What Is This Module About?

In a Filipino family, it is usual for the members to share daily chores. What kind of work do you do at home? Do you help cook the family's meals? Maybe you are in charge of buying food from the wet market.

Have you ever brought your child or younger sibling to the health center to be weighed? Can you tell whether he/she weighs more than most children of his/her age?

This module is all about measuring the weights of objects and persons. This is composed of two parts. This is Part One. It will introduce you to the metric and English systems of measurement. Part Two will teach you how to convert units from one system of measurement to another, and will show you some practical applications of weight measurement.

There are two lessons in Part One, namely:

Lesson 1 – *Off to the Market We Go*

Lesson 2 – *How Heavy Is Totoy?*

What Will You Learn From This Module?

After studying Part One, you should be able to:

- identify the units for measuring weight in the metric and English systems;
- measure, read and record the weights of objects and persons; and
- convert smaller units of weight to bigger units and vice versa.

You will be able to learn from this module if you already know how to do the basic mathematical operations, especially multiplication and division. If you do not know how to multiply and divide, it is recommended that you first learn how to do these before studying this module.

It will be very helpful if you take down some notes as you study this module. Later, when you have finished this module and need to review some items, you can always go back to your notes.

Let's See What You Already Know

Before you start with Lesson 1, try to answer the following questions. They will help you find out how much you know about the subject matter.

Encircle the letter of the correct answer. For numbers 6–8, write your solutions in the boxes provided.

1. How many grams are there in one kilogram?

   a. 16
   b. 100
   c. 1,000
   d. 1/2

2. How many ounces are there in one pound?

   a. 16
   b. 100
   c. 1,000
   d. 1/2

3. How many grams are there in one metric ton?

   a. 1,000
   b. 1,000,000
   c. 100,000
   d. 10,000

4. Which is heavier, 500 grams or 1/2 kilogram?

   a. 500 grams
   b. 1/2 kilogram
   c. They are equivalent.

5. Which is heavier, 33 ounces or 2 pounds?

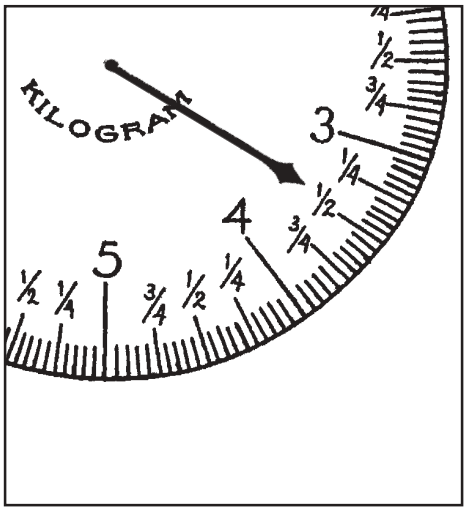
   a. 33 ounces
   b. 2 pounds
   c. They are equivalent.

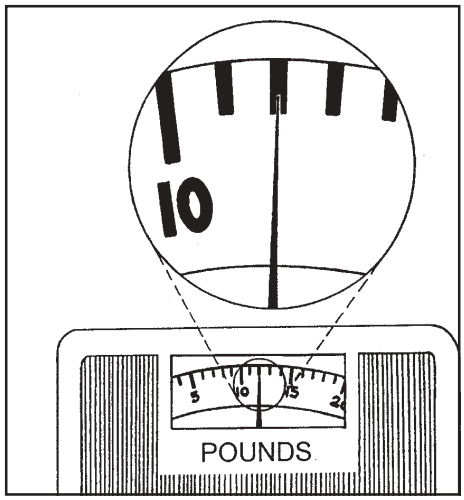
6. How many pounds are there in 1 ½ English tons?

7. The total weight that a vehicle can carry is 250 kilos. There are already four passengers seated in the vehicle. Their total weight is 196 kilos. If one of them wishes to bring a box weighing 3,400 grams, would the vehicle be overloaded?

8. A lady wants to buy 2 pounds of peanuts from a food stall. The vendor loads several scoops of peanuts into a bag and weighs the bag. The scale reads 2 ½ pounds. How many ounces of peanuts should she remove from the bag for the weight to be exactly 2 pounds?

Read the weights from these scales.

9. 

10. 

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on pages 52–57 to find out.

If all your answers are correct, 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. This 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.

Off to the Market We Go

When was the last time you went to the market to buy food for the family? Do you go there regularly? Or do you go there only when you are asked to? Whether you go to the market often or rarely, you have to know how meat, fish, vegetables and other food items are weighed. This will help you budget your money wisely. It can also protect you from dishonest vendors.

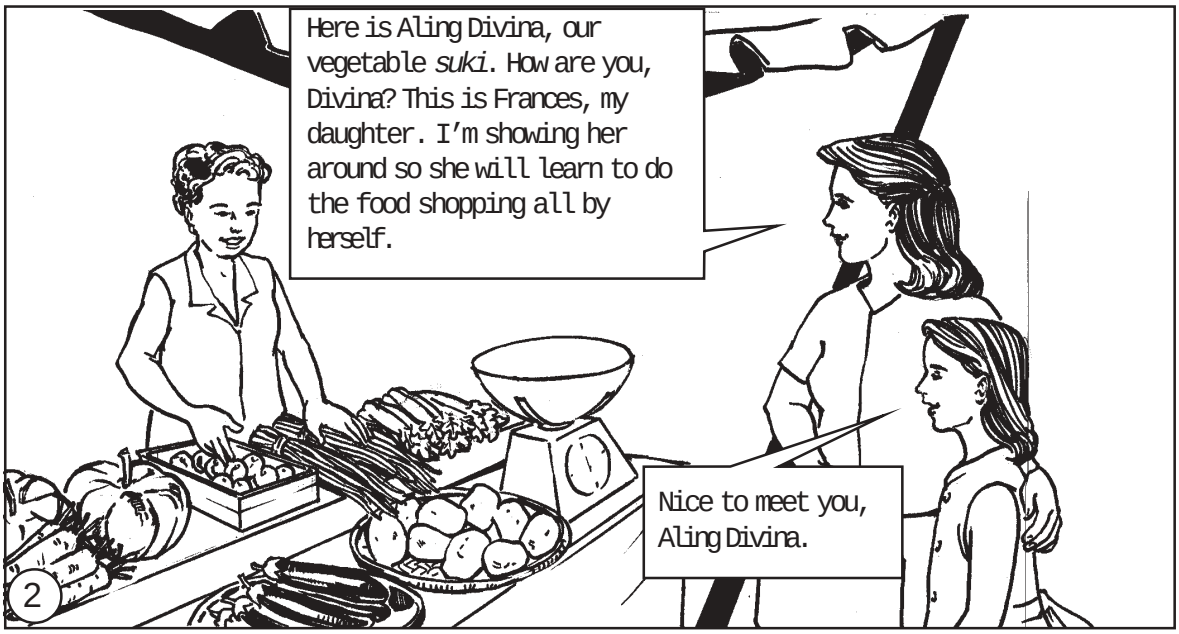
After studying Lesson 1, you should be able to use the metric system of measurement to:

- identify the units for measuring weight in the metric system;
- measure and record weights of objects;
- convert smaller units of weight to bigger units and vice versa; and
- estimate the weights of objects.

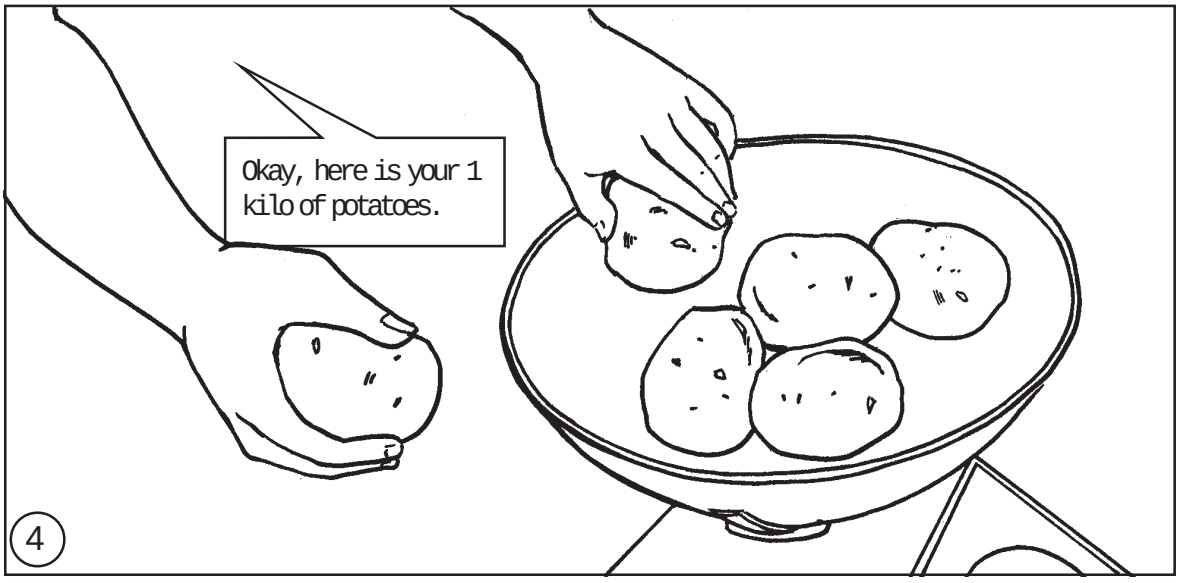
Now, start by reading the story of Frances and Aling Lucing, her mother.

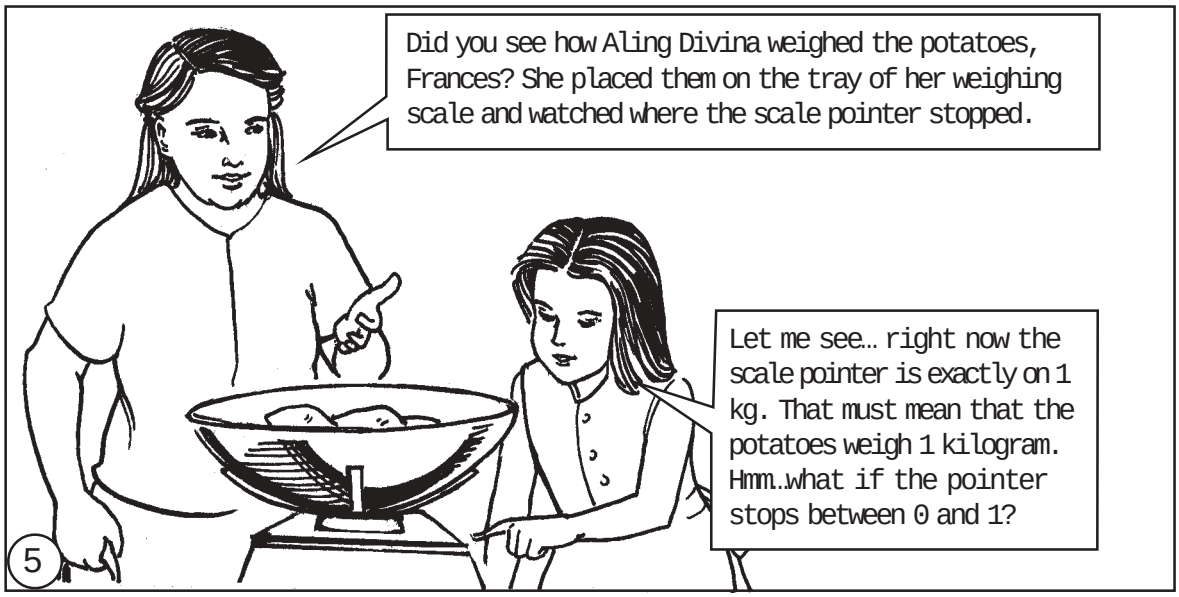
Let's Read

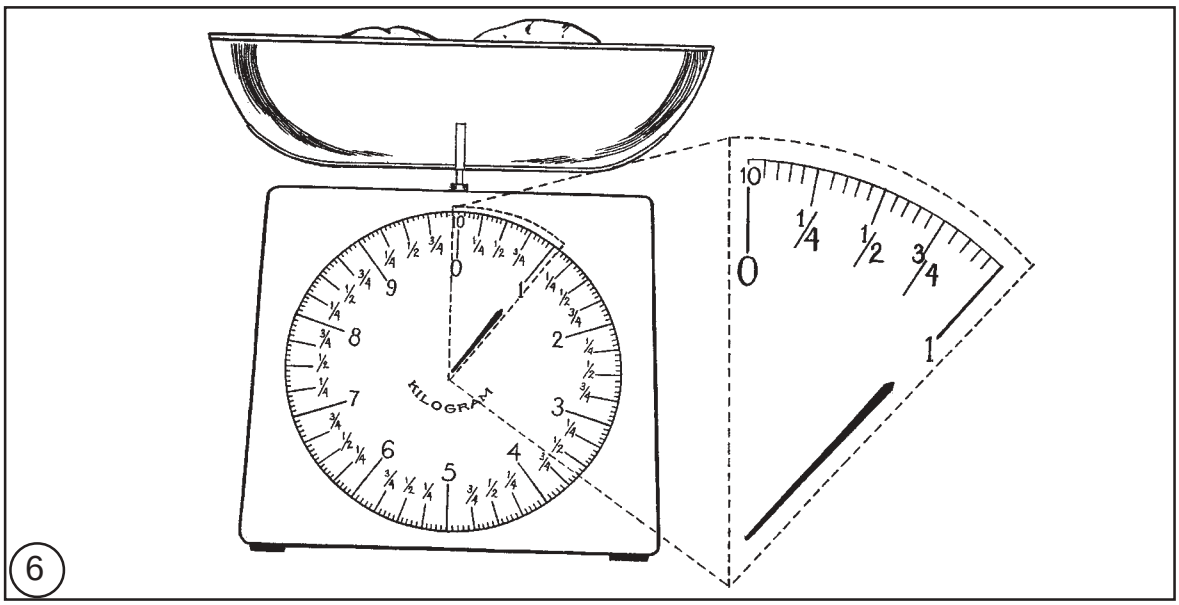
Frances is a young girl eager to help her mother with household chores. One day, her mother brought her along to the wet market to buy food for the family. Join them and learn with Frances.

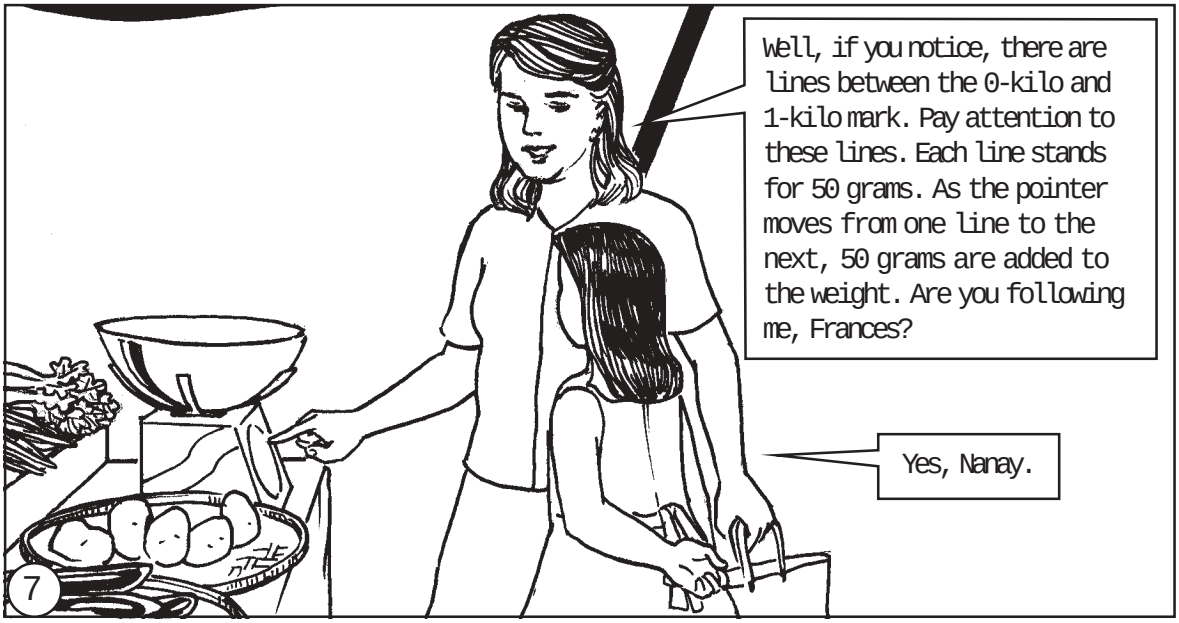

Here is Aling Divina, our vegetable *suki*. How are you, Divina? This is Frances, my daughter. I'm showing her around so she will learn to do the food shopping all by herself.
Nice to meet you, Aling Divina.
2

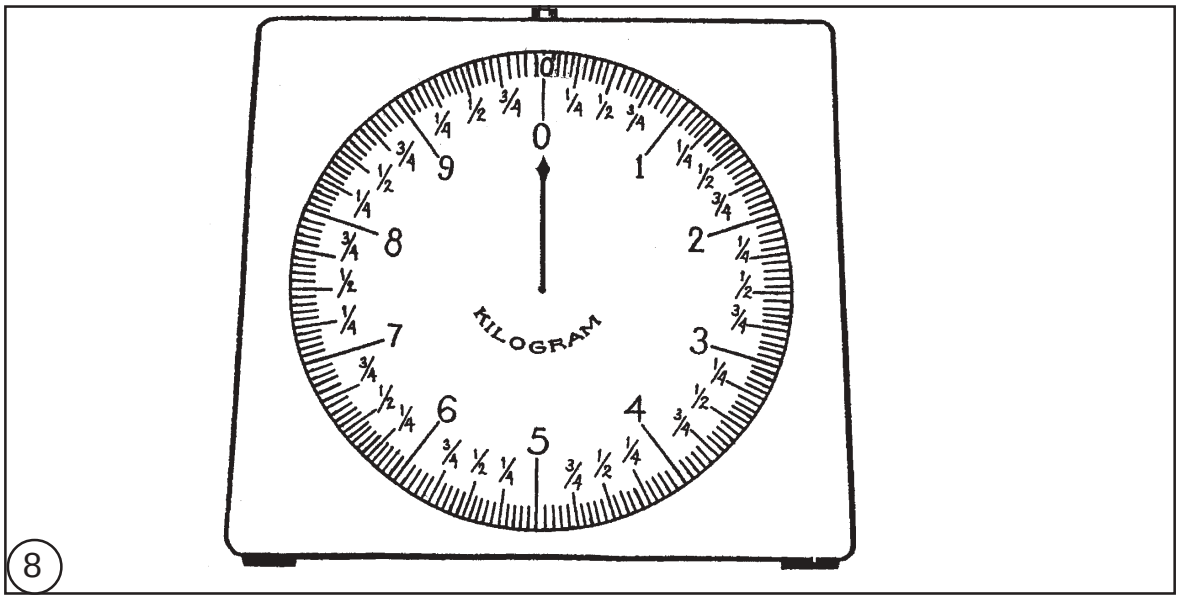

Nice to meet you, too, Frances. How can I help you?
I need 1 kilo of potatoes, 100 grams of celery and 1/2 kilo of carrots. My cousins are visiting us this afternoon and Nanay is making some potato salad.
3


Okay, here is your 1 kilo of potatoes.
4


Did you see how Aling Divina weighed the potatoes, Frances? She placed them on the tray of her weighing scale and watched where the scale pointer stopped.
Let me see… right now the scale pointer is exactly on 1 kg. That must mean that the potatoes weigh 1 kilogram. Hmm..what if the pointer stops between 0 and 1?
5


KILOGRAM
6

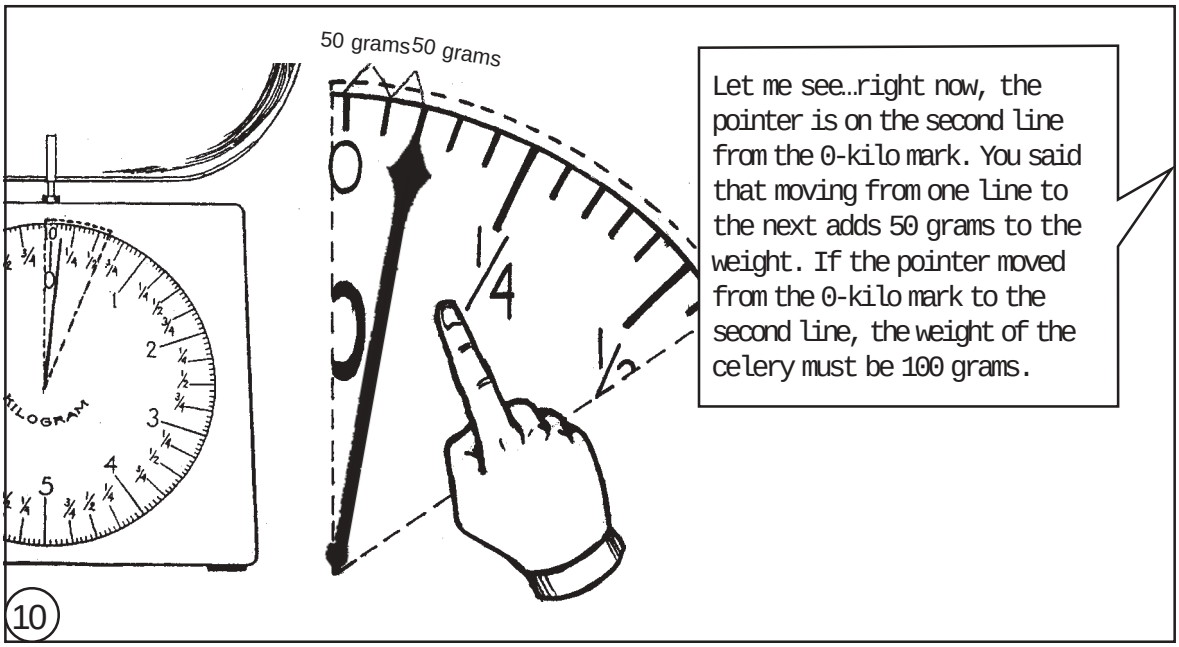

Well, if you notice, there are lines between the 0-kilo and 1-kilo mark. Pay attention to these lines. Each line stands for 50 grams. As the pointer moves from one line to the next, 50 grams are added to the weight. Are you following me, Frances?
Yes, Nanay.
7


KILOGRAM

8

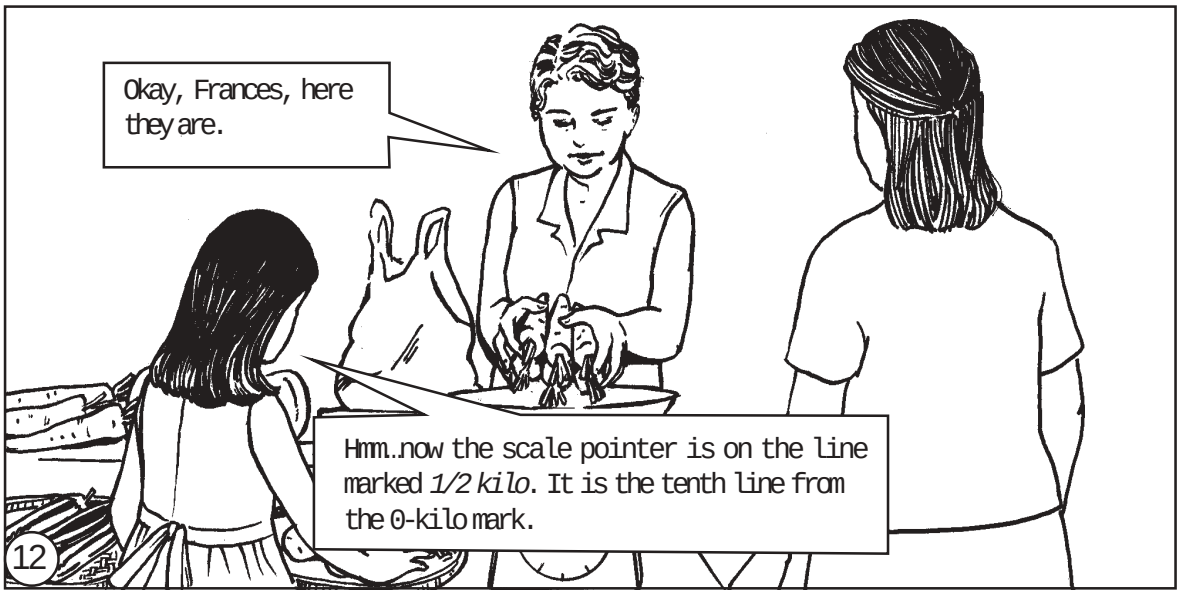

Let's weigh your celery so you will understand. You wanted 100 grams of celery, right? Here they are.

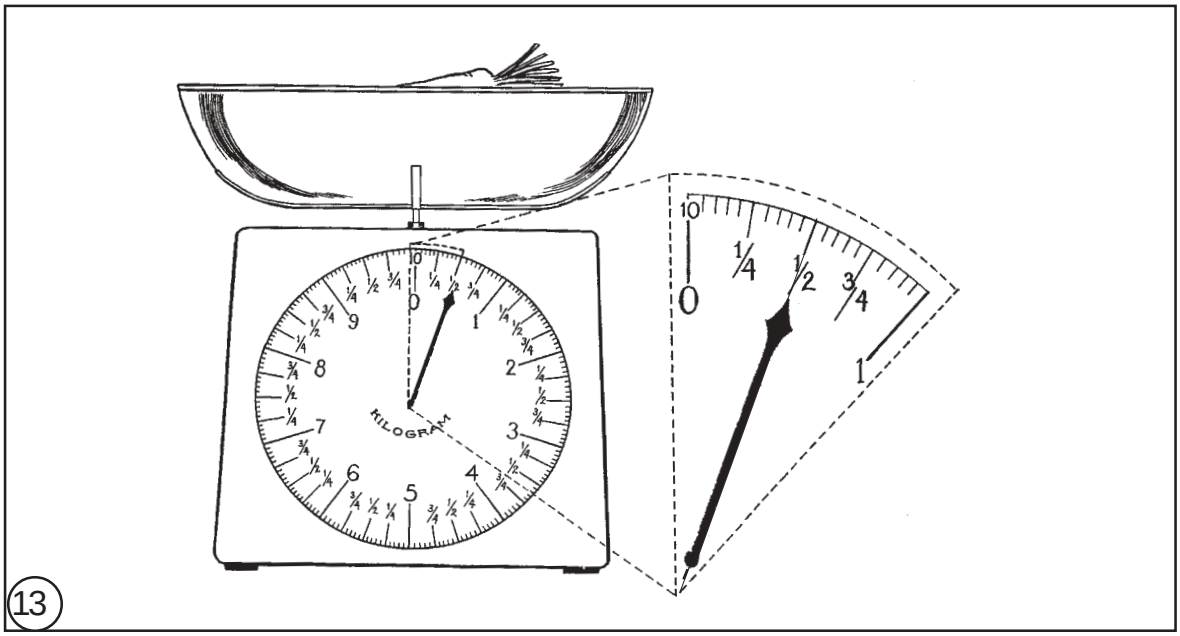
9

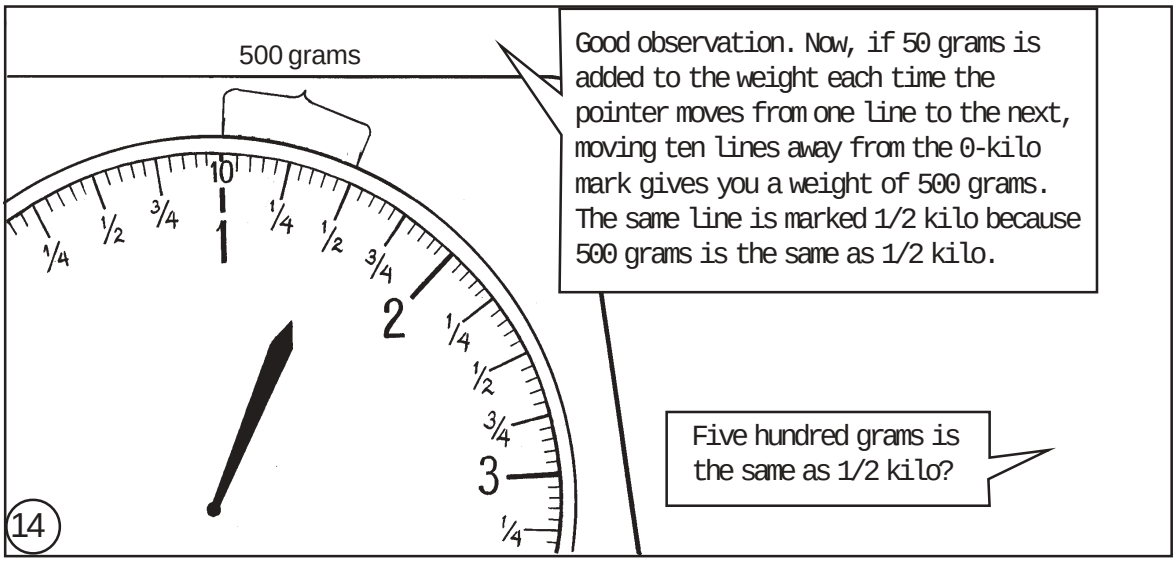

50 grams
50 grams
KILOGRAM
Let me see…right now, the pointer is on the second line from the 0-kilo mark. You said that moving from one line to the next adds 50 grams to the weight. If the pointer moved from the 0-kilo mark to the second line, the weight of the celery must be 100 grams.

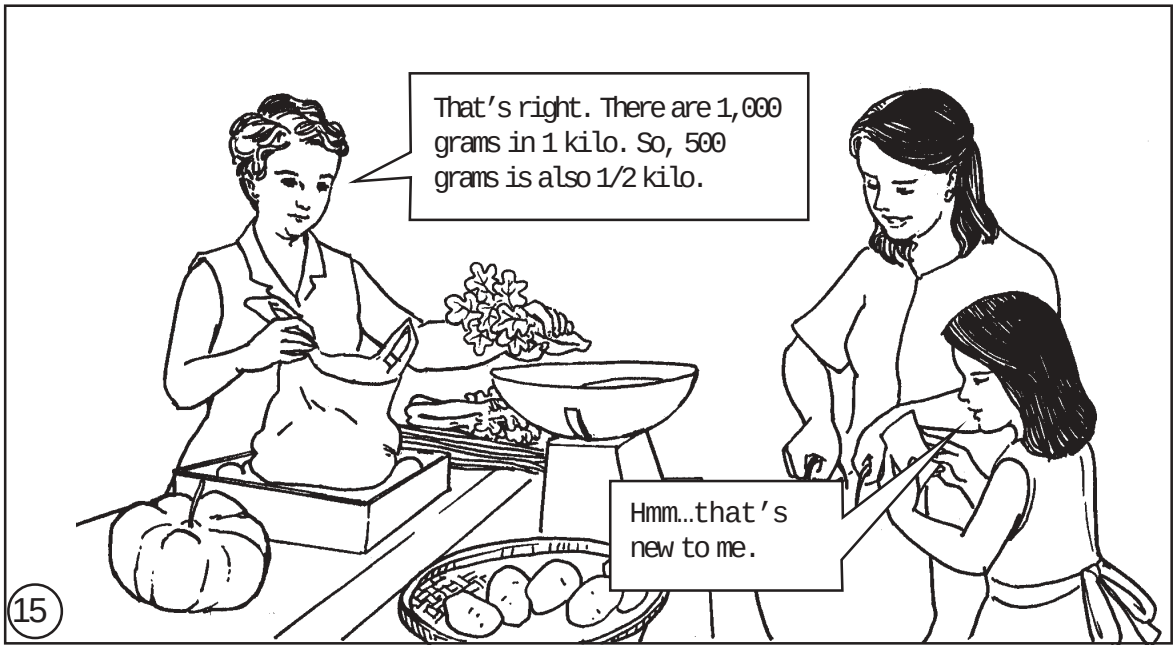
10


That's right.
Now I'm beginning to understand... We still need 1/2 kilo of carrots, Aling Divina.
11


Okay, Frances, here they are.
Hmm..now the scale pointer is on the line marked *1/2 kilo*. It is the tenth line from the 0-kilo mark.
12


KILOGRAM
13



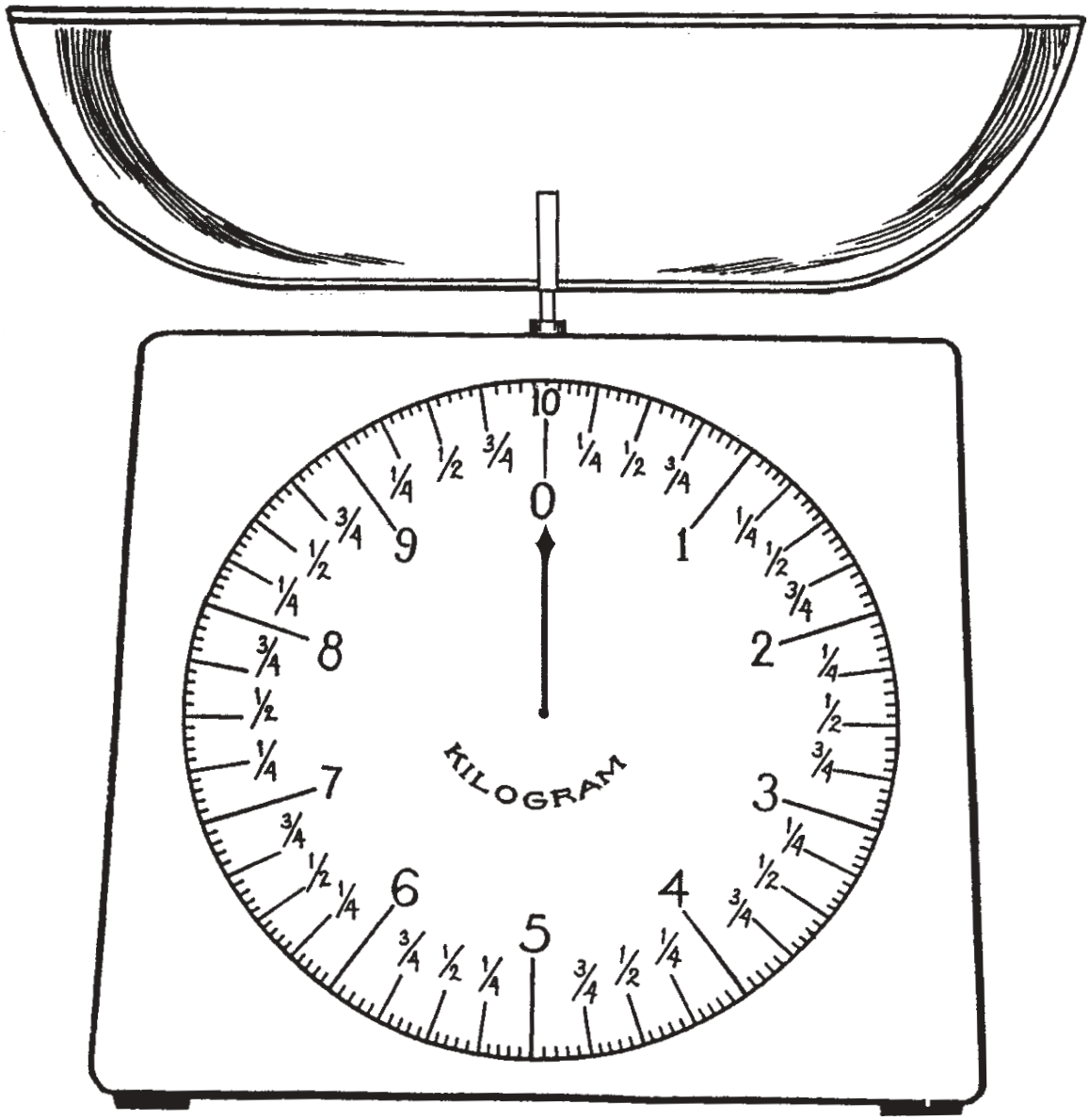


To be continued…

Before you continue reading Frances' story, try to review what happened so far. Look for the picture of Aling Divina weighing potatoes. What did she use to weigh her goods?

The instrument that she uses to weigh her goods is called a **weighing scale**. There are many types of weighing scales in wet markets and many of them look like Aling Divina's weighing scale. Try to be familiar with how it looks.

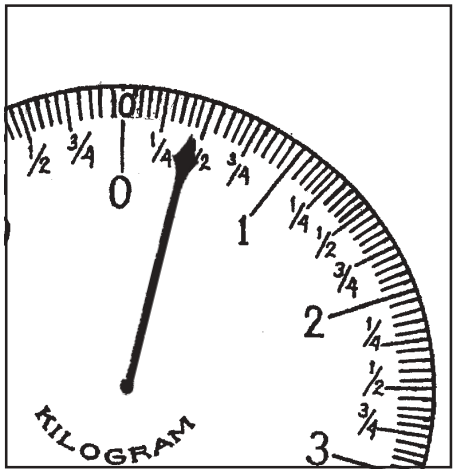
A bigger drawing of the same scale appears below. Observe the marks on the face of the scale.



Let's Try This

Now, try reading the weights from these scales. Write your answers in the blanks.

1.



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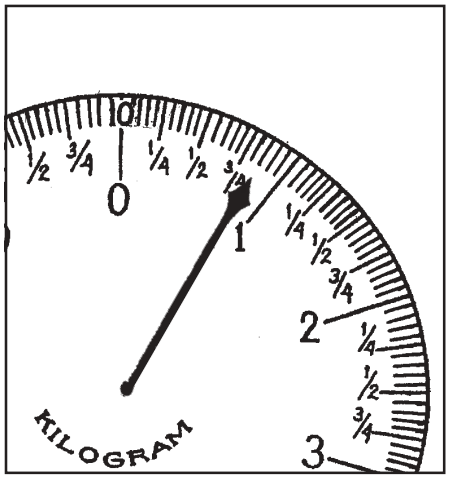
2.



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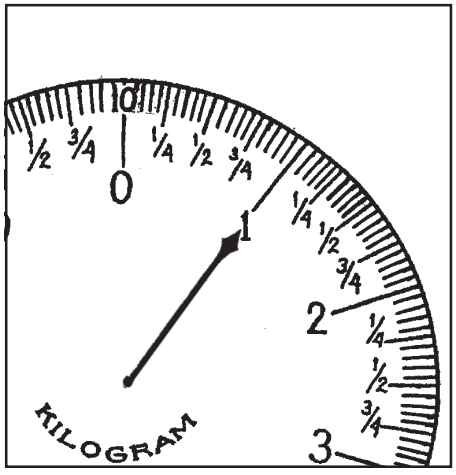

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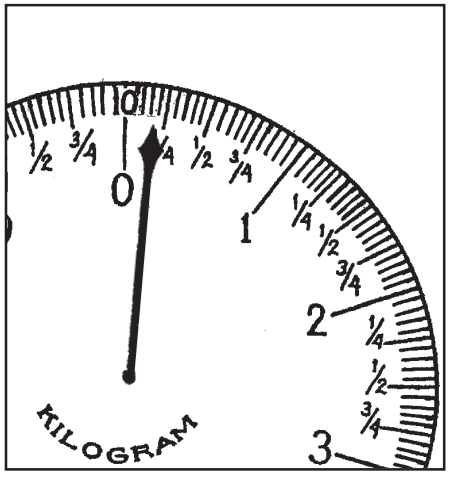
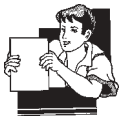
4.



_____

Check your answers using the *Answer Key* on page 57.

If you were able to read all four scales correctly, that's very good! If not, go over each one again. You probably just have to look more carefully at the position of each pointer.



Let's Learn

Go back to the picture of the weighing scale on page 11. Look at the lines on the scale. Do you remember what Aling Lucing said about them?

She said: *As the pointer moves from one line to the next, 50 grams are added to the weight.*

This also means that the distance between the two lines stands for 50 grams. Pretend that your finger is the scale pointer. Ready? Point your finger at the 0-kilo mark. Slowly move your finger until it points at the first line after the 0-kilo mark. When the scale pointer is on this mark, the weight of the object you are weighing is 50 grams.

Now, move your finger from the first line to the second line. As you do this, another 50 grams is added. When the scale pointer is on this mark, the object you are weighing is 100 grams. This is how Aling Divina's scale looked when she weighed 100 grams of celery.

Go on moving 1 line or 50 grams at a time. How many lines away from 0 kilo is 1 kilo?

One kilo is 20 lines away from 0 kilo. Remember, 50 grams is added to the weight as you move from 1 line to the next. Therefore, when the pointer moves *20 lines away from 0 kilo to 1 kilo*, the weight increases by 1,000 grams. What does this tell you?

This tells you that there are 1,000 grams in 1 kilogram.

The gram and the kilogram are two of the units of measurement that you will learn about in this module. You will know more about the other units of weight measurement as we move on. For now, you already know how to read weights on a weighing scale. Nice going!

Let's Try This

Go to the nearest wet market. Observe for yourself how meat, fish, vegetables and fruits are weighed.

Make a report of this assignment by making a table similar to the one below. List down an item only if you have actually observed it being weighed.

Goods Weighed	Weight i
Bangus (2 pieces)	1 kilo
Chicken wings	500 grams
Garlic (4 heads)	200 grams

Now, use the space below for your own table:

Goods Weighed	Weight

After working on your table, answer this question:

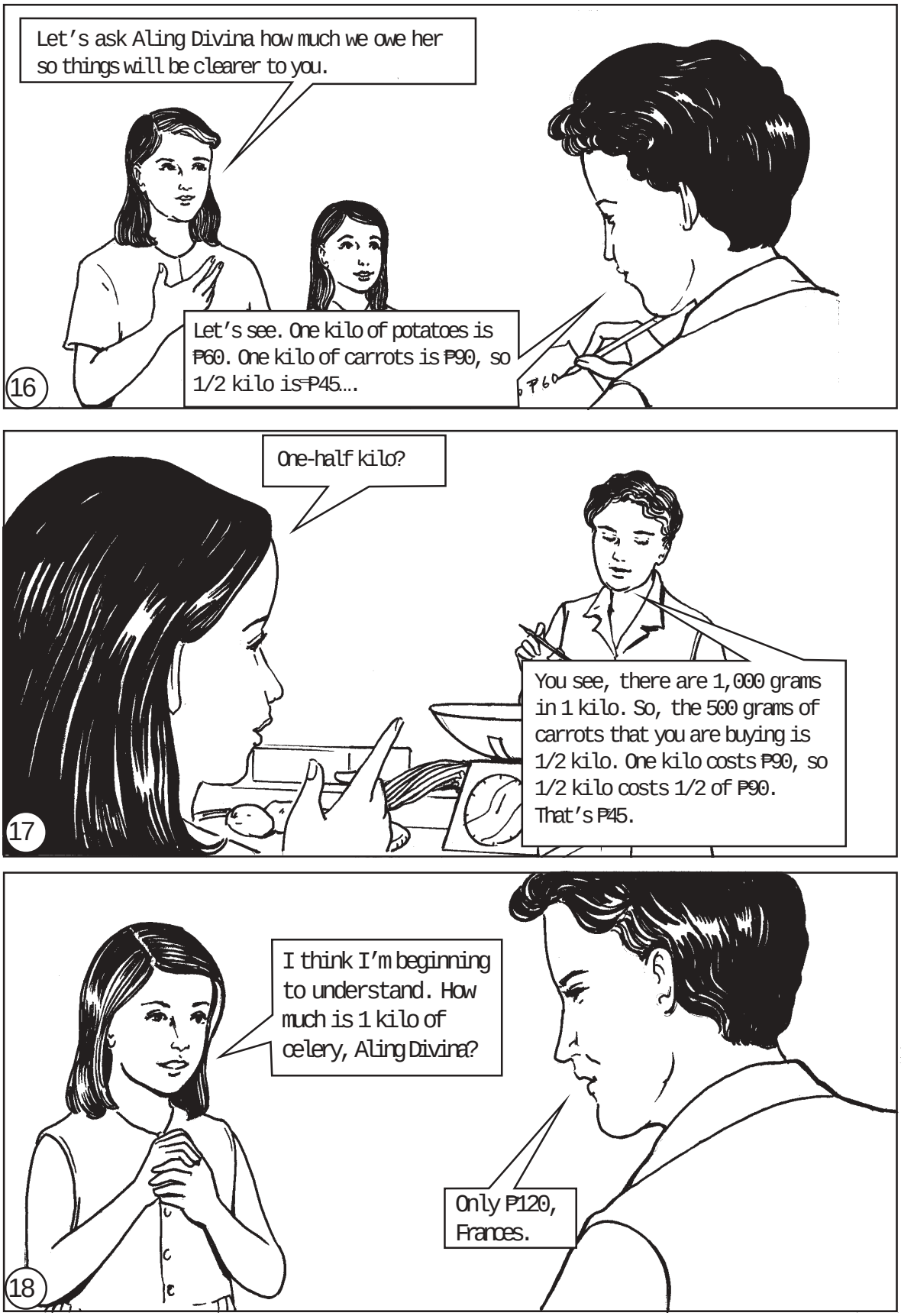
Why do you think it is important that you know how to read a weighing scale when you shop for food in the market?

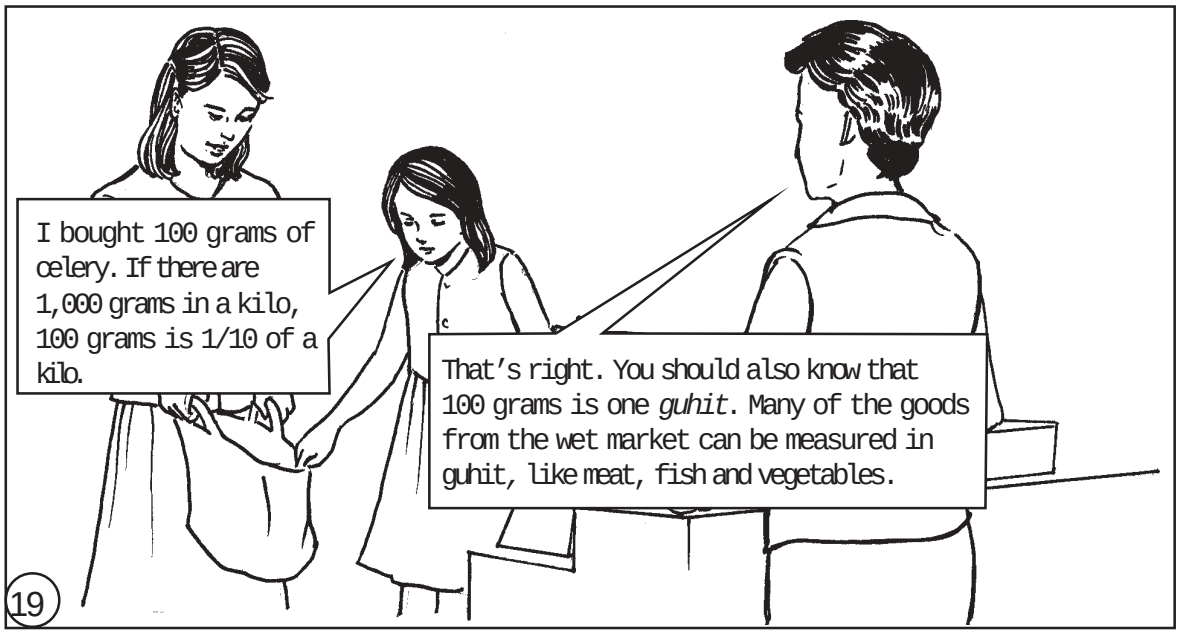
_____
_____
_____
_____
_____
_____

Compare your answers with those in the *Answer Key* on page 57. You may then continue reading about Frances' trip to the market.

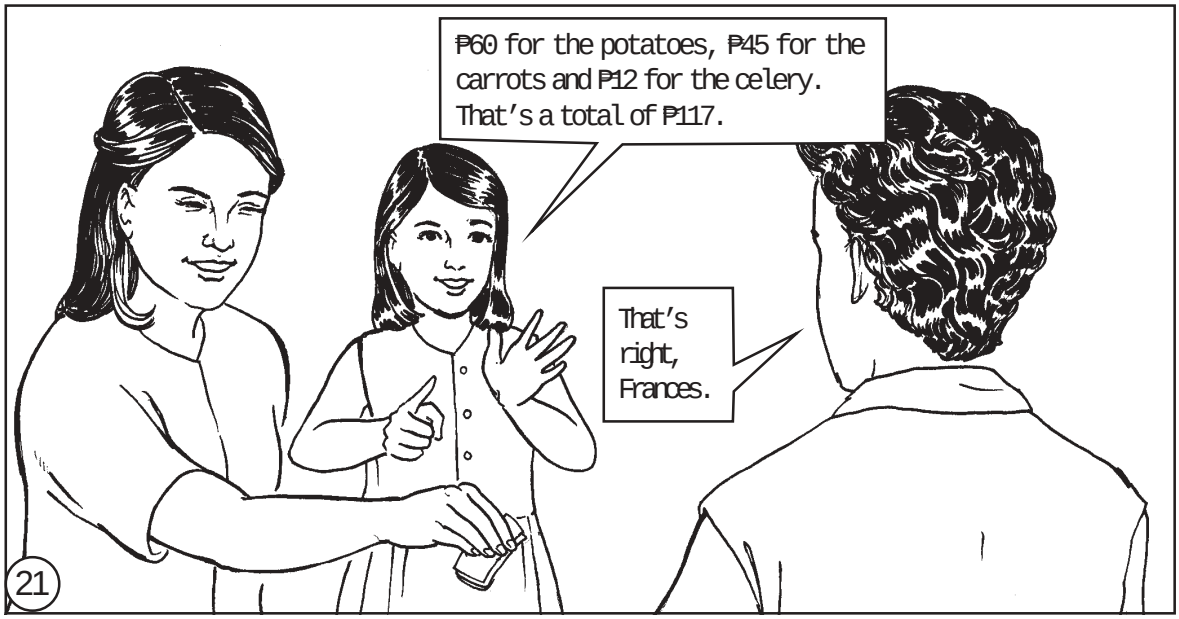
Let's Read

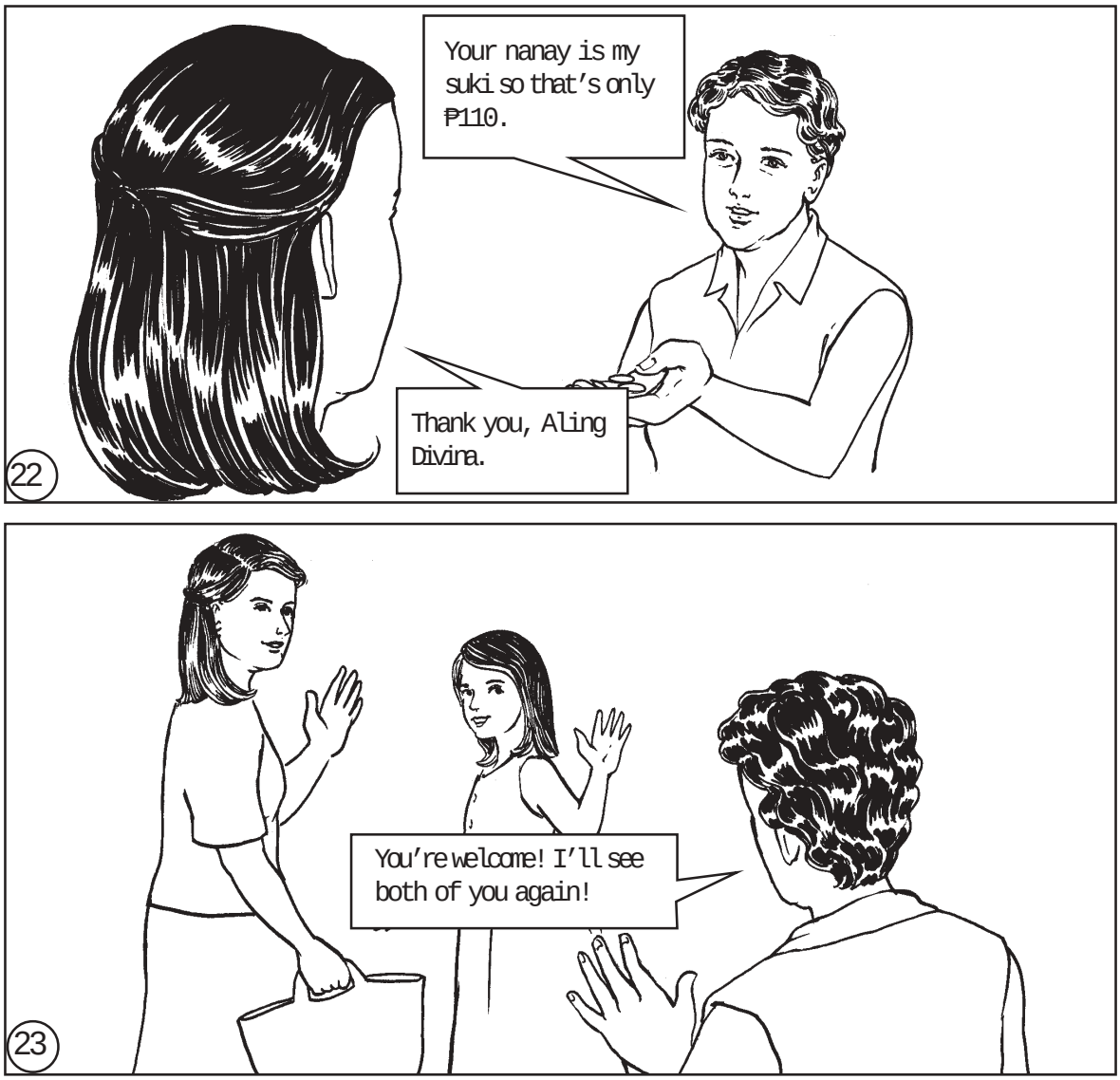
Let's continue reading about Frances and her mother's visit to the market.




I bought 100 grams of celery. If there are 1,000 grams in a kilo, 100 grams is 1/10 of a kilo.
That's right. You should also know that 100 grams is one *guhit*. Many of the goods from the wet market can be measured in guhit, like meat, fish and vegetables.
19


So...one guhit should cost 1/10 of ₱120. That's ₱12!
Learning fast, aren't you?
20


₱60 for the potatoes, ₱45 for the carrots and ₱12 for the celery. That's a total of ₱117.
That's right, Frances.
21



To be continued…

Is it now clear why it is important that you know how to read a weighing scale when you go to the market? That's right! Being able to read a weighing scale helps you to check the quantity of the goods you are buying.

Let's Review

Aling Divina used the following units of measurement to weigh her vegetables. What are they?

g _ _ _
k _ _ _ g _ _ _
g _ _ _ _

The units that she used are the gram, kilogram and guhit.

Now, using what you have learned from Frances' trip to the market, complete each of the following sentences by underlining the correct answer in the parentheses.

1. There are (1,000; 100) grams in 1 kilogram.

2. One gram is (smaller, bigger) than 1 kilogram.

3. There are (2,000; 200) grams in 2 kilograms.

4. There are (500, 50) grams in 1/2 kilogram.

5. The guhit is an (indigenous or local, international) unit for measuring weight.

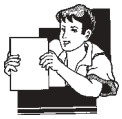
6. The guhit is used to measure the weight of (vegetables, people).

7. The guhit is commonly used in (supermarkets, wet markets).

8. There are (1,000; 100) grams in 1 guhit.

9. There are (2,000; 200) grams in 2 guhits.

Compare your answers with those in the *Answer Key* on pages 57–58.



Let's Learn

Units of weight measurement in the metric system

Two systems can be used for measuring weight, namely, the **metric** and the **English systems.** In this lesson, you will study the units used for measuring weight in the metric system. Lesson 2 will introduce you to the units used for measuring weight in the English system.

The units used for measuring weight in the metric system are the *milligram, centigram, decigram, gram, decagram, hectogram, kilogram* and *metric ton*. How much of one unit is equivalent to another can be seen below:

10 milligrams	=	1 centigram
10 centigrams	=	1 decigram
10 decigrams	=	1 gram
10 grams	=	1 decagram
10 decagrams	=	1 hectogram
10 hectograms	=	1 kilogram
1,000 kilograms	=	1 metric ton

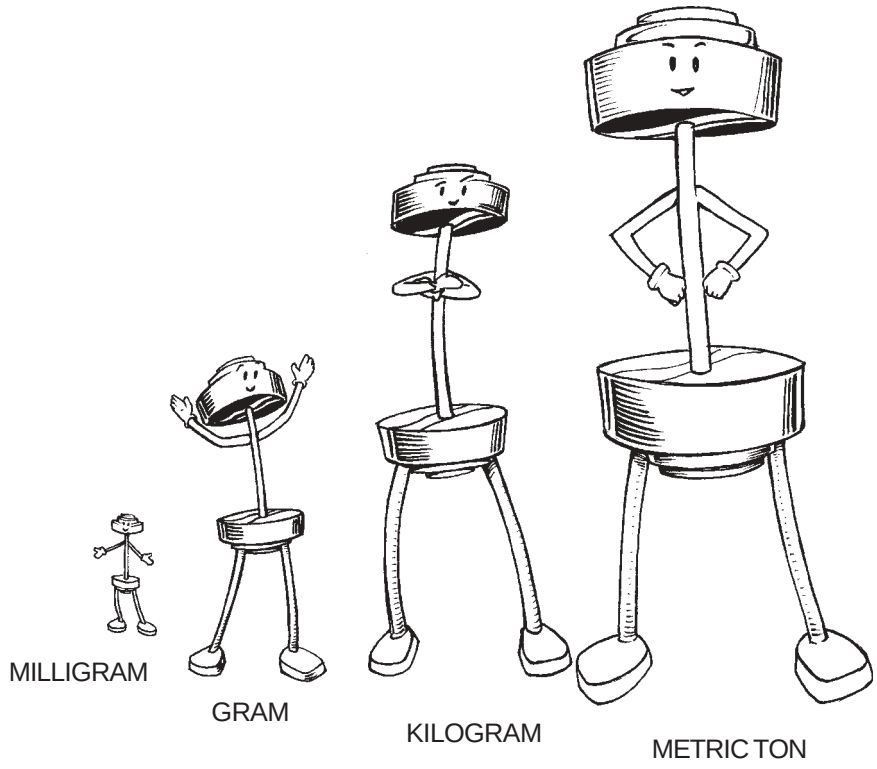
These units are presented to you so that you will be familiar with them. However, we will concentrate only on the units most commonly used every day. These are the *milligram, gram, kilogram* and *metric ton*. Study carefully how much of one unit is equal to another unit:

1,000 milligrams (mg)	=	1 gram (g)
1,000 grams	=	1 kilogram (kilo or kg)
1,000 kilograms	=	1 metric ton

As you can observe from the box above, the **milligram** is the smallest among the units. It is sometimes used for measuring medicines such as vitamin tablets and other items of very small quantities.

There are 1,000 milligrams in one gram and there are 1,000 grams in one kilogram. The **gram** and the **kilogram** are commonly used for measuring food like rice and canned goods. They are also used to measure human body weight, as you will learn in Part Two of this module. The kilogram may also be used to measure hardware materials.

There are 1,000 kilograms in one metric ton. The **metric ton** is a very big quantity. It is used to measure large amounts of food that we import or export, like rice and sugar. Large quantities of construction materials for a building site may also be measured in metric tons.



Converting smaller units of weight to bigger units

Now that you are familiar with the units used for measuring weight, you can study how to convert one unit to another.

Do you remember Aling Divina telling Frances, "That's right. There are 1,000 grams in 1 kilo. So, 500 grams is also 1/2 kilo."

What did she mean? How did she change 500 grams to 1/2 kilo?

Aling Divina changed or **converted** the weight of the carrots from grams to kilograms. As you already know, the gram is a smaller unit than the kilogram. So, what she did was convert a smaller unit of weight to a bigger unit.

Here is one way of doing it. It is called the **unit factor method**.

STEP 1 *What quantity are you given? To what unit will you convert this quantity?*

You are given 500 grams. You have to convert this to kilos.

STEP 2 *What unit factor will you need to do the conversion?*

A **unit factor** tells you how much of one unit is equivalent to another. You need a unit factor to convert one unit of weight to another.

You need to convert grams to kilos. From the table on the previous page, you know that there are 1,000 grams in one kilo. Your unit factor is:

$$\frac{1\text{ kilogram}}{1{,}000\text{ grams}}$$

unit to which you will convert the given quantity

unit of the given quantity

STEP 3 *You can now convert grams to kilos by multiplying 500 grams by the unit factor:*

$$500\text{ grams}\left(\frac{1\text{ kilogram}}{1000\text{ grams}}\right)$$

$$= \frac{500\text{ grams} \times 1\text{ kilogram}}{1000\text{ grams}}$$

$$= \frac{500}{1000}$$

$$= \frac{1}{2}\text{ kilo}$$

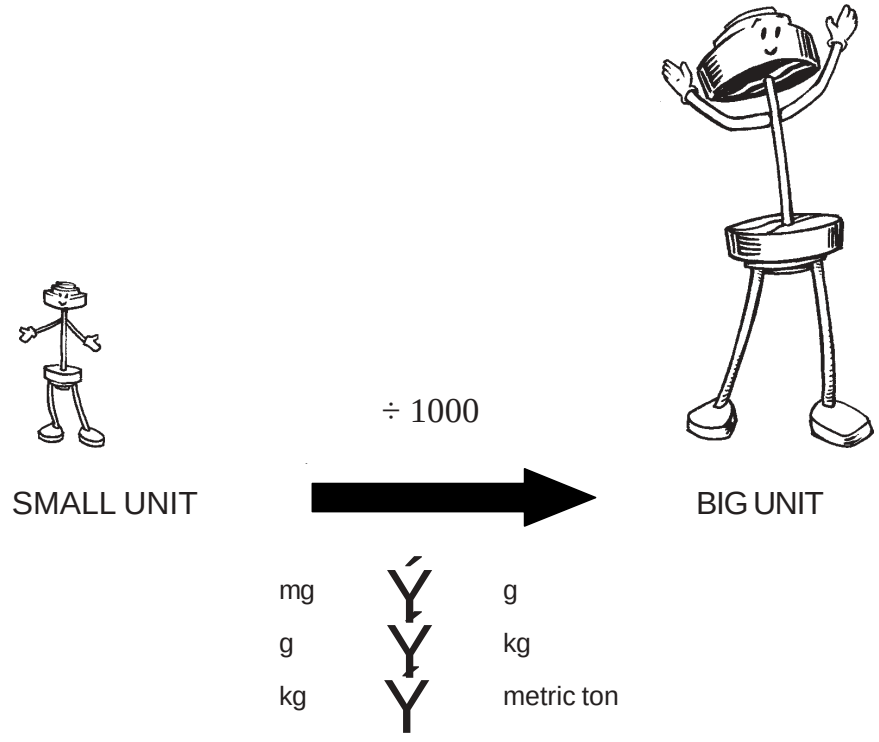
Remember: If the units of the numerator and denominator are the same, they cancel out. So, for this problem, the grams cancel out. Your final answer will be in kilos.

Remember: You can simplify fractions by dividing the numerator and the denominator by the greatest common factor (GCF). The GCF of 500 and 1,000 is 500.

Thus, 500 grams = 1/2 kilo.

For the following conversions, **a quicker way to convert the smaller unit to the bigger unit is by simply dividing the number of the smaller unit by 1,000:**

- milligram to gram
- gram to kilogram
- kilogram to metric ton



For you to understand this technique, three examples have been worked out for you:

1. Once again, let us try converting 500 grams to kilograms.

$$\frac{500}{1000} = \frac{500/500}{1000/500} = \frac{1}{2}$$ OR,

$$1000\overline{)500.0}\ 0.5$$

$$\underline{500.0}$$

x

Therefore, 500 g = 1/2 or 0.5 kilo. This is the same answer that we got by using the unit factor method.

2. Let us now try converting 2,000 milligrams to grams.

$$1000\overline{)2000}\quad 2$$
$$\underline{2000}$$
$$x$$

Therefore, 2,000 mg = 2 g.

3. Let's convert 800 kilograms to metric tons.

$$\frac{800}{1000} = \frac{800/200}{1000/200} = \frac{4}{5}$$

Or,

$$1000\overline{)800.0}\quad 0.8$$
$$\underline{800.0}$$
$$x$$

Therefore, 800 kg = 4/5 or 0.8 metric ton.

Let's Review

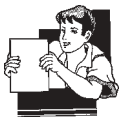
Write your solutions and answers in the box after each question.

1. How many kilos of rice are there in 7.2 metric tons?

2. How many milligrams are there in 8 grams of medicine?

3. A wholesaler is proposing to supply sugar to a candy factory. It can commit to supply 200 kilos a month. The candy factory uses 3 metric tons of sugar a year. Is the wholesaler capable of supplying the candy factory with the sugar that it needs for one year?

Compare your answers with those in the *Answer Key* on pages 58–60.



Let's Learn

Converting bigger units of weight to smaller units

Let us say that you read a newspaper report about relief operations in a province. According to the report, 15 metric tons of rice is needed to supply an evacuation center for a month. Now, you are more familiar with the kilogram as a unit of weight. Thus, you want to know how much that quantity is in kilos.

As you already know, the metric ton is bigger than the kilogram. So, you have to convert a bigger unit of weight to a smaller unit.

Once again, you can do this by using the unit factor method.

STEP 1 *What quantity are you given? To what unit will you convert this quantity?*

You are given 15 metric tons. You have to convert this to kilos.

STEP 2 *What unit factor will you use to convert metric tons to kilos?*

You need to convert metric tons to kilos. From the table on page 19, you know that there are 1,000 kilos in one metric ton. Your unit factor is:

$$\frac{1{,}000 \text{ kilograms}}{1 \text{ metric ton}}$$

unit to which you will convert the given quantity

unit of the given quantity

STEP 3 *You can now convert metric tons to kilos by multiplying 15 metric tons by the unit factor.*

$$15 \text{ metric tons}\left(\frac{1{,}000 \text{ kilograms}}{1 \text{ metric ton}}\right)$$

$$\frac{15 \cancel{\text{metric tons}} \times 1{,}000 \text{ kilograms}}{1 \cancel{\text{metric ton}}}$$

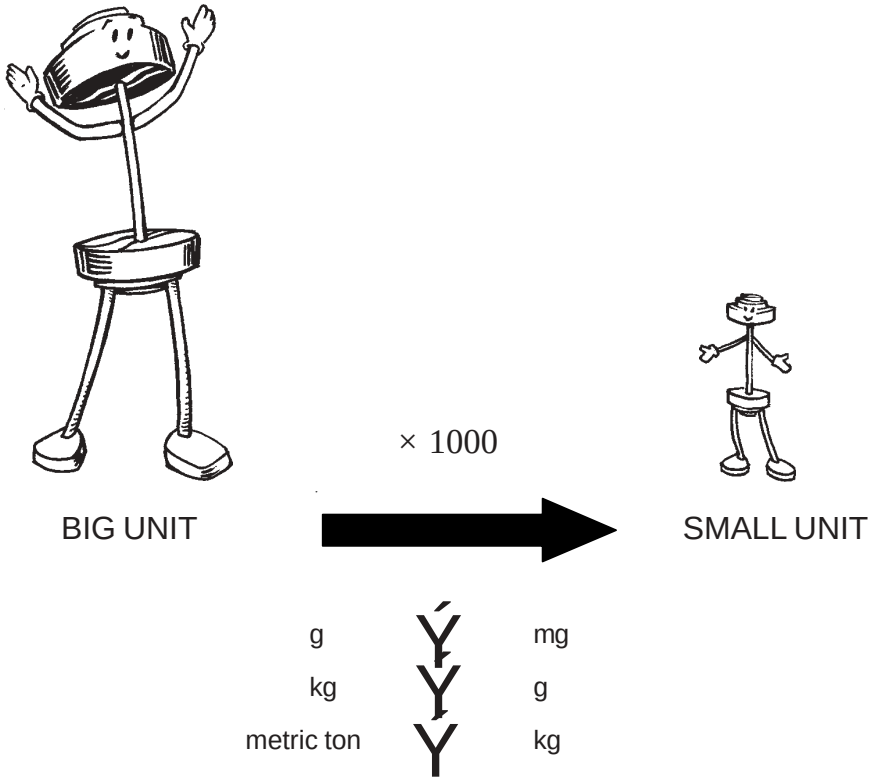
$$= \frac{15 \times 1{,}000}{1}$$

$$= 15{,}000 \text{ kilos}$$

Thus, 15 metric tons = 15,000 kilos.

For the following conversions, **a quicker way to convert the bigger unit to the smaller unit is by simply multiplying the number of the bigger unit by 1,000:**

- gram to milligram
- kilogram to gram
- metric ton to kilogram



For you to understand this technique, three examples have been worked out below:

1. Once again, let us try converting 15 metric tons to kilograms.

   $$15 \times 1000 = 15{,}000$$

   Thus, 15 metric tons = 15,000 kilos. This is the same answer that we got by using the unit factor method.

2. Let's convert 6 grams to milligrams.

   $$6 \times 1000 = 6{,}000$$

   Thus, 6 grams = 6,000 mg.

3. Let's convert 5 ½ kilograms to grams.

   $$5\ ½ = 5.5$$

   $$5.5 \times 1000 = 5{,}500$$

   Thus, 5 ½ kilos = 5,500 g.

Let's Review

The following questions ask you to convert a quantity from one unit of weight to another. Show your solutions in the boxes provided.

1. How many grams are there in 3,000 mg?

2. How many kilos are there in 1,200 grams of fish?

3. A repair job is being done in a school building that was damaged by a typhoon. About 3,430 grams of cement is needed for the repair. A nearby hardware store sells cement in sacks of 10 kilos each. Will one sack of cement be enough for the repair job?

Check your answers using the *Answer Key* on pages 60–62.

Did you get the correct answers? If you did, you deserve praise for the good work! If you found some questions difficult, do not be discouraged. Just keep on studying patiently. Always feel free to go to the portions of the module that you need to understand some more.

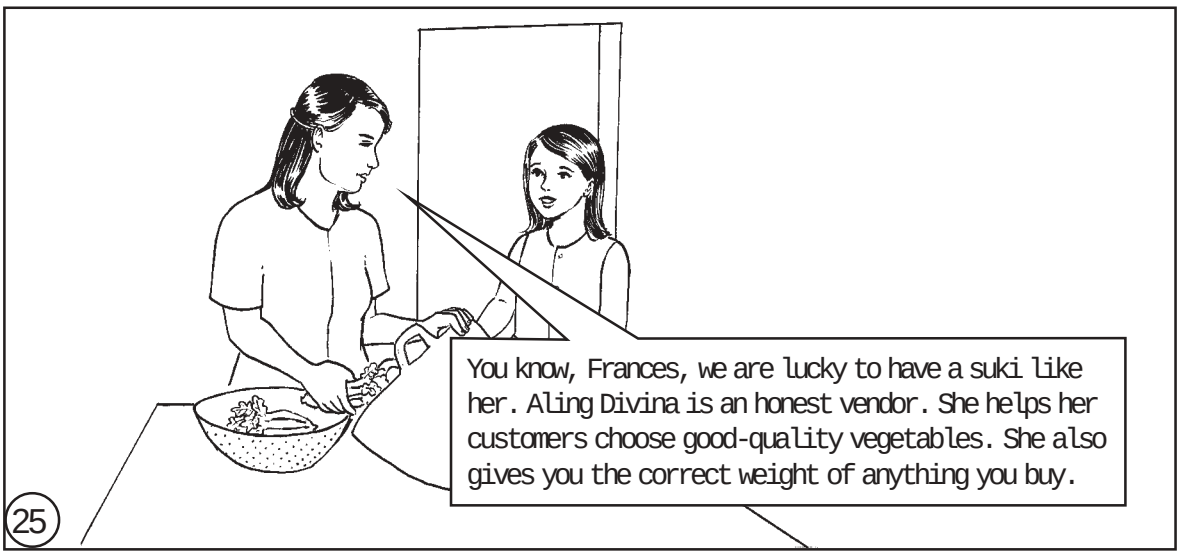
You will go back to this part of Frances' story in Part Two of this module. There you will solve for the cost of goods bought according to their weights.

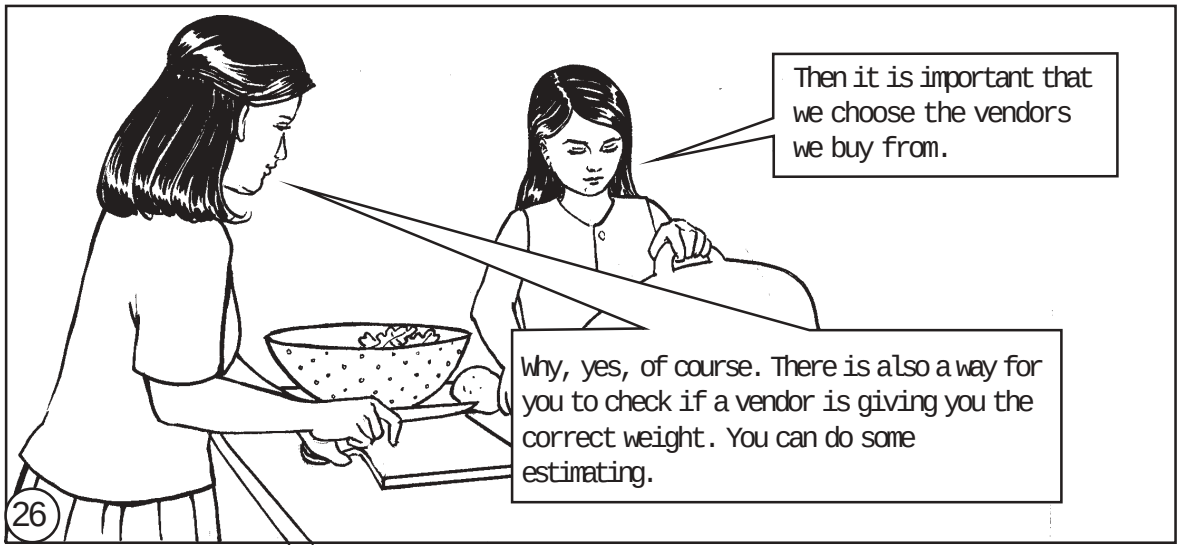
Well, you have been such a patient learner so far! Why don't you take a well-deserved rest? Then you can go back to the next activity and learn some more.

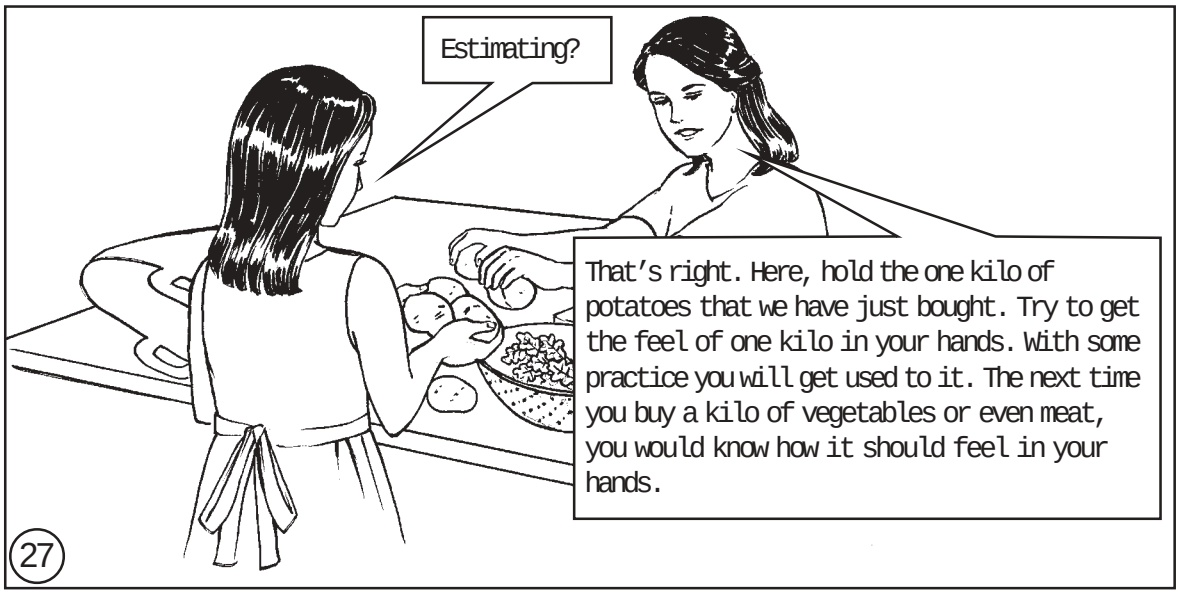
When you are ready, follow Aling Lucing and Frances as they walk home from the market.

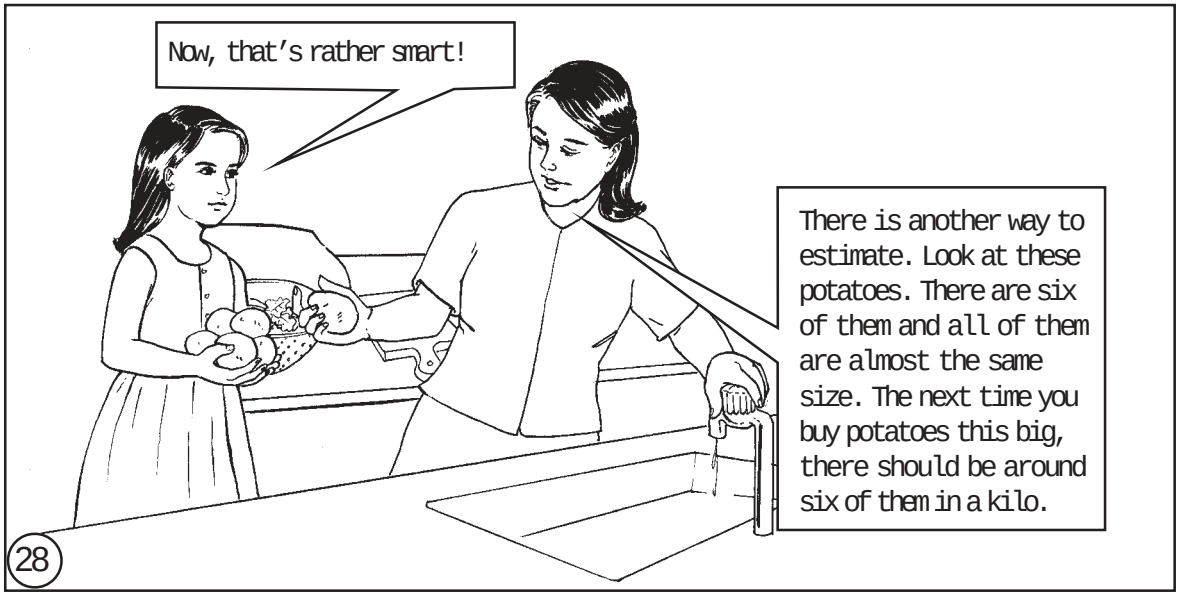
Let's Read

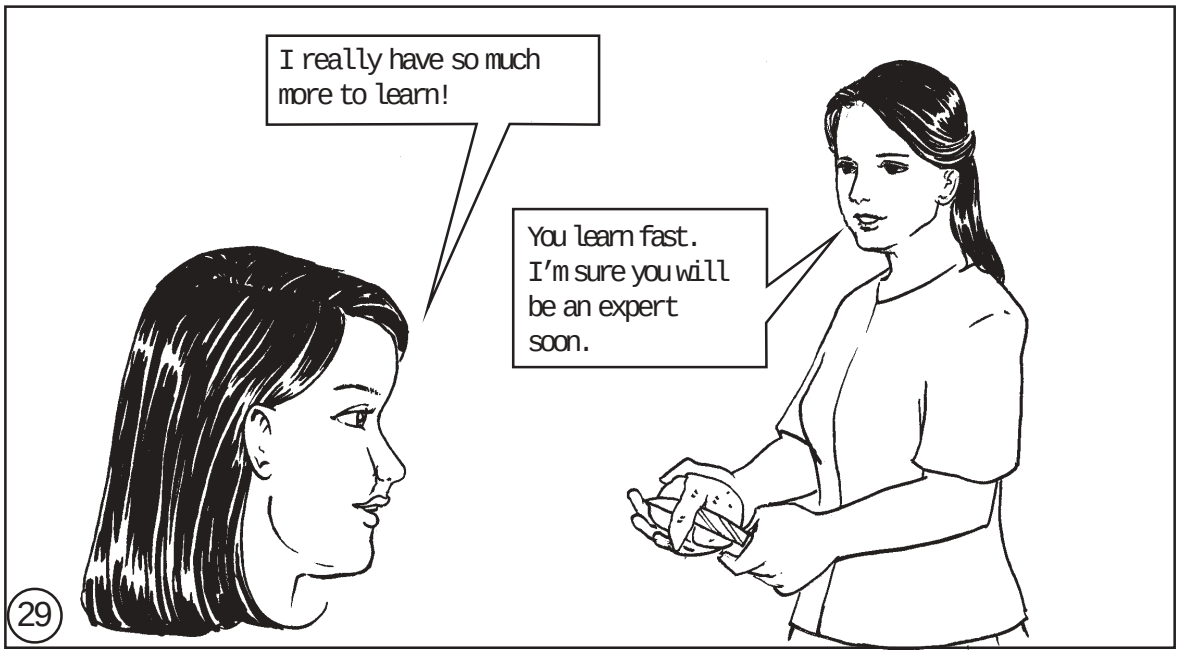
Let's read the continuation of our earlier comic strips. In the house of Frances and Aling Lucing . . .






Estimating?
That's right. Here, hold the one kilo of potatoes that we have just bought. Try to get the feel of one kilo in your hands. With some practice you will get used to it. The next time you buy a kilo of vegetables or even meat, you would know how it should feel in your hands.
27


Now, that's rather smart!
There is another way to estimate. Look at these potatoes. There are six of them and all of them are almost the same size. The next time you buy potatoes this big, there should be around six of them in a kilo.
28


I really have so much more to learn!
You learn fast. I'm sure you will be an expert soon.
29

The End

Let's Think About This

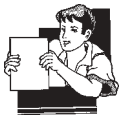
Let us say that you like mangoes very much. Last week, you bought a kilo of them and noticed that there were five mangoes in one kilo.

This week, you bought another kilo of mangoes from the same vendor. You noticed that when you asked for a kilo of mangoes, the vendor gave you only four mangoes. You also tried to feel the one kilo of mangoes in your hands. You thought this one kilo of mangoes felt lighter than the one kilo of mangoes you bought last week. Still, you were not very sure.

Do you think you were given less than a kilo of mangoes this week? Think about this, then write down your answer.

_____
_____
_____
_____
_____
_____

Compare your answer with that in the *Answer Key* on page 62.



Let's Learn

At the start of this lesson, you learned how to read the weights of objects on a weighing scale. This skill is important because the prices of many things that you buy are based on their weights.

The best way to know the weight of an object is of course to use a weighing scale. Sometimes, you cannot use a scale and you have to make a wise guess about the weight of an object. When you do this, you **estimate** the weight of that object.

In what situations do you usually have to make an estimate? According to Aling Lucing, some vendors may be dishonest. They give you goods that weigh less than what you pay for. When you have this doubt, you can estimate the weight of what you are buying. It is not always dishonesty on the vendor's part, though. Sometimes, the scales they use are already worn-out. Worn-out scales may not weigh objects correctly anymore. They may have to be replaced with new ones.

How can you estimate the weights of objects? Here are two ways:

1. Hold one kilo of an object or objects in your hand. The object/s may be fruits, meat or anything you pay for by its weight. Familiarize yourself with the feel of one kilo in your hands. The next time you buy a kilo of certain goods you would know how heavy it should feel in your hands.
2. Count how many objects there are in one kilo of goods. These objects should be about the same size. (For example, Frances counted six potatoes in one kilo.) The next time you buy a kilo of the same goods, observe if they are as big or as small as those you bought before. If they are, you should have about the same number of goods for this purchase.

Let's See What You Have Learned

Encircle the letter of the correct answer.

1. What is the **best** way to know the weight of an object?
   a. Carry the object in your hands. Guess its weight based on how it feels in your hands.
   b. Use a weighing scale.
   c. Ask your shopping companion how much he/she thinks it weighs.
   d. Ask the vendor you are buying the goods from how much he/she thinks the object weighs.

2. What do we usually mean by estimating an object's weight?

    a. A wise guess about how much the object weighs
    b. The weight of the object using a weighing scale
    c. The actual and correct weight of an object
    d. The number of objects you wish to weigh

3. When you estimate that a vendor gave you the wrong amount of goods based on the weight, you should _____.

    a. start a fight and demand that he/she give back your money
    b. explain very carefully and in a nice way why you think he/she may have given you the wrong amount and request him/her to weigh the goods again
    c. tell him/her that he/she should buy a new weighing scale
    d. go home without saying anything but feeling bad because you might have been cheated

4. Last week you bought one kilo of big ponkans (oranges). One kilo was equal to six ponkans. This week you saw some smaller ponkans. You think about it and decide that you will buy some anyway. One kilo of the smaller ponkans will probably have _____.

    a. exactly six ponkans
    b. more than six ponkans
    c. less than six ponkans

5. The last time I bought a kilo of pork chops, I was given seven slices of meat. I found the slices too thin for grilling. I want thicker slices the next time. If I buy a kilo of pork chops and ask for thicker slices, about how many slices of meat can I expect to receive?

    a. more than seven slices
    b. less than seven slices
    c. exactly seven slices

Check your answers using the *Answer Key* on pages 63–64.

You are making some progress in this module! Before you move on to Lesson 2, let us summarize what you have learned so far.

Let's Remember

- The instrument used for measuring weight is called a weighing scale.
- In the metric system, the most commonly used units for weight measurement are the milligram, gram, kilogram and metric ton.

  1,000 milligrams = 1 gram (g)
  1,000 grams = 1 kilogram (kilo or kg)
  1,000 kilograms = 1 metric ton

- To convert one unit of weight to another, you can use the unit factor method. It consists of three steps:

  STEP 1 Find out what the given quantity is, and to what unit you have to convert this quantity.

  STEP 2 Set the unit factor that you need to make the conversion.

  STEP 3 Multiply the given quantity by the unit factor.

- A quicker way to do the following conversions (smaller units to bigger units) is to divide the smaller unit by 1,000.

  - milligram to gram
  - gram to kilogram
  - kilogram to metric ton

- A quicker way to do the following conversions (bigger units to smaller units) is to multiply the bigger unit by 1,000.

  - gram to milligram
  - kilogram to gram
  - metric ton to kilogram

- When you are not sure about the weight of an item you are buying, you can estimate its weight in two ways.

  - Familiarize yourself with the feel of say, one kilo in your hands. The next time you buy a kilo of goods, you would know how heavy it should feel in your hands.
  - When you buy one kilo of goods that are of the same size, count how many there are in say, one kilo. The next time you buy a kilo of the same goods, check if they are as big or as small as those you bought before. If they are, you should have about the same number of goods.

When you are ready, turn the page and start with Lesson 2. This time, you will study the English system of measurement.

How Heavy Is Totoy?

In this lesson, you will extend what you have learned in Lesson 1. You will learn of another system you can use to measure the weights of objects and people. It is important though that before you start, you know Lesson 1 very well. Remember Frances, the girl with whom you learned all about the metric system of measurement? You will meet her here again, this time with her younger brother Totoy.

At the end of this lesson, you should be able to use the English system of measurement to:

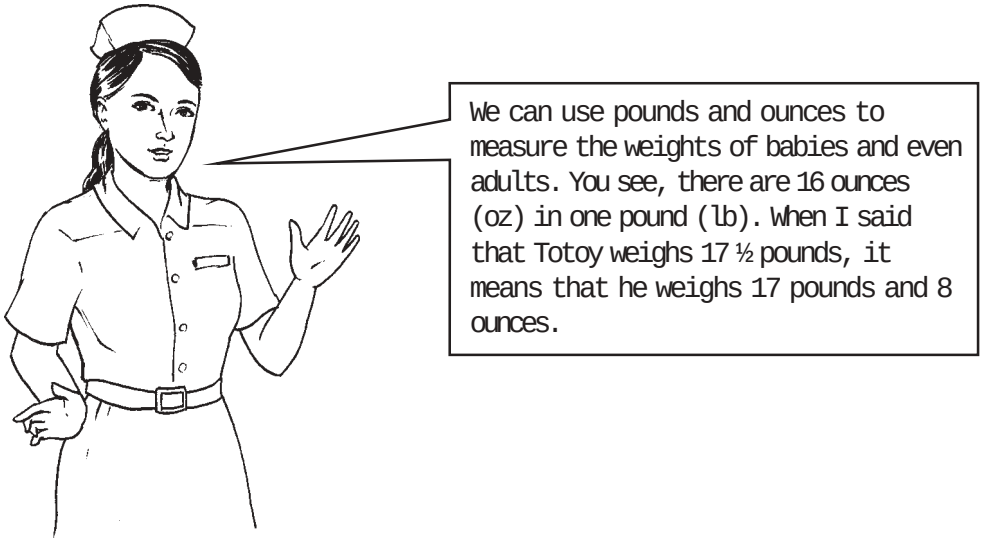
- measure and record the weights of objects and persons; and
- convert smaller units of weight to bigger units and vice versa.

Let's Read

Frances has a younger brother named Totoy. When Totoy was eight months old, Aling Lucing and Frances brought him to the health center for a checkup.

Before Dr. Bautista saw Totoy, the nurse placed him on a weighing scale. The nurse said, "Very good, Totoy. You now weigh 17 ½ pounds. That's great for an 8-month-old baby."

Now, Frances knows all about milligrams, grams and kilograms but she is not so sure about pounds and ounces. When she asked the nurse about these, this is what the nurse said:



Let's Review

Complete each of the following sentences by underlining the correct word or figure inside the parentheses.

1. Pounds and ounces can be used to measure people's (weights, heights).

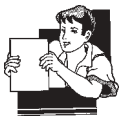
2. There are (16, 1.6) ounces in 1 pound.

3. One ounce is (smaller, bigger) than 1 pound.

4. There are (32, 3.2) ounces in 2 pounds.

5. There are (8, 0.8) ounces in 1/2 pound.

Compare your answers with those in the *Answer Key* on page 64.



Let's Learn

Units of weight measurement in the English system

You have learned that two systems can be used for measuring weight, namely, the metric and English systems. You studied the metric system in Lesson 1. In this lesson, you will learn about the **English system** for measuring weight.

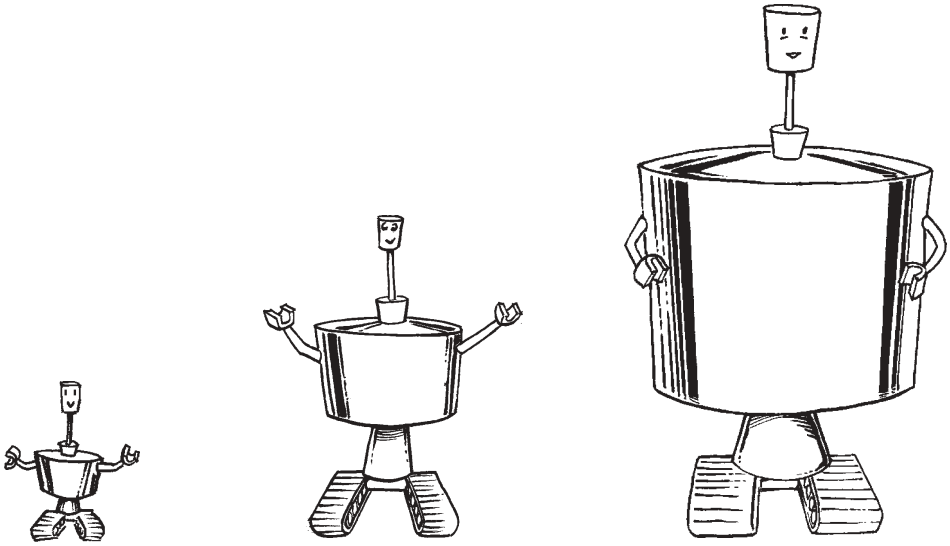
The important units used for measuring weight in the English system are the **ounce**, **pound** and **ton**. Study carefully how much of one unit is equivalent to another:

16 ounces (oz)	=	1 pound (lb)
2,000 pounds (lbs)	=	1 ton

As you can observe, the **ounce** is the smallest among the units in the box above. It is a very small quantity. One of its uses is to measure small quantities of ingredients, such as those used in baking.

There are 16 ounces in one **pound**. Pounds may be used for measuring the weights of persons. You may have noticed that when babies are weighed, pounds and ounces are used. This is to make sure that the weight recorded is more accurate.

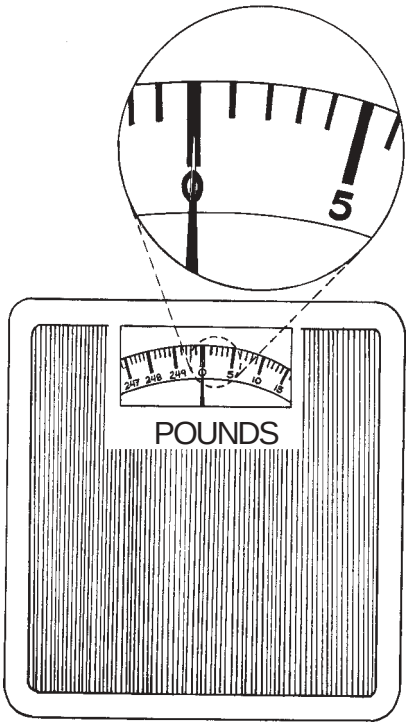
There are 2,000 pounds in one **ton**. Can you begin to imagine how heavy 2,000 pounds are? That makes a ton a very large quantity! The ton may be used to measure big quantities that are transported like construction materials, or even rice and sugar. Remember, however, that the English ton is different from the metric ton we have discussed in Lesson 1.



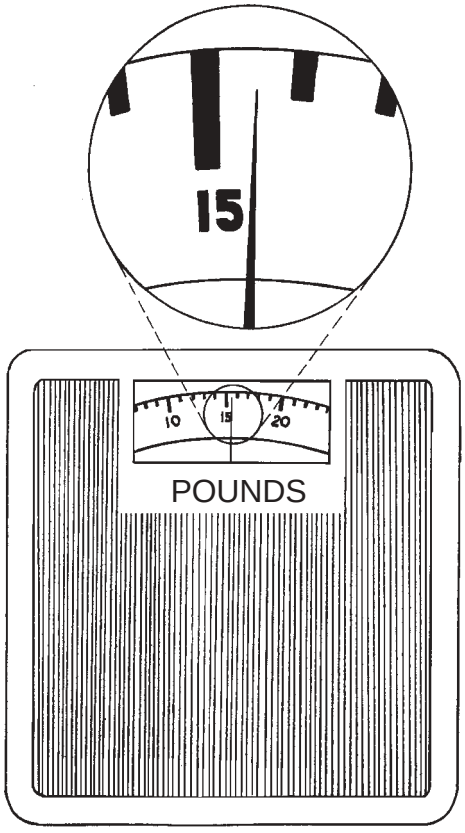
OUNCE POUND TON OR ENGLISH TON

Do you remember how to read a weighing scale calibrated for the metric system (or a scale with grams and kilograms)? Reading a weighing scale calibrated for the English system (or a scale in ounces or pounds) is not very different. Just be sure to know what units the lines on the scale stand for.

Take a look at the scale below. It is a bathroom scale. The scale will register your weight when you step on the pad.



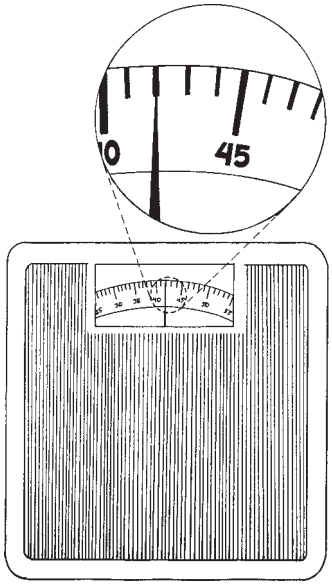
In this scale, each line stands for one pound. This means that as the scale pointer moves from one line to the next, one pound is added to the weight. If the pointer stops in the middle of two lines, it means that half a pound is registered on the scale. Study the scale below.

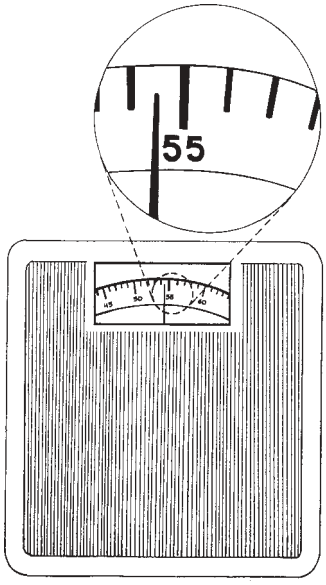


The scale pointer is between 15 and 16 pounds. This means that the object being weighed is 15 ½ pounds.

Let's Try This

1. Read the weights from these scales. The scales are calibrated to measure weight in pounds.





_____ _____

2. Ask the members of your family and some of your friends if you can weigh them. Use a weighing scale calibrated to measure weight in pounds. (Many bathroom scales are calibrated this way.) You can go to a health center if you do not have your own weighing scale. This activity will help you read weights faster and more accurately.

As you weigh the members of your family and some of your friends, record their weights in a table similar to the one below:

NAME	WEIGHT IN POUNDS
Tatay	160
Nanay	136
Cecilia	98 ½
Joseph	61

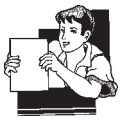
Now, use the table below for your own weighing activity.

NAME	WEIGHT IN POUNDS

3. Go to the *sari-sari* store where you buy your everyday needs. Explain to the storeowner that you are studying about weight measurement. Ask him/her if you can go over the goods he/she sells and see which ones are weighed in pounds and ounces. List down these products below:

_____
_____
_____
_____

Compare your answers with those in the *Answer Key* on page 64.



Let's Learn

Converting smaller units of weight to bigger units

Now, you may also have to do some conversion of units in the English system. As with the metric system, you can convert smaller units to bigger units, and bigger units to smaller units.

Let us convert 35 ounces to pounds. You know that the ounce is a smaller unit than the pound. So we will be converting a smaller unit to a bigger unit. Once more, let us do this using the unit factor method.

STEP 1 *What quantity are you given? To what unit will you convert this quantity?*

You are given 35 ounces. You have to convert this quantity to pounds.

STEP 2 *What unit factor will you need to convert from ounces to pounds?*

From the box on page 34, you know that there are 16 ounces in 1 pound. Your unit factor is:

$$\frac{1\text{ pound}}{16\text{ ounces}}$$

1 pound — unit to which you will convert the given quantity

16 ounces — unit of the given quantity

STEP 3 *Convert ounces to pounds by multiplying 35 ounces by the unit factor:*

$$35\text{ ounces}\left(\frac{1\text{ pound}}{16\text{ ounces}}\right)$$
$$=\frac{35\text{ oz}\times 1\text{ lb}}{16\text{ oz}}$$
$$=\frac{35\times 1}{16}$$
$$=\frac{35}{16}\text{ lbs}$$

Then, do the required division:

$$\begin{array}{r} 2 \\ 16\overline{)35} \\ \underline{32} \\ 3 \end{array}$$

At this point, you know that 35 oz = 2 lbs 3 oz, or 35 oz = 2 $\frac{3}{16}$ lbs. If you complete the division, you will get:

$$\begin{array}{r} 2.1875 \\ 16\overline{)35.0000} \\ \underline{32} \\ 30 \\ \underline{16} \\ 140 \\ \underline{128} \\ 120 \\ \underline{112} \\ 80 \\ \underline{80} \\ \text{x} \end{array}$$

Now you also know that 35 oz = 2.1875 lbs ≈ 2.19 lbs

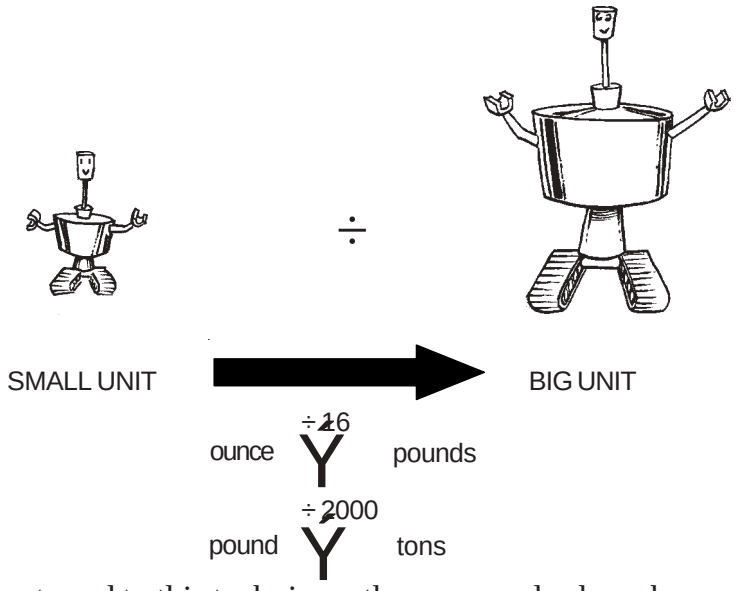
Thus, $35\text{ lbs} = 2\text{ lbs }3\text{ oz}$
$= 2\ \frac{3}{16}\text{ lbs}$
$= 2.1875\text{ lbs} \approx 2.19\text{ lbs}$

Remember, however, that it is more common practice to write "2 lbs 3 oz" rather than "2 $\frac{3}{16}$ lbs" or "2.19 lbs."

Here are quicker ways to do the following conversions from a **smaller unit to a bigger unit**:

- ounces to pounds
  To convert **ounces to pounds**, divide the number of ounces by 16.

- pounds to tons
  To convert **pounds to tons**, divide the number of pounds by 2,000.



For you to get used to this technique, these examples have been worked out for you:

1. To convert 35 ounces to pounds:

$$16\overline{)35}\quad 2,\ 32,\ 3$$

   Thus, 35 oz = 2 lbs 3 oz. This is the same answer that we got by using the unit factor method.

2. To convert 6,000 pounds to tons:

$$2000\overline{)6000}\quad 3,\ 6000,\ x$$

   Thus, 6,000 lbs = 3 tons.

Let's Review

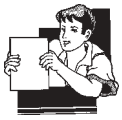
Write your solutions and answers in the boxes provided.

1. How many pounds are there in 290 ounces?

2. How many tons are there in 4,750 pounds of rice?

3. A small factory of native delicacies can make about 100 ounces of *pastillas* daily. It is offering to supply pastillas to a supermarket. The supermarket requires 5 pounds daily. Can the factory supply the supermarket's daily demand for *pastillas*?

Compare your answers with those in the *Answer Key* on pages 65–67.



Let's Learn

Converting bigger units of weight to smaller units

Let us now try converting 2 pounds and 6 ounces to ounces. This is how it is done using the unit factor method:

STEP 1 *What quantity are you given? To what unit will you convert this quantity?*

You are given 2 lbs 6 oz. You have to convert this quantity to ounces.

STEP 2 *What unit factor will you need to convert pounds and ounces to ounces?*

You know that there are 16 ounces in 1 pound. Your unit factor is:

$$\frac{16 \text{ ounces}}{1 \text{ pound}}$$

16 ounces: unit to which you will convert the given quantity

1 pound: unit of the given quantity

STEP 3 *You can now convert pounds and ounces to ounces by using the unit factor:*

2 lbs 6 oz

This is already in ounces so you don't have to convert it anymore.

This is still in pounds. You have to convert it to ounces.

$$2 \text{ lbs} \left(\frac{16 \text{ oz}}{1 \text{ lb}} \right)$$

$$= \frac{2 \cancel{\text{lbs}} \times 16 \text{ oz}}{1 \cancel{\text{lb}}}$$

$$= 32$$

$$2 \text{ lbs} = 32 \text{ oz}$$

Then, you have to add 32 oz to 6 oz to complete the conversion:

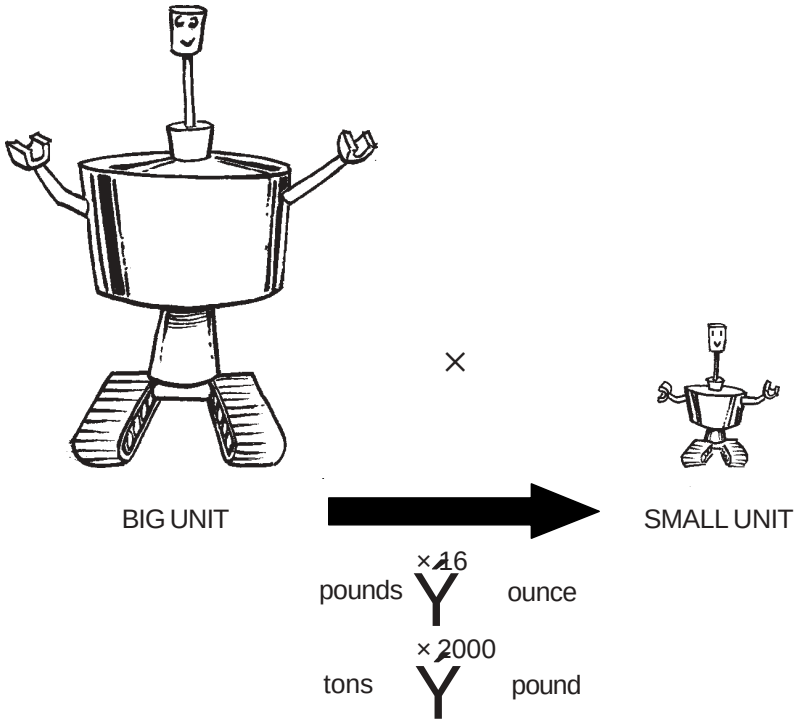
$$\begin{array}{rcrcr} & 2 \text{ lbs} & \rightarrow & & 32 \text{ oz} \\ + & 6 \text{ oz} & \rightarrow & + & \underline{\ 6 \text{ oz}} \\ & & & & 38 \text{ oz} \end{array}$$

Thus, 2 lbs 6 oz = 38 oz.

Here are quicker ways to do the following conversions from a **bigger unit to a smaller unit**:

- pounds to ounces
  To convert **pounds to ounces**, multiply the number of pounds by 16.

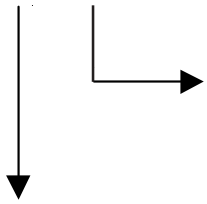
- tons to pounds
  To convert **tons to pounds**, multiply the number of tons by 2,000.



For you to get used to this technique, these examples have been worked out for you:

1. To convert 2 pounds and 6 ounces to ounces:

   2 lbs 6 oz

   This is already in ounces so you don't have to convert it anymore.

   This is still in pounds. Convert the quantity to ounces by multiplying it by 16:

   $$2 \times 16 = 32$$
   $$2 \text{ lbs} = 32 \text{ oz}$$

   Then, you have to add 32 oz to 6 oz to complete the conversion:

   $$\begin{array}{rl} & 2 \text{ lbs} \rightarrow \ 32 \text{ oz} \\ + & 6 \text{ oz} \ \rightarrow \underline{+ \ 6 \text{ oz}} \\ & \quad 38 \text{ oz} \end{array}$$

   Thus, 2 lbs 6 oz = 38 oz. This is the same answer that we got using the unit factor method.

2. To convert 3 tons to pounds:

   $$3 \times 2000 = 6000$$

   Thus, 3 tons = 6,000 lbs.

Let's See What You Have Learned

Try solving the following problems. Show your solutions in the boxes provided.

1. How many ounces are there in 3 ½ pounds?

2. How many pounds are there in 6 ½ tons of sugar?

3. Last month, a baby weighed 14 pounds and 15 ounces. This month, he weighs 15 pounds and 6 ounces. How much weight did the baby gain?

4. A cook has 2 pounds of butter in her kitchen. She has to bake two cakes that need 20 ounces of butter each. Will there be enough butter to bake the two cakes?

Check your answers using the *Answer Key* on pages 67–69.

This is the end of Lesson 2. Now you are familiar with both the metric and the English systems of measuring weight. Before you begin with Part Two, let us summarize what you have learned in this lesson.

Let's Remember

- In the English system, the most commonly used units for measuring weight are the ounce, pound and ton:

  16 ounces (oz) = 1 pound (lb)
  2,000 pounds (lbs) = 1 ton

- To convert one unit of weight to another, you can use the unit factor method that you learned in Lesson 1.
- There are quicker ways to do the following conversions from a smaller unit to a bigger unit:
  - ounces to pounds
    To convert ounces to pounds, divide the number of ounces by 16.
  - pounds to tons
    To convert pounds to tons, divide the number of pounds by 2,000.
- There are quicker ways to do the following conversions from a bigger unit to a smaller unit:
  - pounds to ounces
    To convert pounds to ounces, multiply the number of pounds by 16.
  - tons to pounds
    To convert tons to pounds, multiply the number of tons by 2,000.

We have covered quite a number of topics in this module. Before you take the post-test, carefully read the module summary. It will help you put together the things that you have learned.

Let's Sum Up

- In the metric system, the most commonly used units for measuring weight are the milligram, gram, kilogram and metric ton.

1,000 milligrams	=	1 gram (g)
1,000 grams	=	1 kilogram (kilo or kg)
1,000 kilograms	=	1 metric ton

  A commonly used indigenous unit of weight is the *guhit*. One guhit is equivalent to 100 grams. There are 10 guhits in one kilo.

- In the English system, the most commonly used units for measuring weight are the ounce, pound and ton:

16 ounces (oz)	=	1 pound (lb)
2,000 pounds (lbs)	=	1 ton

- To convert one unit of weight to another, you can use the unit factor method. It consists of three steps:

  STEP 1 Find out what the given quantity is, and to what unit you have to convert this quantity.

  STEP 2 Set the unit factor that you need to make the conversion. A unit factor tells you how much of one unit is equivalent to another unit.

  STEP 3 Multiply the given quantity by the unit factor.

- In the metric system, a quicker way to do the following conversions (smaller units to bigger units) is to divide the smaller units by 1,000:

  - milligram to gram
  - gram to kilogram
  - kilogram to metric ton

  Also in the metric system, a quicker way to do the following conversions (bigger units to smaller units) is to multiply the bigger unit by 1,000:

  - gram to milligram
  - kilogram to gram
  - metric ton to kilogram

- In the English system, there are quicker ways to do the following conversions from a smaller unit to a bigger unit:

  - ounces to pounds
    To convert ounces to pounds, divide the number of ounces by 16.

  - pounds to tons
    To convert pounds to tons, divide the number of pounds by 2,000.

  Also in the English system, there are quicker ways to do the following conversions from a bigger unit to a smaller unit:

  - pounds to ounces
    To convert pounds to ounces, multiply the number of pounds by 16.

  - tons to pounds
    To convert tons to pounds, multiply the number of tons by 2,000.

- When you are not sure about the weight of an item you are buying, you can estimate its weight in two ways.

  - Familiarize yourself with the feel of say, one kilo in your hands. The next time you buy a kilo of goods, you would know how heavy it should feel in your hands.

  - When you buy one kilo of goods that are of the same size, count how many there are in say, one kilo. The next time you buy a kilo of the same goods, try to observe if they are as big or as small as those you bought before. If they are, you should have about the same number of goods.

What Have You Learned?

Answer the following questions. Show your solutions in the boxes provided.

1. Maximo needs 2,500 grams of feed for his chickens every week. He asks his son to go to the market and buy the chicken feed. How many kilos of chicken feed should his son buy?

2. A candy stall sold 144 ounces of heart-shaped lollipops last Valentine's Day. How many pounds of heart-shaped lollipops were sold?

3. The school-feeding program of a certain province needs 1.2 metric tons of rice. A charity group donates 1,458 kilos of rice. Is this quantity enough for the needs of the school-feeding program?

4. Which is heavier to lift, a suitcase weighing 6 pounds or a plastic bag of beef weighing 96 ounces?

5. Ester weighs 99 ½ pounds. How many ounces should she gain for her to weigh exactly 100 pounds?

6. Jenny needs 1.7 kilos of sweet potatoes for some delicacies she wants to prepare. Since she finds only a kilo in her kitchen, she sends her son to the market to buy some more. Her son brought home 4 guhits of sweet potatoes. Would this quantity be enough?

7. A freight container can hold 0.4 metric ton of cargo. If a company will ship 775 kilos of cargo, how many freight containers will it need?

8. Last week, you bought a kilo of pork chops. You were given six slices of the meat. You found the slices too thick for frying. You thought you would want thinner slices next time. If you buy a kilo of pork chops and ask for thinner slices, would you expect more or less than six slices?

Compare your answers with those in the *Answer Key* on pages 70–74.

How did you fare?

If you got:

7–8 Excellent! You have learned a lot from this module! Just review those parts that will help you answer the questions you have missed.

5–6 Good! Just go back to the parts of the module that you did not understand.

0–4 You have to carefully study this module again. Try not to hurry. Make sure that you understood one part of a lesson before moving on to the next.

Well, I hope that you had quite an adventure with weights in Part One of *Measuring Weight*. In Part Two, you will find out that it was worth your while learning about the metric and English systems of measurement. You will learn how units can be converted from one system to another. You will also learn how to apply your knowledge of weight measurement to everyday situations.

Take a break and relax! When you are ready, you can start with Part Two, *Measuring Weight: Some Practical Applications*.

Answer Key

A. Let's See What You Already Know *(pages 2–3)*

1. **(c)** There are 1,000 grams in one kilogram.

2. **(a)** There are 16 ounces in one pound.

3. **(b)** You are asked how many grams there are in 1 metric ton. You know that there are 1,000 kilos in 1 metric ton. However, you cannot directly say how many grams there are in 1 metric ton.

   One thousand kilos is equivalent to 1 metric ton. Thus, computing for the number of grams in 1,000 kilos is the same as computing for the number of grams in 1 metric ton.

   Solution:

   Using the unit factor method:

   STEP 1 You have to convert 1 metric ton to grams.

   STEP 2 You know that there are 1,000 grams in 1 kilo.

   So, the unit factor is $\frac{1000\text{ grams}}{1\text{ kilo}}$

   STEP 3 $1000\text{ kilos}\left(\frac{1000\text{ g}}{1\text{ kilo}}\right)$

   $$=\frac{1000\ \cancel{\text{kilos}}\times 1000\text{ g}}{1\ \cancel{\text{kilo}}}$$

   $$=1{,}000{,}000\text{ grams}$$

   Therefore, there are 1,000,000 grams in 1 metric ton.

4. **(c)** You are given two quantities — 500 grams and 1/2 kilogram. Then, you are asked to tell which of them is heavier.

   Solution:

   To be able to compare two quantities, both of them should be in the same unit. Try converting 500 grams to kilograms so both quantities will be in kilograms.

   Using the unit factor method:

   STEP 1 You need to convert 500 grams to kilos.

   STEP 2 You know that 1,000 g = 1 kilo

   So, the unit factor is $\frac{1\text{ kilo}}{1000\text{ grams}}$

STEP 3 $500 \text{ grams}\left(\frac{1 \text{ kilo}}{1000 \text{ g}}\right)$

$$= \frac{500 \cancel{g} \times 1 \text{ kilo}}{1000 \cancel{g}}$$

$$= \frac{500}{1000}$$

$$= \frac{500/500}{1000/500}$$

$$= 1/2 \text{ kilo}$$

500 g = 1/2 kilo

Therefore, 500 grams is as heavy as 1/2 kilo.

Or, you can directly divide 500 grams by 1,000.

$$\frac{500}{1000} = \frac{500/500}{1000/500} = \frac{1}{2}$$

500 grams = 1/2 kilo

Therefore, 500 grams is as heavy as 1/2 kilo.

5. **(a)** You are given two quantities — 33 ounces and 2 pounds. Then, you are asked to tell which of them is heavier.

Solution:

To be able to compare two quantities, both of them should be in the same unit. Try converting 33 ounces to pounds so both quantities will be in pounds.

Using the unit factor method:

STEP 1 You need to convert 33 ounces to pounds.

STEP 2 You know that 16 oz = 1 lb

So, the unit factor is $\frac{1 \text{ lb}}{16 \text{ oz}}$

STEP 3

$$33 \text{ oz}\left(\frac{1 \text{lb}}{16 \text{oz}}\right)$$

$$= \frac{33 \cancel{\text{oz}} \times 1 \text{lb}}{16 \cancel{\text{oz}}}$$

$$= \frac{33}{16}$$

Working out the division,

$$16\overline{)33}\quad 2 \text{ r. } 1$$
$$\underline{32}$$
$$1$$

33 oz = 2 lbs 1 oz
2 lbs 1 oz > 2 lbs

Therefore, 33 ounces is heavier than 2 pounds.

Or, you can directly divide 33 ounces by 16:

$$16\overline{)33}\quad 2 \text{ r. } 1$$
$$\underline{32}$$
$$1$$

33 oz = 2 lbs 1 oz
2 lbs 1 oz > 2 lbs

Therefore, 33 ounces is heavier than 2 pounds.

6. You are asked how many pounds there are in 1 ½ English tons.

***Solution**:*

Using the unit factor method:

STEP 1 You have to convert 1 ½ English tons to pounds.

The term 1 ½ is a mixed numeral. Convert 1 ½ to rational form so it will be easier to work with:

$$1\,1\!\!\diagup\!\!_2 = \frac{(2\times 1)+1}{2} = \frac{3}{2}$$

Now, you can proceed with conversion.

STEP 2 You know that there are 2,000 pounds in 1 ton.

So, the unit factor is $\dfrac{2000 \text{ lbs}}{1 \text{ ton}}$

STEP 3
$$3\!\!\diagup\!\!_2 \text{ tons}\left(\frac{2000 \text{ lbs}}{1 \text{ ton}}\right)$$
$$= \frac{3\!\!\diagup\!\!_2 \cancel{\text{tons}} \times 2000 \text{ lbs}}{1 \cancel{\text{ton}}}$$
$$= \frac{3\times 2000 \text{ lbs}}{2} = \frac{6000 \text{ lbs}}{2}$$
$$= 3000 \text{ lbs}$$

Therefore, there are 3,000 pounds in 1 ½ English tons.

Or, you can directly multiply 1 ½ metric tons by 2,000:

$$1\ ½ = 3/2$$

$$\frac{3}{2} \times 2{,}000 = \frac{6{,}000}{2} = 3{,}000$$

Therefore, there are 3,000 pounds in 1 ½ English tons.

7. You are given the following information:

A vehicle can carry 250 kilos. The passengers seated in the vehicle already weigh 196 kilos. One of them wishes to bring a box weighing 3,400 grams.

You are asked to find out if the vehicle would be overloaded if this box were to be loaded into the vehicle.

***Solution**:*

First, you have to find out how much more weight the vehicle can carry. You do this by subtracting the load (196 kilos) from its total capacity (250 kilos):

250 kilos – 196 kilos = 54 kilos

Now you know that the vehicle can still accommodate 54 kilos.

Next, you know that the box the passenger wishes to bring weighs 3,400 grams. The vehicle can accommodate the box if it weighs 54 kilos or less. To find out if this is so, you have to convert 3,400 grams to kilos.

Using the unit factor method:

STEP 1 You need to convert 3,400 grams to kilos.

STEP 2 You know that there are 1,000 grams in 1 kilo.

So, the unit factor is $\frac{1\,\text{kilo}}{1000\,\text{grams}}$

STEP 3

$$3400\,\text{g}\left(\frac{1\,\text{kilo}}{1000\,\text{g}}\right)$$

$$= \frac{3400\,\cancel{\text{g}} \times 1\,\text{kilo}}{1000\,\cancel{\text{g}}}$$

$$= 3.4\,\text{kilos}$$

Or, you can directly divide 3,400 grams by 1,000:

$$\frac{3400}{1000} = 3.4$$

The box therefore weighs 3.4 kilos. This is much less than the 54 kilos that the vehicle can still carry.

So, the answer is: No, the vehicle would not be overloaded if a box weighing 3,400 grams were to be added to its load.

8. You are given the following information:

A lady wants to buy 2 pounds of peanuts.
The vendor scoops 2 ½ pounds of peanuts in a bag.

You are asked how many ounces should be removed from the bag for the weight to be exactly 2 pounds.

Solution:

To compute for the extra amount of peanuts, subtract the amount that the lady wishes to buy (2 pounds) from the amount scooped by the vendor (2 ½ pounds):

2 ½ pounds – 2 pounds = 1/2 pound

Now you know that 1/2 pound is the excess amount of peanuts. However, you are asked for the excess amount in ounces. Thus, you have to convert 1/2 pound to ounces.

Using the unit factor method:

STEP 1 You have to convert 1/2 pound to ounces.

STEP 2 You know that there are 16 ounces in 1 pound.

So, the unit factor is: $\frac{16 \text{ ounces}}{1 \text{ pound}}$

STEP 3

$$\frac{1}{2} \text{ pound} \left(\frac{16 \text{ ounces}}{1 \text{ pound}} \right)$$

$$= \frac{\frac{1}{2} \cancel{\text{lb}} \times 16 \text{ oz}}{1 \cancel{\text{lb}}} = \frac{16}{2} \text{ oz}$$

$$= 8 \text{ oz}$$

1/2 pound = 8 ounces

8 ounces should be removed from the bag of peanuts for it to weigh exactly 2 pounds.

9. The object on the scale weighs 3 ½ kilos.
10. The object on the scale weighs 12 pounds.

B. Lesson 1

Let's Try This (page 12)

1. 450 grams
2. 850 grams
3. 1 kilo
4. 150 grams

Let's Try This (page 14)

After your trip to the market, you should have made a table similar to that found on page 14. The table should contain the items you have observed being weighed. Opposite them, you should have written the weights as you have read them from the weighing scale.

Here is a sample answer to the question, *Why do you think it is important that you know how to read a weighing scale when you shop for food in the market*?:

Many of the things we buy from the market are weighed. Often, the first thing that vendors ask their customers is, *"Ilang kilo?"* ("How many kilos?") It will help if we know how to read weighing scales. This way, we can tell the vendor exactly how much we need. We can also make sure that the vendor is giving us the correct amount of goods that we are being charged for.

Let's Review (pages 17–18)

The completed sentences should read as follows:

1. There are *1,000* grams in one kilogram.

   You could directly pick up this information from the story of Frances' trip to the market.

2. One gram is *smaller* than 1 kilogram.

   If it takes 1,000 grams to make up a kilogram, then the gram should be smaller than the kilogram.

3. There are *2,000* grams in 2 kilograms.

   You know that there are 1,000 grams in 1 kilo. Therefore, 2 kilos should have twice as many grams as 1 kilo.

4. There are *500* grams in 1/2 kilogram.

   You know that there are 1,000 grams in one kilo. Therefore, 1/2 kilo should have half as many grams as 1 kilo.

The answers to questions 5, 6, 7 and 8 could be derived from Frances' trip to the market.

5. The guhit is an *indigenous or local* unit for measuring weight.
6. The guhit is used to measure the weight of *vegetables*.
7. The guhit is commonly used in *wet markets*.
8. There are *100* grams in 1 guhit.
9. There are *200* grams in 2 guhits.

   You know that there are 100 grams in one guhit. Therefore, 2 guhits should have twice as many grams as 1 guhit.

Let's Review (pages 22–23)

1. 7.2 metric tons of rice = **?** kilos of rice

   Using the unit factor method,

$$7.2 \text{ metric tons} \left(\frac{1000 \text{ kilos}}{1 \text{ metric ton}} \right)$$
$$= \frac{7.2 \cancel{\text{metric tons}} \times 1000}{1 \cancel{\text{metric ton}}}$$
$$= 7200 \text{ kilos}$$

   7.2 metric tons of rice = 7,200 kilos of rice

   Therefore, there are 7,200 kilos of rice in 7.2 metric tons.

   Or, you can directly multiply the number of metric tons by 1,000:

$$7.2 \times 1{,}000 = 7{,}200$$

   7.2 metric tons of rice = 7,200 kilos of rice

   Therefore, there are 7,200 kilos of rice in 7.2 metric tons.

2. 8 g = **?** mg

   Using the unit factor method,

$$8\,\text{g}\left(\frac{1000\,\text{mg}}{1\,\text{g}}\right)$$
$$= \frac{8\,\cancel{\text{g}} \times 1000\,\text{mg}}{1\,\cancel{\text{g}}}$$
$$= 8000\,\text{mg}$$

   8 g = 8,000 mg

   Therefore, there are 8,000 mg in 8 g.

   Or, you can directly multiply the number of grams by 1,000:

$$8 \times 1{,}000 = 8{,}000$$

$$8\text{ g} = 8{,}000\text{ mg}$$

   Therefore, there are 8,000 mg in 8 g.

3. You are given the following information:

   A candy factory needs 3 metric tons of sugar a year.
   A wholesaler can supply 200 kilos of sugar per month.

   You are asked if the wholesaler can provide the factory with one year's supply of sugar.

   ***Solution**:*

   The two quantities are not in the same unit so you cannot compare them yet. First, try converting the quantity that the factory needs for a year (3 metric tons) to kilos.

   3 metric tons = **?** kilos

$$3\left(\frac{1000\,\text{kilograms}}{1\,\text{metric ton}}\right)$$
$$= \frac{3\,\cancel{\text{metric tons}} \times 1000\,\text{kilograms}}{1\,\cancel{\text{metric ton}}}$$
$$= \frac{3 \times 1000}{1}$$
$$= 3000\,\text{kilos}$$

   Thus, 3 metric tons = 3,000 kilos.

Can the wholesaler supply 3,000 kilos a year? Let's see.

200 kilos (amount of sugar it can supply in a month)
× 12 (months in a year)

400
200

2,400 kilos

The wholesaler can only supply 2,400 kilos of sugar per year, so it **cannot** meet the factory's need for 3,000 kilos (3 metric tons) a year.

Let's Review (pages 25–26)

Questions 1–3 require you to convert one unit to another in the metric system.

1. 3,000 mg = **?** g

Using the unit factor method,

$$3000\ \text{mg}\left(\frac{1\ \text{g}}{1000\ \text{mg}}\right)$$

$$= \frac{3000\ \cancel{\text{mg}} \times 1\ \text{g}}{1000\ \cancel{\text{mg}}}$$

$$= \frac{3000}{1000}$$

$$= 3$$

3,000 mg = 3 g

Or, you can directly divide the number of milligrams by 1,000.

$$1000\overline{)3000}\ 3$$

$$\underline{3000}$$

$$x$$

= 3 g

3,000 mg = 3 g

Therefore, there are 3 grams in 3,000 mg.

2. 1,200 g of fish = **?** kilos of fish

Using the unit factor method,

$$1200\,\text{g}\left(\frac{1\text{kilo}}{1000\,\text{g}}\right)$$

$$=\frac{1200\,\cancel{g}\times 1\,\text{kilo}}{1000\,\cancel{g}}$$

$$=\frac{1200}{1000}$$

Working out the division,

$$\begin{array}{r} 1.2 \\ 1000\overline{)1200.0} \\ \underline{1000} \\ 200.0 \\ \underline{200.0} \\ x \end{array}$$

1,200 g of fish = 1.2 kilos of fish

Therefore, there are 1.2 kilos in 1,200 grams of fish.

Or, you can directly divide the number of grams by 1,000:

$$\frac{1200}{1000}$$

Working out the division,

$$\begin{array}{r} 1.2 \\ 1000\overline{)1200.0} \\ \underline{1000} \\ 200.0 \\ \underline{200.0} \\ x \end{array}$$

1,200 g of fish = 1.2 kilos of fish

3. You are given the following information:

   A repair job needs 3,430 grams of cement.
   A sack of cement weighs 10 kilos.

   You are asked if a sack of cement is enough for the repair job.

   ***Solution**:*

   Once again, the two quantities are not in the same unit so you cannot compare them yet. Try converting the quantity that the repair job needs (3,430 grams) to kilos:

   3,430 g = **?** kilos

$$3430\ \text{g}\left(\frac{1\ \text{kilo}}{1000\ \text{g}}\right)$$
$$=\frac{3430\cancel{\text{g}}\times 1\ \text{kilo}}{1000\cancel{\text{g}}}$$
$$=\frac{3430}{1000}$$

   Working out the division,

$$\begin{array}{r} 3.43 \\ 1000\overline{)\,3430.00} \\ \underline{3000} \\ 4300 \\ \underline{4300} \\ 3000 \\ \underline{3000} \\ x \end{array}$$

   3,400 g = 3.4 kilos

   Next, you know that a sack of cement weighs 10 kilos. The repair job needs only 3.4 kilos of cement.

   Therefore, one sack is enough for the repair job.

Let's Think About This (page 29)

There are many things to consider. First, if you are new to this practice of estimating, you may not be used to the feel of a kilo in your hands yet. Second, there is a difference of only one mango between the kilos that you bought last week and this week. It is possible that you may have bigger mangoes this time. Hence, there are only four of them. Still, if you have doubts, you can still politely ask the vendor to weigh the goods again.

Let's See What You Have Learned (pages 30–31)

1. **(b)** The best and most accurate way to measure weight is to use a weighing scale.

   Letter (a) describes how you can estimate the weight of an object. If there is a weighing scale available, use the weighing scale instead of making estimates because it is more accurate.

   Letters (c) and (d) rely on opinions of other people. Some people may know how to estimate weights. Others may not know how to do this. Even if they do, estimating is still not the best and most accurate way to measure weight.

2. **(a)** An estimate of the weight of an object is a wise guess about how much the object weighs. The guess is "wise" because it is based on experience (of lifting say, one kilo in your hands and getting used to its feel) and previous knowledge (of about how many pieces of say, small mangoes there are in one kilo).

   Letters (b) and (c) relate to the use of a weighing scale, not estimating.

   Letter (d) refers to one way of estimating weight but it does not describe the meaning of estimation.

3. **(b)** Explain very carefully and in a nice way why you think he/she may have given you the wrong weight. Request him/her to weigh the goods again.

   When you estimate weight, you may be closer to the correct weight but you still are **not absolutely sure**. That is why you have to explain this very carefully and in a nice way to the vendor.

   Letter (a) is an example of bad manners. You can still use peaceful means even if you are absolutely sure that you have been cheated.

   Letter (c) is also a judgment based on your estimate. You do not know for sure yet if his/her scale is broken and needs replacement.

   Letter (d) is not a very wise course of action. It is possible that the vendor did not give the correct weight and overcharged you. If you leave without saying anything, this may encourage him/her to do the same to other customers.

4. **(b)** One kilo of smaller ponkans will probably have more than six ponkans.

   A smaller ponkan would weigh less than a bigger ponkan. Therefore, more ponkans would be needed to come up with one kilo.

5. **(b)** You may expect less than seven slices of pork chops in one kilo. This is because a thick pork chop weighs more than a thin slice.

C. Lesson 2

Let's Review (page 34)

The completed sentences should read as follows:

(Numbers 1 and 2 can be picked up from what the nurse told Frances.)

1. Pounds and ounces can be used to measure the weights of persons.
2. There are 16 ounces in 1 pound.
3. One ounce is smaller than 1 pound.

   If it takes 16 ounces to make up a pound, then the ounce must be smaller than the pound.
4. There are 32 ounces in 2 pounds.

   You know that there are 16 ounces in 1 pound. Therefore, 2 pounds should have twice as many ounces as 1 pound.
5. There are 8 ounces in 1/2 pound.

   You know that there are 16 ounces in 1 pound. Therefore, 1/2 pound should have half the number of ounces in 1 pound.

Let's Try This (pages 37–38)

1. The first scale reads 42 pounds.

   The second scale reads 54 ½ pounds. If the pointer is in between two lines, it stands for half a pound.
2. After you are done with your weighing activity, you should have completed a table similar to that found on page 37. It should contain the names of the people that you weighed and their corresponding weights.
3. Here are some goods that you may have observed being sold in pounds or ounces: soap, noodles and canned goods.

Let's Review (page 41)

Questions 1–3 require you to convert one unit to another in the English system.

1. You are asked how many pounds there are in 290 ounces. Using the unit factor method:

   STEP 1 You need to convert 290 ounces to pounds.

   STEP 2 You know that there are 16 ounces in 1 pound.

   So, the unit factor is $\frac{1\,\text{pound}}{16\,\text{ounces}}$

   STEP 3

   $$290\ \text{oz}\left(\frac{1\,\text{lb}}{16\ \text{oz}}\right)$$

   $$= \frac{290\ \cancel{\text{oz}} \times 1\,\text{lb}}{16\ \cancel{\text{oz}}}$$

   Working out the division,

   $$16\overline{)290}$$

   18 r. 2

   16

   130

   128

   2

   = 18 lbs 2 oz

   Therefore, 290 oz = 18 lbs 2 oz.

2. 4,750 pounds of rice = **?** tons of rice

   Using the unit factor method:

   STEP 1 You need to convert 4,750 lbs to tons.

   STEP 2 You know that 2,000 lbs = 1 ton

   So, the unit factor is $\frac{1\,\text{ton}}{2000\ \text{lbs}}$

   STEP 3

   $$4750\ \text{lbs}\left(\frac{1\,\text{ton}}{2000\ \text{lbs}}\right)$$

   $$= \frac{4750\ \cancel{\text{lbs}} \times 1\,\text{ton}}{2000\ \cancel{\text{lbs}}}$$

   $$= \frac{4750}{2000}$$

Working out the division,

$$
\begin{array}{r}
2.375 \\
2000\overline{)4750.000} \\
\underline{4000} \\
7500 \\
\underline{6000} \\
15000 \\
\underline{14000} \\
10000 \\
\underline{10000} \\
x
\end{array}
$$

$$= 2.375$$

4,750 lbs of rice = 2.375 tons of rice

Therefore, there are 2.375 tons in 4,750 pounds of rice.

Or, you can directly divide 4,750 pounds by 2,000:

When you work out the division you will get:

$$\frac{4750}{2000} = 2.375$$

4,750 lbs of rice = 2.375 tons of rice

Therefore, there are 2.375 tons in 4,750 pounds of rice.

3. You are given the following information:

   A factory can make about 100 ounces of pastillas daily.
   A supermarket requires 5 pounds of pastillas daily.

   You have to find out if the factory can supply the supermarket's demand for pastillas.

   Solution:

   You cannot compare the two quantities yet because they are in different units. Try converting the daily production of pastillas from 100 ounces to pounds.

$$100 \text{ oz} = \textbf{?} \text{ lbs}$$

$$= 100 \text{ oz} \left(\frac{1 \text{ lb}}{16 \text{ oz}} \right)$$

$$= \frac{100 \cancel{\text{oz}} \times 1 \text{ lb}}{16 \cancel{\text{oz}}}$$

Working out the division,

$$16\overline{)100.0} \quad 6 \text{ r. } 4$$
$$96.0$$
$$4$$

100 oz = 6 lbs 4 oz

You know that the supermarket requires 5 pounds of pastillas daily. This is more than what the factory can supply — 6 lbs 4 oz.

Therefore, the factory can supply the supermarket's daily demand for pastillas.

Let's See What You Have Learned (pages 44–45)

1. 3 ½ pounds = **?** oz

   Using the unit factor method,

   STEP 1 You need to convert 3 ½ pounds to ounces.

   STEP 2 You know that 1 lb = 16 oz

   So, the unit factor is $\frac{16 \text{ ounces}}{1 \text{ pound}}$

   STEP 3 3 ½ lbs = 3.5 lbs

   $$3.5 \text{ lbs}\left(\frac{16 \text{ oz}}{1 \text{ pound}}\right)$$
   $$= \frac{3.5 \cancel{\text{lbs}} \times 16 \text{ oz}}{1 \cancel{\text{lb}}}$$
   $$= 3.5 \times 16$$
   $$= 56$$

   3 ½ lbs = 56 oz

   Therefore, there are 56 ounces in 3 ½ pounds.

   Or, you can directly multiply 3 ½ lbs by 16.

   3 ½ lbs = 3.5 lbs

   3.5 ×16 = 56

   3 ½ lbs = 56 oz

   Therefore, there are 56 ounces in 3 ½ pounds.

2. 6 ½ tons of sugar = **?** pounds of sugar

   Using the unit factor method:

   STEP 1 You need to convert 6 ½ tons to pounds.

   STEP 2 You know that 2,000 lbs = 1 ton.

   So, the unit factor is $\frac{2000 \text{ lbs}}{1 \text{ ton}}$

   STEP 3

$$6.5 \text{ tons} \left(\frac{2000 \text{ lbs}}{1 \text{ ton}} \right)$$
$$= \frac{6.5 \cancel{\text{tons}} \times 2000 \text{ lbs}}{1 \cancel{\text{ton}}}$$
$$= 6.5 \times 2000$$
$$= 13000$$

   6 ½ tons = 13,000 lbs

   Therefore, there are 13,000 pounds in 6 ½ tons.

3. You are given the following information:

   Last month, the baby weighed 14 lbs 15 ounces.
   This month, the baby weighed 15 lbs 6 ounces.

   You are asked how much weight the baby gained.

   Solution:

   To find out how much weight the baby gained, you have to subtract his weight this month from his weight last month:

   15 lbs 6 oz (weight this month)
   – 14 lbs 15 oz (weight last month)

   Subtract 15 ounces from 6 ounces. Notice, however, that this is not possible. So the first thing that we must do is rewrite 15 lbs 6 oz.

   The next thing to do is subtract 1 pound from 15 pounds to get 14 pounds. Now, the 1 pound that you subtracted is also equivalent to 16 ounces. You add these 16 ounces to 6 ounces to get 22 ounces. So, you merely rewrite 15 lbs 6 oz as 14 lbs 22 oz. They are still equivalent quantities.

Your problem can thus be rewritten like this:

$$\begin{array}{r} 15 \text{ lbs } \ 6 \text{ oz} \\ -\underline{14 \text{ lbs } 15 \text{ oz}} \end{array} \rightarrow \begin{array}{r} 14 \text{ lbs } \ 22 \text{ oz} \\ -\underline{14 \text{ lbs } \ 15 \text{ oz}} \\ 0 \text{ lb } \ \ 7 \text{ oz } = 7 \text{ oz} \end{array}$$

Therefore, the baby gained 7 ounces.

4. You are given the following information:

   A cook has 2 pounds of butter available.
   The cook needs to bake two cakes that need 20 ounces of butter each.

   You have to find out if the butter available would be enough to bake the two cakes.

   ***Solution**:*

   The first thing to do is to find out how much butter the cook needs to bake the two cakes. If the two cakes need 20 ounces of butter each, the total amount of butter needed is: $20 \times 2 = 40$ ounces.

   Then, you have to compare 40 ounces with the amount of butter available, which is 2 pounds. To compare the 2 quantities more easily, convert the amount of butter available from pounds to ounces.

   $$2 \text{ lbs} = \textbf{?} \text{ oz}$$

   $$2 \text{ lbs} \left(\frac{16 \text{ oz}}{1 \text{ lb}} \right)$$

   $$= \frac{2 \cancel{\text{lbs}} \times 16 \text{ oz}}{1 \cancel{\text{lb}}}$$

   $$2 \times 16 = 32$$

   $$2 \text{ lbs} = 32 \text{ oz}$$

   Now, you know that the cook needs 40 ounces. However, only 32 ounces are available.

   Therefore, there would not be enough butter to bake the two cakes.

D. What Have You Learned? *(pages 49–51)*

1. You are given the information:

   Maximo needs 2,500 grams of chicken feed every week.

   You are asked how many kilos of chicken feed he should ask his son to buy.

   Solution:

   You have to convert 2,500 grams to kilos.

$$2500\,\text{g}\left(\frac{1\,\text{kilo}}{1000\,\text{g}}\right)$$

$$=\frac{2500\,\cancel{g}\times 1\,\text{kilo}}{1000\,\cancel{g}}$$

$$=\frac{2500}{1000}$$

   Working out the division,

$$\begin{array}{r} 2.5 \\ 1000\overline{)\,2500.0} \\ \underline{2000} \\ 5000 \\ \underline{5000} \\ x \end{array}$$

$$= 2.5$$

$$2{,}500\text{ g} = 2.5\text{ kilos}$$

   Maximo should ask his son to buy 2.5 kilos of chicken feed.

2. You are given this information:

   A candy stall sold 144 ounces of heart-shaped lollipops.

   You are asked how many pounds of heart-shaped lollipops were sold.

   Solution:

   You are to convert 144 ounces to pounds.

$$144\,\text{oz}\left(\frac{1\,\text{lb}}{16\,\text{oz}}\right)$$

$$=\frac{144\,\cancel{\text{oz}}\times 1\,\text{lb}}{16\,\cancel{\text{oz}}}$$

$$=\frac{144}{16}$$

Working out the division,

$$16\overline{)144}\quad 9$$

$$144$$

$$x$$

$$= 9$$

144 oz = 9 lbs

The candy stall sold 9 pounds of heart-shaped lollipops.

3. You are given this information:

   The school-feeding program of a province needs 1.2 metric tons of rice.

   A charity group donates 1,458 kilos of rice.

   You have to find out if the donation is enough for the needs of the feeding program.

   ***Solution**:*

   The rice need of the program is in metric tons, while the quantity donated is in kilos. Both quantities should have the same unit so you can compare them. Try to convert the rice donated from kilos to metric tons.

$$1458 \text{ kilos}\left(\frac{1 \text{ metric ton}}{1000 \text{ kilos}}\right)$$

$$= \frac{1458 \cancel{\text{kilos}} \times 1 \text{ metric ton}}{1000 \cancel{\text{kilos}}}$$

$$= \frac{1458}{1000}$$

Working out the division,

$$1000\overline{)1458.000}\quad 1.458$$

$$1000$$

$$4580$$

$$4000$$

$$5800$$

$$5000$$

$$8000$$

$$8000$$

$$x$$

1,458 kilos = 1.458 metric tons

Since only 1.2 metric tons are needed, the rice donation of 1.458 metric tons is enough for the school-feeding program.

4. You are asked to compare the weight of 2 objects:

   A suitcase weighing 6 pounds and a plastic bag of beef weighing 96 ounces.

   Solution:

   You cannot compare the two quantities yet because they are in different units. Try converting the weight of the suitcase, 6 pounds, to ounces.

$$6 \text{ lbs} \left(\frac{16 \text{ oz}}{1 \text{ lb}} \right)$$
$$= \frac{6 \cancel{\text{lbs}} \times 16 \text{ oz}}{1 \cancel{\text{lb}}}$$
$$= 96$$
$$6 \text{ lbs} = 96 \text{ oz}$$

   Therefore, a 6-pound suitcase is just as heavy as a plastic bag of beef weighing 96 ounces. In fact, they weigh the same.

5. Ester weighs 99 ½ pounds. For her to weigh exactly 100 pounds, she needs to gain:

$$100 - 99 \tfrac{1}{2} = 1/2 \text{ pound or } 0.5 \text{ pound}$$

   For you to find out how many ounces she should gain, you should convert 0.5 pound to ounces:

$$0.5 \times 16 = 8$$

   Ester has to gain 8 ounces.

6. You are given the following information:

   Jenny needs 1.7 kilos of sweet potatoes.
   She has 1 kilo of sweet potatoes available.

   Her son buys 4 guhits of sweet potatoes.

   You are asked if what Jenny's son brought home would be enough.

   Solution:

   First, you have to find out how much more sweet potatoes Jenny needs. You do this by subtracting what is available (1 kilo) from what is needed (1.7 kilos).

$$1.7 \text{ kilo} - 1 \text{ kilo} = 0.7 \text{ kilo}$$

Next, you have to find out if what her son brought home (4 guhits) would be enough to fill in the needed amount (0.7 kilo). Since the two quantities are in different units, you cannot compare them yet. Try converting 4 guhits to kilos.

$$4 \text{ guhits}\left(\frac{100 \text{ grams}}{1 \text{ guhit}}\right)$$

$$= \frac{4 \cancel{\text{guhits}} \times 100 \text{ grams}}{1 \cancel{\text{guhit}}}$$

$$= 400 \text{ grams}$$

4 guhits = 400 grams

$$400 \text{ grams}\left(\frac{1 \text{ kilo}}{1000 \text{ g}}\right)$$

$$= \frac{400 \cancel{g} \times 1 \text{ kilo}}{1000 \cancel{g}}$$

$$= \frac{400}{1000}$$

Working out the division,

$$\begin{array}{r} 0.4 \\ 1000\overline{)400.0} \\ \underline{400.0} \\ x \end{array}$$

$$= 0.4$$

400 g = 0.4 kilo

Jenny needs 0.7 kilo of sweet potatoes, but her son brought home only 0.4 kilo. The quantity, therefore, would not be enough.

7. You are given the following information:

A freight container holds 0.4 metric ton of cargo.
A company will ship 775 kilos of cargo.

You are asked how many freight containers the company will need.

Solution:

Once again, you have to compare two quantities which are in different units. Try converting the capacity of the freight container (0.4 metric ton) to kilos:

$$0.4 \text{ metric ton}\left(\frac{1000 \text{ kilos}}{1 \text{ metric ton}}\right)$$
$$= \frac{0.4 \cancel{\text{metric ton}} \times 1000 \text{ kilos}}{1 \cancel{\text{metric ton}}}$$
$$= 0.4 \times 1000$$
$$= 400$$

0.4 metric ton = 400 kilos

Now, you know that a single freight container can hold 400 kilos.

You also know that the company will ship 775 kilos of cargo. You have to find out how many freight containers will be needed for 775 kilos.

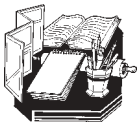
You can solve for this by dividing the 775 kilos by the capacity of 1 freight container (400 kilos).

$$\begin{array}{r} 1.9375 \\ 400\overline{)775.0000} \\ \underline{400} \\ 375 \\ \underline{360} \\ 1500 \\ \underline{1200} \\ 3000 \\ \underline{2800} \\ 2000 \\ \underline{2000} \\ x \end{array}$$

The answer is 1.9375, which we should round off to the next higher whole number to come up with the number of freight containers needed.

Therefore, the company will need 2 freight containers to ship the 775 kilos of cargo.

8. A kilo of pork chops has 6 thick slices. A thinner slice should weigh less than a thicker slice. More slices are needed to make up one kilo. Therefore, a kilo of thinner slices should have more than 6 slices.



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