Capstone Scoring Criteria Sheet

Name of Concordia Student Teacher _Preston P. Doerr_____ Subject area Geometry Grade level 9th-10th Theme or title of unit _Circles_____ Unique composition of class _____ Name and email of mentor teacher _Mrs. Lori Klooz LKlooz@esu8.org_ /25 Stage 1 /25 Stage 2, all boxes /25 Rubric ____/50 Hook 3 complete long form lesson plans that include: /300

Evidence of student engagement /50 Comprehension strategy What was your specific strategy? Relate here. /50 Vocabulary strategy What was your specific strategy? Relate here.

/15 List of resources

/35

+-Stage 1 - Identify Desired Results

Established Goals:

(This is the standard to which you are teaching.)

MA 12.2.1.g Know the definitions and basic properties of a circle and use them to prove basic theorems and solve problems

Nebraska Mathematics Standards

What understandings are desired?

Students will understand how... Over-arching: Knowledge of math formula enable us to solve real-life problems.

Topical: knowledge of the characteristics of circles enables us to solve real-life problems.

What essential questions will be considered?

(Questions are the interrogative form of the U declarative statement.)

How do we use these math formulas to solve real-life problems?

What real-life problems can be solved using the characteristics of circles?

What key knowledge and skills will students acquire as a result of this unit?



G

U

Q

Students will be able to. . .

(S items are expressed as verbs and usually represent processes such as compute, research, measure, etc.)

- 1. Find chord lengths
 - 2. Find radius and diameter
 - 3. Find measures of segments in intersecting circles
 - 4. Find Circumference
 - 5. Find Measures of Central Angles
- 6. Classify Arcs and Find Arc Measures
- 7. Use Arc Addition to Find Measures of Arcs
- 8. Find the length of the arc
- 9.Find arc measure
 - 10. Find chord lengths
 - 11. Find length of segments and arcs using theorem 10.3 and 10.4
 - 12. Find lengths of segments using Pythagorean theorem
 - 13. Find lengths of segments using theorem 10.5
- 14. Find measures of angles using theorem 10.6
- 15. Find angle measures using theorem10.7
- 16. Find measures of angles using theorem 10.8
- 17. Find measures of angles using theorem 10.9
- 18. Identify a tangent
 - 19. Find missing values using a tangent and Pythagorean theorem
 - 20. Find measures of segments using theorem 10.11
 - 21. Find measure of angles and arcs using theorem 10.12
 - 22. Find measure of angles and arcs using theorem 10.13
- 23. Find measures of angles and arcs using theorem10.14

S

Stage 2 - Determine Acceptable Evidence

Т

What evidence will show that students understand?

Performance Tasks* (summary in GRASPS form):

(G=Goal) Students will know the different characteristics of circles, and will be able to use them to solve different problems.

(R=Role) The role of the student will be to construct the circle and label the circle with the different parts. They will then measure the different parts of the circle and prove theorems from the unit.

(A=Audience) The audience will be the other students and me.

(S=Situation) The students will be in class. They will be following directions on constructing circles and proving theorems.

(P=Performance) The students will be given a circle to construct. They will given instructions on what parts of the circle to construct and measure. They will then use their measurements to prove different theorems from the unit.

S=Standards (expressed in a rubric)

Category	Excellent	Good	Proficient	Satisfactory	Poor
Accuracy	The measurements are all within 0.5 decimal places	Most measurements are within 0.5 decimal places	The measurements are within 1 unit of length	The measurements are within 2 units of length	The student did not measure correctly.
Neatness and Attractiveness	The labels are easy to find, the handwriting is easy to read, and the	3-6 labels are difficult to find, the handwriting is legible, and the all but 3	More than 6 labels are difficult to find, the handwriting is not legible,	The labels are not all present. The handwriting is difficult to read, and the	There are no labels. The student did not do the

	constructions are precise.	constructions are precise.	and more than 3 constructions are not precise.	constructions are not all done correctly.	constructions.
Completion	All the objectives have been met.	1-3 objectives have not been met.	4-6 objectives have not been met.	7-9 objectives have not been met.	No objectives have been met.

Other Evidence (quizzes, tests, prompts, observations, dialogues, work samples):

OE

Vocabulary log

Labeled Circle Cut-out

Homework assignment from book

Questions for comprehension during class

Student Self-Assessment and Reflection:



*What did you like most about my teaching style?

*What did you like least?

*What about my lesson would you change?

*What about my lesson would you keep the same?

Lesson Plan Template (Long Form)

<u>Day 1</u>

Student Teacher's Name _Preston Doerr_____Grade Level_9th-10th__

State Standard_MA 12.2.1.g_____Subject__Geometry_____

Name of Lesson: "Circles and Circumference" and "Measuringing Angles and Arcs" Period/Time_2nd/9:50-11:25

I. Goal: MA 12.2.1.g The teacher will instruct the definitions and basic properties of a circle and use them to prove basic theorems and solve problems

Nebraska Mathematics Standards

- II. Objectives: Students will be able to do the following:
- 1. Find chord lengths 80% of the time
 - 2. Find radius and diameter 90% of the time
 - 3. Find measures of segments in intersecting circles 80% of the time
 - 4. Find Circumference 90% of the time
 - 5. Find Measures of Central Angles 80% of the time
- 6. Classify Arcs and Find Arc Measures 80% of the time
- 7. Use Arc Addition to Find Measures of Arcs 80% of the time
- 8. Find the length of the arc 80% of the time
- III. Adaptations for Diverse Learners
- IV. Materials:

Whiteboard

Cardboard cutouts of circles

Vocabulary worksheet

V. Procedure:

A. Set / Hook

"We see circles everywhere in our lives. The reason for this is because they have so many useful properties. What makes circles different from what you have previously been studying is that circles do not have any sides. The line is a "curve" rather than a "straight edge." In order to solve for different parts of a circle, we have special derived formulas to follow. For this week, we will be focusing our attention on the properties of circles and the formulas that we can use to solve different measures of circles. We will start out by simply defining different parts of circles, and by the end we will be able to find several measures of these parts by using the formulas.

B. Transition

To begin, we will start with defining certain parts of a circle and some of the basic formulas associated with circles.

C. Main lesson

Take a flat circular object and label the following components, center, radius, diameter, inscribed, circumscribed, and chord. Explain what the definitions of these components to the class. Give flat circular objects to the students and have them draw these components on it and label them accordingly. Then have them write down this vocabulary in their vocabulary log where they will be asked to write the word, write my definition, their definition, and draw a picture of it. (8 minutes)

Draw the picture from example 3 on page 685. Label the measures that are given. Ask the students, using the knowledge previously given, to fill in the rest of the unknown measures of the circle. Work through the problem to explain how to find the measures of segments that are asked to be found. Explain that this is what they will have to be able to do on the homework. (10 minutes)

Explain that long ago, it was discovered that for any circle the circumference was about three times the length of the diameter. As calculations got more and more specific, they finally found out that the ratio for every circle's circumference is Π x diameter or because diameter = 2 x radius, the ratio can also be expressed as 2 X Π x radius. Explain that these formulas, by doing algebra, can be used to find the diameter, radius, or circumference of a circle. Explain that they will have to do this on their homework, as well. (5 minutes)

Show the students that by connecting opposite vertices of a rectangle that is inscribed, we can find the diameter. I will tell them that this will be useful in finding the circumference of the circle for question # 30 on the homework. (2 minutes)

Explain that the angle measure of every circle is 360 degrees. Explain what a central angle is and have the students fill out their vocab log accordingly. Central angels can be added up and their sum is always 360. We can use this concept to find the central angle measures of any circle. Draw example 2 on page 693 on the board. Label the minor arc, major arc, and semicircle on the example, and have the students fill out their vocab log accordingly after I give my own brief definition. Using this example and the knowledge given, ask a student to find the measures of the other angles. Let the student explain

how he or she arrived at that answer. If the answer given is correct and the majority of the students seem to understand, I will move on. If not, I will call on another student or explain in my own words. (10 minutes)

Draw a picture of a circle with central angle measures 90, 180, 45, and explain that 90/360 is 1/4, which is also 25% of the circle. Show the students that the same is true for any central angle measure of a circle. To find the central angle measure take the percentage x 360. (5 minutes)

Draw example 4 on the board and ask the students, using the sum of central angles theorem to find each measure. Have the students explain to their peers how they arrived at their solution. (10 minutes)

Write the following proportion: $l/(2\Pi r) = x/360$. Explain that if we want to find the length of 25% of the circle, we need to take .25 x 2 Πr . To find the measure of the arc. We need two things: the percent of the perimeter of the circle we are trying to find and the circumference of the entire circle. By multiplying these two together, we get the measure of the arc. Ask the students how to find the percent of the arc we are trying to find. As the student(s) to explain how he/she/they arrived at that answer.

D. Transition

I know for me personally, I do not like having to go through all my notes again in order to start my homework assignment. So I will quickly reiterate what we just went over.

E. Conclusion

Look at the examples that we went through in class. Remember what the radius, diameter, a chord, inscribed, and circumscribed mean. You will need to know this for 10-17 on the homework. Using these definitions, we found the measures of these components. You will need to be able to do that on 18-21. Remember that circumference = pi x diameter or 2 x pi x radius. We can solve for any variable in these formulas to find the other. You will use this for 22-17 on the homework. Lastly, remember the hint I told you about for # 30. You need to use Pythagorean theorem to find the circumference.

Remember that the central angles of any circle always add up to 360. So to find the missing angle measures for 12-15, just do simple arithmetic. For 16-23, Use this same concept. You will not have to identify whether it is a major or minor arc, or semicircle. For 36-40, remember that all we need to find is what percent of the circle we are trying to find. We find this by simply taking the central angle measure and deciding it by 360. Then take that percent times the entire circumference of the circle to find the length of the arc.

VI. Assessment:

I will check their comprehension by seeing how well they do on the homework assignment.

I will look at their circles and their vocab log that they designed in class to see if they understand the vocabulary.

I will check for accuracy in both of these performance tasks in order to give them a grade.

VII. Assignment:

Page 687-688 (10-34 even)

Page 696-697 (12-24, 36-40 even)

VII. Self Evaluation: (On Back)

IX. Coop's Comments: (On Back)

<u>Day 2</u>

Student Teacher's Name _Preston Doerr_____Grade Level_9th-10th__

State Standard_MA 12.2.1.g_____Subject__Geometry_____

Name of Lesson: "Arcs and Chords" and "Inscribed Angles" Period/Time_2nd/9:50-11:25

I. Goal: MA 12.2.1.g The teacher will instruct the definitions and basic properties of a circle and use them to prove basic theorems and solve problems

Nebraska Mathematics Standards

III. Objectives: Students will be able to do the following:

1. Find arc measure 80% of the time

- 2. Find chord lengths 90% of the time
- 3. Find length of segments and arcs using theorem 10.3 and 10.4 80% of the time
- 4. Find lengths of segments using Pythagorean theorem 80% of the time
- 5. Find lengths of segments using theorem 10.5 80% of the time
- 6. Find measures of angles using theorem 10.6 90% of the time
- 7. Find angle measures using theorem10.7 90% of the time
- 8. Find measures of angles using theorem 10.8 80% of the time

9. Find measures of angles using theorem 10.9 80% of the time

- III. Adaptations for Diverse Learners
- IV. Materials:

Whiteboard

Cardboard cutouts of circles

Yarn

Protractor

Straightedge

Vocabulary worksheet

V. Procedure:

A. Set / Hook

Yesterday we talked about the components of a circle and some of the formulas. Remember that the circumference of a circle is 2∏r and we used this information to find the lengths of different segments of circles. Did you have any questions about yesterday's homework?

B. Transition

Yesterday we only had formulas. Today, I am going to introduce you to some theorems. Rather than proving them, though, I am going to show you that they work. In order to do this, I need you to take out your circles from yesterday.

C. Main lesson

Draw a circle that illustrates theorem 10.2. Instruct the students to take the yarn I have given them and draw two congruent chords using the yarn. Then I will have them use the yarn to measure the arc for each chord in order to show them that they are indeed congruent. (10 minutes)

Draw a circle to illustrate theorems 10.3 and 10.4. Instruct the students to again use the yarn and straightedge to construct a chord that is perpendicular to the diameter. Then I will have them measure the bisected arcs and the bisected segments to prove that they are indeed congruent, as well. (10 minutes)

Explain to the students to draw another chord that is of equal distance from the chord they just drew. Explain that distance is measured along the perpendicular. Ask the students to measure the lengths of both those chords to prove that they are also congruent. (10 minutes)

Use a circle that I have already constructed the angle measures and chord lengths of to illustrate for the students theorem 10.6. Show that the measure of an inscribed angle is one-half the measure of its intercepted arc. Explain what an inscribed angle and an intercepted arc are. Ask the students to fill this out in their vocabulary log appropriately. (10 minutes)

Now that students have had some practice constructing these theorems on their own, I will divide the class up into three sections. I will ask one group to prove theorem 10.7, one to prove theorem 10.8, and one to prove theorem 10.9. Once they have done

this, I will ask for volunteers from each group to explain to the rest of the class what they found to be true. (20 minutes)

D. Transition

Today, we have proven a lot of theorems by construction. Just to help you remember, though, what we just went over I want to go through a few examples of what you will see on the homework.

E. Conclusion

I am going to go through some of the more difficult ones. You guys are really smart so you will be able to figure out the rest of them. Look at #9 on page 705. Can some one tell me how you would go about solving this one? What theorem would we use to solve this? How would you start? (Wait for students' responses and give feedback for wrong and correct answers)Great job!

Now look at #3 on page 713. We are not looking for arc WY on this one. We want to find the measure of arc WX. How would you find that? What theorems would we utilize? How do we set this up? Maybe it will help you to draw a picture to get a better idea. (Allow students to work out these ideas for themselves and give their responses) Awesome!

Lastly I want this table to tell me how to go about solving #9 and this table to tell me how to solve #29. Help the students if necessary. Otherwise, let them explain to the class how they ought to solve these problems. Your hint on #17 is to use the fact that the radii for any one circle are all congruent and that Pythagorean theorem will be very useful in finding the solution, as well. Draw the example on the board with the radius and show how they can find the length of the segment that the problem asks for.

VI. Assessment:

I will check their comprehension first by seeing how well they respond to the questions in the conclusion. If they understand well, they will be able to recite how to solve these problems. Also I will check their comprehension by seeing how well they do on the homework assignment.

I will look at their circles and their vocab log that they designed in class to see if they understand the vocabulary.

I will check for accuracy in both of these performance tasks in order to give them a grade.

VII. Assignment:

Page 705 (8,12,14,16,17,22)

Page 713 (2,6,8,10,12,16,29,30)

VII. Self Evaluation: (On Back)

IX. Coop's Comments: (On Back)

<u>Day 3</u>

Student Teacher's Name _Preston Doerr_____Grade Level_9th-10th__

State Standard_MA 12.2.1.g_____Subject__Geometry_____

Name of Lesson: "Tangents" and "Secants, Tangents, and Angle Measures"

Period/Time_2nd/9:50-11:25

I. Goal: MA 12.2.1.g The teacher will instruct the definitions and basic properties of a circle and use them to prove basic theorems and solve problems

Nebraska Mathematics Standards

IV. Objectives: Students will be able to do the following:

- 1. Identify a tangent 90% of the time
 - 2. Find missing values using a tangent and Pythagorean theorem 85% of the time
 - 3. Find measures of segments using theorem 10.11 80% of the time
 - 4. Find measure of angles and arcs using theorem 10.12 80% of the time
 - 5. Find measure of angles and arcs using theorem 10.13 80% of the time
- 6. Find measures of angles and arcs using theorem 10.14 80% of the time
- III. Adaptations for Diverse Learners
- IV. Materials:

Whiteboard

Vocabulary worksheet

V. Procedure:

A. Set / Hook

Yesterday we talked about inscribed angles, arcs, and chords. Well now today we are going to talk about a component of a circle that acts similarly to an inscribed angle: tangents. Then we will also discuss secants later.

B. Transition

To begin today, we will first discuss what a tangent is and how to identify one.

C. Main lesson

Draw circles on the board and construct the tangents to those circles. Using this illustration, explain what a tangent is. Ask them to fill out their vocab log accordingly for the word "tangent." Using this definition, explain to the students how to figure out whether or not a line that "appears" to be tangent really is or not using the Pythagorean theorem. Draw example 2 on the board and ask the students to solve for the missing variable using their previous knowledge of the Pythagorean theorem. (10 minutes)

Draw example 3 on the board and ask the students, using the strategy previously used on the last example, to figure out how to solve for the missing variable. (5 minutes)

Illustrate for the students theorem 10.11. Prove using simple techniques rather than a formal outline just so that they can see the picture in their minds when looking at a circle with these conditions. (5 minutes)

Define for the students what a secant is and ask them to fill out their vocab log accordingly. Quickly go over the exterior angle theorem and explain that we will be using this theorem to prove other theorems in this unit. (5 minutes)

Draw an example to illustrate theorem 10.12 on the board. Draw the line to make a triangle and ask the students how we can use the exterior angle theorem to prove this theorem. Finish the proof. (10 minutes)

Draw an illustration for theorem 10.13. Show the students that the two angles are supplementary inscribed angles and use this to justify the theorem. (5 minutes)

Draw an illustration for theorem 10.14. This time, ask the students what I should do. If necessary, give them the hint that we are going to use the exterior angle theorem. Then explain how we arrive at the theorem by proving it using the exterior angle theorem. (15 minutes)

Illustrate how we find the measure of an inscribed angle, an angle formed by a tangent and secant, two secant lines inside the triangle, and secant lines that intersect outside of the circle. Make the connection between all of them. Explain that we can think of them all by just using the theorem of inscribed angles. (15 minutes)

D. Transition

Today, we covered some new ground with tangents and secants and doing what we always do in geometry: find the measures of angles. I want to review with you all quickly, though, just to make sure you understand it and to answer any questions you might have before starting the homework.

E. Conclusion

Have the students look at # 15. Ask the students how they should go about determining whether or not the segment is tangent to the circle. Give appropriate feedback. Have the students look at #21. Ask the students what theorem we will use to solve this problem. Ask them how to set up the problem in order to solve it. (8 minutes)

Have the students look at #9 and ask them what theorem they ought to use in order to solve that problem. Then ask how to set it up in order to find the answer. Do the same for problems #13 and #19. (15 minutes)

VI. Assessment:

I will check their comprehension first by seeing how well they respond to the questions in the conclusion. If they understand well, they will be able to recite how to solve these problems. Also I will check their comprehension by seeing how well they do on the homework assignment.

I will look at their circles and their vocab log that they designed in class to see if they understand the vocabulary.

I will check for accuracy in both of these performance tasks in order to give them a grade.

VII. Assignment:

Page 722-723 (14-20 even, 26)

Page 731-732 (2,4,6,8,12,16,18,28)

VII. Self Evaluation: (On Back)

IX. Coop's Comments: (On Back)

Comprehension Strategy

My strategy is to get the students to see the theorems first-hand rather than me just telling them that they are true. This gets the students involved. They must know how to do the constructions themselves before being able to use them properly. This way they have a better understanding of how these theorems work.

Also, I am always asking them questions in class about the theorems and how to solve different problems using the prior knowledge that I have provided them with. By them being able to respond correctly to these types of questions, I know that they are understanding the material that I just covered with them.

Also, in some instances I ask the students to volunteer to speak to the class about how they solve a certain problem. By asking the students to teach one another shows that they understand the material well enough to not only replicate it, but to actually teach it. Also, this helps the students that may not have already understood it to hear the process of solving these problems from a new perspective.

Vocabulary Strategy

My vocabulary strategy is quite simple. I will provide them with a log. In the log will be boxes for them to write the word, write the book's definition, write their own definition, and to draw a picture to help them to remember what the word means. This way they will be able to understand what I am talking about when I use these words in relation to the problems being solved.

Resources

Carter, John A. "Circles." Geometry. Columbus, OH: Glencoe/McGraw-Hill, 2010. Print.