# EDUC 317 Liberty Lesson Plan Template

by Isaiah Quigley

## Planning

### Subject and Grade Level

5th Grade Mathematics

### Topic

Geometry: Circles, Parts of; Finding the Circumference of

### STANDARDS

CCSS.MATH.CONTENT.5.G.B.3
Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.

CCSS.MATH.CONTENT.5.G.B.4
Classify two-dimensional figures in a hierarchy based on properties.

**Attachments** [w] Liberty_Standards_List.doc

### Standards: Virginia Standard of Learning (SOL)

**VA-SOL.MA.5.8** STANDARD: The student will describe and determine the perimeter of a polygon and the area of a square, rectangle, and right triangle, given the appropriate measures.

**VA-SOL.MA.5.9** STANDARD: The student will identify and describe the diameter, radius, chord, and circumference of a circle.

### Standards: National

**NCTM-2003.ELEM.11** STANDARD: Candidates use spatial visualization and geometric modeling to explore and analyze geometric shapes, structures, and their properties.

### Standards: Liberty TCA (Teacher Competency Assessment

**VA-LIBEDU-2006.1.1** General and professional knowledge: Teacher candidate

demonstrates adequate general and professional knowledge.

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| **VA-LIBEDU-2006.1.10** | Professionalism: Teacher candidate demonstrates appropriate behaviors of a reflective practitioner and seeks opportunities for professional development. |
| **VA-LIBEDU-2006.1.11** | Content knowledge: Teacher candidate demonstrates adequate knowledge of content in the endorsement area. |
| **VA-LIBEDU-2006.1.12** | Candidateâ□□s impact on K-12 student learning: Teacher candidate provides multiple evidences of student learning at the grade level and content appropriate to the endorsement. |
| **VA-LIBEDU-2006.1.2** | Communication: Teacher candidate integrates sufficient skills in speaking, writing, reading, and listening for effective classroom communication. |
| **VA-LIBEDU-2006.1.3** | Planning: Teacher candidate plans and selects effective instructional strategies based on developmental levels and individual needs of the learner. |
| **VA-LIBEDU-2006.1.4** | Curriculum: Teacher candidate applies sufficient knowledge of content areas and curriculum goals to design appropriate instruction. |
| **VA-LIBEDU-2006.1.6** | Diversity: Teacher candidate participates collaboratively to enhance the success of diverse learners. |
| **VA-LIBEDU-2006.1.8** | Assessment: Teacher candidate uses a variety of assessment strategies to improve student learning. |
| **VA-LIBEDU-2006.1.9** | Technology and resources: Teacher candidate selects appropriate technology and resources to support instruction. |

## Liberty TCA - Part 2 Content

C1 MATHEMATICS - Demonstrates competence in the fundamentals of math concepts.

C2 MATHEMATICS - Consistently engages elementary students in problem solving, reasoning and proof, communication, connections, and representation.

## Objective

Given a circle, students will be able to

       a. label its center, diameter, radius, and one chord getting 4/4 correct,

       b. measure the diameter and radius getting 1/2 correct, and

       c. calculate its circumference using the formula πd or 2πr getting 1/1 correct.

    for a total of 6/7 correct.

# Pre-Assessment

Before each section, I ask students about what I'm about to teach.  (i.e. "Would anyone like to guess what the center is?" Procedure T.1).

# Diversity

Race/ethnicity: Miss Bowyer's 5th grade class is predominantly African American with one asian student, one hispanic student, and four caucasian students.

SES: The majority of the students come from low or middle SES.

Exceptionalities: Five students have exceptionalities.  Three of these have Learning Disabilities (LD), one is Emotionally Disturbed (ED), one has ADHD.

There are no ELLs in her classroom.

# Differentiation

**Learning Styles:**

Visual/Spatial: Much of the lesson is projected onto the smartboard.  Many elements are drawn on the smartboard.  Part of procedue T.3 involves using string to prove that the circumference is slightly longer than three diameters.

Auditory/Verbal/Linguistic: Much of the lesson is spoken directly to the students as direct instruction.

Bodily/Kinesthetic: the only part with motion is when students need to move around the room to find round objects.  If the student with ADHD needs more motion in order to concentrate he can be permitted to stand at his desk or he can be given something to play with (i.e. silly putty).

Logical/Mathematical: the entire lesson, as a math lesson, is logical/mathematical.

Interpersonal: students are given the opportunity to work together during guided practice and to work as a class during teaching/modelling.

Intrapersonal: students are to work on their own for the independent practice.

**Exceptionalities:**

Learning Disabilities: those with learning disabilities can be given extra help during guided practice and independent practice if needed.  Sometimes all it takes is one-on-one instruction or for the material to be explained in a different way.  From my

experience in the class, this holds true.  This can be accomplished either by myself or one of the TAs in the room.

ADHD: see Learning Styles: Bodily/Kinesthetic

## Materials/Equipment/Resources

Children's Book:

Reference: Neuschwander, C. (1999). *Sir Cumference and the Dragon of Pi.* Watertown: Charlesbridge.

Lexile Level: AD510L

Readability: 4.1

Measurable circles (TBD) for Summative Assessment

String/yarn for after discussion of Pi

Globe for set/closure

Fortune Tellers for Guided practice

## Technology Integration

I will primarily be using the smart board to teach this lesson.  I will use it to draw circles and their parts and measure their diameters/radii.  Important information will be written on the board.  I may use a powerpoint or a word document for certain examples to make the circles perfect.

I will use the document camera to show the book to the class.

## Character Education Principle

Character education can be taught through the book.

Gratitude (Eph. 1:16) is displayed by Sir Cumference and the town.

Reliability (Prov. 20:11), integrity (II Cor. 8:21), discipline (Ps. 101:2a), perseverance (Gal. 6:9), and work ethic (I Cor. 15:58) are shown by Radius throughout as he tries to help his father.

# Procedures

## Set

"Let me tell you a story of a man named Eratosthenes [picture of Eratosthenes on ppt]. Eratosthenes was the chief librarian at the Library of Alexandria in Greece [show on actual globe] and lived about 2300 years ago.  Eratosthenes was most known for calculating how big around the earth was [give the globe a spin].  Nowadays, if we wanted to know that, we have computer programs, calculators, and the ability to travel to space.  All these can be used to measure this now.  Eratosthenes didn't have that. All he had was a simple formula.  And that formula is what I am going to show you today."

## Teacher Instruction/Modeling

**Directly teach the concept:**

Direct teaching is divided into three parts: parts of a circle and their measures, pi, and the circumference of a circle and its measure.

### 1. Parts of a circle and their measures

"The distance around the earth is of course a circle.  [Draw a circle on the smartboard]. Can anybody tell me what the distance around a shape is? [call on student to answer; perimeter].  That's right, perimeter.  How do you find the perimeter of a shape? [allow answer; to find the perimeter, add up the sides].  Exactly!  Add up the sides…[trail off]. How many sides does a circle have? [allow answer; trick question, it doesn't].  It actually doesn't technically have sides.  Circles are different than most other shapes.  Since they're different, we need to learn some new terms in order to talk about circles and to find the perimeter.  And since circles are so different, we'll use a different word for the distance around the circle.  We'll call the distance around a circle its circumference."

#### a. Center

"The first word we need to learn is the center.  Would anyone like to guess what the center of the circle is? [allow answer; the center of the circle is the point in the center].  The center of the circle is the point in the center.  [draw and label the center].  Pretty self-explanatory."

#### b. Chord

"Another important word is chord.  A chord is any line segment in the circle that goes from one end to the other [draw several examples of chords]."

#### c. Diameter

"The chord that goes through the center of the circle is the most important and has its own special name.  The chord that goes through the center of the circle is called the diameter [draw and label the diameter].  The diameter is the largest chord of the circle and the length of the diameter is one of the things we need to find the circumference.

### d. Radius

"Before we actually look at the circumference though, we need to look at one more important part of the circle.  The radius of the circle is the line segment that goes from the center to the edge of the circle.  [draw and label a radius].  Looking at my picture, do you see anything special about the radius? [allow answer; r = ½d or d = 2r]. The radius is half length of the diameter. [circle half of the diameter.  As proof, measure the diameter and measure a radius with a ruler].

Bridge: "Now that we know all the parts of a circle, we should try and find its perimeter.  As we've already discussed, you can't just add up the sides since a circle doesn't really have sides."

## 2. Magic Number Pi (π)

"To teach you about this new number, I brought this book, *Sir Cumference and the Dragon of Pi* by Cindy Neuschwander [pronounced Noish van der (orig.) or New shwan der (anglicized)] [show book].  This is a great book that explains it better than I could.  I need every paying attention while I read so that you know what this number is and how to use it."

Read: *Sir Cumference and the Dragon of Pi* (Neuschwander, 1999).

Bridge: Say: Now that we have the number we need, we can find out how big around our circle is.

## 3. The circumference of a circle and its measure

"The circumference, the distance around the circle, is the same length as 3.14 diameters.  So our formula for the circumference is C = πd. [read, circumference is equal to pi times the diameter].  Let's make sure that's correct.  [Draw a circle on the smart board and draw its diameter.  Take a length of string and cut it into three pieces equal to the diameter.]  I need some helpers [take 2 volunteers and give them each a diameter].  I cut this string equal to the diameter.  I need you two to hold them around the circle.  I'll hold the top one to the top.  [Hold the diameters around the circle.]  As you can see, there's a little bit of space left, so three isn't enough.  This length [cut another piece approximately 1/7 the diameter.] gives us 3.14 diameters.  [dismiss volunteers].  Let's practice finding circumference."

[after some modelling (see below), instructor will draw a circle but only provide the radius]

"Remember what I said about the radius earlier? What's special about it? [take answers; it is half the size of the diameter]. That's right! It's half the size of the diameter. So we could say the diameter [write d on the smart board] is twice as big as the radius right? [write = 2r after the d]. So if we only have the radius, we can replace the d in our formula with 2r. Which means C = 2πr [when you say this, say, 'the circumference is also equal to 2 times the radius times pi.'] Normally, this is rearranged to what I've written here, 2πr. What property lets me move factors around like that? [allow answer; commutative].

## Modeling:

Modelling the concept will occur during and directly after each part of the lesson as follows:

### 1. Parts of a circle and their measures

The center, chords, diameters, and radii will be labelled on several practice circles including pizzas, pies, doughnuts, CD/DVD/VG discs, etc. The instructor will label these parts for them and ask them to label some of the parts.

### 2. Magic Number Pi (π)

Informational. Instructor will be reading a book. No other modelling needed.

### 3. The circumference of a circle and its measure

Instructor will model this with several examples by drawing circles, measuring the diameter, and plugging in the formula.

After C = 2πr is explained, model this by drawing circles, their radii, and measuring the radii and plugging in the formula

Finding the circumference will be shown in three steps:

1. Label the required parts (center and diameter or radius)

2. Measure the diameter or radius

3. Calculate using the formula (πd or 2πr).

Note: center and radius are usually given

## Guided Student Practice

### Fortune Tellers

"Everybody choose a partner. [allow 1 minute for partners to be chosen]. I am passing out fortune tellers to each group.  Who knows how to use these? [show of hands].  For those of you who don't know, one person holds the fortune teller and the other picks a number.  The person with the fortune teller opens and closes it like this [demonstrate] that many times.  The one without the fortune teller selects a diameter from inside.  You will then work together to find the circumference of a circle with that diameter.  Once you find the circumference, open the flap [demonstrate] to see the answer.  If you got it right, put a check mark next to the problem.  DO NOT LOOK AT THE ANSWER UNTIL YOU HAVE WORKED THE PROBLEM.  Record your answers on the answer sheet.  [when each group finishes, instruct them on the next activity (independent practice) and have them get started.]

## Independent Practice

### Search and Find

[Instructions are to be given two by two.  Students will be in partnerships from the last activity.  As students finish, transition them to this activity.]  Go find a circle and bring it back to your seat.  It must be something you could take back to your seat.  I don't want you trashing the classroom looking for something, so pick something in plain view and find your object quickly.  [wait for the students to return to their seats with their objects].  Find the circumference of the [item].  To do this, I want you to measure the diameter of the circle with this ruler.  Can you remind me what the diameter is? [accept answer; it's a chord going through the center.]  Once you have the diameter, you can use our formula to find the circumference.  If you have trouble measuring the diameter, or if you're not sure it's right, it would be a good idea to trace the object onto paper.  Once you finish, raise your hand, and I'll check it.  Everybody look around and see if you can find something.  [Keep an eye on them at this time.  Some may try to be funny and grab something which could cause damage or be dangerous like a chair.] [allow 10 minutes for this activity.  Once students finish, begin the next activity (summative assessment)].

## Closure

"Now back to my first story, about Eratosthenes.  Remember how I said he was a librarian?  Back then, librarians were much different than they are today.  Eratosthenes would have had to travel a lot to find all the books to fill the library.  From his travels, he was able to guess the radius of the earth and double it to get the diameter and he used our formula, πd, to find that the earth was 24,466 miles.  The actual circumference of the earth is 24,860 miles.  He was only 394 miles off!  Using even a simple formula like this, it's possible to discover something so massive and seemingly complex.  You can do anything once you know how!"

## Summative Assessment

[Pass out the circles to each student. The circles vary in size and are decorated to resemble different objects. Each circle has the center and a diameter or radius drawn on it. Students will label and measure the diameter and radius, draw and/or label a chord, label the center, and calculate the circumference.]

"You've all done a great job so far! I'm passing out some circles to all of you. Each one has the center and a diameter or radius drawn on it already. Notice that there are blanks next to each. I want you to label the center, diameter, and radius and draw a chord onto the circle and label that. Once you've done that, you will measure the circumference of your circle. The directions are on the smartboard if you need them. If you need help, raise your hand and one of the adults in the room will come help you. [Allow 15-30 minutes for this activity]

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