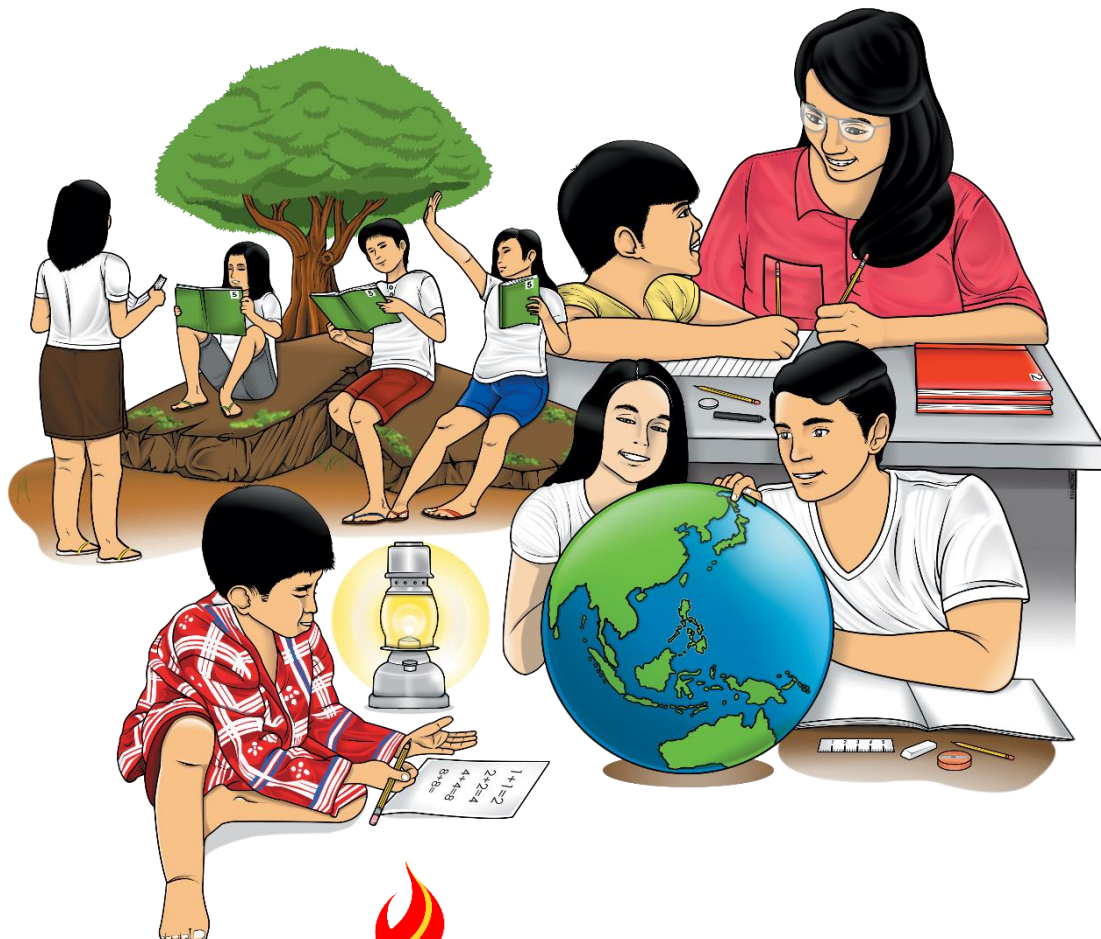


# Mathematics

## Quarter 3 – Module 18: Visualizing the Circumference of a Circle



**Mathematics – Grade 5**  
**Alternative Delivery Mode**  
**Quarter 3 – Module 18: Visualizing the Circumference of a Circle**  
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# Mathematics

**Quarter 3 – Module 18:  
Visualizing the Circumference  
of a Circle**

# **Introductory Message**

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.



## ***What I Need to Know***

Hello, Mathletes! This module was designed to help you develop your understanding of circles and their circumferences, as well as test your abilities to visualize them. This module also includes activities which will add to your understanding as they relate to experiences in your daily life.

When you finish this module, you will be able to:

- visualize the circumference of a circle;
- describe the circumference of a circle; and
- appreciate the importance of visualizing a circle's circumference in your daily life.

First, let us check what you have learned so far.



## ***What I Know***

**Directions:** Read and understand the following statements carefully. Choose the letter that corresponds to the best answer. Write your answers on a separate sheet of paper.

1. Which of the following describes the circumference of a circle?
  - A. the distance around the circle
  - B. distance between two points on a circle
  - C. the distance from the center of a circle to any point on the circle
  - D. the halfway distance from the center of a circle to any point on the circle
2. One of the following circular objects has a circumference that is much bigger than the others in the group. Which one is it?
  - A. plate
  - B. wall clock
  - C. pizza pie
  - D. Ferris wheel
3. Which of the following common things has a circumference which measures approximately 10 inches?
  - A. A cymbal
  - B. A swimming pool
  - C. A wedding ring
  - D. A circular earring
4. Which of the following common circular objects has a much bigger circumference than the rest of the objects in the group?
  - A. a basin
  - B. a bottle cap
  - C. a 10-peso coin
  - D. a round pendant of a necklace
5. Which of the following common things has a circumference that is closest to the circumference of a motorcycle tire?
  - A. a Ferris wheel
  - B. a round bracelet
  - C. a circular swimming pool
  - D. a plastic basin for washing clothes
6. Which of the following is **not** true?
  - A. The bigger the circle is, the longer its circumference is.
  - B. If the diameter increases, then the circumference of a circle decreases.
  - C. You can measure the circumference of a circle using a tape measure.
  - D. The circumference of any circle divided by its diameter is approximately equal to 3.14.

7. Which of the following pairs is likely to have circumferences that are almost of the same length?
- A. A coin and a small basin
  - B. A hula hoop and the rim of a cup
  - C. A round wall clock and a round plate
  - D. A bicycle wheel and a Ferris wheel
8. Which circle has the longest circumference?
- A. A circle with a radius of 1 m
  - B. A circle with a diameter of 10 mm
  - C. A circle with a radius of 15 km
  - D. A circle with a diameter of 20 cm
9. Which situation requires finding the circumference of the object?
- A. Finding the height of a pole
  - B. Deciding which box contains more space
  - C. Determining which water melon is the heaviest
  - D. Determining how much plastic tube is needed to create a Hula hoop
10. Which of the following best represents a circumference?
- A. A hotcake
  - B. A slice of pizza
  - C. The crust of a round pie
  - D. Half of a circular kakanin

## Lesson

# 1

# Visualizing the Circumference of a Circle



## What's In

Can you still remember the different terms related to circle? Let's see if you can recall of some of them.

For example, you are given the following objects: a 1-peso coin, a globe, and a ball. What do they have in common?

Yes, you are correct! They are all closed figures and round. Which of them can represent circles, and which ones do not? Why?

If you still remember, a *circle* is a set of all points in a plane that have the same distance from a fixed point called its center. Hence, a 1-peso coin can be used to represent a circle. However, a globe and a ball have the shape of a circle but are not considered as representations of circles because they are better representations of spheres. A sphere is a three-dimensional figure.

The radius and the diameter of a circle are terms related to a circle.

A *radius* is a line segment from the center to any point on the circle. It is the distance from the center to a point on the circle.

A *diameter* is a line segment which passes through the center of a circle and whose endpoints are on the circle. Its length is twice that of the radius.

Take a look at this figure.

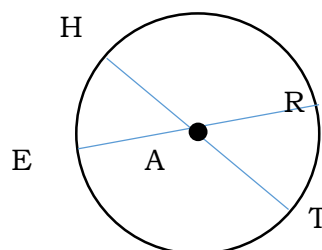


Figure 1

The line segment **HT** represents the diameter of the circle. The line segment **AR** is a radius of the circle. Point A is the center of the circle. Can you identify other diameters or radii (plural for radius) that are found in the circle?



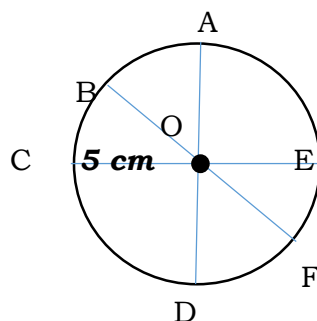
## Exercise 1

**Directions:** Using Figure 1 on page 3, answer the following. Use a separate answer sheet for your answer.

- a. Name another diameter.
  1. \_\_\_\_\_
  
- b. List down other radii.
  2. \_\_\_\_\_
  3. \_\_\_\_\_
  4. \_\_\_\_\_
  
- c. If the distance between point A to point R is 3 cm, what is the distance between point E to point R?
  5. \_\_\_\_\_

## Exercise 2

**Directions:** Using the figure below, determine which of the following statements is true or not. Write **FACT** if the statement is true and **BLUFF** if it is false. Write your answers on a separate sheet of paper.



- \_\_\_\_\_ 6. Point O is the center of the circle.
- \_\_\_\_\_ 7. There are 6 given diameters in this circle.
- \_\_\_\_\_ 8. Line segment OE is half the length of line segment AD.
- \_\_\_\_\_ 9. Line segment CE divides the circle into two halves.
- \_\_\_\_\_ 10. If radius OC measures 5 cm, then the distance from point A to D is 10 cm.

Keep going! You are doing well.



## ***What's New***

By this time, you have already gained knowledge about how circles look like and the parts related to them.

Let's review the figures below.

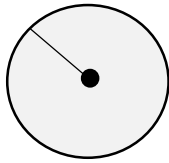


Figure 1

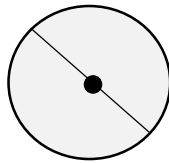


Figure 2

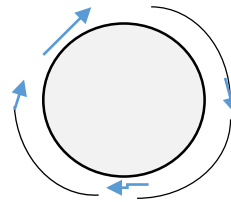


Figure 3

Figure 1 illustrates a **radius** of the circle. Figure 2 shows a **diameter**. Figure 3 illustrates the **circumference** of a circle.

How will you determine the circumference of any circle?



## What is It

The circumference of a circle can be represented by the length of the crust of a circular pizza or the distance around a round plate.

Suppose you walk along the path of a circular park and you reach the same point from where you started. The *distance* that you travelled is the *circumference* of the circular park.

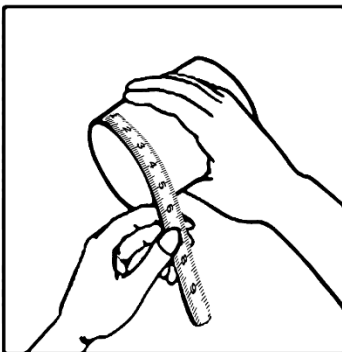
A dressmaker wraps a tape measure around your wrist to know the *circumference* of your wrist. He or she uses a tape measure to know the *length* of your waistline. Health professionals use a tape measure to know the head circumference of a baby. This is done with the assumption that the tape measure is forming a circle.

These are just a few of the different applications of the circumference of a circle which are present in our lives. Can you think of some other applications?

**Circumference** is the distance around a circle. To help us visualize this, we can use a string, ruler, meter stick or tape measure depending upon the size of the circular object that will be measured. The circumference of a circle can be measured in meters, feet, centimeters, inches, decimeters, millimeters, or even kilometers.

Let us consider the situation below.

Get an empty can. Visualize how to measure the distance around it.



**Problem:** Can you imagine the distance around an empty can?

**Solution:** As shown, wind a strip of paper once around the can. The length of the strip is the distance around the circle. This is the **circumference** of the empty can.

Considering the size the circle, we can visualize the measure of the distance around it. Is it big or small? Then, you can determine the unit of measure to use depending on its size.

Is there a relationship between the circumference and the length of a diameter of a circle?

To understand the concept further, do the following activity.

## Experiment 1

**Directions:** Read and understand each of the following. Copy the table below on a separate sheet of paper. Do as indicated.

*Materials:*

- 5 circular objects of different sizes (Examples: plate, wall clock)
- Tape measure or a piece of string or a strip of paper
- Ruler
- A calculator

*Procedures:*

1. Use a tape measure to measure the distance around the circular objects (*circumference*) in centimeters.
2. If there is no tape measure, wrap around a piece of string or a strip of paper once the circular objects. You should end up with a single loop of string or strip of paper. Use a ruler to determine the length (*circumference*) of the string or paper in centimeters.
3. Use a ruler to measure the diameter of the each object.
4. Divide the circumference and diameter.
5. Record your observation.

Circular Objects	Circumference ( <b>C</b> ) <i>in cm</i>	Diameter ( <b>d</b> ) <i>in cm</i>	<b>C ÷ d</b>
<b>A</b>			
<b>B</b>			
<b>C</b>			
<b>D</b>			
<b>E</b>			

After getting the average of all the entries in the last column, what have you found out? Are they equal or almost equal?

Upon measuring the distance around the circle and dividing it by the diameter, you will get a constant value whatever sizes of circles you have. It is an irrational number (a decimal that is non-repeating and non-terminating) and it cannot be expressed as a fraction nor a decimal. This why the Greek letter  $\pi$  (phi) is used to denote its value. However, the rational numbers **3.14** and  $\frac{22}{7}$  are used as approximation for  $\pi$ .

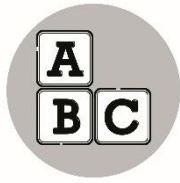
It is also important to imagine how small or big the circular object looks like, so that we can visualize its circumference.

## Activity 1

**Directions:** Read and understand each of the following. Copy the table below on your answer sheet. Write Yes or No if the given is illustrating the circumference of a given circular object. The first two are done for you.

<b>Circular Objects</b>	<b>Is it modelling the circumference of a circle?</b>
1. the whole round wall clock	No (It represents the area of the clock.)
2. the crust of a circular apple pie	Yes
3. a slice of round kakanin	
4. the whole circular pizza	
5. a wedding ring	
6. the half of a round cake	
7. the lace around a circular table	

Excellent! You can now visualize and describe the circumference of a circle or any circular object. Keep going.



## What's More

Well done! You have reached this far! Keep going.

After going through the examples on visualizing the circumference of a circle, let's try some challenging activities below.

### Activity 1: A Tool 4 Me





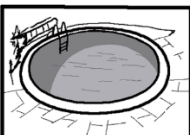
**Directions:** A piece of string is wrapped around each of the following objects. Visualize if the length of the string representing the circumference of the circular object can be best measured using a **meter stick** or a **ruler**. Write your answers on a separate sheet of paper.

1. a soft drink bottle cap
2. a 10-peso coin
3. a circular pool
4. a car tire
5. a round necklace pendant
6. a circular fountain in a park

### Activity 2: Unit My Picture!

**Directions:** Match the picture in Column A with the appropriate unit of measure of its circumference in Column B. You may use an option more than once. Write the letter of your answer on a separate answer sheet.

#### Column A

1. 
2. 
3. 
4. 
5. 

#### Column B

- A. millimeter
- B. centimeter
- C. meter

### Activity 3: A or B?

1. Which one has a bigger circumference?  
A. a bottle cap with a radius of 1.8 cm  
B. a 5-peso coin which has a diameter of 2.5 cm
2. The following can be seen at Pilar National Agricultural High School. Which one has a smaller circumference?  
A. A round table with a radius of 3 feet  
B. A circular flower garden with a diameter of 5 feet
3. Jose bought two circular mirrors at Metro Gaisano, Calbayog City. Which has a greater circumference?  
A. The mirror with a diameter of 25 cm  
B. The mirror with a radius of 13 cm



### *What I Have Learned*

**Directions:** Copy and complete the following on a separate sheet of paper.

1. The \_\_\_\_\_ of a circle is the distance around it.
2. Using your own words, how do you visualize and describe the circumference of a circle? Give an example.

Great job! You are doing well. Try the next activity.



## ***What I Can Do***

**Directions:** Visualize the problem below. Describe briefly what you have discovered. Write your answers on a separate sheet of paper.

- A. Gilbert put two circular wall clocks side by side without overlapping. The diameter of the first clock measures 20 cm. The diameter of the second clock is equal to the radius of the first clock. Which of the following is true?
1. The circumference of the first wall clock is longer than the second wall clock.
  2. The circumference of the first wall clock is shorter than the second wall clock.
  3. The two wall clocks have the same circumference
- B. If the diameter of a circle increases, what happens to its circumference?







## ***Assessment***

**Directions:** Read and understand the following statements carefully. Choose the letter that corresponds to the best answer. Write your answers on a separate sheet of paper.

1. Which of the following statements is **true**?
  - A. A whole round cake illustrates the circumference of the cake.
  - B. The circumference of a circular park is the amount of space inside the park.
  - C. The circumference of a circular park is the distance around the park.
  - D. A slice of bibingka is the circumference of the bibingka.
2. Which of the following common circular objects has a circumference that is much bigger than the others in the group?
  - A. A bus tire
  - B. A truck tire
  - C. A wash basin
  - D. A Ferris wheel



3. Which of the following has a circumference that is nearest to the circumference of a bus tire?
  - A. A wash basin
  - B. A Ferris wheel
  - C. A round earring
  - D. A circular swimming pond
4. Which of the following may illustrate the circumference of the given object?
  - A. The whole circular kakanin
  - B. The crust of a circular pie
  - C. A slice of a circular pizza
  - D. Half of a round cake
5. Which of the following pairs of circular objects have almost the same measures of their circumferences?
  - A. a plate and a 5-peso coin
  - B. an earring and a wall clock
  - C. a 10-peso coin and a bottle cap
  - D. a bicycle wheel and a Ferris wheel

6. Which of the following circular objects has a circumference that measures approximately 80 cm?
  - A. 
  - B. 
  - C. 
  - D. 

A.

1-peso coin

B.

softdrink cap

C.

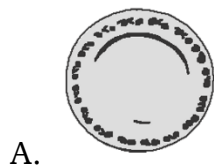
food plate

D.

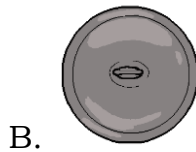
motorcycle tire

7. Which of the following is true?
  - A. The smaller the circle is, the shorter its circumference is.
  - B. The circumference of a circle is equal to  $\pi$  ( $\pi$ ) multiplied by its radius.
  - C. If the diameter increases, the circumference of a circle remains the same.
  - D. The circumference of a circle is the distance from one point to any point on the circle.
8. Which of the following circles has the shortest circumference?
  - A. A circle with a radius of 6 cm
  - B. A circle with a diameter of 13 cm
  - C. A circle with a diameter of 5 m
  - D. A circle with a radius of 3 m
9. Suppose you are given two round mirrors. The first mirror has a diameter of 20 cm. The second is twice the diameter of the first. If you put the mirrors side by side without overlapping, which of the following show how to get the total distance around the two circles?
  - A. the circumference of the first circle is subtracted from the circumference of the second circle
  - B. the circumference of the first circle is added to the circumference of the second circle
  - C. the sum of 10 inches is added to 20 inches
  - D. the 10 inches is multiplied by 2

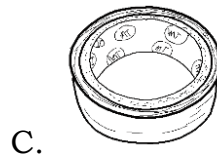
10. Let  $C$  be the circumference of the given circular objects. Which of the following is **most reasonable**?



$C = 9.42$  mm  
food plate



$C = 6.28$  in  
casserole cover



$C = 27.8$  cm  
masking tape



$C = 7.85$  mm  
5-peso coin

Perfect! One last task and you are done with this module. Are you proud of yourself?



## ***Additional Activities***

Look around and collect at least 5 circular objects. Describe the circumference of each circular object. Write your answers on a separate sheet of paper.

Congratulations! Give yourself a pat on your shoulder. You did well!



# Answer Key

<p><b>Additional Activities</b> Answers vary.</p> <p><b>Assessment</b></p> <ol style="list-style-type: none"> <li>1. C</li> <li>2. D</li> <li>3. A</li> <li>4. B</li> <li>5. C</li> <li>6. C</li> <li>7. A</li> <li>8. A</li> <li>9. B</li> <li>10. C</li> </ol>	<p><b>What I Can Do</b></p> <p>A. Statement 1 B. If the diameter of a circle increases, the circumference also increases.</p> <p><b>What I Have Learned</b></p> <ol style="list-style-type: none"> <li>1. circumference</li> <li>2. Answers vary.</li> </ol>	<p><b>What's More</b></p> <p><b>Activity 1: A Tool 4 Me</b></p> <ol style="list-style-type: none"> <li>1. Ruler</li> <li>2. Ruler</li> <li>3. Meter stick</li> <li>4. Meter stick</li> <li>5. Ruler</li> <li>6. Meter stick</li> </ol> <p><b>Activity 2: Unit My Picture!</b></p> <ol style="list-style-type: none"> <li>1. A</li> <li>2. B</li> <li>3. B</li> <li>4. A</li> <li>5. C</li> </ol>
<p><b>What's More</b></p> <p><b>Activity 3: A or B?</b></p> <ol style="list-style-type: none"> <li>1. A</li> <li>2. B</li> <li>3. B</li> </ol> <p><b>What is It</b></p> <p><b>Activity 1</b></p> <ol style="list-style-type: none"> <li>3. No</li> <li>4. No</li> <li>5. Yes</li> <li>6. No</li> <li>7. Yes</li> </ol>	<p><b>What's In</b></p> <p><b>Exercise 1</b></p> <ol style="list-style-type: none"> <li>1. Line segment ER</li> </ol> <p><i>For items 2 to 4, these come in any order.</i></p> <p>line segment AH line segment AE line segment AT</p> <p>5. 6 cm</p> <p><b>Exercise 2</b></p> <ol style="list-style-type: none"> <li>6. Fact</li> <li>7. Bluff</li> <li>8. Fact</li> <li>9. Fact</li> <li>10. Fact</li> </ol>	<p><b>What I Know</b></p> <ol style="list-style-type: none"> <li>1. A</li> <li>2. D</li> <li>3. A</li> <li>4. A</li> <li>5. D</li> <li>6. B</li> <li>7. C</li> <li>8. C</li> <li>9. D</li> <li>10. C</li> </ol>

## ***References***

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