## Stage 1- Desired Results

**Established Goals:**

1. Students will be able to develop and apply the formulas for the areas of triangles, special quadrilaterals, circles, and regular polygons.
2. Students will solve problems involving the perimeters and areas of triangles, quadrilaterals, and circles independently and through cooperative learning groups.
3. Students will apply their knowledge of important terminology to classify and label different figures.
4. Students will be able to calculate the area of composite figures using the Area Addition Postulate and justify their answers through verbal explanation and written work.
5. Students will use their understanding of composite figures to estimate the areas of irregular shapes.
6. Students will be able to verbally explain the effect on perimeter and area when one or more dimensions of a figure are changed.
7. Students will be able to calculate geometric probabilities using length, angle measurements, and area.
8. Students will be able to provide examples that support the use of area, perimeter, circumference, and geometric probability in the real-world.

**Standards:**

**CC.2.2.HS.C.1** Use the concept and notation of functions to interpret and apply them in terms of their context.

**CC.2.3.HS.A.3** Verify and apply geometric theorems as they relate to geometric figures.

**CC.2.3.HS.A.8** Apply geometric theorems to verify properties of circles

**CC.2.3.HS.A.9** Extend the concept of similarity to determine arc lengths and areas of sectors of circles.

**CC.2.3.HS.A.13** Analyze relationships between two-dimensional and three-dimensional objects.

**Big Ideas:**

1. Developing Formulas
2. Composite Figures
3. Dimension Changes
4. Geometric Probability

**Essential Questions:**

1. How does knowing the area of basic shapes help us develop formulas for the areas of more complex figures?
2. Why is the understanding of vocabulary important when finding the area of different figures?
3. How does what we know about simple shapes help us calculate the area of composite figures?
4. What is the effect on perimeter and area when one or more dimensions of a figure are changed?
5. How can geometric probability be used to predict real results in real-world situations?

**Enduring Understanding:**

1. Understanding how simple shapes fit together allows us to develop formulas for the areas of more complex figures.
2. Vocabulary is critical part of identifying, labeling, and solving the area of different figures.
3. The formulas for the areas of simple shapes can be used to calculate the area of composite figures.
4. Changing one or more dimensions of a figure affects both the area and perimeter of the shape.
5. Geometric probability allows us to make informed judgements on what is likely to happen based on a pattern of data.

**Students will know:**

- The area and perimeter formulas for triangles, special quadrilaterals, circles, and regular polygons
- The importance of key vocabulary terms
- How to use composite figures to estimate the area of irregular figures
- The real-life relevancy of area, perimeter, circumference, and geometric probability in the real-world.

**Students will be able to:**

- Develop formulas for triangles, special quadrilaterals, circles, and regular polygons.
- How to calculate the area of composite figures using the Area Addition Postulate
- Describe the effect on perimeter when one or more dimensions of a figure are changed.
- Apply the relationship between perimeter and area in problem solving.
- Calculate geometric probability and use it to predict results in real-world situations.

## Stage 2- Performance Task

**Goal:** You are going to construct a blue print for potential home-owners. You may design the house however you like. However, the buyers do have a few requests that you must follow. Within the house you design, you must include:

1. 6 total rooms (3 bedrooms, 1 kitchen,1 living room, 1 bathroom)
2. At least one A-frame window (Triangle shaped)
3. One kitchen table
4. One master bed
5. A rhombus shaped mirror in at least one room
6. Hallways throughout the house for easy access to rooms

**Role:** You are an architect designing a blue print for a future home-owner. Your job is to draw a blue print of a house that meets the potential buyers' expectations.

**Audience:** Your audience is the potential home owners. Your blue print will provide them with a sketch of what the house will look like, the area of specific objects within the house, and the composite area of the entire house.

**Situation:** The tasks you will complete include:

- Design a blue-print that includes AT LEAST all of the 6 things the potential home-owners asked for (You may include extras that they did not ask for)
- Calculate the area of each of these 6 figures using a ruler measuring in inches
- Convert the measurements using the scale (1 in=8 ft) to get more realistic measurements
- The area of each figure must be listed on it or on a separate sheet of paper
- Find the total composite area of all of the 6 rooms
- Find the perimeter of the house
- Imagine tossing a penny onto your blue print. What is the geometric probability of the penny landing in the kitchen?

**Product, Performance, and Purpose:**

You will not be graded based off of artistic ability. However, your blueprint should be neat and the area of each figure, composite area of the house, perimeter of the house, and geometric probability should be clearly stated either directly on the blue print or on a separate sheet of paper.

**Standards and Criteria for Success:**

**Your performance needs to** demonstrate your ability to calculate the area of different figures, the composite area of the house, the perimeter of the house, and the geometric probability of a penny landing on the kitchen if it were to be tossed onto the blueprint.

**Your work will be judged by** the accuracy of each of your calculations.

**A successful result will** demonstrate a deep understanding of area, perimeter, and geometric probability.

## Stage 2-Other Evidence

- **Cooperative Learning**: Students will work in groups of four. Each student will:
1. Solve/calculate the areas of polygons, triangles, trapezoids, circles, and regular polygons
2. Identify questions or concepts that they are unsure of
3. Discuss each problem with groups members
   (At various times throughout the unit)

- **Write a response** to the following question: "What would you say to someone that says area isn't important in everyday life? How could you support your answer/what real life examples could you provide them?"
- **Self-reflect** on the following questions and write down their response: "What are my strengths and weaknesses in calculating area, circumference, and perimeter"?
- **Quizzes** will be given throughout the unit to check for understanding

**Stage 3 Overview with Learning Activities**

Graphic organizer

Cooperative learning groups

 Explanation (Facet of Understanding)

Exit Slip

Interactive PowerPoint

Rap

double-entry journal

hypothesize

 2-minute write

Quizlet live- review game

 3-2-1

 Modeling

 Shaping

 Turn to a partner

Quiz

 What if chart

 Analyze

 Quick write

Summarize

Motivation

Compare (Aspects of the Topic)

Self-Knowledge (Facet of Understanding)

Relevancy in the real-world

Homework and practice

Jeopardy Review Game

Concept Map

**Concept Map**

- Area Addition Postulate
- Triangles & Quadrilaterals
- Developing Formulas
  - Pythagorean Theorem
  - Circles & Regular Polygons
- Area by Adding
- Composite Figures
  - Area by Subtracting
- Extending Perimeter, Circumference and area
- Area of Regular Shapes
  - Area Addition Postulate
  - Area Formulas
  - Real-world applications
- Estimate of area of irregular shapes
- Dimension Changes
  - One-dimension change
  - Multi-dimension change
  - Changing Dimensions proportionally
  - Area Change
    - Identifying Misleading Graphs
- Sample Space
- Geometric Probability
  - Event
  - Angle Measures

# Calendar

## Day 1

### *Introduction to Vocabulary*

**Anticipatory Set:** Students will be given a **knowns/unknown's** chart of key vocabulary terms and formulas.

**Facilitate:** Students will be called on and we will discuss what students already know about the words, as well as clear up any misconceptions they may have.

**Acquire New Knowledge:** Explain a **word wall** and how it will be used throughout the unit (As we move through the unit more words and formulas will be added to the vocabulary wall for reference.

## Day 2

### *Lesson on Developing Formulas for Triangles and Quadrilaterals*

**ANTICIPATORY SET:** Students will complete a quick warm up reviewing the Pythagorean theorem where they will be asked to solve problems and explain their understanding verbally.

**INPUT/ ACQUIRE NEW KNOWLEDGE:** Students will complete a **graphic organizer** including area formulas, shapes, and examples done together in class.

**Vocabulary Word Wall**: New words from the lesson are added to the vocabulary word wall

## Day 3

### *Lesson on Developing Formulas for Triangles and Quadrilaterals Continued*

**APPLY/ DEEPEN NEW KNOWLEDGE:** Students will be put in **cooperative learning** groups of 4. Each group will work on the guided practice problems in order to check for understanding.  Students will demonstrate selected problems on the board where they will show their work and **explain/justify** their answers verbally.

**CLOSURE/ASSESSMENT:** Students will fill out an **exit slip** where they identify how they feel about the lesson.

**HOMEWORK:** Students will work on selected problems from the book for practice.

## Day 4

### *Lesson on Developing Formulas for Circles and Regular Polygons*

**Homework Review:** Students will have the opportunity to resubmit their homework after reviewing comments and going over common mistakes/misunderstandings.

**ANTICIPATORY SET:** Students will watch a **circle rap** to grab their attention and help them remember circle formulas.

**INPUT/ ACQUIRE NEW KNOWLEDGE:** Students will participate in an interactive PowerPoint where students will, complete a **double entry-journal** to stress the importance of vocabulary and formulas, **hypothesize**, stop and think by answering questions after every few slides, and complete a **2-minute write** to summarize what they learned.

**APPLY/ DEEPEN NEW KNOWLEDGE:** Students will complete a double-entry journal where they will write the definition of words, construct their own meaning of the word, and draw a picture that they can associate with each word.

**CLOSURE/ASSESSMENT:** Students will complete a 2-minute write where they will summarize the importance of vocabulary in this section.

**HOMEWORK:** Students will work on selected problems from the book.

**Day 5**

*Lesson on Composite Figures*

**Homework Review:** Students will have the opportunity to resubmit their homework after reviewing comments and going over common mistakes/misunderstandings.

**ANTICIPATORY SET:** Students will work in **cooperative learning groups** of 4 to play an online review game **(Quizlet live)**.

**INPUT/ ACQUIRE NEW KNOWLEDGE:**

Students will take notes while examples are **modeled** on the board. After each example, a question will be asked to check that the students fully understand the process of solving each problem. After modeling, the students will be given problems to solve independently during **shaping**. After the students are done solving the problems, they will **turn to a partner** to make sure they are on the same page and answer any questions the other partner may have.

**Facilitate:** I will be walking around to observe, listen to student conversations, and answer any questions throughout the process.

**Day 6**

*Lesson on Composite Figures Continued*

**APPLY/ DEEPEN NEW KNOWLEDGE:** Students will work on an assignment where they are asked to develop their own drawing of their bed room. The room must include a bed, window, mirror, tv, and clock. The student must calculate the area of all of the items listed as well as the total composite area of the bedroom using a ruler. The student must measure in inches and convert using the scale 1 in=8ft.

**CLOSURE/ASSESSMENT:** Students will complete a 3-2-1 on what they learned throughout the lesson.

**HOMEWORK:** Students will finish the bedroom assignment that they began in class.

**Day 7**

*Lesson on the Effect of Dimension Changes*

**ANTICIPATORY SET:** Students will take a brief quiz to check for understanding on formulas.

**INPUT/ ACQUIRE NEW KNOWLEDGE:** Students will complete a **what if chart** where they will **analyze** the effect of dimension changes. Some of the chart will be done together as a class and the rest will be done independently.

**CLOSURE/ASSESSMENT:** The students will complete a **quick write** where they **summarize** their conclusions after completing the what if chart.

**Facilitate:** Selected students will share their summaries with the class.

**Day 8**

*Lesson on Geometric Probability*

**ANTICIPATORY SET:**

Students will draw this figure on a piece of paper and tape it to their desks. They will toss a penny onto the paper. I will then explain to them that finding how likely it is that the penny lands on the square requires geometric probability. This will be used as a form of **motivation** for the lesson. Students will **hypothesize** about how to go about finding the probability.
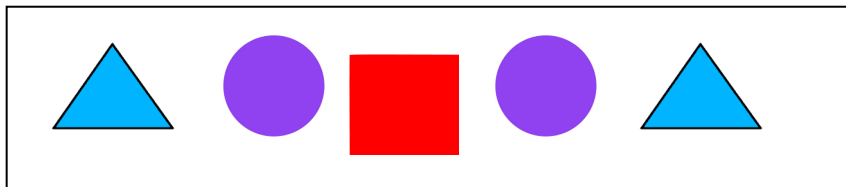


**INPUT/ ACQUIRE NEW KNOWLEDGE:**

Students will take notes on examples that are **modeled** on the board and then practice selected problems individually through **shaping.**

**Day 9**

*Lesson on Geometric Probability Continued*

**APPLY/ DEEPEN NEW KNOWLEDGE:**

Students will make a spinner like the one in example problem 3. They will need a compass, protractor, ruler, paper, and colored pencils to color or label each area. They will cut out a pointer and attach it to a paper clip and attach it to the spinner. They will each spin the spinner 20 times, and then combine the class results and compare them to the calculated probabilities.
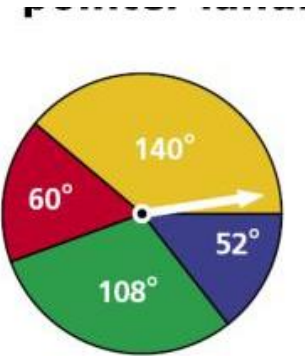


**Facilitate:** The results of the activity will be discussed together as a class.

**CLOSURE/ASSESSMENT:** Now that students understand how to calculate geometric probability, they will **explain** how they would calculate the geometric probability of the penny landing on the square from the anticipatory set.

**HOMEWORK:** Students will **compare** theoretical probability and geometric probability and provide real-world examples of each through a written response.

**Day 10**

*Jeopardy Review Game Lesson*

**ANTICIPATORY SET:**

Students will create their own **concept map** of chapter 9. This will show me their understanding of important concepts thus far. After the lesson, students will have the opportunity to add to them.

**Facilitate:** I will facilitate by observing student work as they are creating them. I will also provide them with an example of a concept map, so they have a format to work off of.

**APPLY/ DEEPEN NEW KNOWLEDGE:**

Students will be divided into **cooperative learning groups** of 4 to participate in **a jeopardy review game**. The game will consist of questions from what they have learned thus far from chapter 9. A PowerPoint will be displayed with the game board and questions that are hyper-linked to each category and point value.

**CLOSURE/ASSESSMENT:**

The students will go back to their concept map and add to/correct it to make sure it is as complete as possible. Students will work with a partner like they did in the beginning of class.

**HOMEWORK: (Purpose- Preparation, Practice, Expansion)**

Students will be given a study guide of all the questions that were included in the jeopardy review game. The students will have already completed these questions, but this will be a helpful tool to study that may be

**Day 11**

*Performance Task*

**Homework Review:** Students will compare their written responses they did with a partner and then we will go over answers as a class.

**Performance Task:** The Performance task will be explained and a rubric for the task will be provided. Students will begin working on it.

**Day 12**

*Performance Task Continued*

Students will continue to work on their performance tasks.

Homework: Finnish anything that they did not finish in class.

**Day 13**

*Performance Task Presentations*

Each student will do a brief presentation to show their blue print to the class. At the end of the presentations, the students will put themselves in the shoes of the home buyers and choose which blueprint they like the best.

Student Teacher Candidate:  Courtney Harriman

Lesson Subject(s)/Title:  9.1: Developing Formulas for Triangles and Quadrilaterals

Lesson Date(s):  Day 2 and 3

Course & Grade(s):  Geometry 8-11


**INSTRUCTIONAL MATERIALS:**

Graphic Organizer

Exit Slip


**ESSENTIAL QUESTIONS/ SUBSIDIARY QUESTIONS:**
How does knowing the area of basic shapes help us develop formulas for the areas of more complex figures?
- What is the area addition postulate and how is it used?
- What is the Pythagorean theorem and when do we use it?
- What formulas may be used to calculate the measurements of parallelograms, triangles, trapezoids, rhombuses, and kites?


**PURPOSE:**

Students will develop and apply the formulas for the areas of triangles and special quadrilaterals.


**SPECIFIC LEARNING OBJECTIVES: (clear, observable)**

1. Before the lesson, when provided with problems, students will correctly solve three problems to serve as a review of Pythagorean theorem.
2. During the lesson, students will develop an understanding of area by taking notes of class examples on a provided graphic organizer.
3. After the lesson, students will work on selected example problems in cooperative learning groups to check for understanding.

**STANDARDS:**

CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.

CC.2.3.HS.A.3. Verify and apply geometric theorems as they relate to geometric figures

**ANTICIPATORY SET:**

Students will complete a quick warm up reviewing the Pythagorean theorem where they will be asked to solve problems and explain their understanding verbally.

**INPUT/ ACQUIRE NEW KNOWLEDGE:**

Students will complete a graphic organizer including area formulas, shapes, and examples done together in class.

**and/or**

**APPLY/ DEEPEN NEW KNOWLEDGE:**

Students will be put into cooperative learning groups of 4. Each group will work on the guided practice problems in order to check for understanding. Students will demonstrate selected problems on the board as well as explain/justify how they got their answer verbally.

**CLOSURE/ASSESSMENT:**

Students will complete an exit slip that identifies how they feel about the lesson (understand a lot, understood most parts, don't understand)

**HOMEWORK: (Purpose- Preparation, Practice, Expansion)**

Students will work on selected problems from the book for practice.

**INSTRUCTIONAL PROCEDURES:**

**Time:**

| The teacher will: | The students will: |
|---|---|
| 1. Provide students with three Pythagorean theorem problems<br>2. Model example problems and provide students with a graphic organizer<br>3. Divide students into cooperative learning groups<br>4. Provide students with an exit slip | 1. Complete the problems through written work/verbal explanation<br>2. Take notes on the graphic organizer<br>3. Complete the problems within their group and demonstrate/explain selected problems on the board with their group members<br>4. Complete the exit slip to identify how they feel about the lesson |

**Student Teacher Candidate:** Courtney Harriman

**Lesson Subject(s)/Title:** Developing Formulas for Circles and Regular Polygons

**Lesson Date(s):** Day 4

**Course & Grade(s):** 8-11

**INSTRUCTIONAL MATERIALS:**

Interactive PowerPoint

**ESSENTIAL QUESTIONS/ SUBSIDIARY QUESTIONS:**
1. How does knowing the area of basic shapes help us develop formulas for the areas of more complex figures?
2. Why is the understanding of vocabulary important when finding the area of different figures?
- How is a circle named?
- What are the formulas for area and circumference of a circle and what is the difference between them?
- What is the apothem and when is it used?
- How do you calculate the area of a regular polygon?

**PURPOSE:** Students will develop and apply the formulas for the area and circumference of a circle as well as develop and apply the formulas for the area of a regular polygon.

**SPECIFIC LEARNING OBJECTIVES: (clear, observable)**

1. Before the lesson, students will correctly complete three review problems.
2. During the lesson, students will demonstrate their understanding of using area formulas by completing 4 example problems.
3. After the lesson, students will identify the importance of vocabulary by completing a 2-minute write.

**STANDARDS:**

**CC.2.2.HS.C.1** Use the concept and notation of functions to interpret and apply them in terms of their context.

**CC.2.3.HS.A.3** Verify and apply geometric theorems as they relate to geometric figures.

**CC.2.3.HS.A.9** Extend the concept of similarity to determine arc lengths and areas of sectors of circles.

**ANTICIPATORY SET:** Students will watch a **circle rap** to grab their attention and help them remember circle formulas.

**INPUT/ ACQUIRE NEW KNOWLEDGE:** Students will participate in an interactive PowerPoint where students will, complete a **double entry-journal** to stress the importance of vocabulary and formulas, **hypothesize**, stop and think by answering questions after every few slides, and complete a **2-minute write** to summarize what they learned.

**APPLY/ DEEPEN NEW KNOWLEDGE:** Students will complete a double-entry journal where they will write the definition of words, construct their own meaning of the word, and draw a picture that they can associate with each word.

**CLOSURE/ASSESSMENT:** Students will complete a 2-minute write where they will summarize the importance of vocabulary in this section.

**HOMEWORK: (Purpose- Preparation, Practice, Expansion)**

Students will work on selected problems from the book.

**INSTRUCTIONAL PROCEDURES:**

**Time:**

| The teacher will: | The students will: |
|---|---|
| 5. Show a circle rap video as an anticipatory set<br>6. Teach new vocabulary using an interactive power point<br>7. Ask students to hypothesize<br>8. Stop after every few slides to ask students a few questions to check for understanding<br>9. Have students complete a 2-minute write that summarizes what they learned | 5. Watch the video/sing along<br>6. Take notes using a double entry journal<br>7. Write down/discuss their hypotheses<br>8. Answer the questions through a whole class discussion<br>9. Complete the 2-minute write and selected students will share them with the class |

**Student Teacher Candidate:** Courtney Harriman

**Lesson Subject(s)/Title:** 9.5: Effects of changing Dimensions Proportionally

**Lesson Date(s):** Day 7

**Course & Grade(s):** 8-11

**INSTRUCTIONAL MATERIALS:**

Sections 9.1-9.3 Formula Quiz

What if chart

**ESSENTIAL QUESTIONS/ SUBSIDIARY QUESTIONS:**
3. What is the effect on perimeter and area when one or more dimensions of a figure are changed?
- What is the effect of changing one dimension?
- What is the effect of changing dimensions proportionally?
- What are the effects of changing the area of a figure?

**PURPOSE:** Students will be able to describe the effect on perimeter and area when one or more dimensions of a figure are changed.

**SPECIFIC LEARNING OBJECTIVES: (clear, observable)**

1. Before the lesson, students will show their understanding of formulas by completing a given quiz.
2. During the lesson, students will determine the effect of changing dimensions proportionally through the use of a what if chart.

**STANDARDS:**

**CC.2.3.HS.A.13** Analyze relationships between two-dimensional and three-dimensional objects.

**ANTICIPATORY SET:** Students will take a brief quiz to check for understanding on formulas.

**INPUT/ ACQUIRE NEW KNOWLEDGE:** Students will complete a **what if chart** where they will **analyze** the effect of dimension changes. Some of the chart will be done together as a class and the rest will be done independently.

**CLOSURE/ASSESSMENT:** The students will complete a **quick write** where they **summarize** their conclusions after completing the what if chart.

**Facilitate:** Selected students will share their summaries with the class.

**INSTRUCTIONAL PROCEDURES:**

**Time:**

| The teacher will: | The students will: |
|---|---|
| 10. Provide students with a brief quiz<br>11. Provide students with a what if chart for note taking<br>12. Have students complete a quick write summarizing their conclusions after analyzing their charts | 10. Take the quiz<br>11. Take notes on their what if chart<br>12. Use the analysis of their charts to complete a summary through a quick write |