The purpose of this unit is to teach students the theorems relating to angles and segments of a circle.

OVERALL OBJECTIVES FOR THE UNIT:

1) To provide the students with practice using the Geometer’s sketchpad

2) To familiarize students with the terms, definitions and notation needed to study circles

3) To have students discover the relationship between central angles, inscribed angles and the measures of their intercepted arcs

4) To review and reinforce the theorems discovered by the students in lesson 2

5) To introduce and have students work with the theorems involving other angles involved with circles, such as the angle formed by two chords intersecting within a circle.

6) To introduce and have students discover the theorems involving line segments related to the circle

RESOURCES NEEDED FOR THIS UNIT:

1) Textbook: Integrated Mathematics Course 3
Day by day description of unit:

**Day 1:** Students will use their book and the Geometer’s sketchpad to define and study terms, definitions and notations associated with circles.

**Day 2:** Students will use the Geometer’s Sketchpad to discover that: 1) central angles are equal to their intercepted arcs and 2) inscribed angles are equal to one-half their intercepted arcs.

**Day 3:** Students will review the two theorems they learned yesterday and use Geometer’s Sketchpad to verify that 1) The measure of an angle formed by two chords intersecting within a circle is equal to one-half the sum of the intercepted arcs and 2) the angle formed by a tangent and a secant, two secants or two tangents is equal to one-half the difference of the intercepted arcs.

**Day 4:** Students will review and practice using the theorems involving angles and the circle.

**Day 5:** Students will use Geometer’s Sketchpad to verify and experiment with these three theorems involving line segments related to the circle: 1) If two chords intersect within a circle, the product of the measures of the segments of one chord equals the product of the measures of the segments of the other 2) If two secants intersect outside a circle, then the product of the measures of one secant segment and its external segment is equal to the product of the measures of the other secant segment and its external segment and 3) If a tangent and a secant are drawn to a circle from an external point, then the square of the measure of the tangent segment is equal to the product of the measure s of the secant segment and its external segment.
Lesson 1

OBJECTIVE: The objective of this lesson is to familiarize students with the terms, definitions and notation needed to study circles. It will also provide them with practice pertaining to the use of Geometer’s Sketchpad.

LESSON DESCRIPTION: Students use their textbooks to define, draw and name terms associated with circles. They then use the Geometer’s Sketchpad to sketch and investigate properties of a circle, diameter, and chords.

Chapter 3: Geometry of the Circle

Using your book, a ruler and a compass, define and draw a picture of each of the following:
(Include how each would be named)

A) CIRCLE:

B) SEMICIRCLE:

C) CENTRAL ANGLE:

D) ARC:
E) MAJOR ARC:

F) MINOR ARC:

G) CHORD:

H) RADIUS:

I) DIAMETER:

J) INSCRIBED ANGLE:

K) TANGENT:

L) SECANT:

PAGE 1 OF GEO. SKETCHPAD:

Q1:
Lessons on Geometry of the Circle

Lesson 2

OBJECTIVE: The purpose of this lesson is to have students discover the relationship between central angles, inscribed angles and the measure of their intercepted arcs.

LESSON DESCRIPTION: Students use the Geometer’s Sketchpad to discover that the measure of a central angle is equal to the measure of the minor arc it intercepts. They then do problems from the book related to this theorem. Then, then go back to the Geometer’s Sketchpad to investigate the relationship between inscribed angles and the arcs they intercept. Problems from the book reinforce this concept.

NAME: _________________________________ DATE: ______________________

SEQUENTIAL MATH 3 PERIOD _________________

CHAPTER 3: GEOMETRY OF THE CIRCLE

PAGE 2 OF GEO. SKETCHPAD:
Q1:

Q2:

BOOK: page 100

3) Copy diagram and then answer the questions:

a)_____________________                    f)________________________
b)_____________________                    g)________________________
c)______________________                   h)________________________
d)______________________
I)_________________________
e)_________________________

4) Copy the diagram and then answer the questions:
DO PAGE 3 OF THE GEO. SKETCHPAD HANDOUT:

Q3:

BOOK: page 113

3) Copy the diagram and answer the questions:

a)________________________________  c)________________________________

b)________________________________  d)___________________________________

e)________________________________

4) Copy the diagram and answer the questions:
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Lessons on Geometry of the Circle

Lesson 3

OBJECTIVE: The objective of this lesson is to review and reinforce the two theorems discovered by the students in the second lesson.

LESSON DESCRIPTION: The students will restate the two theorems discovered in the second lesson and do practice problems to reinforce their understanding. They will then be introduced to the theorem that states: The measure of an angle formed by two chords intersecting within a circle is equal to one-half the measure of the intercepted arcs.” Practice problems will be done and the students will be asked to use their Geometer’s Sketchpad to draw pictures to demonstrate this theorem. The theorem that states “The measure of the angle formed by a tangent and a secant, or two secants, or two tangents intersecting outside the circle is equal to one-half the difference of the intercepted arcs” will be introduced and sample problems given. Again, the students will be asked to use the Geometer’s Sketchpad to illustrate this theorem.
GEOMETRY OF THE CIRCLE

THEOREMS INVOLVING ANGLES OF THE CIRCLE

Th: The measure of a central angle of a circle is equal to
______________________________________________________________
______________________________________________________________


Book page 100
5) Copy the diagram and then answer the questions:

a) ____________________  f) ____________________
b) ____________________  g) ____________________
c) ____________________  h) ____________________
d) ____________________  i) ____________________
e) ____________________


Th: The measure of an inscribed angle of a circle is equal
to
______________________________________________________________
______________________________________________________________


Book page 113
5) Copy the diagram and answer the questions:
Th: The measure of an angle formed by two chords intersecting within a circle is equal to
________________________________________________________________________

________________________________________________________________________

Book page 127
19) Copy the diagram and answer the question:

20) Copy the diagram and answer the question:

Use Geo. Sketchpad to draw a diagram to illustrate the theorem above. Measure the angle as well as both arcs. Print your diagram and measurements.

Th: The measure of the angle formed by a tangent and a secant, or two secants, or two tangents intersecting outside the circle is equal to
________________________________________________________________________

________________________________________________________________________

Book page 126 – 127

ANGLE FORMED BY TWO SECANTS:
1) Copy the diagram and answer the question:

ANGLE FORMED BY A TANGENT AND A SECANT:
7) Copy the diagram and answer the question:
ANGLE FORMED BY TWO TANGENTS:
13) Copy the diagram and answer the question

Use Geo. Sketchpad to illustrate the three parts of the above theorem. Measure the angles and the arcs and print all three diagrams. The measurements should be included in your printouts.

Book page 126 – 127
On a separate sheet of paper, copy the diagram and answer the question for each of the following questions: 2, 3, 8, 9, 14, 15, 21, 22

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Lessons on Geometry of the Circle

Lesson 4

OBJECTIVE: The purpose of this lesson is to review and reinforce the students’ understanding of the theorems involving angles and the circle.

LESSON DESCRIPTION: The five theorems will be restated and sample problems demonstrating each will be done. Students will then be given problems to complete on their own.

CHAPTER 3: THE GEOMETRY OF THE CIRCLE

THEOREMS INVOLVING ANGLES OF THE CIRCLE:

1) The measure of a central angle is equal to

2) The measure of an inscribe angle is equal to
3) The measure of an angle formed by two chords intersecting within a circle is equal
to__________________________________________________________

4) The measure of an angle formed by a tangent and a secant, or two secants, or two
tangents is equal
to__________________________________________________________

5) The measure of an angle formed by a tangent to a circle and a chord intersecting
at the point of tangency is equal
to__________________________________________________________

Do worksheet involving theorem 5.

Homework
Page 101: #6
Page 113: #6
Page 126 – 127: 5,6,11,12,17,18,23,24
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Lessons on Geometry of the Circle

Lesson 5

OBJECTIVE: The purpose of this lesson is to introduce students to the three theorems
related to line segments and the circle.

LESSON DESCRIPTION: The three theorems will be introduced to the students. They
will then use Geometer’s Sketchpad to design a sketch to go with each theorem and to
find the measurements necessary to verify the theorems.

NAME: ___________________________ DATE: ________________
SEQUENTIAL MATH 3 PERIOD____________

CHAPTER 3: GEOMETRY OF THE CIRCLE

Theorems involving line segments related to the circle:

1) If two chords intersect within a circle, the product of the measure of the segments
of one chord equals the product of the measures of the segments of the other.

Book: page 136 #1
2) If two secants intersect outside a circle, then the product of the measures of one secant segment and its external segment is equal to the product of the measures of the other secant segment and its external segment.

   Book: page 137 #22

3) If a tangent and a secant are drawn to a circle from an external point, then the square of the measure of the tangent segment is equal to the product of the measures of the secant segment and its external segment.

   Book: page 136 #14

Use the Geometer’s Sketchpad to draw a diagram to represent each of these theorems and demonstrate the theorem using the appropriate measurements. Print three examples of each theorem.

   Homework: page 136 – 137
   4,5,6,17,18,19,26,27