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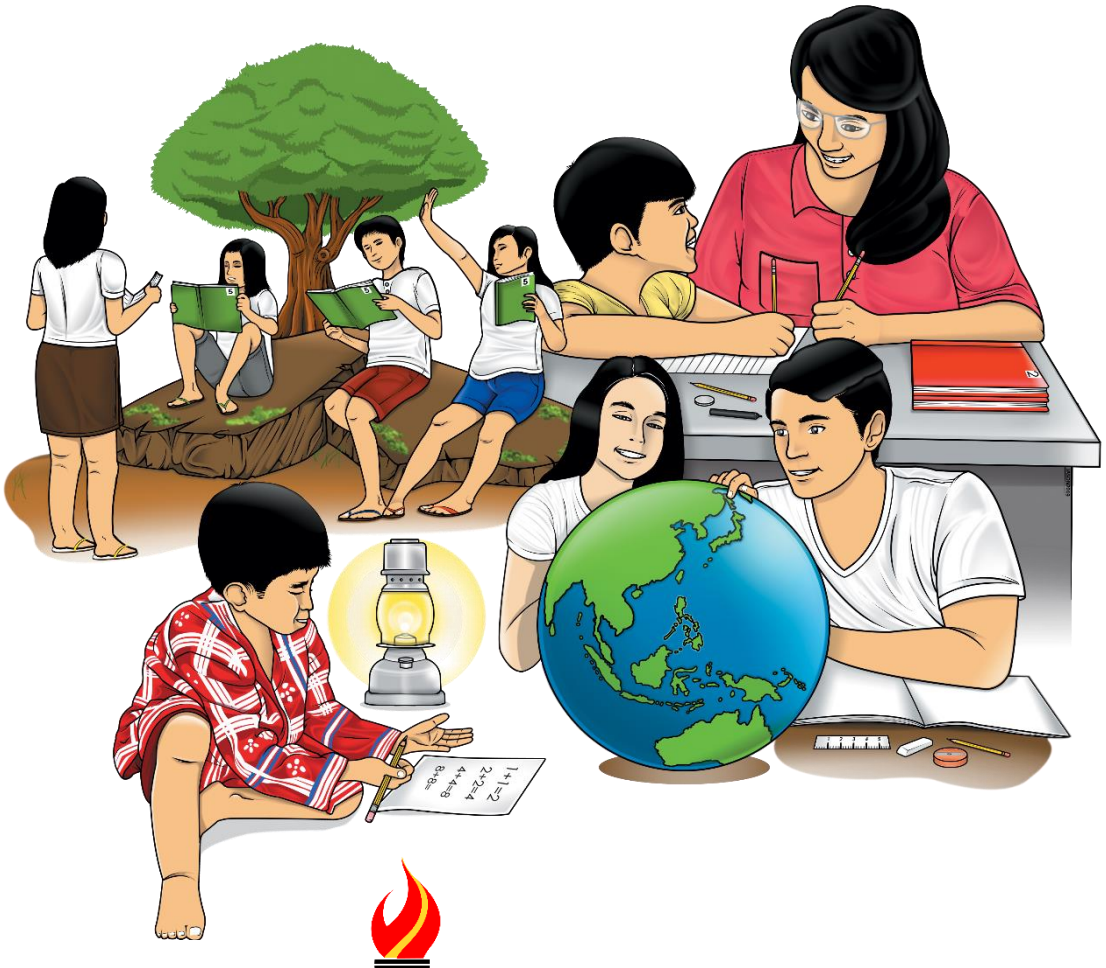
Mathematics

Quarter 3 – Module 19: Measuring the Circumference of a Circle Using Appropriate Tools



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Mathematics

Quarter 3 – Module 19: Measuring the Circumference of a Circle Using Appropriate Tools

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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

Good day, Mathletes! This module was designed and written with you in mind. It is here to help you gain understanding in measuring the circumference of a circle using appropriate tools. Measuring the circumference of a circle is a very important skill in solving real-life problems involving circles. Likewise, exciting and challenging activities will be provided in this module to solidify your knowledge of the main concepts.

When you complete this module, you are expected to:

1. measure the circumference of a circle using appropriate tools; and
2. appreciate the importance of measuring the circumference of a circle in real-life situations.

Are you excited? Let us check what you know about measuring the circumference of a circle using appropriate tools.

What I Know

Directions: Read and understand the given. Choose the letter that corresponds to the correct answer. Write your answers on a separate sheet of paper.

1. Which of the following tools will **NOT** be helpful in measuring the circumference of a circular wall clock?
   A. a piece of string
   B. a tape measure
   C. a compass
   D. a ruler

2. Which of the following is the best tool to measure the circumference of a circular flower garden?
   A. a ruler
   B. a compass
   C. a tape measure
   D. a vernier caliper

3. A string is wrapped once around a coin. Which of the following is the best tool to measure the length of the string?
   A. a ruler
   B. a compass
   C. a laser tape measure
   D. a vernier caliper

4. What unit of measure is appropriate to use in measuring the circumference of a wall clock?
   A. millimetre B. centimeter C. kilometre D. meter

5. To measure the circumference of a bottle cap, what unit of measure will you use?
   A. metre B. millimeter C. kilometre D. micrometer

6. To measure the circumference of a round paper plate, what appropriate tool will you use?
   A. a ruler
   B. a compass
   C. a laser tape measure
   D. a vernier calliper

7. What appropriate unit of measure is used to measure the circumference of a common yoyo?
   A. metre B. centimeter C. kilometre D. micrometer

8. Which of the following is the best tool to measure the circumference of a circular jewellery stone?
   A. a ruler
   B. a compass
   C. a tape measure
   D. a mechanical calliper

9. If a satellite's orbit follows a circular path, what appropriate unit of measure is used to measure the circumference of the orbit?
   A. kilometer B. centimeter
   C. millimeter D. meter

10. Which of the following units of measure is **not** used to measure the circumferences of small circular objects?
   A. centimeter B. micrometer
   C. millimeter D. light year

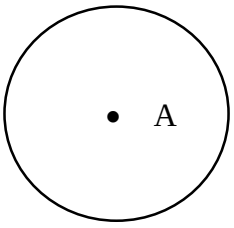
Lesson 1 Measuring the Circumference of a Circle Using Appropriate Tools

To measure the length of any object including the circumferences of circles, there are appropriate tools that you can use. Say for instance, the circumference of a bottle cap can be measured by a tape measure or a strip of paper and a ruler. The circumference of a wall clock can be measured by using a tape measure or a piece of string and a meter stick. The unit of measure is also an important factor to consider in measuring the circumference of a circle. Knowledge about how these tools are used for a particular object is a prerequisite skill in order to deepen your understanding of circles.

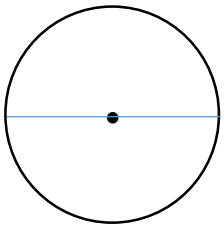
Let's now enjoy exploring the exciting facts about circles.

What's In

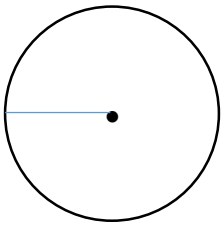
A **circle** is a set of points in a plane where every point is of equal distance from a fixed point called its **center**. It is a close curve figure.



The above figure shows that point A is the *center* of the circle.



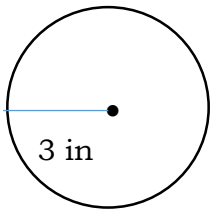
The figure above shows a *diameter* or the distance between two points on a circle which forms a straight line passing through its center.



The figure above illustrates a *radius* or the distance between the center of a circle and any point on the circle.

In the above figures, they show that the *diameter* of a circle (d) is twice as long as its *radius* (r). Hence, $d = 2r$ or $r = \frac{1}{2}d$.

Example: The radius of a circle is 3 inches. What is the diameter of the circle?



Since the radius is 3 inches, the diameter is 6 inches.

Try the activity that follows. You can do it!

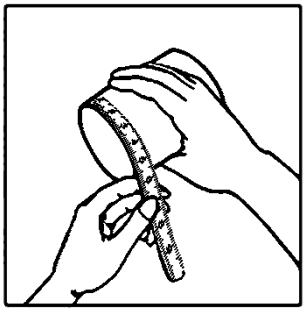
Directions: Copy and complete the table by filling in the missing information. Write your answer on your answer sheet.

Name of Circle	Radius (cm)	Diameter (cm)
1. Circle ***D***	4	_____
2. Circle ***Y***	_____	9
3. Circle ***L***	6.5	_____
4. Circle ***A***	_____	20
5. Circle ***N***	12	_____

What's New

In the previous lesson, you learned how to visualize the circumference of a circle. In this module, you will be learn how to measure the circumference of a circle using appropriate tools. Remember that your prior understanding of the circumference of a circle will be of great help in determining the appropriate tools to use in finding circumference of a given circular object.

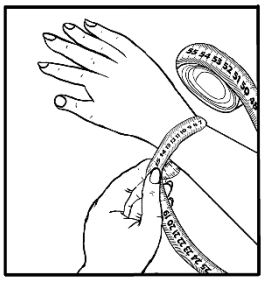
Consider the figure below.



Problem: What tool or tools will you use to measure the distance around this empty milk can? (The top of the can represents a circle.)

Can you find an appropriate tool or tools to find its circumference?

What is It

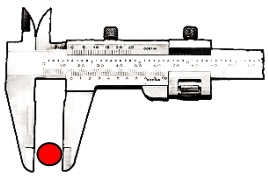


Getting the circumference of a circular object is common in our life. We need it in determining the length of a ribbon to wrap around a bottle for gift giving, for instance. When you see a dressmaker or tailor, they may wrap a tape measure around your wrist to record its measure. They may also wrap a tape measure around your waistline to ensure that the skirt or pair of pants will fit your waist perfectly. These are done with the assumption that your waist and wrist are circular in shape.

Tape measures are usually available from 6 feet to 33 feet in length or about 1.2 meters to 10 meters. Most of the time, a tape measure is the appropriate tool to measure the circumference of a circular object because it can bend while measuring.

If a tape measure is not available, we can measure the circumference of a circle by using a piece of string, strip of paper, ruler or meter stick depending upon the size of the circular object. These tools are the common measuring tools for lengths.

If a circular object is small, you can use a piece of string or a strip of paper. The string must be long enough to wrap around the circle once. Find the place on the string that completes the loop, touching the end of the string that you started with. Use a pair of scissors to cut it at this point. Take the loop of string and measure it on a ruler or a caliper. The length of your string is the same as the circumference of the circle.



A Vernier caliper

You are familiar with *rulers*. They are readily available measuring tools to measure short lengths. They usually have ruled scales in centimeters, millimeters or inches. Their lengths vary from 12 inches to 18 inches or from about 30 cm to 46 cm. A *calliper* can also be used to measure short lengths. Vernier calipers allow readings to the nearest 0.01 millimeter or 10 micrometers. That is too small! Callipers can be used to measure the circumferences of tiny circular jewellery stones.

If an object is big or wide, you can use a tape measure to wrap around the circular object. You may also use a piece of string to wrap around the circular object. Then, a meter stick or laser tape measure can be used to measure the length of the string.

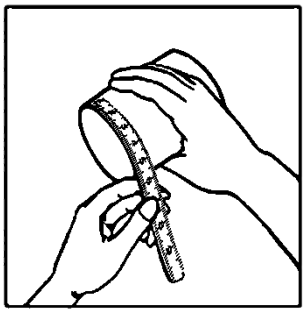
Meter sticks are used to measure objects that are larger than a piece of paper. Their lengths can be one meter or 2 meters. They show ruled scales in centimeters and millimeters. *Laser tape measures* are suitable for short and long distances. They use optics and laser physics to give accurate measurements.

There are other advanced measuring tools that can be used for long and short distances. With the advancement of our technology, smart phones are able to replace rulers, meter sticks and tape measures. However, the advance tools are most of the time expensive and uses electricity. Rulers, meter sticks and tape measure are readily available and require little maintenance.

If we consider the size of a circular object and the appropriate tool to be used in measuring its circumference, the same is true with the unit of measure. The common units of measure used in measuring the circumference of a circle are meter, centimeter, millimeter, foot, yard and inch. We commonly use the metric system like meters, centimeters and millimeters. Other countries use the imperial system for their units of measurements like feet, yards and inches.

If we need to measure a small circular object, we can use centimeter, millimeter, decimeter, or inches. However, for bigger or wider objects, the units that can be used are foot, yard, meter or kilometer.

To find the distance around a milk can, we have to do the following.



Solution: Wind a strip of paper once around the can. The length of the strip is the distance around the circle. The distance around the circle is called *circumference.*

Considering the size or length of the strip of paper, we can determine an appropriate tool to measure its length. A ruler or *tape measure* can be used for this purpose. The units of measure that can be used are decimeter, centimeter, millimeter, or inch.

Consider this example.

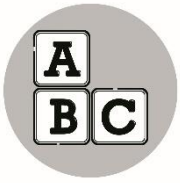
Dylan wanted to measure the distance of the circular vegetable garden in the school. How can he do it?

Solution:

In measuring the circumference of the circular garden, the following can be done.

a. The tape measure can be wrapped once around the garden. If the available tape measure is long enough, the length can be directly measured.
b. If tape measure is not available, the following can be done:
   Step 1. Wind once a piece of string around the circular garden. The string must be long enough to wrap once around the garden.
   Step 2. Use a pair of scissors to cut the string at the point that completes the loop, touching the end of the string that you started with.
   Step 3. Take the loop of string and measure it on a meter stick or ruler.
c. Decide the unit of measure to use. It can be in meters or yards. The length of the string is the circumference of the garden.

Great job! You have reached this far. Are you not proud of yourself? You should be. Keep going!



What's More

Now that you have understood the concepts of measuring the circumference of a circle using different tools, let us try the next activities.

Activity 1: Tool Box

Directions: Suppose a string is wrapped once around each of the given circular objects. Give the appropriate tool that can be used to measure the circumference of each item. Choose your answer from the choices inside the box. Write your answers on your answer sheet.

ruler	meter stick	calliper

1. a 10-peso coin
2. a lagoon
3. a stone on a ring
4. a pool
5. a steering wheel of a car

Activity 2: Unit-y Please!

Using the circular objects below, identify the appropriate unit of measure for each common object. Choose the letter of your answer from inside the box. Write your answers on your answer sheet.

A. millimeter	C. centimeter
B. kilometer	D. meter

1. A bicycle wheel
2. A round mirror
3. A Ferris wheel
4. A 25-centavo coin
5. A car tire
6. A bottle cap

Activity 3: U Complete Me

Directions: Copy and complete the table below. The first one is done for you.

Circular Objects	Tools to measure the circumference	Unit of Measurement
1. a one peso coin	Tape measure or a string and a ruler	millimeter
2. a car tire		
3. a round wall clock		
4. a round paper plate		
5. a round stone in an earring		
6. a circular pond		

What I Have Learned

Directions: Read and understand the following carefully. Do as indicated. Write your answers on a separate sheet of paper.

1. Give at least 4 tools that you can use to measure the circumference of the circle.
   a.
   b.
   c.
   d.
2. List down at least 4 units of measure in finding the circumference of a circle.
   a.
   b.
   c.
   d.

3. How do you measure the circumference of a circle with a given tool? Give an example.

Excellent! You are doing well. Continue with the next activity.

What I Can Do

Directions: Copy and complete the table below by giving the appropriate unit of measure and measuring tool for the object given in every situation. Write your answers on a separate sheet of paper.

Objects	**Unit of Measure** (*in, mm, cm, m*)	**Measuring Tool** (ruler, meter stick, tape measure or calliper)
1. Marilou jogs around a *circular park*.		
2. A *circular table top* needs a lace to decorate its edge.		
3. Father plants pechay in a *circular basin*.		
4. Manuel paints the *circular concrete fence*.		
5. Ana finds a beautiful wedding ring with a *round diamond*.		

Assessment

Directions: Read and understand the given. Choose the letter that corresponds to the correct answer. Write your answers on a separate sheet of paper.

1. The circumference of one of the objects below can be best measured by a ruler. Which one is it?
   A. a circular clock B. a circular swimming pool
   C. a circular pond D. a truck tire

2. If you have to measure the circumference of a circular plate, which of the following tools are you **not** going to use?
   A. a piece of string
   B. a tape measure
   C. a protractor
   D. a ruler

3. What appropriate tool can be used to measure the circumference of a circular hoop earring?
   A. a protractor B. a calliper
   C. a tape measure D. a meter stick

4. What appropriate unit of measure is used to measure the circumference of a circular Frisbee?
   A. micrometer B. millimetre C. centimeter D. meter

5. To measure the circumference of a Ferris wheel, what unit of measure will you use?
   A. micrometer B. millimetre C. centimeter D. meter

6. In order to measure the circumference of a circular wall clock, what appropriate tool will you use?
   A. a protractor B. a calliper
   C. a tape measure D. a meter stick

7. What appropriate unit of measure is used to measure the circumference of a stone of an earring?
   A. micrometer B. millimetre C. centimeter D. meter

8. Which of the following is the best tool to measure the circumference of a circular diamond in a ring?
   A. a ruler
   B. a meter stick
   C. a tape measure
   D. a vernier calliper

9. If an orbit follows a circular path, what appropriate unit of measure is used to measure the circumference of the orbit of a planet?
   A. millimeter B. meter C. kilometer D. centimeter

10. Which of the following units of measure is **not** used to measure the circumferences of big circular objects?
   A. meter B. micrometer C. foot D. yard

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: Collect at least 5 circular objects of different sizes. Use a piece of string to wrap around your chosen object. Copy and complete the table below. One is done for you. Use a separate sheet of paper for your answers.

Objects	**Unit of Measure** (*mm, cm, m*)	**Measuring Tool** (ruler, meter stick, tape measure, calliper)	**Circumference** (rounded to the nearest whole number)
1. Compact disc	cm	ruler or tape measure	12 cm
2.			
3.			
4.			
5.			
6			

Perfect! You are done with this module. You deserve a good break. Hooray!

Answer Key

What I Can Do

1. m, metre stick
2. cm; tape measure or ruler
3. cm; tape measure or ruler
4. m; tape measure or meter stick
5. mm; calliper

Assessment

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

Additional Activities

Answers vary.

What I Know

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

What's In

1. 8
2. 4.5
3. 13
4. 10
5. 20

What's More

Activity 1: Tool Box

1. Ruler
2. Metre stick
3. Calliper
4. Metre stick
5. Metre stick

Activity 2: Unit-y Please

1. C
2. C
3. D
4. A
5. C
6. A

Activity 3: U Complete Me

1. This is already answered.
2. Tape measure or a string and a metre stick; metre or inch
3. Tape measure or a string and a ruler; centimeter or inch
4. Tape measure or a string and a ruler; centimeter or inch
5. Tape measure or a string and a calliper; millimetre
6. Tape measure or a string and a metre stick; metre, foot or yard

What's I Have Learned

1. These come in any order.
   a. String
   b. Ruler
   c. Tape measure
   d. Meter stick
   e. Calliper
   f. Laser tape measure
2. These come in any order.
   a. Inch
   b. Millimetre
   c. Centimetre
   d. Metre
   e. Kilometre
   f. Micrometre
   g. Yard
   h. foot
3. Answer vary

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