point is .05.
- The value of 1 is 1
- The value of 2 is 20.

EXAMPLE 2 What is the value of the digits in 1.786?

- The value of 7 is .7
- The value of 8 is .08
- The value of 6 is .006
- The value of 1 is 1

EXAMPLE 3 What is the value of the digits in 226.373?

- The value of 3 (tenths place) is .3
- The value of 7 (hundredths place) is 0.7
- The value of 3 (thousandths place) is .003
- The value of 6 (ones place) is 6.
- The value of 2 (tens place) is 20.
- The value of 2 (hundreds place) is 20

Notice that the value of the digits to the right of the decimal point becomes smaller as you move towards the thousandths place. On the other hand, the value of the digits to the left of the decimal point becomes bigger as you move towards the thousands place.

In Example 3, let's compare the value .3 and .003, which one is greater? If you said, .3, you're right. Look at digit 2 in the tens and hundreds places, which one is greater? Digit 2 in the hundreds place is greater because its value is 200 while digit 2 in the tens place is only 20.

In the decimal 1.55, which of the underlined digit is lesser? .05 is lesser than .5.

Let's Try This

1. Give the value of the underlined digit in the following decimals.

   a. 1.2̲46 – _____
   b. 35.7̲5 – _____
   c. .08̲9 – _____
   d. 2̲.5 – _____

2. Compare the values of the underlined digits. Which digit has the greater value?

   a. 1<u>3</u>.00<u>3</u> – _____
   b. 6.<u>55</u> – _____
   c. 2<u>1</u>7.5<u>1</u> – _____

3. Compare the values of the underlined digits. Which digit has the lesser value?

   a. 17.<u>1</u>3<u>1</u> – _____
   b. <u>5</u>.3<u>5</u> – _____
   c. <u>9</u>2.06<u>9</u> – _____

Compare your answers with the following:

1. a. 1.<u>2</u>46 – .2
   b. 35.7<u>5</u> – .05
   c. .08<u>9</u> – .009
   d. <u>2</u>.5 – 2

2. a. 1<u>3</u>.00<u>3</u> – 3
   b. 6.<u>55</u> – .5
   c. 2<u>1</u>7.5<u>1</u> – 10

3. a. 17.<u>1</u>3<u>1</u> – .001
   b. <u>5</u>.3<u>5</u> – .05
   c. <u>9</u>2.06<u>9</u> – .009

Let's Study and Analyze

There are fractions like $\frac{1}{10}, \frac{13}{100}, \frac{8}{100}$ whose denominators are powers of ten. There is another way of writing these fractions which makes use of our decimal place value system.

We write: $\frac{1}{10} = 0.1, \quad \frac{1}{10} = 0.01, \quad \frac{1}{100} = 0.01$

Do you see any relation between the number of decimal places and the number of zeros in the denominator? Yes, the number of zeros is the same as the number of decimal places. This makes it easy to change these rational numbers from fraction to decimal and vice versa.

We will first study how to convert decimals to fractions by analyzing the following examples:

EXAMPLE 1 Convert 0.06 to fraction.

STEP 1 Look at how many decimal places are there.

(There are two.)

STEP 2 Think of the number in the powers of ten with two zeros. (That's 100.) Multiply 0.06 by 100.

$$\begin{array}{rr} & 0.0\,6 \\ \times & 1\,0\,0 \\ \hline & 0\,0\,6\,0\,0 \\ & \downarrow \\ & 0\,0\,6.0\,0 \end{array}$$

0.06 — multiplicand

100 — multiplier

Count the number of decimal places in the multiplicand (0.06). Then put the decimal point 2 places from the first digit on the right going to the left.

STEP 3 Write 6 as the numerator and 100 as the denominator. Thus, we have:

$$\frac{6}{100}$$

EXAMPLE 2 Convert 2.8 to fraction.

STEP 1 Look at how many decimal places are there. (One only.)

STEP 2 Think of the number in the powers of ten with only one zero. (That's 10.) Multiply 2.8 by 10.

$$\begin{array}{rr} & 2.8 \\ \times & 1\,0 \\ \hline & 2\,80 \\ & \downarrow \\ & 2\,8.0 \end{array}$$

Count the number of decimal places in the multiplicand (2.8). Then put the decimal point one place from the first digit on the right going to the left.

STEP 3 Write 28 as the numerator and 10 as the denominator. Thus, we have:

$$\frac{28}{10}$$

EXAMPLE 3 Convert 1.013 to fraction.

STEP 1 Look at how many decimal places are there. (There are three.)

STEP 2 Think of the number in the powers of ten with three zeros. (That's 1000.) Multiply 1.013 by 1000.

$$\begin{array}{rr} & 1.013 \\ \times & 1000 \\ \hline & 1{,}013.000 \end{array}$$

Count the number of decimal places in the multiplicand (1.013). Then put the decimal point 3 places from the first digit on the right going to the left.

STEP 3 Write 1,013 as the numerator and 1,000 as the denominator. Thus, we have:

$$\frac{1{,}013}{1{,}000}$$

Let's Try This

Convert the following decimals to fractions.

1. 84.2

STEP 1 Identify the number of decimal places. _____

STEP 2 Multiply 84.2 × _____ = _____

STEP 3 Write the fraction form. _____

2. 1.027

STEP 1 Identify the number of decimal places. _____

STEP 2 Multiply 1.027 × _____ = _____

STEP 3 Write the fraction form. _____

3. 0.03 in fraction form is _____.

4. 5.1 in fraction form is _____.

5. .75 in fraction form is _____.

Compare your answer with those in the *Answer Key* on pages 42–44.

Let's Study and Analyze

Now we move on to converting fractions to decimals.

Converting fractions to decimal numbers is done by dividing the numerator by the denominator. Let's study and analyze the following examples:

EXAMPLE 1 Convert ½ to fraction.

STEP 1 Divide 1 by 2 as in:

$$2\overline{)1}$$

STEP 2 Since we can't divide a smaller number (1) by a bigger one (2), put a decimal point to the right of the dividend 1, then cipher a zero, as in:

$$2\overline{)1.0}$$

STEP 3 Compute for the quotient.

$$\begin{array}{r} .5 \\ 2\overline{)1.0} \\ \underline{1.0} \\ 0 \end{array}$$

Therefore: $\frac{1}{2}$ in decimal form is .5

EXAMPLE 2 Convert $\frac{3}{4}$ to a decimal.

STEP 1 Divide 3 by 4 as in:

$$4\overline{)3}$$

STEP 2 Since the fraction is a proper fraction, we can't divide the smaller number (3) by a bigger one (4), put a decimal point to the right of the dividend (3), then cipher two zeros, as in:

$$4\overline{)3.00}$$

STEP 3 Compute for the quotient.

$$\begin{array}{r} .75 \\ 4\overline{)3.00} \\ \underline{2\ 8} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

Therefore: $\frac{3}{4}$ in decimal form is .75

EXAMPLE 3 Convert $\frac{5}{9}$ to decimal by using the short method.

SOLUTION

$$\begin{array}{r} .555 \\ 9\overline{)5.000} \\ \underline{4\ 5} \\ 50 \\ \underline{45} \\ 50 \\ \underline{45} \\ 5 \end{array}$$

Therefore: $\frac{5}{9}$ in decimal form is .555

Notice in all the examples that the number of zeros ciphered to the right of the decimal point determines the number of decimal places.

Let's Try This

Convert the following fractions to decimal. Show your solution using the short method.

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

2. $\frac{1}{8}$

3. $\frac{9}{4}$

Compare your answers with those found in the *Answer Key* on page 45.

Let's See What You Have Learned

A. Fill in the blanks by writing down the decimal numbers in words or in symbols.

In words	In symbols
1. _____	1.362
2. thirty six and twenty three thousandths.	_____

B. Put the following decimals in the place value chart below. Identify the place value of each digit.

1. 810.02 2. 0.297

Numbers	Whole Numbers			Decimal Point	Decimal Numbers		
	hundreds	tens	ones		tenths (1/10)	hundredths (1/100)	thousandths (1/1000)

C. Identify the place value and the value of each digit.

1. 810.02

Digit	**Place Value**	**Value**
8		
1		
0		
0		
2		

2. 0.297

Digit	**Place Value**	**Value**
0		
2		
9		
7		

D. Compare the values of the underlined digits. Which digit has the greater value?

1. 2̲32̲.1 – _____

2. 1̲.561̲ – _____

3. 49.5̲5̲ – _____

E. Convert the following decimals to fractions.

1. 35.6

2. 9.201

F. Convert the following fractions to decimals.

1. 6/15

2. 3/25

Compare your answers with those found in the *Answer Key* on pages 45–48.

If your test score is from:

21–27 Excellent! You have understood the lesson well.

11–20 Review the parts of the lesson which you did not understand.

0–10 You should study the whole lesson again.

You may now go to the next lesson.

Let's Remember

- Decimals are fractions expressed in tenths, hundredths, thousandths, etc. They can also be expressed with a whole number.
- The decimal point (.) separates the fraction and the whole number. All digits to the right of the decimal point make up the fraction. All the digits to the left of the decimal point are part of the whole number.
- The place value of the digit determines its value.
- The value of the digits decreases as you move farther to the right of the decimal point. The value of the digits increases as you move farther to the left of the decimal point.
- In converting decimals to fractions, the number of decimal places is the same as the number of zeros of the powers of ten in the denominator. Powers of ten are 10, 100, 1,000, 10,000, etc. . . .
- In converting fractions to decimals, divide the numerator by the denominator. If the fraction is a proper fraction, you cannot divide a smaller number by a greater number. So put a decimal point to the right of the dividend and cipher the appropriate number of zero(s).

Take a brief break. Have a cup of coffee or just walk around to relax.

Are you ready for Lesson 2?

LESSON 2

Addition of Decimals

Money is often expressed as decimal numbers and certain measurements are also expressed as decimals. There is often a need for these decimal values to be added, like when you need to pay for the grocery items you bought, or when you need to get the perimeter of a lot with dimensions 34.40 m, 12.36 m, 11.12 m and 25.09 m.

In this lesson you will learn how to add decimals. After studying this lesson, you should be able to:

- add decimal numbers; and
- solve problems involving addition of decimals and money.

Let's Study and Analyze

Adding decimals is just like adding whole numbers. Study the examples shown below.

EXAMPLE 1

Find the sum of 1.69 and 0.63.

SOLUTION Arrange the decimals in a column. Align the decimal points.

$$\begin{array}{rr} & {\scriptstyle 1\ 1} \\ & 1.69 \\ + & 0.63 \\ \hline & 2.32 \end{array}$$

Add: 9 + 3 = 12 hundredths. Write 2 below the hundredths column and regroup 1 tenths to the tenths place.

Add: 1 + 6 + 6 = 13 tenths. Write 3 below the tenths column and regroup 1 to the ones place.

Add: 1 + 1 = 2. Write 2 below the ones column.

The sum is 2.32.

EXAMPLE 2

Find the sum of 14.34, 1.628 and 3.96.

SOLUTION Arrange the decimals in a column. Align the decimal points.

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ \ \ } \\ 14.34 \\ 1.628 \\ +\ 3.96 \\ \hline 19.928 \end{array}$$

Bring down 8 in the thousandths column.

Add: 4 + 2 + 6 = 12 hundredths. Write 2 below the hundredths column and regroup 1 tenths in the tenths place.

Add: 1 + 3 + 6 + 9 = 19 tenths. Write 9 below the tenths column and regroup 1 to the ones place.

Add: 1 + 4 + 1 + 3 = 9 ones. Write 9 below the ones place.

Bring down 1.

The sum is 19.928.

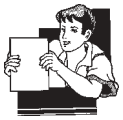
Let's Review

Find the sum of the following.

1. 36.125 + 8.01 + 23.9

2. 0.539 + 0.987 + 0.83

Compare your answers with those in the *Answer Key* on pages 48–49.



Let's Learn

One application of adding decimals is adding money. Money is usually expressed in decimals. The process of adding money should then be the same as adding decimals. Look at the example shown below.

EXAMPLE

Find the sum of ₱ 123.65, ₱ 59.80 and ₱ 12.15.

SOLUTION Arrange the decimals in column. Align the decimal points.

$$\begin{array}{rr} & {\scriptstyle 1\,1\;\;1} \\ ₱ & 123.65 \\ & 59.60 \\ & 12.15 \\ \hline ₱ & 195.40 \end{array}$$

Add: 5 + 0 + 15 = 10. Write 0 below the hundredths column and regroup 1 to the tenths place.

Add: 1 + 6 + 6 + 1 = 14. Write 4 below the tenths column and regroup 1 to the ones place.

Add: 1 + 3 + 9 + 2 = 15. Write 5 below the ones column and regroup 1 to the tens place.

Add: 1 + 2 + 5 + 1 = 9. Write 9 below the tens column.

Bring down 1 in the hundreds column.

The sum is ₱ 195.60.

Let's Study and Analyze

Let us now work on problems involving money. Study the examples below.

EXAMPLE 1 Aling Rita bought four items from the store as follows: cooking oil (₱ 31.75), canned tuna (₱ 22.15), tomato sauce (₱ 15.50) and powdered milk (₱ 73.65). How much should she pay for the items she bought?

SOLUTION

STEP 1 Write the given information.

₱31.75 – cooking oil
₱22.15 – canned tuna
₱15.50 – tomato sauce
₱73.65 – powdered milk

STEP 2 Determine what is asked.

The problem asks for the total price or sum of the items Aling Rita bought.

STEP 3 Solve for the answer.

Find the sum.

$$\begin{array}{rrll} & {\scriptstyle 1\,2\;\;1} & & \\ ₱ & 31.75 & – & \text{cooking oil} \\ & 22.15 & – & \text{canned tuna} \\ & 15.50 & – & \text{tomato sauce} \\ + & 73.65 & – & \text{powdered milk} \\ \hline ₱ & 143.05 & & \end{array}$$

The total price of the items Aling Rita bought is ₱ 143.05.

EXAMPLE 2 Mang Enteng, a truck driver, needs to deliver goods from a factory to warehouses A, B and C. The distance from the factory to warehouse A is 3.45 km, from warehouse A to warehouse B, 6.29 km and from warehouse B to warehouse C is 5.17 km. What is the total distance traveled by Mang Enteng in delivering goods to the three warehouses?

SOLUTION

STEP 1 Write the given information.

3.45 km – distance from factory to warehouse A
6.29 km – distance from warehouse A to warehouse B
5.17 km – distance from warehouse B to warehouse C

STEP 2 Determine what is asked.

Find the total distance traveled by Mang Enteng to deliver the goods to the three warehouses.

STEP 3 Solve for the answer.

Find the sum.

$$\begin{array}{rr} & {\scriptstyle 2} \\ & 3.45 \\ & 6.29 \\ + & 5.17 \\ \hline & 14.91 \end{array}$$

Mang Enteng traveled a total distance of 14.91 km.

Let's Review

1. Mang Diego was trying to check the expenses for his family's out-of-town trip last week. These were the expenses of his family during the trip: food—₱564.85; transportation—₱974.75; lodging—₱615.25 and shopping expenses—₱841.60. What was their total expenses?

2. A gold digger mined four nuggets of gold. The nuggets weighed 5.143 grams, 10.928 grams, 7.036 grams and 9.255 grams. What is the total weight of the gold nuggets?

Compare your answers with those in the *Answer Key* on pages 49–51.

Let's Remember

- In addition, the numbers/decimals to be added are called **addends.** The answer is called the **sum.**
- To add decimals, write the addends in column such that the decimal points and the digits of the same place value are aligned.
- When adding decimals always start from the first digit on the right moving on towards the last digit on the left.
- Money values are examples of decimals that we add in our day to day life.

Let's See What You Have Learned

1. Aling Azon bought a loaf of bread (₱ 22.95), cheese (₱ 23.25), mayonnaise (₱ 63.15) and a dozen eggs (₱ 40.50). How much did Aling Azon spend (2 points)

2. Billy is constructing a chicken wire fence around his garden. The 1st side is 10.23 meters long, the 2nd side is 5.87 meters long, the third side is 12.48 meterstick long and the fourth side is 6.91 meters long. How many meters of chicken wire will he need to fence the whole garden?

3. A person traveling in a plane can carry only up to 30 kilos of baggage. Mang Tonio carried four bags for his air travel. The first bag weighed 6.8 kilos, the second bag weighed 8.25 kilos, the third bag weighed 7.9 kilos and the last bag weighed 8.41 kilos. Did Mang Tonio exceed the baggage weight limit? (2 points)

4. As fund-raising for the purchase of more books for the school library, each of the four classes organized a newspaper drive. Section A was able to raise ₱ 1,062.75, section B was able to raise ₱ 958.10, section C was able to raise ₱ 1,139.65 and section D was able to raise ₱ 980.25. How much money were the classes able to raise? (2 points)

5. Aling Nena's electric bill, when broken down, is made up of the Basic Charge (₱ 1,328.37), the Currency Adjustment (₱ 53.12), and the Power Purchase Adjustment (₱ 360.49). What is the total cost of Aling Nena's electric bill? (2 points)

Compare your answers with those in the *Answer Key* on pages 51–55.

If your test score is from:

8–10 Excellent! You have understood the lesson well.

5–7 Review the parts of the lesson which you did not understand.

0–4 You should study the whole lesson again.

Why don't you relax before going on to the next lesson?

Sit up straight. Put your feet flat on the floor. Take a deep breath. Hold it. Then exhale/inhale….. exhale. Do this 10 times.

How do you feel? Do you feel good? If you do, then turn to Lesson 3.

LESSON 3

Subtraction of Decimals

Many applications in daily life require subtraction of decimals. Money transactions like giving change for a ₱ 100.00 bill, or tax deductions from your income involve subtraction of decimals. Some measurements expressed as decimals also involve subtraction. One example is determining how much cloth is left if the original length is 30.25 meters and 12.75 meters of it was used.

In this lesson, you will learn how to subtract decimals and study how to solve word problems involving decimals. After studying this lesson, you should be able to:

- subtract decimals; and
- solve word problems involving the subtraction of decimals.

Let's Study and Analyze

Subtracting decimals is just like subtracting whole numbers. Let us take a look at the examples given on the next page.

Remember that the **minuend** is the number/decimal to be subtracted from. The **subtrahend** is the number/decimal to be subtracted. The minuend is always greater than the subtrahend.

EXAMPLE 1 Subtract 0.74 from 0.89.

SOLUTION Align the decimal points.

$$\begin{array}{rl} & 0.089 \\ - & 0.74 \\ \hline & \end{array}$$

0.089 — minuend

0.74 — subtrahend

The difference between 0.89 and 0.74 is 0.15.

EXAMPLE 2 Solve for the difference of 5.32 and 3.86.

SOLUTION Align the decimal points and for the difference.

a.
$$\begin{array}{rl} & 5.3\overset{2}{\cancel{2}} \\ - & 3.8\,6 \\ \hline & 6 \end{array}$$

Subtract .02 – .06. This is not possible because we cannot subtract a bigger number (.06) from a smaller number (.02). Regroup or take .1 from .3 so that .02 becomes .12 and .3 becomes .2. Subtract .12 – .6 = 0.6. Write the 6 below the hundredths column.

b.
$$\begin{array}{rl} & 5.\overset{4}{\cancel{3}}\overset{12}{\cancel{2}} \\ - & 3.8\,6 \\ \hline & 4\,6 \end{array}$$

Subtract .2 – .8. This is not possible again. Regroup or take 1 from 5 in the one's place so that .2 in the tenths place becomes 1.2 and 5 becomes 4. Now we can subtract 1.2 – .8 = .4. Write .4 below the tenths column.

c.
$$\begin{array}{rl} & \overset{4}{\cancel{5}}.\overset{12}{\cancel{3}}2 \\ - & 3.8\,6 \\ \hline & 1.4\,6 \end{array}$$

Subtract 4 – 3 = 1. Write 1 below the ones column.

The difference between 5.32 and 3.86 is 1.46.

Let's Review

1. Find the difference of ₱39.45 and ₱14.23. Write your solution below.

2. Find the difference of 6.78 and 4.89. Write your solution below.

Compare your answers with those in the *Answer Key* on pages 55–56.

Let's Study and Analyze

Now let us move on to solving word problems involving subtraction of decimals. Let us study the examples below.

EXAMPLE 1 A coil of wire is measured to be 14.37 m long. If 8.95m is cut from it, how much will be left?

SOLUTION

STEP 1 Write the given information.

Length of coil of wire: 14.37 m
Portion of wire taken: 8.95 m

STEP 2 Determine what is asked.

Length of the coil of wire remaining.

STEP 3 Solve for the answer.

Find the difference between 14.37 and 8.95.

a. $\begin{array}{r} 14.37 \\ -\ 8.95 \\ \hline 2 \end{array}$

Let's check the value of the digits in the minuend:

Digit 7 is 0.7 Digit 4 is 4
Digit 3 is .3 Digit 1 is 10

Subtract .07 – .05 = .02. Write 2 below the hundredths column.

b. $\begin{array}{r} {}^{3}\not{1}\not{4}.{}^{1}37 \\ -\ 8.95 \\ \hline 42 \end{array}$

Subtract .3 – .9. This is not possible. Regroup 1 from 4 to the tenths place so that .3 becomes 1.3 and 4 becomes 3. Now, subtract 1.3 – .9 = 4. Write .4 below the tenths place.

c. $\begin{array}{r} {}^{0\ 13}\not{1}\not{4}.{}^{1}37 \\ -\ 8.\ 95 \\ \hline 5.\ 42 \end{array}$

Subtract 3 – 8. This is not possible. Regroup 10 to 3 in the ones place so that 3 becomes 13 and 10 becomes 0. Now, subtract 13 – 8 = 5. write 5 below the ones place.

The difference of 14.37 meters and 8.95 meters is 5.42 meters.

EXAMPLE 2 Aling Carol bought vitamins worth ₱68.45from a drugstore. She gave ₱ 100.00 + to the cashier. How much is her change?

SOLUTION

STEP 1 Write the given information.

Price of vitamins bought – ₱ 68.45
Amount Aling Carol paid – ₱ 100.00

STEP 2 Determine what is asked.

How much is Aling Carol's change?

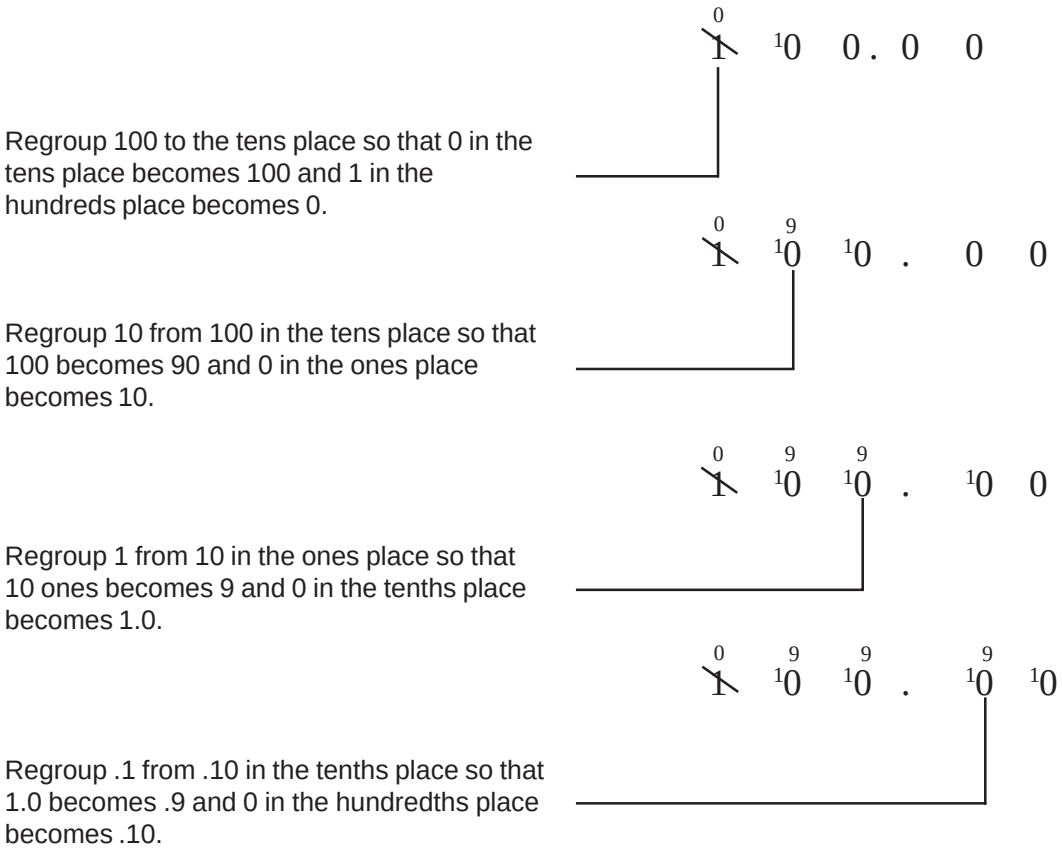
STEP 3 Solve for the answer.

Subtract ₱ 68.45 from ₱ 100.00

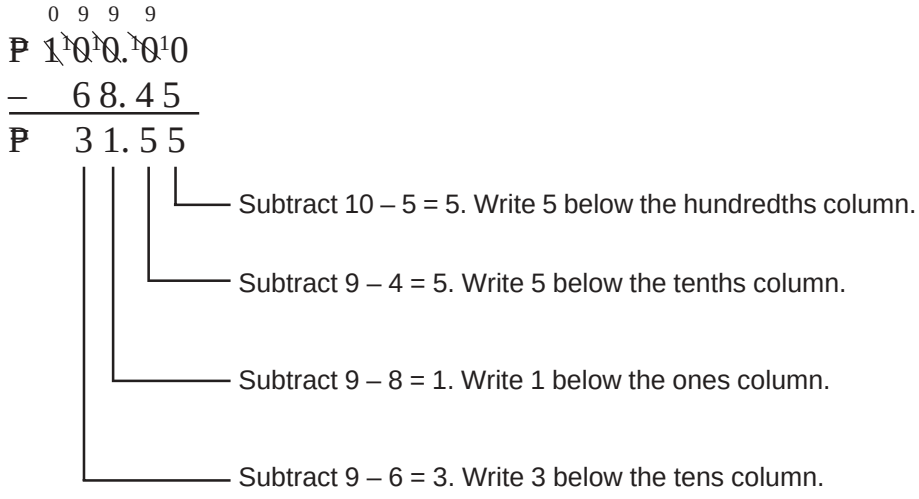
a. Align the decimal points and the digit of the same place value of the minuend and the subtrahend.

$$\begin{array}{rr} & {\scriptstyle 0\ 9\ 9\ 9} \\ ₱ & 100.0^{1}0 \\ - & 68.4\ 5 \\ \hline ₱ & 5 \end{array}$$

b. Since there are four consecutive zero digits in the minuend, regrouping has to be done in the minuend starting with 1 in the hundreds place whose value is 100. In regrouping, we'll be using the values of the digits.



c. Now we are ready to subtract. Always start with the last digit on the right and move towards the last digit on the left.



Aling Carol's change is ₱31.55

Let's Review

1. Mang Nardo has ₱ 8,726.35 in his bank account. How much money will be left in the bank if he withdraws ₱ 3,457.25?

2. Aling Sally went to the market to buy food for the family. She spent ₱ 348.75 for vegetables, bananas, fish and meat. How much was left of her ₱ 500 bill?

Compare your answers with those in the *Answer Key* on pages 57–59.

Let's Remember

- In the subtraction of decimals, the number to be subtracted from is called the **minuend** and the number to be subtracted to or be taken away is called the **subtrahend**. The answer in subtraction is called the **difference**.

  Example:

  $$\begin{array}{rl} 26.78 & \longrightarrow \text{ minuend} \\ -\ 3.58 & \longrightarrow \text{ subtrahend} \\ \hline 23.22 & \longrightarrow \text{ difference} \end{array}$$

- The minuend is always bigger/greater than the subtrahend because we cannot subtract a bigger/greater number from a smaller one.

- In subtracting decimals, write the minuend and subtrahend in a column such that the decimal points and the digits of the same place value are aligned.

- In solving for the difference, always start with the first digits on the right moving towards the last digit on the left.

- In cases where there are two, three or four zeros in the minuend, subtraction is not possible. To make this possible, regrouping has to be done in the non-zero place value.

  Example:

  $$\begin{array}{r} {}^{0}{}^{9}{}^{9}{}^{9} \\ 1^{1}0^{1}0.^{1}0^{1}0 \\ -\quad 5\,2.\,8\,5 \\ \hline \end{array}$$

- Money values are examples of decimals which we subtract in our day to day life.

Let's See What You Have Learned

Write the solution of each problem below.

1. Aling Mila went shopping for a dress. She bought a dress worth ₱ 429.15. If she gave a ₱ 1,000 bill, how much was her change?

2. Rina and Lita's combined weight is 80.7 kilograms. If Rina weighs 46.9 kilograms, what is Lita's weight?

3. Bong reached the finish line in 37.19 seconds while Jun reached it in 41.36 seconds. How much faster did Bong reach the finish line?

4. Mr. Guzman has ₱12,081.85 in his bank account. He withdrew ₱ 2,954.90 from this account. How much money was left in his account?

Compare your answers with those in the *Answer Key* on pages 59–64.

Let's Sum Up

- Decimals are fractions expressed in tenths, hundredths, thousandths, etc. They can also be expressed with a whole number.
- The decimal point (.) separates the fraction and the whole number. All digits to the right of the point make up the fraction. All the digits to the left of the decimal point are part of the whole number.
- The place value of the digit determines its value.
- The value of the digits decreases as you move farther to the right of the decimal point. The value of the digits increases as you move farther to the left of the decimal point.
- In converting decimals to fractions, the number of decimal places is the same as the number of zeros of the powers of ten in the denominator. Powers of are 10, 100, 1,000, 10,000, etc. . . .
- In converting fractions to decimals, divide the numerator by the denominator. If the fraction is a proper fraction, you cannot divide a smaller number by a greater number. So put a decimal point to the right of the dividend and cipher a number of zero(s).
- In addition, the numbers/decimals to be added are called **addends.** The answer is called the **sum.**
- To add the decimals, write the addends in a column such that the decimal points and the digits of the same place value are aligned.

- When adding decimals, always start at the first digit at the right moving on towards the last digit at the left.
- In adding decimals, we either use the expanded form to show the step by step process or the short method.
- Money values are examples of decimals that we add in our day to day life.
- In the subtraction of decimals, the number to be subtracted from is called the **minuend** and the number to be subtracted or be taken away is called the **subtrahend**. The answer in subtraction is called the **difference**.

Example:

$$\begin{array}{rl} 26.78 & \text{minuend} \\ -\ 3.58 & \text{subtrahend} \\ \hline 23.22 & \text{difference} \end{array}$$

- The minuend is always bigger/greater than the subtrahend because we cannot subtract a bigger/greater number from a smaller one.
- In subtracting decimals, write the minuend and subtrahend in a column such that the decimal points and the digits of the same place value are aligned.
- In solving for the difference, always start with the first digits at the right moving towards the last digit at the left.
- In cases where there are two, three or four zeros in the minuend, subtraction is not possible. To make this possible, regrouping has to be done in the non-zero place value.

Example:

$$\begin{array}{r} {}^{0}\cancel{1}{}^{9}0{}^{9}0.{}^{9}0{}^{9}0 \\ -\quad 5\,2.8\,5 \\ \hline \end{array}$$

- Money values are examples of decimals which we subtract in our day to day life.

What Have You Learned?

1. Write 93.035 in words. (2 points)

   _____

2. Write in symbols “three and nine thousandths.” (2 points)

   _____

3. Convert 1.15 to a fraction. (2 points)

4. Convert 8/25 to a decimal number. (2 points)

5. Identify the place value and value of the underlined digit of the following decimals:

   a. 0.<u>6</u>41 b. 0.6<u>3</u> c. 0.07<u>9</u> d. <u>2</u>8.6 e. 1<u>7</u>.017

Digit	Place Value	Value
a.		
b.		
c.		
d.		
e.		

6. Aling Trining bought bangus (₱ 120.75) and chicken (₱ 97.50) in the market. If she gave a ₱ 500.00 bill to the vendor, how much will her change be? (4 points)

Compare your answers with those in the *Answer Key* on pages 64–67.

If your test score is:

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 *(pages 2–3)*

1. fourteen and five hundred nine thousandths.

2. 42.068

3. **STEP 1** Look at how many decimal places there are. There are three.

   STEP 2 Think of a number in the powers of ten with three zeros. (That's 1000). Multiply 0.043 by 1000.

$$\begin{array}{rr} & 0.043 \\ \times & 1000 \\ \hline & 4300 \end{array}$$

   43.000 or 43 — Count the number of decimal places in the multiplicand (0.043). Then put the decimal point three places from the first digit going to the left.

   STEP 3 Write 43 as the numerator and 1000 as the denominator. Thus we have:

$$\frac{43}{1000}$$

4. To convert 12/25 to a decimal number, divide 12 by 25.

$$\begin{array}{r} .48 \\ 25\overline{)1200} \\ \underline{100} \\ 200 \\ \underline{200} \\ 0 \end{array}$$

   The decimal form of 12/25 is 0.48.

5. a. thousandths place
   b. hundredths place
   c. ones place
   d. tenths place

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

₱375.35 pair of pants
₱175.60 polo shirt
₱34.85 pair of socks
₱54.25 three handkerchiefs

STEP 2 Determine what is asked.

Find the total cost of the items Arnel bought.

STEP 3 Solve for the answer.

a. To find the sum of the prices, align the decimal points of all the values.

₱ 375.35
175.60
34.85
54.25

b. Add the values.

2 2 2 1
₱ 375.35
34.85
54.25
₱ 640.05

Add: 5 + 0 + 5 + 5 = 15. Write 5 below the hundredths column. Regroup 1 to the tenths place.

Add: 1 + 3 + 6 + 8 + 2 = 20. Write 0 below the tenths column. Regroup 2 to the ones place.

Add: 2 + 5 + 5 + 4 + 4 = 20. Write 0 below the ones place. Regroup 2 to the tens place.

Add: 2 + 7 + 7 + 3 + 5 = 24. Write 4 below the tenths place. Regroup 2 to the hundreds place.

Add: 2 + 3 + 1 = 6. Write 6 below the hundreds place.

Arnel spent ₱640.05 for these items.

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

Height of wall to be built: 2.36 meters
Height of wall built so far: 1.47 meters

STEP 2 Determine what is asked.

Find the remaining height of wall that Mang Mario needs to build.

STEP 3 Solve for the answer.

a.

$$\begin{array}{r} {\scriptstyle 1\ 12} \\ 2.\not{3}{}^{1}6 \\ -\ 1.4\ 7 \\ \hline 0.8\ 9 \end{array}$$

Subtract .06 – .07. This is not possible. Regroup .1 from .3 in the tenths place to the hundredths place so that .3 becomes .2 and .06 becomes 0.16. Now subtract .16 – .07 =.09. Write 9 below the hundredths place.

b.

$$\begin{array}{r} {\scriptstyle 1\ 12} \\ \not{2}.{}^{1}\not{3}{}^{1}6 \\ -\ 1.4\ 7 \\ \hline 0.8\ 9 \end{array}$$

Subtract .2 – .4. This is not possible. Regroup 1 from 2 in the ones place to the tenths place so that 2 becomes 1 and .2 becomes 1.2. Now subtract 1.2 – .4 = .8. Write 8 below the tenths place.

(1 – 1 = 0)

Mang Mario still needs to build the wall 0.89 meters high.

Let's Try This (pages 12–13)

1. **STEP 1** Look at how many decimal there are. There is only one.

   STEP 2 Think of the number in the powers of 10 with one zero. (That's 10). Multiply 84.2 by 10.

$$\begin{array}{r} 84.2 \\ \times \quad 10 \\ \hline 8420 \end{array}$$

1 decimal place

842.0 or 842

Count the number of decimal places in the multiplicand (84.2). Then put the decimal point one place from the first digit on the right going to the left.

   STEP 3 Write 842 as the numerator and 10 as the denominator. Thus we have:

$$\frac{842}{10}$$

2. Convert 1.027 to a fraction.

   STEP 1 Look at how many decimal places there are. There are three.

   STEP 2 Think of the number in the powers of 10 with three zeros. (That's 100). Multiply 1.027 by 1000.

$$\begin{array}{r} 1.027 \\ \times \quad 1000 \\ \hline 1027000 \end{array}$$

3 decimal places

1027.000 or 1027

Count the number of decimal places in the multiplicand (1.027). Then put the decimal point three places from the first digit on the right going to the left.

STEP 3 Write 1027 as the numerator and 1000 as the denominator. Thus we have:

$$\frac{1027}{1000}$$

3. Convert 0.03 to a fraction.

STEP 1 Look at how many decimal places there are. There are two.

STEP 2 Think of the number in the powers of ten with two zeros. (That's 100). Multiply 0.03 by 100.

$$\begin{array}{rr} & 0.03 \\ \times & 100 \\ \hline & 0300 \end{array}$$

$$\downarrow$$

$$03.00 \text{ or } 3$$

Count the number of decimal places in the multiplicand (00). Then put the decimal point two places from the first digit on the right going to the left.

STEP 3 Write 3 as the numerator and 10 as the denominator. Thus we have:

$$\frac{3}{100}$$

4. Convert 5.1 to a fraction.

STEP 1 Look at how many decimal places there are. There is only one.

STEP 2 Think of the number in the powers of ten with one zero. (That's 10.) Multiply 5.1 by 10.

$$\begin{array}{r} 5.1 \\ \times\ \ 10 \\ \hline 510 \end{array}$$

51.0 or 51 ——— Count the number of decimal places in the multiplicand (5.1). Then put the decimal point one place from the first digit on the right going to the left.

STEP 3 Write 3 as the numerator and 10 as the denominator. Thus we have:

$$\frac{51}{10}$$

5. Convert .75 to a fraction.

STEP 1 Look at how many decimal places there are. There are two.

STEP 2 Think of the number in the powers of ten with two zeros. (That's 100.) Multiply 0.75 by 100.

$$\begin{array}{r} 0.75 \\ \times\ \ 100 \\ \hline 7500 \end{array}$$

75.00
or 75 ——— Count the number of decimal places in the multiplicand (0.75). Then put the decimal point two places from the first digit on the right going to the left.

STEP 3 Write 3 as the numerator and 10 as the denominator. Thus we have:

$$\frac{75}{100}$$

Let's Try This (page 15)

1. Convert 2/5 to a decimal.

$$
\begin{array}{r}
0.4 \\
5\overline{)2.0} \\
20 \\
\hline
0
\end{array}
$$

2/5 is equal to 0.4.

2. Convert 1/8 to a decimal.

$$
\begin{array}{r}
0.12 \\
8\overline{)1.000} \\
8 \\
\hline
20 \\
16 \\
\hline
40 \\
40 \\
\hline
0
\end{array}
$$

1/8 is equal to 0.12.

3. Convert 9/4 to a decimal.

$$
\begin{array}{r}
2.25 \\
4\overline{)9.00} \\
8 \\
\hline
10 \\
8 \\
\hline
20
\end{array}
$$

9/4 is equal to 2.25.

Let's See What You Have Learned (pages 15–17)

A. 1. one and three hundred sixty two thousandths.

2. 36.023

B.

Number	Whole Numbers			Decimal Point	Decimal Numbers		
	hundreds	tens	ones		tenths (1/10)	hundredths (1/100)	thousandths (1/1000)
810.02	8	1	0	.	0	2	
0.297			0	.	2	9	7

C.

1. 810.02

Digit	Place Value	Value
8	Hundreds	800
1	Tens	10
0	Ones	0
0	Tenths	.00
2	Hundredths	.02

2. 0.297

Digit	Place Value	Value
0	Ones	0
2	Tenths	.2
9	Hundredths	.09
7	Thousandths	.007

D. 1. 200
2. 1
3. .5

E.

1. Convert 35.6 to a fraction.

STEP 1 Look at how many decimal places there are. There is only one.

STEP 2 Think of the number in the powers of ten with one zero. (That's 10). Multiply 35.6 by 10.

$$\begin{array}{r} 35.6 \\ \times \quad 10 \\ \hline 3560 \end{array}$$

s

356.0 or 356 — Count the number of decimal places in the multiplicand (35.6). Then put the decimal point one place from the first digit on the right going to the left.

STEP 3 Write 35.6 as the numerator and 10 as the denominator. Thus we have:

$$\frac{356}{10}$$

2. Convert 9.201 to a fraction.

STEP 1 Look at how many decimal places there are. There are three.

STEP 2 Think of the number in the powers of ten with three zeros. (That's 1000.) Multiply 9.201 by 1000.

$$\begin{array}{r} 9.201 \\ \times \quad 1000 \\ \hline 9201000 \end{array}$$

s

9201.000 or 9201 — Count the number of decimal places in the multiplicand (9.201). Then put the decimal point three places from the first digit on the right going to the left.

STEP 3 Write 35.6 as the numerator and 1000 as the denominator. Thus we have:

$$\frac{9201}{1000}$$

F.

1. Convert 6/15 to a decimal.

$$15\overline{)6.0} = 0.4$$

$$\begin{array}{r} 60 \\ \hline 0 \end{array}$$

15 is equal to 0.4.

2. Convert 3/25 to a decimal.

$$25\overline{)3.00} = 0.12$$

$$\begin{array}{r} 25 \\ \hline 50 \\ \hline 0 \end{array}$$

25 is equal to 0.12.

C. Lesson 2

Let's Review (page 20)

1. Align the decimals and find the sum.

$$\begin{array}{rr} & {\scriptstyle 1\ 1} \\ & 36.125 \\ & 8.01 \\ + & 23.9 \\ \hline & 68.035 \end{array}$$

Bring down 5 below the thousandths column.

Add: 2 + 1 = 3. Write 3 below the hundredths column.

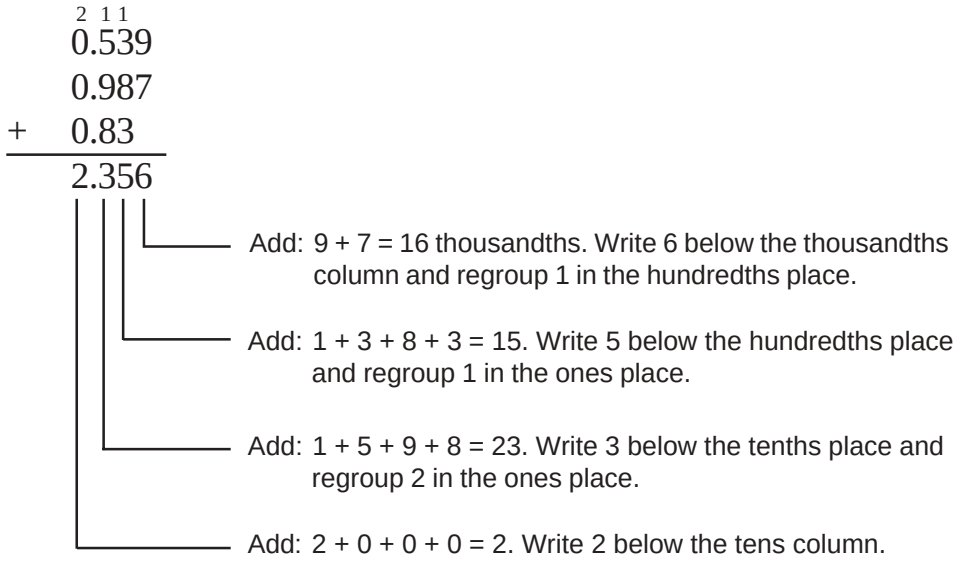
Add: 1 + 0 + 9 = 10. Write 0 below the tenths column and regroup 1 in the ones place.

Add: 1 + 6 + 8 + 3 = 18. Write 8 below the ones column and regroup 1 in the tens place.

Add: 1 + 3 + 2 = 6. Write 6 below the tens column

The sum is 68.035.

2. Align the decimals and find the sum.



The sum is equal to 2.356.

Let's Review (pages 23–24)

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

Expenses:

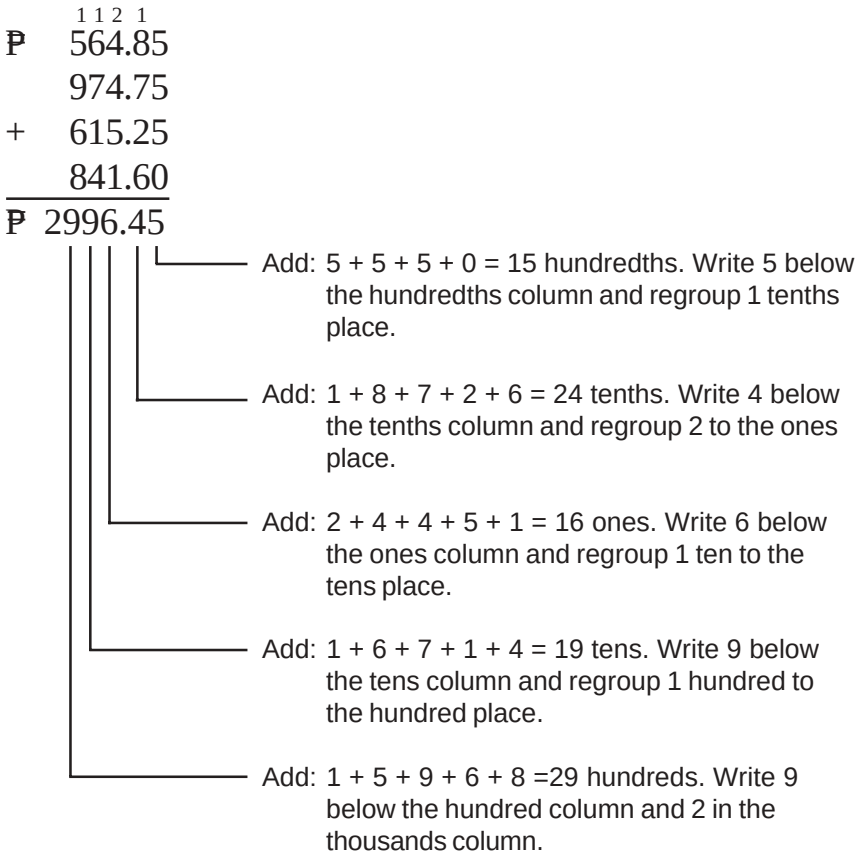
Food	–	₱564.85
Transportaion	–	₱974.75
Lodging	–	₱615.25
Shopping	–	₱841.60

STEP 2 Determine what is asked.

Find the total expenses for the trip.

STEP 3 Solve for the answer.

Align the decimal points and find the sum.



The total expenses for the trip was ₱2,996.45.

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

Weight of gold nuggets mined:

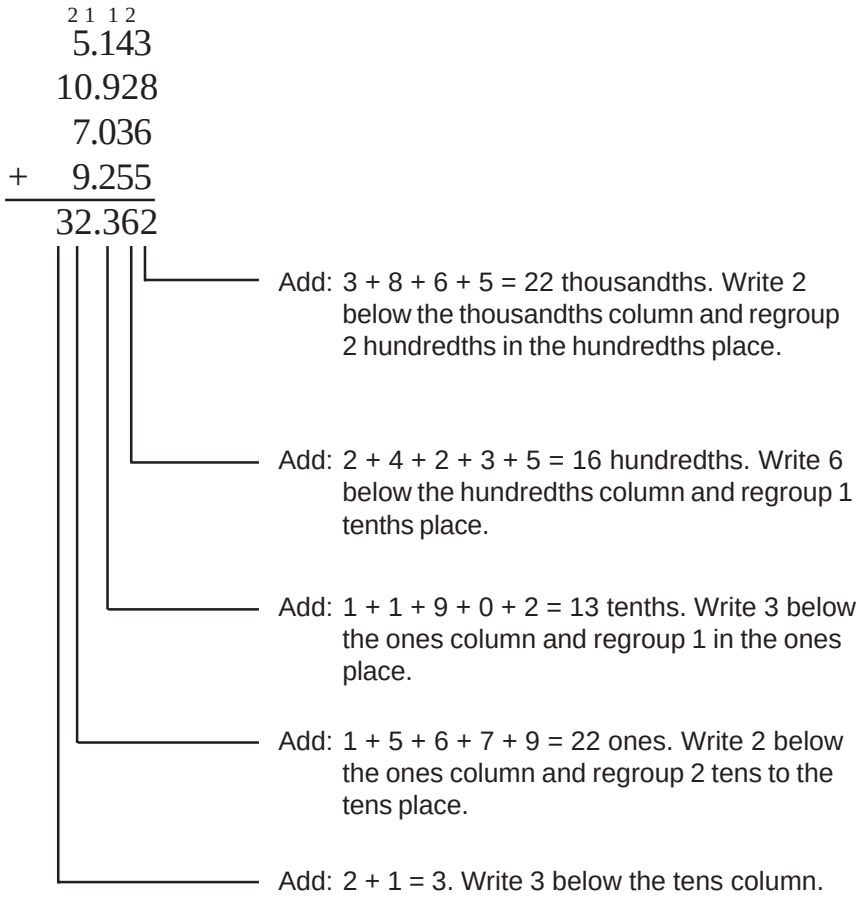
5.143 grams, 10.928 grams, 7.036 grams and 9.255 grams

STEP 2 Determine what is being asked.

Find the total weight of the gold nuggets.

STEP 3 Solve for the answer.

Align the decimal points then find the sum.



The total weight of all the nuggets is 32.362 grams.

Let's See What You Have Learned (pages 24–26)

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

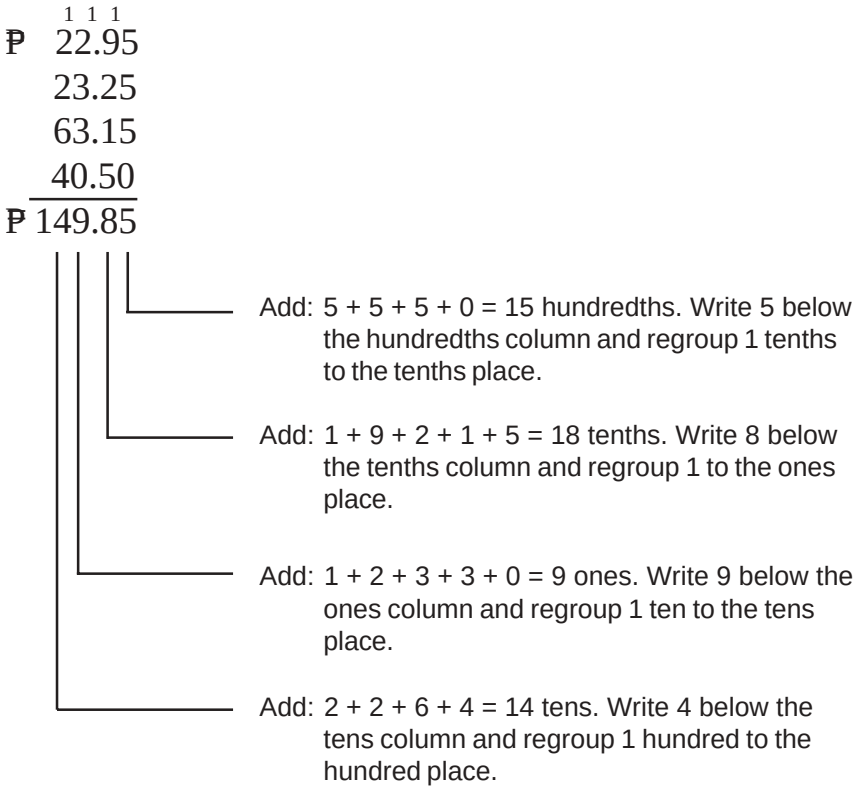
Items Aling Azon bought:

₱ 22.95 – bread	₱ 63.15 – mayonnaise
₱ 23.25 – cheese	₱ 40.50 – dozen eggs

STEP 2 Determine what is asked.

Find the total cost of the items Aling Azon bought.

STEP 3 Solve for the answer.



The total cost of the items Aling Azon bought is ₱ 149.85.

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

Length of each side to be fenced:

1st side – 10.23 m
2nd side – 5.87 m
3rd side – 12.48 m
4th side – 6.91 m

STEP 2 Determine what is being asked.

The length of chicken wire needed to fence all sides of the garden.

STEP 3 Solve for the answer.

Align the decimal points and find the sum.

$$\begin{array}{rr} & {\scriptstyle 1\,2\;1} \\ & 10.23 \\ & 5.87 \\ + & 12.48 \\ & 6.91 \\ \hline & 35.49 \end{array}$$

You will need 35.49 meters of chicken wire to fence all sides of the garden.

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

Total weight of the bags must not exceed 30 kilos.

Individual weights of the bag:
6.8 kilos, 8.25 kilos, 7.9 kilos, and 8.41 kilos

STEP 2 Determine what is asked.

Find the total weight of the bags and determine if it exceeds 30 kilograms.

STEP 3 Solve for the answer.

Align the decimal points of the weight values and find the sum.

$$\begin{array}{rr} & {\scriptstyle 2} \\ & 6.80 \\ & 8.25 \\ & 7.90 \\ + & 8.41 \\ \hline & 31.36 \end{array}$$

Add: 0 + 5 + 0 + 1 = 6 hundredths. Write 6 below the hundredths column.

Add: 8 + 2 + 9 + 4 = 23 tenths. Write 3 below the tenths column and regroup 2 to the ones place.

Add: 2 + 6 + 8 + 7 + 8 = 31 tens. Write 1 below the ones column and 3 in the tens place.

Since Mang Antonio's baggage weighed a total of 31.36 kilograms, he exceeded the baggage limit.

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

Money raised by each of the four classes.

₱1,062.75 (class A), ₱958.10 (class B), ₱1,139.65 (class C), ₱980.25 (class D)

STEP 2 Determine what is asked.

Find the total amount of money that the four classes collected.

STEP 3 Solve for the answer.

Find the total amount collected by finding the sum.

$$\begin{array}{rr} & {\scriptstyle 2\,2\,2\,1\;\;1} \\ ₱ & 1062.75 \\ & 958.10 \\ + & 1139.65 \\ & 980.25 \\ \hline ₱ & 4140.75 \end{array}$$

Add: 5 + 5 + 5 + 0 = 15 hundredths. Write 5 below the hundredths column and regroup 1 tenths place.

Add: 1 + 7 + 1 + 6 + 2 = 17 tenths. Write 7 below the tenths column and regroup 1 to the ones place.

Add: 1 + 2 + 8 + 9 + 0 = 20 ones. Write 0 below the ones column and regroup 2 to the tens place.

Add: 2 + 6 + 5 + 3 + 8 = 24 tens. Write 4 below the tens column and regroup 2 hundreds to the hundreds place.

Add: 2 + 0 + 9 + 1 + 9 = 21. Write 1 below the hundreds column and regroup 2 thousands in the thousands place.

Add: 2 + 1 + 1 = 4 thousands.Write 4 below the thousands column.

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

Breakdown of the cost of the electric bill

Basic charge (₱ 1,328.37), Currency adjustment (₱53.12), Power Purchase Adjustment (₱ 360.49).

STEP 2 Determine what is asked.

Find the total cost of the electric bill.

STEP 3 Solve for the answer.

Align the decimal points and find the sum.

$$\begin{array}{rr} & {\scriptstyle 1\ 1\ \ 1} \\ ₱ & 1328.37 \\ + & 53.12 \\ & 360.49 \\ \hline ₱ & 1741.98 \end{array}$$

The total electric bill is ₱ 1,741.98.

C. Lesson 3

Let's Review (page 29)

1. **SOLUTION** Align the decimal point and find the difference.

$$\begin{array}{rr} ₱ & 39.45 \\ – & 14.23 \\ \hline ₱ & 25.22 \end{array}$$

Subtract: .05 – .03 = .02. Write 2 below the hundredths column.

Subtract: .4 – .2 = .2. Write 2 below the tenths column.

Subtract: 9 – 4 = 5. Write 5 below the ones column.

Subtract: 3 – 1 = 2. Write 2 below the tens column.

The difference of ₱ 39.45 and ₱ 14.33 is ₱ 25.22.

2. **STEP 1** To get the difference, align the decimal point of the subtrahend with that of the minuend.

$$\begin{array}{r} 6.78 \\ -\ 4.89 \\ \hline \end{array}$$

STEP 2 Get the difference of the decimals.

a.

$$\begin{array}{r} {\scriptstyle 6} \\ 6.\not{7}{}^{1}8 \\ -\ 4.8\ 9 \\ \hline 9 \end{array}$$

Subtract .08 – .09. This is not possible again. Regroup 0.1 from 0.7 to the hundredth's place so that 0.7 becomes 0.6 and 0.08 becomes 0.18. Now subtract .18 – .09 = .09. Write 9 below the hundredths column.

b.

$$\begin{array}{r} {\scriptstyle 5\ 16} \\ \not{6}.\not{7}{}^{1}8 \\ -\ 4.8\ 9 \\ \hline .8\ 9 \end{array}$$

Subtract .06 – 0.8. This is not possible. Regroup 1 from 6 to the tenths place so that 6 becomes 5 and 0.6 becomes 1.6 Now subtract 1.6 – 0.8 – .08. Write 8 below the tenths column.

c.

$$\begin{array}{r} {\scriptstyle 5\ 16} \\ \not{6}.\not{7}{}^{1}8 \\ -\ 4.8\ 9 \\ \hline 1.8\ 9 \end{array}$$

Subtract: 5 – 4 = 1. Write 1 below the ones column.

The difference of 6.78 and 4.89 is 1.89.

Let's Review (page 32)

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

₱8,726.35 (Mang Nardo's money in the bank)
₱3,457.25 (money he needs to withdraw)

STEP 2 Determine what is asked.

Find out how much money is left in the bank after the withdrawal.

STEP 3 Solve for the answer.

Find the difference between ₱8,726.35 and ₱3,457.25

a.

$$\begin{array}{r} {}^{1} \\ ₱\ 87\not{2}{}^{1}6.35 \\ -\ 345\ 7.25 \\ \hline 9.10 \end{array}$$

(5 – 5 = 0)

(3 – 2 = 1)

Subtract 6 – 7. This is not possible. Regroup 10 from 20 in the tens place to the ones place so that 20 becomes 10 and 6 becomes 16. Now subtract 16 – 7 = 9. Write 9 below the ones place.

b.

$$\begin{array}{r} {}^{6}\ {}^{11} \\ ₱\ 8\not{7}\not{2}{}^{1}6.35 \\ -\ 3\,4\,5\ 7.25 \\ \hline 6\ 9.10 \end{array}$$

Subtract 10 – 50. This is not possibe. Regroup 100 from 700 to the tens place so that 700 becomes 600 and 10 becomes 110. Now subtract 110 – 50 = 60. Write 6 below the tens place.

c.

$$\begin{array}{rr} & {\scriptstyle 6\ 11} \\ ₱ & 87\not{2}^{1}6.35 \\ - & 345\ 7.25 \\ \hline ₱ & 526\ 9.10 \end{array}$$

(6 – 4 = 2)

(8 – 3 = 5)

The remaining money in the bank is ₱5,269.10.

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

₱ 348.75 (Aling Sally spent for food)

₱ 500 (the amount of money she brought)

STEP 2 Determine what is asked.

Find how much was left of Aling Sally's ₱ 500 bill.

STEP 3 Solve for the answer.

a.
$$\begin{array}{rr} ₱ & 500.00 \\ - & 348.75 \\ \hline \end{array}$$

0 – 5 is not possible. Regroup starting with 5 in the hundreds place.

b.

$$\begin{array}{rrrrrrr} & {\scriptstyle 4} & & & & & \\ & \cancel{5} & {}^{1}0 & 0 & . & 0 & 0 \end{array}$$

Regroup 100 from 500 to the tens place so that 0 becomes 100 and 500 becomes 400.

$$\begin{array}{rrrrrrr} & {\scriptstyle 4} & {\scriptstyle 9} & & & & \\ & \cancel{5} & {}^{1}0 & {}^{1}0 & . & 0 & 0 \end{array}$$

Regroup 10 from 100 to the ones place so that 0 becomes 10 and 100 becomes 90.

$$\begin{array}{rrrrrrr} & {\scriptstyle 4} & {\scriptstyle 9} & {\scriptstyle 9} & & & \\ & \cancel{5} & {}^{1}0 & {}^{1}0 & . & {}^{1}0 & 0 \end{array}$$

Regroup 1 from 10 to the tenths place so that .0 becomes 1.0 and 10 becomes 9.

$$\begin{array}{rrrrrrr} & {\scriptstyle 4} & {\scriptstyle 9} & {\scriptstyle 9} & & {\scriptstyle 9} & \\ & \cancel{5} & {}^{1}0 & {}^{1}0 & . & {}^{1}0 & {}^{1}0 \end{array}$$

Regroup .1 from 1.0 to the hundredths place so that 0 becomes .10 and 1.0 becomes .9.

c. Now , we're ready to subtract.

$$\begin{array}{rrrrrrr} & {\scriptstyle 4} & {\scriptstyle 9} & {\scriptstyle 9} & & {\scriptstyle 9} & \\ ₱ & \cancel{5} & {}^{1}0 & {}^{1}0 & . & {}^{1}0 & {}^{1}0 \\ - & 3 & 4 & 8 & . & 7 & 5 \\ \hline ₱ & 1 & 5 & 1 & . & 2 & 5 \end{array}$$

Therefore, Aling Sally still has ₱ 151.25 from her ₱ 500.00 bill.

Let's See What You Have Learned (pages 34–35)

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

   ₱ 1000.00 (Aling Mila's money for shopping)

   ₱ 429.15 (cost of dress Aling Mila bought)

   STEP 2 Determine what is asked.

   How much was Aling Mila's change?

   STEP 3 Solve for the answer.

   a.
   $$\begin{array}{rrrrrrr} ₱ & 1 & 0 & 0 & 0 & . & 0 & 0 \\ - & & 4 & 2 & 9 & . & 1 & 5 \\ \hline \end{array}$$

   0 – 5 is not possible.

b.

$$\begin{array}{r} {}^{0} \\ 1\,{}^{1}0\,0\,0\,.\,0\,0 \end{array}$$

Regroup 1000 to the hundreds place so that 0 becomes 1000 and 1000 becomes 0.

$$\begin{array}{r} {}^{0}\ {}^{9} \\ 1\,{}^{1}0\,{}^{1}0\,0\,.\,0\,0 \end{array}$$

Regroup 100 from 1000 to the tens place so that 0 becomes 100 and 1000 becomes 900.

$$\begin{array}{r} {}^{0}\ {}^{9}\ {}^{9} \\ 1\,{}^{1}0\,{}^{1}0\,{}^{1}0\,.\,0\,0 \end{array}$$

Regroup 10 from 100 to the ones place so that 0 becomes 10 and 100 becomes 90.

$$\begin{array}{r} {}^{0}\ {}^{9}\ {}^{9}\ {}^{9} \\ 1\,{}^{1}0\,{}^{1}0\,{}^{1}0\,.\,{}^{1}0\,0 \end{array}$$

Regroup 1 from 10 to the tenths place so that .0 becomes 1.0 and 10 becomes 9.

$$\begin{array}{r} {}^{0}\ {}^{9}\ {}^{9}\ {}^{9}\ \ {}^{9} \\ 1\,{}^{1}0\,{}^{1}0\,{}^{1}0\,.\,{}^{1}0\,{}^{1}0 \end{array}$$

Regroup .1 from 1.0 to the hundredths place so that 0 becomes .10 and 1.0 becomes .9.

c. Now, we're ready to subtract.

$$\begin{array}{rr} & {}^{0}\ {}^{9}\ {}^{9}\ {}^{9}\ {}^{9} \\ \text{a. } ₱ & 1\,{}^{1}0\,{}^{1}0\,{}^{1}0.\,{}^{1}0\,{}^{1}0 \\ - & 4\,2\,9.1\,5 \\ \hline ₱ & 5\,7\,0.8\,5 \end{array}$$

Therefore, Aling Mila's change is ₱ 570.85.

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

80.7 kilograms (Rina and Lita's combined weight)

46.9 kilograms (Rina's weight)

STEP 2 Determine what is asked.

Find Lita's weight.

STEP 3 Solve for the answer.

To find Lita's weight, subtract Rina's weight from their combined weight.

a.
$$\begin{array}{r} 80.7 \\ -\ 46.9 \\ \hline \end{array}$$

Subtract .7 – .9. This is not possible.

b. $80.7 \xrightarrow{-6} 8\overset{7}{\cancel{0}}.\overset{1}{7}\overset{9}{} \xrightarrow{-9} 8\overset{7}{\cancel{0}}.\overset{1}{1}\overset{9}{7}$

Regroup 10 from 80 to the ones place so that 80 becomes 70 and 0 becomes 10.

Regroup 1 from 10 in the ones place to the tenths place so that 10 becomes 9 and .7 becomes 1.7.

c.
$$\begin{array}{r} 8\overset{7}{\cancel{0}}.\overset{1}{1}\overset{9}{7} \\ -\ 4\ 6.\ 9 \\ \hline 8 \end{array}$$

1.7 – 9 = .8. Write 8 below the tenths place.

$$\begin{array}{r} 8\overset{7}{\cancel{0}}.\overset{1}{1}\overset{9}{7} \\ -\ 4\ 6.\ 9 \\ \hline 3\ 3.\ 8 \end{array}$$

(9 – 6 = 3)

(7 – 4 = 3)

Lita weighs 33.8 kilograms.

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

37.19 seconds (time Bong reached the finish line)

41.36 seconds (time Jun reached the finish line)

STEP 2 Determine what is asked.

Find the difference between Bong's and Jun's finishing time.

STEP 3 Solve for the answer.

Subtract 37.19 seconds from 41.36 seconds.

a.

$$\begin{array}{r} 41.\overset{2}{3}\overset{1}{6} \\ -\ 37.19 \\ \hline 7 \end{array}$$

Subtract .06 – .09. This is not possible. Regroup .1 from .3 in the tenths place to the hundredths place so that .3 becomes .2 and .06 becomes .16. Now subtract .16 – .09 = .07. Write 7 below the hundredths place.

b.

$$\begin{array}{r} \overset{3}{\not 4}\overset{2}{1}.\overset{1}{\not 3}\overset{1}{6} \\ -\ 37.19 \\ \hline 4.17 \end{array}$$

(2 – 1 = 1)

Subtract 1 – 7. This is not possible. Regroup 10 from 40 in the tens place to the ones place so that 40 in the tens place to the ones place so that 40 becomes 30 and 1 becomes 11. Now subtract 11 – 7 = 4. Write 4 below the one's place.

Bong finished 4.17 seconds faster than Jun.

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

₱ 12,081.85 (money in Mr. Guzman's bank account)

₱ 2,954.90 (money withdrawn from the account)

STEP 2 Determine what is asked.

Find the amount of money left in Mr. Guzman's bank account after withdrawing money.

STEP 3 Solve for the answer.

Subtract ₱ 2,954.90 from ₱ 12,081.85.

a.

$$\begin{array}{rr} & {\scriptstyle 0} \\ ₱ & 12081.^{1}85 \\ - & 2954.90 \\ \hline & 95 \end{array}$$

(5 – 0 = 5)

Subtract .8 – .9. This is not posible. Regroup 1 from 1 in the ones place to the tenths place so that 1 becomes 1.8. Now subtract 1.8 – 0.9 = 0.9. Write 9 below the tenth's place.

b.

$$\begin{array}{rr} & {\scriptstyle 7\ 10} \\ ₱ & 120\not{8}\not{1}.^{1}85 \\ - & 2954.90 \\ \hline & 6.95 \end{array}$$

Subtract 0 – 4. This is not possible. Regroup 10 from 80 in the tens place to the ones place so that 80 becomes 70 and 0 becomes 10. Now subtract 10 – 4 = 6. Write 6 below the ones place.

c.

$$\begin{array}{rr} & {\scriptstyle 1\quad 7\ 10} \\ ₱ & 1\not{2}^{1}0\not{8}\not{1}.^{1}85 \\ - & 2\,954.90 \\ \hline & 126.95 \end{array}$$

(7 – 5 = 2)

Subtract 000 – 900. This is not possible. Regroup 1000 from 2000 in the thousands place so that 2000 becomes 1000 and 0 becomes 1000. Now subtract 1000 – 900 = 100. Write 1 below the hundreds place.

d.

$$\begin{array}{r} {}^{1}\quad {}^{7}{}^{10} \\ ₱\ 12{,}0\not{8}\not{1}.{}^{1}85 \\ -\ \ 2954.\ 90 \\ \hline 9196.\ 95 \end{array}$$

Subtract 1,000 – 2,000. This is not possible. Consider 10,000 so that 1,0000 becomes 11,000. Now subtract 11,000 – 2,000 = 9,000. Write 9 below the thousands place.

Mr. Guzman has ₱ 9,126.95 left in his bank account.

E. What Have You Learned? *(pages 37–38)*

1. ninety three and thirty five thousandths
2. 3.009
3. Convert 1.15 to a fraction.

   STEP 1 Look at how many decimal places there are. There are two.

   STEP 2 Think of the number in the powers of ten with two zeros. (That's 100). Mutiply 1.15 by 100.

$$\begin{array}{r} 1.15 \\ \times\ \ 100 \\ \hline 11500 \end{array}$$

115.00 or 115 — Count the number of decimal places in the multiplicand (1.15). Then put the decimal point two places from the first digit on the right going to the left.

STEP 3 Write 115 as the numerator and 100 as the denominator. Thus we have:

$$\frac{115}{100}$$

4. To convert 8/25 to a decimal number, divide 8 by 25.

$$\begin{array}{r} 0.32 \\ 25\overline{)8.00} \\ 75 \\ 50 \\ 50 \\ 0 \end{array}$$

The decimal form of 8/25 is 0.32.

5.

Digit	Place Value	Value
a. 6	tenths	.6
b. 3	hundredths	.03
c. 9	thousandths	.009
d. 2	tens	20
e. 7	ones	7

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

Items bought:

Bangus – ₱120.75
Chicken – ₱ 97.50

Payment Aling Trining gave:

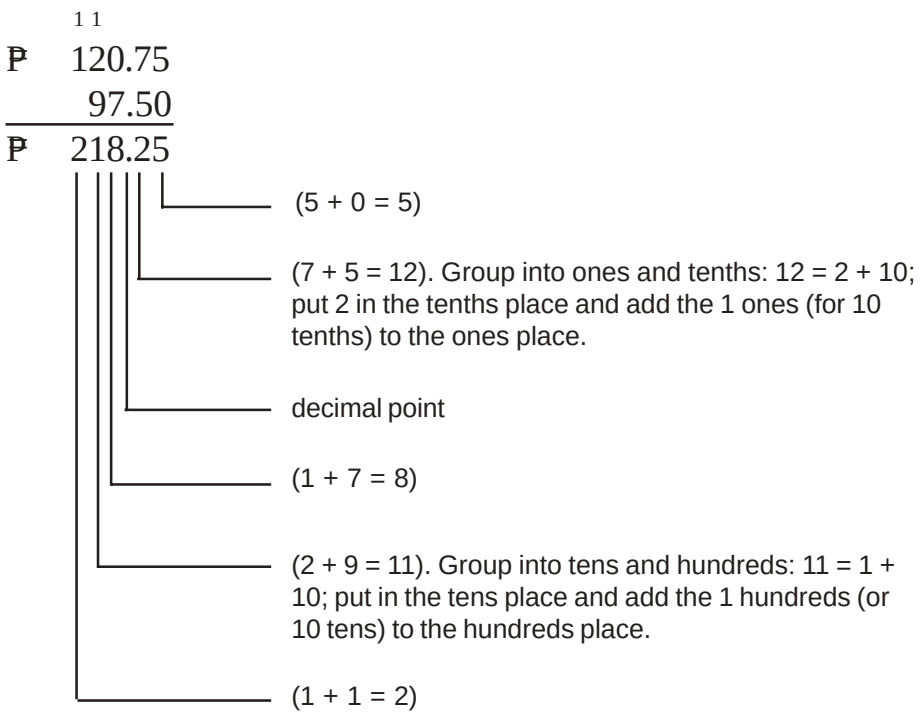
₱500.00 bill

STEP 2 Determine what is asked.

Find out how much is Aling Trining's change.

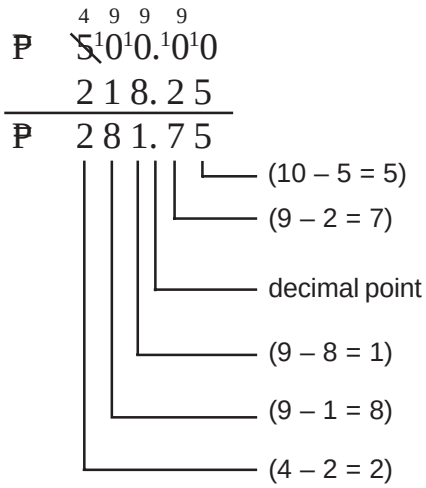
STEP 3 Solve for the answer.

a. Find the total cost of the bangus and chicken.



The combined cost of the bangus and chicken is ₱218.25.

b. Subtract the total cost of the bangus and chicken from the ₱500.00 bill.



Aling Trining's change is ₱ 281.75

Glossary

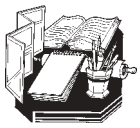
Decimals Fractions expressed in tenths, hundredths, thousandths, ten thousandths, etc.

Multiplicand The number being multiplied

Multplier The number that multiplies another

Minuend The number being subtracted

Subtrahend The number that is subtracted from another



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