What Is This Module About?

Do you know what temperature is? Temperature is part of your everyday life? For example how hot do you like your coffee or milk to be? Do you like drinking ice-cold water? What is the weather today? All of these have something to do with temperature.

Check your gas tank in the kitchen. Is it still full? Did you know that air pressure has something to do with how your gas tank works?

Temperature and air pressure affect our lives. As such, it is important for you to understand them. This module will help you do just that.

There are three lessons in this module. These are:

Lesson 1 – *Temperature*

Lesson 2 – *Celsius and Fahrenheit Scales*

Lesson 3 – *Air Pressure*

What Will You Learn From This Module?

At the end of the module, you should be able to:

- describe what a thermometer looks like;
- explain the proper way of using a thermometer;
- read temperature;
- interpret temperature readings;
- identify two scales for measuring temperature;
- convert temperature readings in degrees Celsius to degrees Fahrenheit;
- convert temperature readings in degrees Fahrenheit to degrees Celsius;
- describe the characteristics of air;
- explain air pressure; and
- identify the applications of air pressure in your everyday life.

Let's See What You Already Know

Before you start studying this module, take the following test first to find out how well you know the topics to be discussed.

Write **T** if the statement is true and **F** if the statement is false. If the statement is false, explain why.

1. A clinical thermometer is used to measure the boiling point of water.

   _____

   _____

2. Never shake a clinical thermometer before using it.

   _____

   _____

3. When the temperature of water is 27°C, this means that the water is hot.

   _____

   _____

4. When the weather temperature is 27°C, it is relatively cold.

   _____

   _____

5. The Fahrenheit scale was developed by Anders Fahrenheit.

   _____

   _____

6. The Fahrenheit scale is the most widely used temperature scale.

   _____

   _____

7. Eighty six degrees Fahrenheit (86°F) is equal to thirty degrees Celsius (30°C).

_____

_____

8. Zero degree Celsius (0°C) is equal to thirty two degrees Fahrenheit (32°F).

_____

_____

9. Air has force but does not occupy space.

_____

_____

10. Air has mass and exerts pressure.

_____

_____

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on page 27 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 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 some 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 go now to the next page to begin Lesson 1.

LESSON 1

Temperature

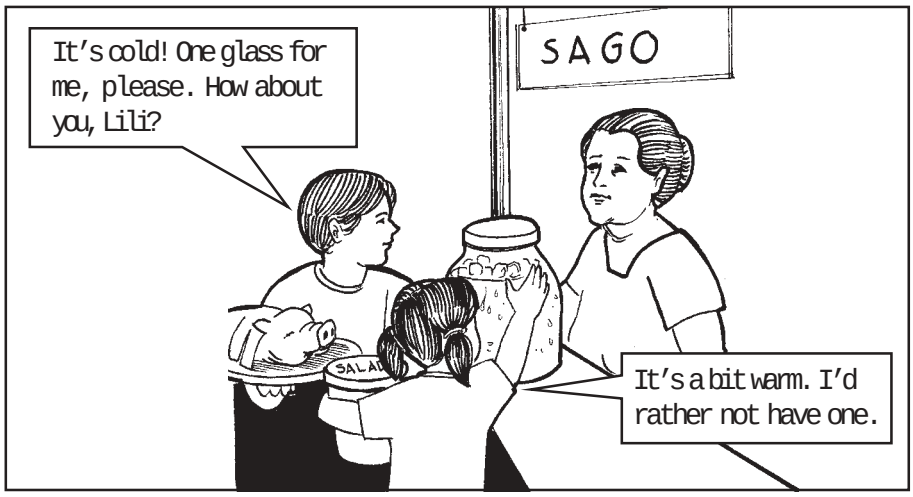
When you think you have a fever, what do you measure to make sure that your suspicion is right? When you go for a medical checkup, the doctor or nurse inserts a thermometer in your mouth. Why?

Is it hot or cold today? What clothes should you wear?

All these situations have to do with temperature. **Temperature** is the degree of hotness or coldness of an object or substance. In this lesson, you will learn how to accurately measure it. More importantly, you will learn to interpret temperature readings.

Let's Read

Louie and Lili took some food to their grandmother for her birthday. Louie carried the hot and crispy *lechon.* Lulu carried a gallon of cold salad. Along the way, they saw a sago vendor. "Let's have a glass of sago," Louie said. They both touched the sago container.



Can Louie and Lili describe the same thing differently?

Why do you think Loiue and Lili described the sago container differently?

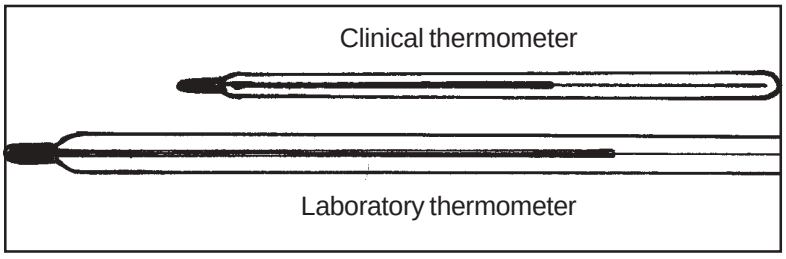
Louie's hands were hot because he was holding the hot lechon. When he touched the sago container, heat transferred from his hand to the container. This is why he felt the sago container as cold. On the other hand, Lili's hands were cold because she was holding the cold gallon of salad. Heat transferred from the container to his hand. This is why her hands felt the sago container as warm.

This activity tells you that our sense of touch does not measure temperature accurately. There is a need for a more reliable instrument. And what is this instrument?

Let's find out.

Let's Try This

Look at the picture below.



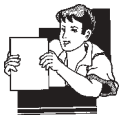
Do you recognize the instruments in the picture above?

The instruments in the picture are both thermometers.

What does a thermometer do?

A **thermometer** measures the temperature of an object or substance.

Let's find out more about thermometers. Read on.



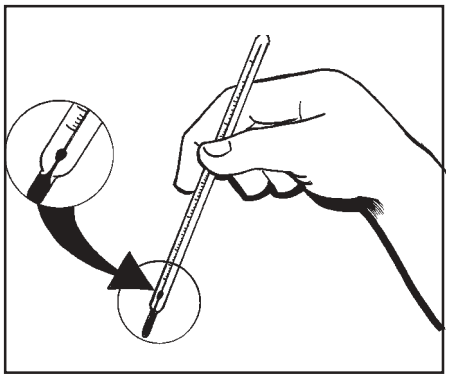
Let's Learn

Thermometer

There are two types of thermometer—the laboratory thermometer and the clinical thermometer.

What is the difference between the two thermometers?

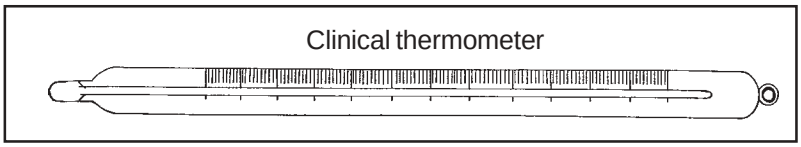
The laboratory thermometer is used to measure air temperature and the temperature of other substances. The clinical thermometer, on the other hand, is used to measure body temperature. The normal body temperature is 37°C.



A clinical thermometer has a constriction for holding the temperature.

Why do you have to shake a clinical thermometer before you use it?

You see, a clinical thermometer has a constriction in the tube just above the bulb. When the liquid (mercury) within the thermometer passes through this constriction, its weight alone will not cause the liquid to flow back to the bulb. This makes it possible for the temperature reading to remain steady even after you have removed the thermometer from the patient's mouth or armpit.

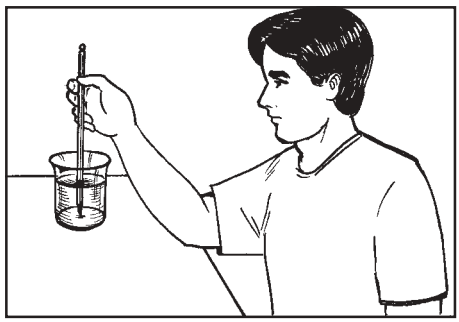


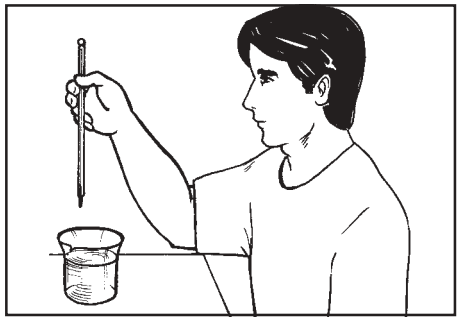
A laboratory thermometer, on the other hand, does not have a constriction. Hence the mercury in the tube rises or falls freely as temperature changes. A laboratory thermometer should **never** be shaken. When a laboratory thermometer is held in air, it measures the temperature of the air, so it is unlikely to register a 0°C reading.

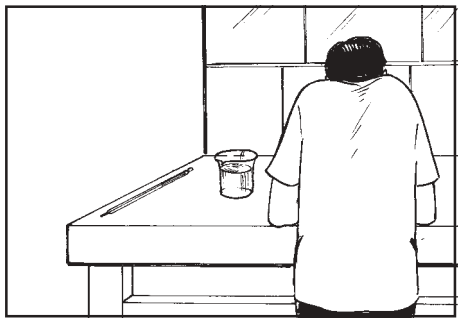
Now you know the two kinds of thermometers. How do you use a thermometer?

Let's Try This

Look at the pictures below. Which of them shows proper way of using a thermometer?

1. 

2. 

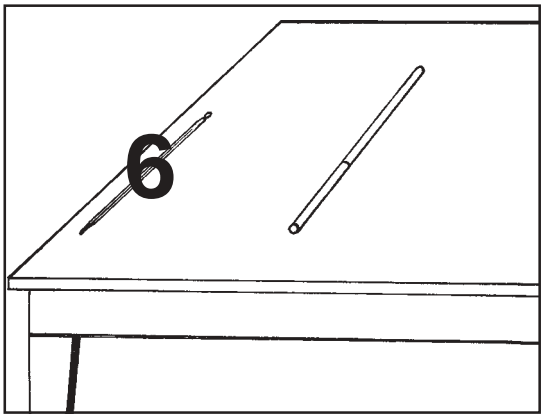
3. 

None of the pictures show the proper way of using a thermometer.

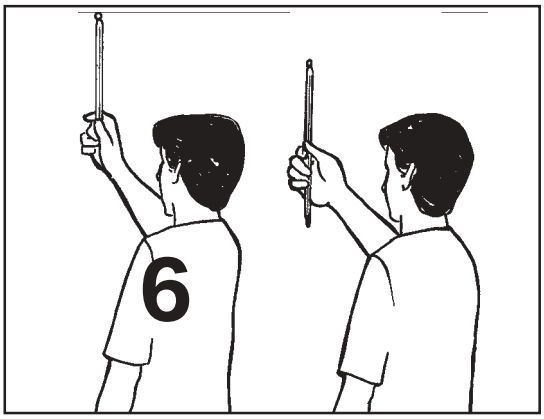
Let's Learn

Proper Use of a Thermometer

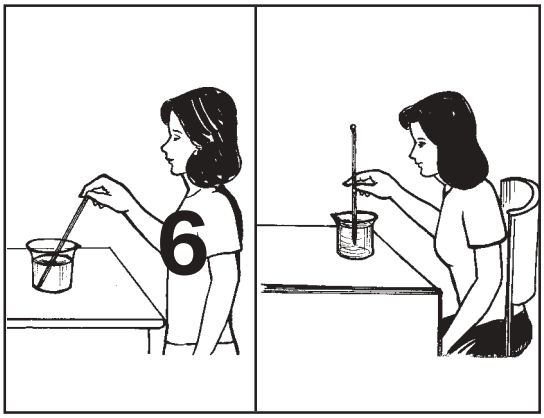
1. Do not leave the thermometer on the table. It might roll and fall off the table. Always keep the thermometer in its case when not in use.



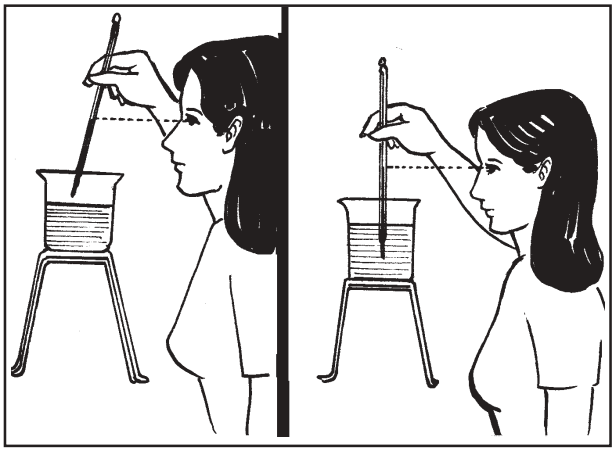
2. Never hold the thermometer by its bulb. Body temperature will cause the mercury in it to rise.



3. When measuring the temperature of a liquid, hold the thermometer with the bulb halfway below the surface. The bulb should not touch the bottom or sides of the container.



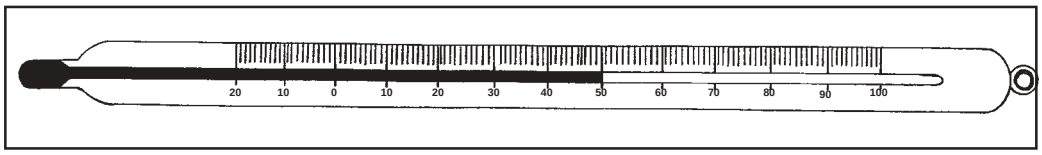
4. If you are measuring the temperature of a liquid, get the thermometer reading while the laboratory thermometer is still immersed in the liquid. Never lift the thermometer while you are taking the temperature reading. If you do, you will measure the air temperature and not the temperature of the liquid.
If you are using a clinical thermometer, you can get the reading while you are holding the thermometer in the air. As you found out discussed earlier, the constriction in a clinical thermometer prevents the mercury inside from rising and falling freely when the temperature changes.



Now you know how to use a thermometer properly. But how do you get a thermometer reading?

Let's Try This

Look at the picture below. What is the temperature indicated by the thermometer?



Laboratory thermometer

If you said 50°C, you are right.

The thermometer above has a scale from 0 to 100 degrees. The unit of temperature used is degree Celsius (°C).

Let's try more thermometer readings.

Look at the pictures below and write the thermometer readings in the spaces provided.

a. 

_____

b. 

_____

c. 

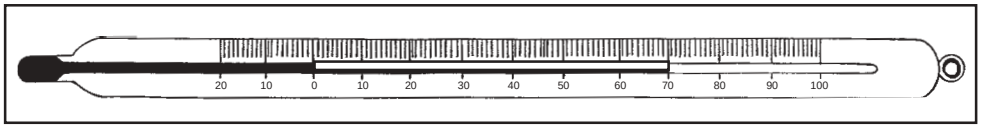
_____

Compare your answers with those in the *Answer Key* on page 27.

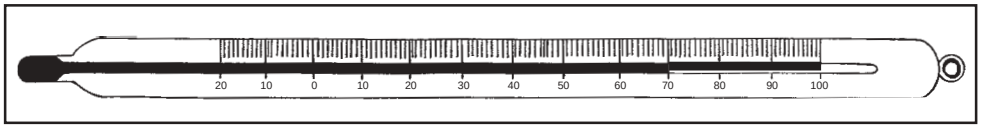
Now you know how to read a thermometer. But what do the readings mean? How do you know that an object or substance is hot or cold based on its thermometer reading?

Let's Study and Analyze

Look at the pictures below.



A



B

1. What is the temperature reading on thermometer A? _____

2. What is the temperature reading on thermometer B? _____

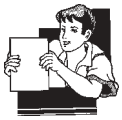
The temperature of the water as in indicated by thermometer A is 0°C. The temperature of the water as indicated by thermometer B is 100°C.

1. Which of the two is hot? _____

2. Which of the two is cold? _____

The water in A is cold while the water in B is hot.

Let's find out more about interpreting temperatures. Read on.



Let's Learn

Interpreting Temperatures

The freezing point of water is O°C. The freezing point of water is when it turns to ice. The boiling point of water is 100°C. If the temperature of water is near 0°C, the water is cold. On the other hand, if the temperature of water is near to 100°C, then it is hot. Take note that this is only true in the case of water or liquids that contain water such as orange juice and coffee.

What if you are measuring the temperature of other objects?

Let's Try This

Get a newspaper. Look at the weather section of the newspaper. The weather section of the newspaper describes the kind of weather to be expected for the day.

What is the temperature given? _____

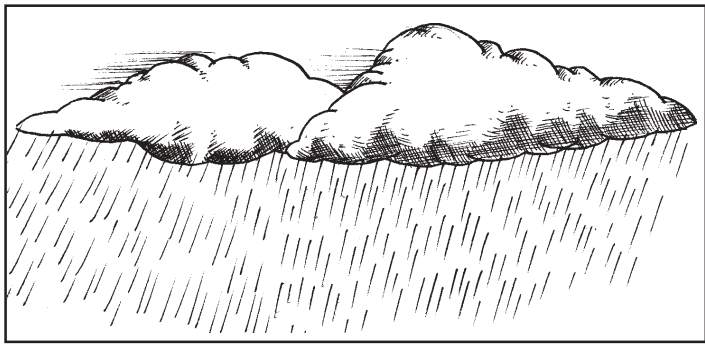
What does this mean? _____

_____

The weather temperature will tell you whether it's going to be a hot or cold day.

The normal temperatures in the Philippines is about 25°C to 35°C, depending on the season. If it is a rainy season, then the average temperature is lower. If it is a hot or summer season, then the temperatures are higher.

Look at the sample weather reports below.



Metro Manila
Cloudy with rainshowers or thunderstorms, winds moderate blowing from the Southwest, Manila Bay slight to moderate, temperature range 24 to 30°C (75 to 86°F).

What is the temperature range in Metro Manila? _____

Is it going to be hot or cold? Why?

_____

_____

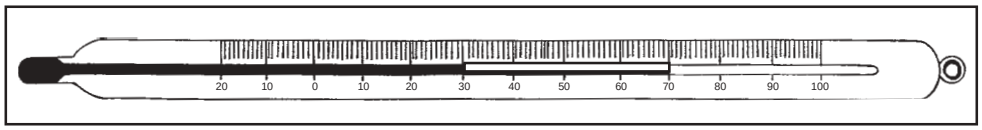
_____

Look at the answers below.

According to the weather report, the temperature range in Metro Manila is between 24 to 30°C. We know that the average temperature in the country is between 25° to 35°C. Based on this average, he temperature in metro manila is relatively low. Therefore, it is going to be a bit cold. Notice that according to the weather report, there will be rainshowers.

Let's See What You Have Learned

1. What is the temperature reflected on the thermometer?



2. Study the table below.

Monday	Tuesday	Wednesday	Thursday	Frid
30°C	32°C	35°C	29°C	30°

a. What day was hottest? _____

b. What day was coldest? _____

3. If Jessie's temperature is 40°C, is he sick? Why?

_____

_____

4. Lisa measured the temperature of the water he placed in the stove. The reading says, 100°C. What does this mean?

_____

_____

Compare your answers to those found in the *Answer Key* on page 28.

Let's Remember

Do not forget the important points of this lesson.

- Temperature refers to the degree of hotness or coldness of an object or substance.
- Thermometer measures temperature.
- There are two types of thermometer; the laboratory thermometer and the clinical thermometer.
- You should use the thermometer properly to ensure accuracy.
- Different objects or substances can have different temperature ranges.
- Degree Celsius is the common unit used in measuring temperature.

LESSON 2

Celsius and Fahrenheit

Temperature can be measured using the Celsius and Fahrenheit scale. But just like a laboratory and clinical thermometer, the two scales have different uses.

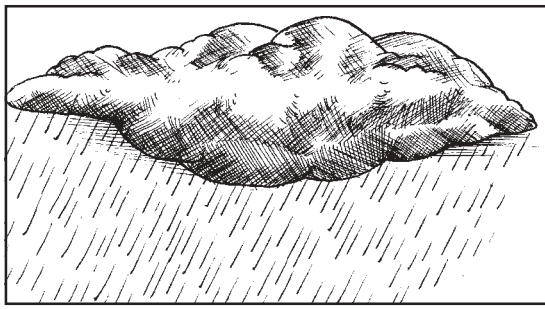
In this lesson, you will know the difference between The Celsius and Fahrenheit scale. You will likewise learn how to convert temperature from Celsius to Fahrenheit and from Fahrenheit to Celsius.

After this module, you should be able to:

- identify the two of the scales used in measuring temperature;
- convert Celsius to Fahrenheit; and
- convert Fahrenheit to Celsius.

Let's Study and Analyze

Look at the weather report below.



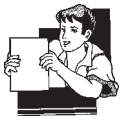
Metro Cebu
Cloudy with rainshowers or thunderstorms, winds light to moderate blowing from the Southwest, Coastal waters slight to moderate, temperature range 24 to 30°C (75 to 86°F).

What is the temperature range given? _____

Notice that the temperature given in two different scales. These scales are the Celsius and Fahrenheit scales.

If you were asked, what is your height, what would you say? How will you have your height measured?

Height is measured using a scale, either centimeters or feet. For example, 5 feet 3 inches. Centimeters and feet are scales. In measuring temperature, we also have different scales; Celsius and Fahrenheit.



Let's Learn

The Celsius and Fahrenheit Scale

In lesson 1, you have learned that the Celsius scale is used in measuring temperature. Aside from the Celsius scale, the Fahrenheit scale is also used in measuring temperature.

The Celsius scale is the most commonly used. The Fahrenheit scale is commonly used in measuring the earth's surface.

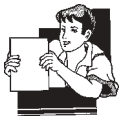
The Celsius scale was named after the man who invented it, Anders Celsius. The Fahrenheit scale is named after the man who invented the mercury thermometer, Gabriel Fahrenheit.

In lesson 1, you learned that the freezing point of water is 0°C and that its boiling point is 100°C. This has an equivalent in the Fahrenheit scale. In the Fahrenheit scale, the freezing point of water is 32°F while the boiling point is 212°F. Notice that we change the unit to degrees Fahrenheit or °F in symbols.

Look at the conversion table below.

Temperature Scales	
Fahrenheit (°F)	Cecsius (°C)
212	100
194	90
176	80
158	70
140	60
122	50
104	40
86	30
68	20
50	10
32	0
14	-10
-4	-20
-22	-30
-40	-40
-58	-50
-76	-60
-94	-70
-112	-80
-130	-90
-148	-100

But without looking at the table, how will you convert Celsius to Fahrenheit and Fahrenheit to Celsius? Let's find out.



Let's Learn

Converting Celsius to Fahrenheit

To convert Celsius to Fahrenheit, just remember this formula:

$$°F = 1.8\ (°C) + 32$$

Here are examples:

1. Let's convert 20C to °F.

   °F = 1.8 (20°C) 32 —multiply 1.8 by 20°C
   = 36 + 32 —add
   = 68°F

2. Let's convert 35°C to °F

   °F = 1.8 (35°C) + 32 —multiply 1.8 by 35°C
   = 63 + 32 —add
   = 95°F

Now you know how to convert Celsius to Fahrenheit. How about from Fahrenheit to Celsius? Let's find out.

Converting Fahrenheit to Celsius

To convert Fahrenheit to Celsius, just remember this formula:

$$°C = \frac{(°F - 32)}{1.8}$$

Here are examples.

1. Let's convert 68°F to °C

$$°C = \frac{(68°F - 32)}{1.8} \text{ - subtract}$$
$$= \frac{36}{1.8} \text{ - divide}$$
$$= 20°C$$

2. Let's convert 52°F to °C

$$°C = \frac{(52°F - 32)}{1.8} \text{ - subtract}$$
$$= \frac{20}{1.8} \text{ - divide}$$
$$= 11.11°C$$

Let's See What You Have Learned

Fill in the blanks with the correct answer.

1. The _____ is the most commonly used scale to measure temperature.
2. The _____ is used to measure the temperature at the earth's surface.
3. The boiling point of water is _____ or _____.
4. The weather temperature today is 32°C or _____.
5. The water temperature is 105°F or _____.

Compare your answers to those found in the *Answer Key* on page 28.

Let's Remember

Do not forget the important point of this lesson

- The Celsius and the Fahrenheit scales are both temperature scales.
- The Celsius scale is more commonly used. The Fahrenheit scale is used to measure the temperature of the earth's surface.
- To convert Celsius to Fahrenheit, use the formula:

$$°F = 1.8\ (°C) + 32$$

- To convert Fahrenheit to Celsius, use the formula:

$$°C = \frac{(°F - 32)}{1.8}$$

LESSON 3

Air Pressure

How can you tell that air surrounds us?

Since air cannot be seen, we only know that it because of its effects on objects. We see smoke rising. When a breeze or gust of wind blows, we see leaves shaking and flags waving.

What causes air to move and affect objects then?

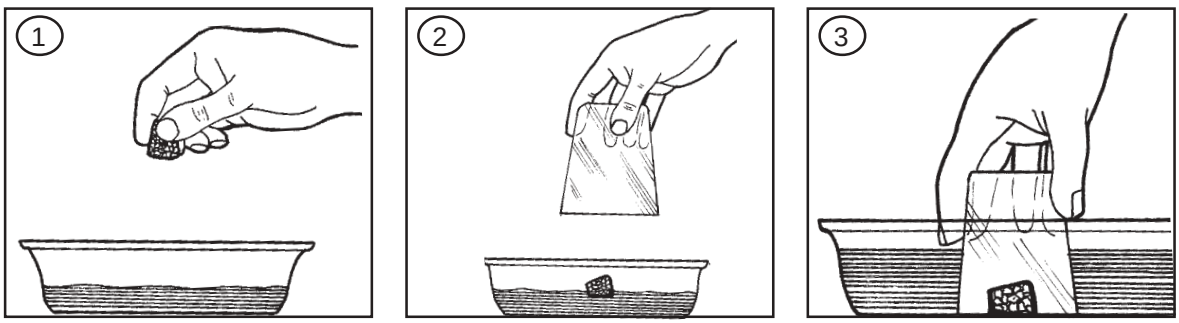
This lesson will tell you that.

After this lesson, you should be able to:

- describe the characteristics of air;
- explain air pressure; and
- identify the application of air pressure in our everyday life.

Let's Try This

Get a bowl, a cork (or anything similar like a small plastic ball) and a glass.



1. Half-fill the glass with water.
2. Drop the cork in the water
3. Invert an empty glass in the water where the cork is.

Did you notice that there is no or very little water inside the glass?

The position of the cork tells you that there is no water in the glass.

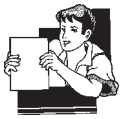
But is the empty glass really empty? What do you think is inside the empty glass?

If you say it's air, then you are right.

How can you make water enter the glass?

If you tilt or tip the glass, this will remove some of the air inside. There will be space then for the water. Do it.

What does this experiment tell you?



Let's Learn

The experiment you just did shows you that air occupies space. The glass was not empty because there was air inside. When you tilted the glass. Some of the air escaped. The space that was formerly occupied by air was occupies by water.

Let's Try This

Get a deflated balloon. Ask a friend to blow air into the balloon. Feel the balloon with your two hand as it fills with air. Make sure that air does not escape from the balloon.

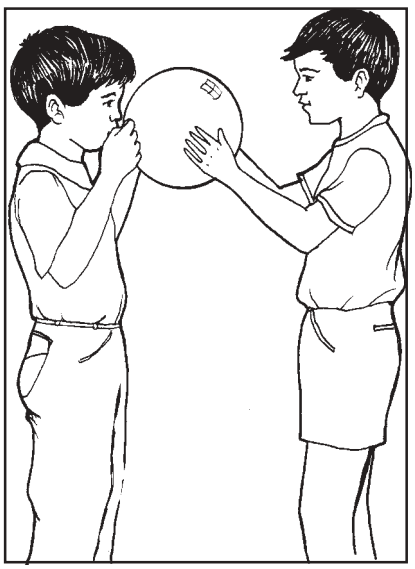
What do you feel around the balloon as it fills with air?

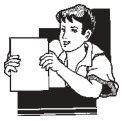
As it fills with air, the balloon pushes your hand. The air inside the balloon causes it to become hard and firm.

In what direction does the air inside the balloon push.

The air inside the balloon pushes in all directions.

What does this experiment tell you?





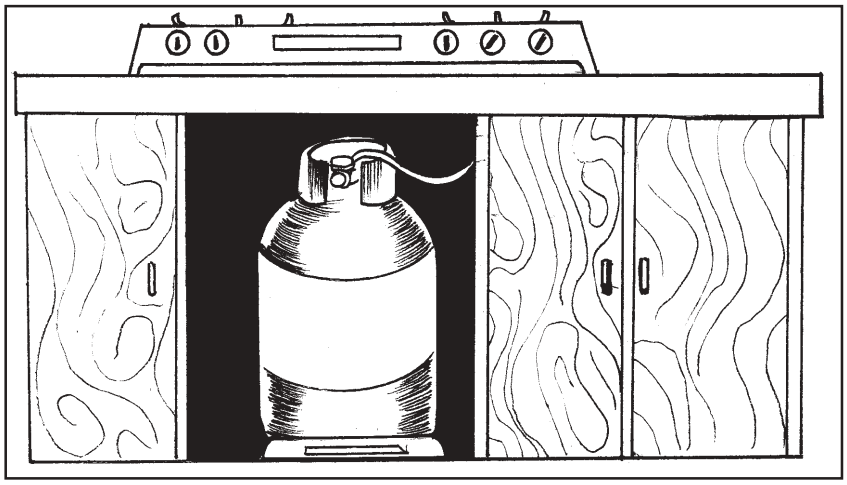
Let's Learn

The experiment tells you that air has weight. The weight of the air inside the balloon causes it to push in all directions.

The push or force exerted by air on an area is called air pressure. Air pressure inside the balloon causes it to expand.

Let's Try This

Do you have an LPG (liquefied petroleum gas) at home. What do you think makes it work?



Of you say air pressure, then you are right. The air inside contained inside the tank continuously pushes in all directions. When you open the regulator of the LPG tank, air escapes. This serves as fuel to the stove.

For this reason, you have to be careful if there are any leaks on the hose of your LPG tank. The air inside will escape in the hole. This can cause fire since it is flammable.

Give examples of applications of air pressure in your everyday life.

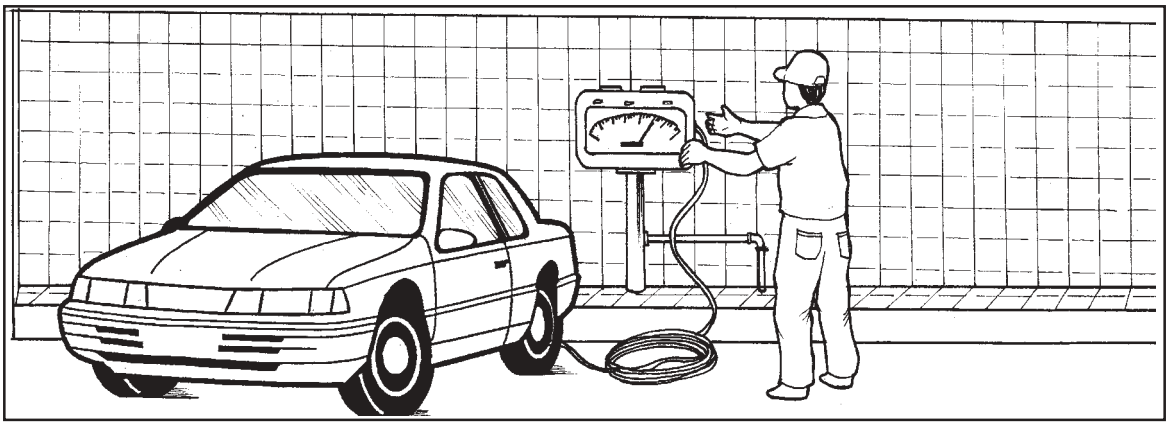
_____

_____

_____

Let's Learn

Look at the picture below.



This is an air pressure section in a gasoline station. Drivers can use this for free to inflate the tires of their vehicles.

Do you remember our balloon experiment? Air pushes in all directions inside the balloon. The same thing happens when air is supplied to tires. Because of air pressure, air pushes in all directions. This makes the tire firm and harder.

If you blow harder and harder to a balloon, what would happen?

It will burst, right?

This tells you that you have to know how much air pressure to exert on an object. In gasoline stations, you will find an air pressure gauge. This measures the amount of air pressure. The tires may not function properly if too much air pressure is placed.

Let's See What You Have Learned

On the space provide before each number, write **T** if the statement is true and **F** if the statement false.

_____ 1. Air occupies empty spaces.

_____ 2. If you inflate a ball, air pressure is applied.

_____ 3. Air pushes in two directions; north and south.

_____ 4. Air pushes because of its weight.

_____ 5. The bending of a whole field of palay with the wind is an example of air pressure.

Compare your answers to those found in the *Answer Key* on page 28.

Let's Remember

Do not forget the important points of this lesson.

- Air occupies space.
- Air has weight.
- Air pushes in all directions.
- Air pressure is the push or force exerted by air in an area.
- You should know how to properly use and apply air pressure in your everyday activities.

Let's Sum Up

Do not forget the important points of this module.

- Temperature refers to the degree of hotness or coldness of an object or substance. The instrument used to measure temperature is the thermometer.

- There are two types of thermometer; the laboratory thermometer and the clinical thermometer.
- You should use the thermometer properly to ensure accuracy.
- Different objects or substances can have different temperature ranges.
- The Celsius and the Fahrenheit scales are both temperature scales. Degree Celsius (°C) is the more common unit used. The Fahrenheit scale is used to measure the temperature of the earth's surface.
- To convert Celsius to Fahrenheit, use the formula:

$$°F = 1.8\ (°C) + 32$$

- To convert Fahrenheit to Celsius, use the formula:

$$°C = \frac{(°F - 32)}{1.8}$$

- Air occupies space and has weight.
- Air pushes in all directions.
- Air pressure is the push or force exerted by air in an area.
- You should know how to properly use and apply air pressure in your everyday activities.

What Have You Learned

Choose the letter of the best answer.

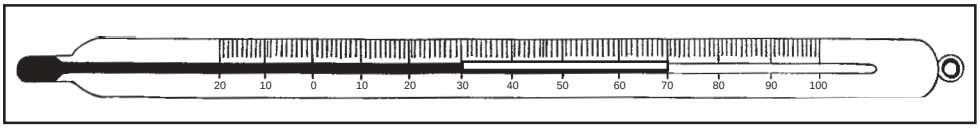
1. The instrument used to measure the temperature of the human body is called _____.

   a. Laboratory thermometer
   b. Clinical thermometer
   c. Stethoscope
   d. none of the above

2. When reading the temperature registered in the thermometer, you should _____.

   a. hold the thermometer by the bulb
   b. shake the thermometer
   c. hold the thermometer on the end opposite the bulb
   d. not hold the thermometer

3. What is the thermometer reading?



   a. 30°C
   b. 30°F
   c. 35°C
   d. 35°F

4. The boiling point of water in the Fahrenheit scale is _____.

   a. 100°C
   b. 100°F
   c. 212°F
   d. 0°C

5. If your body temperature is 40°C, what does this mean?

   a. You are hot and you have fever.
   b. You are cold. You need to put on a jacket.
   c. You are normal.
   d. None of the above.

6. If the water's temperature is 100°C, what should you expect to happen?

   a. The water will boil.
   b. The water will freeze.
   c. The water will disappear.
   d. Water will turn into ice.

7. Forty eight degrees Celsius (48°C) is equal to _____°F.

   a. 108.5°F
   b. 118.4°F
   c. 108.5°C
   d. 118.4°C

8. One hundred five degrees Fahrenheit (105°F) is equal to _____°C.

   a. 40.55 °C
   b. 45.40°C
   c. 40.55°F
   d. 45.40°F

9. Which of the following statements about air is not true?

a. Air occupies space.
b. Air has weight.
c. Air exerts pressure.
d. Air pushes in one direction.

10. The force that air exerts is called _____.

a. air force
b. air pressure
c. air energy
d. air motion

Compare your answers with those in the *Answer Key* on page 29. Were you able to get all the correct answers?

If you got:

10–9 Very good! You have learned a lot in this module.

8–7 Good! But make sure that you go back to the items where you missed. Study them carefully.

6–5 Fair. Go back to the parts of the module which you didn't quite understand.

4–0 Read the module again. I'm sure you'll understand it better the next time.

Answer Key

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

1. **(F)** A laboratory thermometer is used to measure the boiling point of water.
2. **(F)** Always shake the clinical thermometer before using it. This will allow the mercury to fall. However, you should never shake a laboratory thermometer because the mercury inside rises and falls freely.
3. **(F)** The boiling point of water is 100°C, so 27°C means that the water is cold.
4. **(T)**
5. **(F)** The Fahrenheit scale was invented by Gabriel Fahrenheit.
6. **(F)** The Celsius scale is the most widely used temperature scale.
7. **(T)**
8. **(T)**
9. **(F)** Air has force and it occupies space.
10. **(T)**

B. Lesson 1

Let's Try This (page 10)

a. 60°C

b. 70°C

c. 90°C

Let's See What You Have Learned (pages 12–13)

1. 30°C

2. a. Wednesday
   b. Thursday

3. Yes, because the normal body temperature is only 37°C. Jessie's temperature is way over the normal body temperature.

4. The water has reached it's boiling point.

C. Lesson 2

Let's See What You Have Learned (page 17)

1. Celsius scale

2. Fahrenheit

3. 100°C, 212°F

4. 89.6°F

5. 40.55°C

D. Lesson 3

Let's See What You Have Learned (page 23)

1. **T**

2. **T**

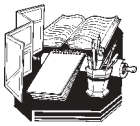
3. **F**

4. **T**

5. **T**

E. What Have You Learned *(pages 24–26)*

1. **(b)**
2. **(c)**
3. **(a)**
4. **(c)**
5. **(a)**
6. **(a)**
7. **(b)**
8. **(a)**
9. **(d)**
10. **(b)**



Reference

Exploring Our Environment. Department of Education, Culture and Sports, 1977.