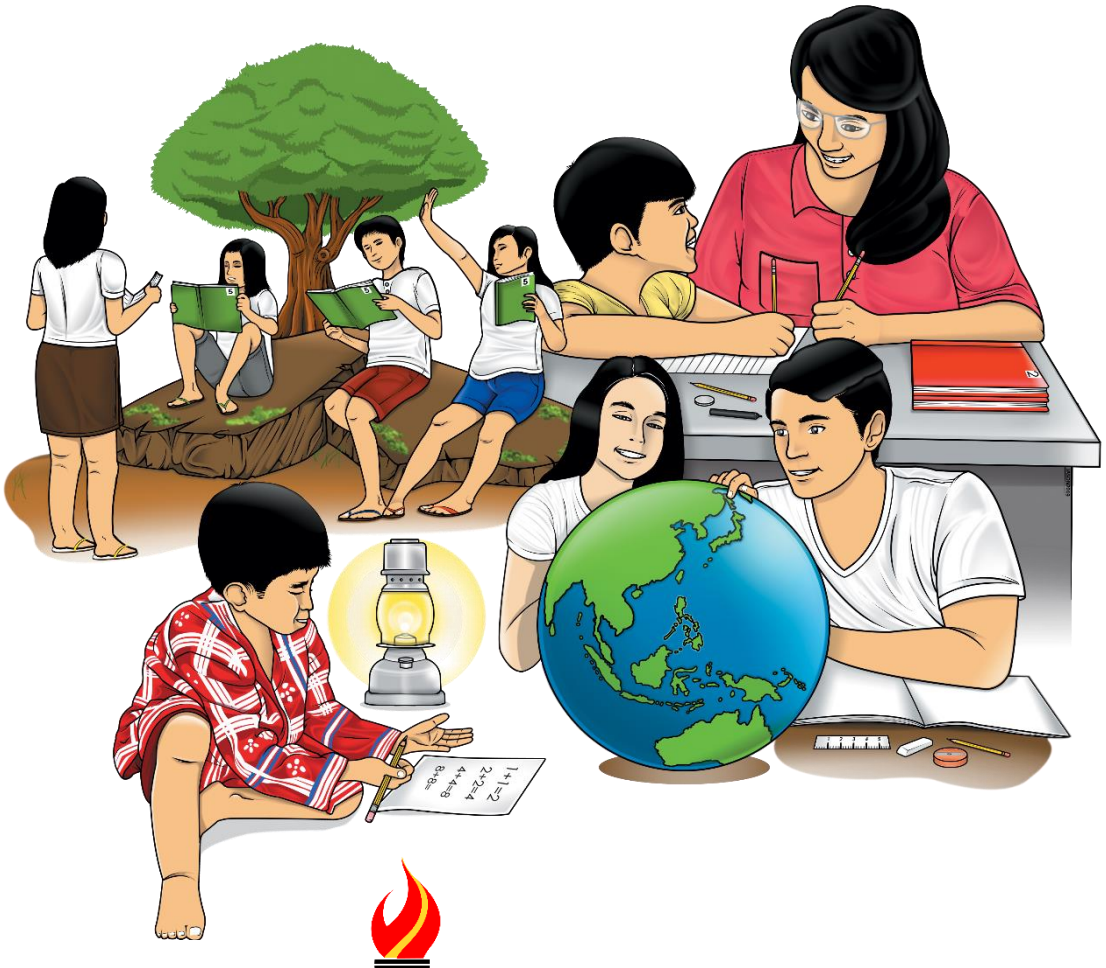
5

DepED
DEPARTMENT OF EDUCATION

Mathematics

Quarter 3 – Module 20:
Finding the Circumference of a Circle



ALTERNATIVE DELIVERY MODE
ADM

Mathematics – Grade 5
Alternative Delivery Mode
Quarter 3 – Module 20: Finding the Circumference of a Circle
First Edition, 2020

Published by the Department of Education
Secretary: Leonor Magtolis Briones
Undersecretary: Diosdado M. San Antonio

Development Team of the Module

Writers: Fe C. Cruz

Editors: Jose J. Sagada Jr.

Reviewers: Renato S. Cagomoc, Rolando Lacbo, Joshua Sherwin T. Lim,
Teodora P. Coreal. Rodel V. Rosales

Illustrator: -

Layout Artist: Joey Sustitudo, Jaycee B. Barcelona

Management Team: Ma. Gemma M. Ledesma, Arnulfo R. Balane, Rosemarie M. Guino
Joy B. Bihag, Ryan R. Tiu, Sarah S. Cabaluna,
Thelma Cabadsan-Quitalig, Elena S. De Luna,
Renato S. Cagomoc, Noel E. Sagayap, Geraldine P. Sumbise
Joshua Sherwin T. Lim

Printed in the Philippines by _____

Department of Education – Region VIII

Office Address: DepEd Regional Office No. 8
Candahug, Palo, Leyte
Telefax: (053)-832- 2997
E-mail Address: region8@deped.gpv.ph

5

Mathematics

Quarter 3 – Module 20: Finding the Circumference of a Circle

DepED
DEPARTMENT OF EDUCATION

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 there, Mathletes! As you know, a circle is a plane figure that is commonly used in art, design, architecture, manufacturing, engineering, and many others. In fact, the coins in your purse are circular in shape! In this module, you will learn how to find the circumference of a circle. Your ability to learn the concepts and keep up with the tasks will depend to a large extent on your willingness to learn. So, are you ready?

At the end of this module, you are expected to:

1. find the radius and diameter of a circle;
2. find the circumference of a circle; and
3. appreciate the value of knowing how to find the circumference of a circle in real-life situations.

What I Know

Directions: Read each statement carefully. Choose the letter that corresponds to the best answer. Write your answer on a separate sheet of paper.

1. If the diameter of a circle is 14 cm, how long is the radius?
   A. 6 cm B. 7 cm C. 14 cm D. 28 cm

2. Which of the following is the formula in finding the circumference of a circle if the radius is given?
   A. $C = \pi$ x d B. C = r x d C. $C = \pi$ x r D. C = 2 x π x r

3. If a circle's radius measures 15 cm, what is its diameter?
   A. 30 cm B. 15 m C. 17 cm D. 7.5 cm

4. Rolly receives a gold medal whose diameter is 15 cm. Which of the following expressions will give the circumference of the medal?
   A. 3.14 x 7.5 B. 3.14 x 1.5 C. 3.14 x 15 D. 3.14 + 15

5. If the radius is doubled, what happens to the diameter of the circle?
   A. The diameter is also doubled.
   B. The diameter remains the same.
   C. The diameter is increased by 2.
   D. The diameter will be the same as the radius.

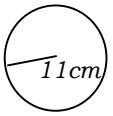
6. The circular pond has a diameter of 7 meters. What is the circumference of the pond to the nearest meter? Use π = 3.14.
   A. 14 B. 17 C. 20 D. 22

7. Marlon's bicycle wheel has a diameter of 40 cm. What is the circumference of the wheel?
   A. 120.40 cm B. 121.12 cm C. 122.05 cm D. 125.60 cm

8. Myrna's circular garden is 10 meters in diameter. How many meters of wire are needed to put a fence around it? Use π=3.14.
   A. 25.50 m B. 30.10 m C. 31.40 m D. 32.50 m

9. Mr. Corsiga is laying out a circular garden whose circumference is 251.20 meters. What is its radius? Use π=3.14.
   A. 40 m B. 50 m C. 125 m D. 250 m

10. Using π=3.14, find the circumference of the circle:



   A. 70.28 cm B. 69.08 cm C. 67.02 cm D. 66.12 cm

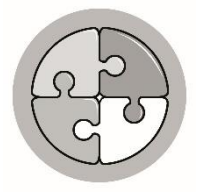
Please check your answers against the answer key on page 11.

CONGRATULATIONS! If you got a score of 9 or 10, you should not have any difficulty studying the lesson in this module.

If you got a score of 8 or below, you may need to study the lesson more carefully and do all the given activities.

Lesson 1 Finding the Circumference of a Circle

To find the circumference of a circle, it is important to identify its diameter or radius. Deriving the formula for getting the circumference of a circle is also very helpful for you to understand how the formula was arrived at.



What's In

Before we take the challenges ahead, let's first look back at the wonderful world of circles.

A circle is a closed plane figure, but unlike a polygon, it is not bounded by line segments. It is made up of points which are equidistant from a fixed point called the ***center***. A circle has many parts. In finding the circumference of a circle, we only need the measure of its ***diameter*** or ***radius***.

Diameter, denoted by ***d***, is the distance between two points on a circle which form a straight line passing through its center.

Radius, denoted by ***r***, is the distance from the center to any point on the circle. The radius is half the length of the diameter. ($r = \frac{1}{2} d$)

Circumference, denoted by ***C***, is the distance around the circle.

INVESTIGATIVE ACTIVITY

Let us explore the ratio between a circle's circumference and diameter through this activity.

1. Measure the circumference of three circular cans of different sizes by wrapping a string around each can and measuring the length of the string at the point where it overlaps.
2. Measure the diameter of the can using a ruler.
3. Divide the circumference of each can by its diameter.
4. Tabulate the results for the 3 cans.

Can	Circumference	Diameter	C/d
A			
B			
C			

What do you observe about the quotient of the circumference and diameter?

The ratio of any circle's circumference to its diameter is constant, and that is about $\frac{22}{7}$, or **3.14**. This ratio is represented by the Greek letter $\boldsymbol{\pi}$ (pi). Using the ratio, you can write the formula in finding the circumference of a circle.

The investigative activity above showed that $\frac{C}{d} = \pi$, where $\boldsymbol{C}$ is the circumference and $\boldsymbol{d}$ is the diameter of the circle. By multiplying both sides of the equation by $\boldsymbol{d}$, we get $\mathbf{C = \pi \times d}$. Thus, to find the circumference of a circle:

a. If the diameter is given, multiply the diameter by π. Use $\pi = 3.14$.
$$\boldsymbol{C = \pi \times d}$$

b. If the radius is given, multiply π by twice the radius. Use $\pi = 3.14$.
$$\boldsymbol{C = 2r \times \pi} \quad \text{or} \quad \boldsymbol{C = 2 \times \pi \times r}$$

Here's a simple drill for you.

Activity 1

Directions: Each item refers to the same circle. Find the diameter of the circle when its radius is given. Find the radius of the circle when the diameter is given.

Radius	Diameter
1. 6 inches	_____
2. _____	22 m
3. 15 mm	_____
4. _____	18 km
5. 22.5 cm	_____

Activity 2

Directions: Complete the table. Given the following, write the correct formula in finding the circumference of the circle. The first one has been done for you.

Given	Formula
1. r = 5 in	$C = 2 \times \pi \times r$
2. d = 3 m	
3. r = 10 mm	
4. r = 15 dm	
5. d = 7 m	

What's New

Two formulas are used to find the circumference (denoted by **C)** of a circle, depending on the given information.

Formulas for Finding the Circumference of a Circle

1. If the diameter is given:
   $\boldsymbol{C = \pi \times d}$
2. If the radius is given :
   $\boldsymbol{C = \pi \times 2r}$
   or
   $\boldsymbol{C = 2 \times \pi \times r}$
   since the value of diameter is twice the radius; $d = 2r$

   where $\boldsymbol{C}$ = circumference
   $\boldsymbol{d}$ = diameter
   $\boldsymbol{r}$ = radius
   $\pi = 3.14$

Given the formula in finding the circumference of the circle, you can also derive the following formulas:

1. To find the **diameter** of the circle, divide the circumference by π (3.14). Hence;
   $\boldsymbol{d} = \frac{\boldsymbol{C}}{\pi}$

2. To find the **radius** of the circle, divide the circumference by $\boldsymbol{2\pi}$. Hence,
   $\boldsymbol{r} = \frac{\boldsymbol{C}}{2\pi}$

What is It

Consider the situation:

Mrs. Violeta Banzon plants roses in her circular flower garden whose diameter is 8 meters. She wants to build a fence around the garden to protect her roses. How long will the fence be?

Can you help her solve this problem?

Since the diameter of the circular flower garden is 8 meters, we use the formula when the diameter is given. So,

$C = \pi \times d$

Given: $d = 8\ m$
Find: C?
Solution:

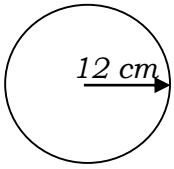
$C = \pi \times d$
$= 3.14 \times 8$
$= 25.12$ m

Therefore, Mrs. Banzon needs 25.12 meters *of fencing materials.*

Let's have more examples.

Example 1:

What is the circumference of the circle whose radius is 12 centimeters?



Since the radius of the circle is given, we use the formula below:

$C = 2 \times \pi \times r$

So:

Given: $r = 12\ cm$
Find: C?
Solution:

$C = 2 \times \pi \times r$
$= 2 \times 3.14 \times 12$
$= 75.36$ cm

Therefore, the circumference of the circle is **75.36 centimeters**.

Example 2:

What is the diameter of a circle whose circumference is 37.68 centimeters?

Since the circumference of the circle is given and we are going to find its **diameter**, we use the formula below:

$$\boldsymbol{d} = \frac{\boldsymbol{C}}{\pi}$$

So:

Given: $\boldsymbol{C}$ = *37.68 cm*
Find: $\boldsymbol{d}$*?*
Solution:

$$\boldsymbol{d} = \frac{\boldsymbol{C}}{\pi}$$

$$= \frac{\mathbf{37.68}}{3.14}$$

$$= 12 \text{ cm}$$

Therefore, the diameter of the circle is 12 centimeters.

Example 3:

If the circumference of a circle is 23.55 cm, what is its radius?

Since the circumference of the circle is given and we are going to find its **radius**, we use the formula below:

$$\boldsymbol{r} = \frac{\boldsymbol{C}}{2\pi}$$

So:

Given: $\boldsymbol{C}$ = *23.55 cm*
Find: $\boldsymbol{r}$*?*
Solution:

$$\boldsymbol{r} = \frac{\boldsymbol{C}}{2\pi}$$

$$= \frac{\mathbf{23.55}}{2\ x\ 3.14}$$

$$= \frac{\mathbf{23.55}}{6.28}$$

$$= 3.75 \text{ cm}$$

Therefore, the radius of the circle is **3.75 *cm***.

Are you now excited to use your knowledge of finding the circumference of a circle to answer the exercises in this module?

What's More

This time, you will answer some exercises to check your ability in finding the circumference of the circle. Just relax and refer to the previous examples as your guide.

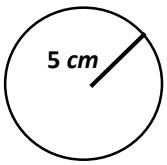
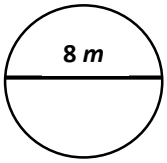
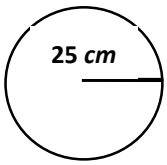
Activity 1: Let's C!

Directions: Find the circumference of the circle given its radius or diameter. You can use an extra sheet for your solution.

1. ***r*** = 2 m
   C = _____
2. ***d*** = 16 cm
   C = _____
3. ***d*** = 18 dm
   C = _____
4. ***r*** = 8 cm
   C = _____
5. ***r*** = 15 km
   C = _____

Activity 2: C - Saw

Directions: Fill in the needed information based on the given illustration. The first one has been done for you.

1. 	2. 	3. 
Radius: ***5 cm***	Radius:	Radius:
Diameter: ***10 cm***	Diameter:	Diameter:
Circumference: ***31.4 cm***	Circumference:	Circumference :

Activity 3: The Circle of Life

Directions: Draw a circle with the given radius or diameter using a compass and ruler and find its circumference

1. d = 9 cm
2. r = 18 mm
3. r = 7 cm
4. d = 28 cm
5. d = 30 m

What I Have Learned

Let's check what you have learned by answering the following questions.

1. What is the formula in finding the circumference of a circle given the following:
   a. Diameter? _____
   b. Radius? _____
2. Which one is wider: a garden whose circumference is 62.8 meters or a room with a diameter of 19 meters? Why?
3. Complete the statement below.

   In this lesson, aside from finding the circumference of a circle, I also learned that _____
   _____
   _____.

What I Can Do

Circles are present everywhere. Day in and day out, we are in close encounter with these figures.

Let's see if you can solve the following real-life problems:

1) The round table in a farm house has a radius of 92.8 cm. Find the distance around the table.
2) You want to make a beautiful tablecloth for the round table in (1). It has an allowance of 15 cm from the edge. What is the circumference of the tablecloth?

See, you have made it this far! Give yourself a hug for keeping up with the challenges in this module. Always keep up the good work.

Assessment

Directions: Read each statement carefully. Choose the letter that best corresponds to the correct answer. Write it on your answer sheet.

1. Which of the following is the formula in finding the circumference of a circle if the diameter is given?
   A. $C = 2 \times \pi \times r$ B. $C = \pi \times d$ C. $C = \pi \times r$ D. $C = r \times d$

2. If the diameter of a circle is 15 meters, then what is the radius?
   A. 7 m B. 7.5 m C. 8.5 m D. 30 m

3. If the radius of a circle is 12.3 cm, then what is its diameter?
   A. 20.8 cm B. 21.20 cm C. 23.40 cm D. 24.6 cm

4. Find the circumference of a plate to the nearest inch with a diameter of 8 in.
   A. 8 B. 16 C. 20 D. 25

5. Danilo is jogging on a circular track with a circumference of 501.40 ft. Find the radius of the track to the nearest foot.
   A. 80 B. 120 C. 250 D. 500

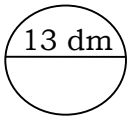
6. The radius of a basin is 9.2 in. What is the circumference to the nearest inch?
   A. 58 B. 59 C. 60 D. 90

7. A wheel has a diameter of 9 meters. What is the circumference of the wheel?
   A. 27.35 m B. 28.26 m C. 29.15 m D. 26.12 m

8. Mr. Delos Santos had a circular lagoon. The distance across the lagoon passing through the center is 25 meters. What is the distance around it?
   A. 77.3 m B. 76.2 m C. 78.5 m D. 75.1

9. What is the circumference of a circular table with a diameter of 14 meters?
   A. 40.75 m B. 42.12 m C. 43.96 m D. 44.15 m

10. Using $\pi = 3.14$, find the circumference of the circle.



A. 40.82 dm B. 41.20 dm C. 42.13 dm D. 43.4 dm

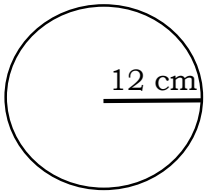
Please check your answers with the ANSWER KEY on page 11.

Got a score of 8-10? CONGRATULATIONS! Job well done. See you in the next module. If below 8, you may have to go over the lessons and the exercises again.

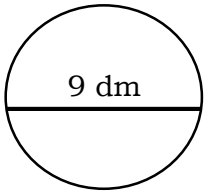
Additional Activities

Directions: Find the circumference of each circle. Use 3.14 for the value of π. (Note: Circles not drawn to scale.)

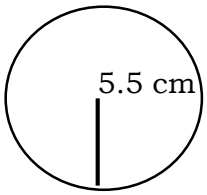
1.



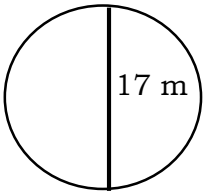
2.



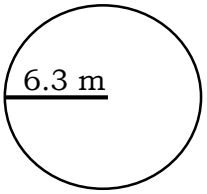
3.



4.



5.



Answer Key

What I Can Do

1. C = 582.784 cm
2. 2. C = 676.984 cm

Assessment

1.	B	6.	A
2.	B	7.	B
3.	D	8.	C
4.	D	9.	C
5.	A	10.	A

Additional Activities

1. 75.36 in
2. 28. 26 dm
3. 34.54 cm
4. 53.38 m
5. 39.564 m

What's More

Activity 1: Let's C

1. 12.56 m
2. 50.24 cm
3. 56.52 dm
4. 50.24 cm
5. 94.2 km

What's In

Activity 1

1. 12 in
2. 11 m
3. 30 mm
4. 9 km
5. 45 cm

Activity 2

1. $C = 2 \times \pi \times r$
2. $C = \pi \times d$
3. $C = 2 \times \pi \times r$
4. $C = 2 \times \pi \times r$
5. $C = \pi \times d$

What I Know

1. B
2. D
3. A
4. C
5. A
6. D
7. D
8. C
9. A
10. B

What's More

Activity 2: C-Saw

Radius: 5 in	Radius: 4 m	Radius: 25 cm
Diameter: 10 in	Diameter: 8 m	Diameter: 50 cm
Circumference: 31.4 in	Circumference: 25.12 m	Circumference: 157 cm

Activity 3: The Circle of Life

1 2 3 4 5

d = 9 cm
C = 28.26 cm

r = 18 mm
C = 113.40 cm

r = 12 cm
C = 75.36 m

d = 28 cm
C = 87.92 cm

d = 30 m
C = 94.2 m

What's I Have Learned

1. a. $C = \pi \times d$
   b. $C = 2 \times \pi \times r$
2. Garden whose circumference is 62.8 meters
   or Room with a diameter of 19 meters?
   Solution:
   $C = \pi \times d$
   $= 3.14 \times 19$ m
   $= 59.66$ m
   Therefore, the ***garden whose circumference is 62.8 meters is wider*** than the room with a diameter of 19 meters because its circumference is greater than the circumference of the room by 3.14 meters.
3. Answers may vary.

References

De Leon Jr., A. (1998). *Today's Math* (3rd Ed). Sibs Publishing House, Inc.

Lumbre, A. P. and Alvin C. & Ursua, A. (2016). *21st Century Mathletes 5 Textbook.* Vibal Group, Inc.

Banao, M. & Barron, A. *(2007) Building New Horizon in MATH*. A Simplified Approach Worktext 5. St. Augustine Publications, Inc.

Mathematics I Textbook, SEDP Series

Burns, W. *PRE-GED Mathematics*, Steck-Vaughn Company, P.O. Box 26015, Austin, Texas 78755

For inquiries or feedback, please write or call:

Department of Education - Bureau of Learning Resources (DepEd-BLR)

Ground Floor, Bonifacio Bldg., DepEd Complex
Meralco Avenue, Pasig City, Philippines 1600

Telefax: (632) 8634-1072; 8634-1054; 8631-4985

Email Address: blr.lrqad@deped.gov.ph * blr.lrpd@deped.gov.ph