Objective: Students will be able to:

- Review types and measurements of angles.
- Review types of polygons.
- Review formulas for perimeter and area.

Time Required: 1 class period

Materials needed:
- Students’ Geometry Dictionaries started in Lesson 1
- Rulers (at least 10)
- Poster board (at least 6 sheets)
- Markers, crayons, or colored pencils
- Construction paper
- Scissors
- Lined paper
- Pencils
- Protractors
- Calculators
- Copies of the “Ballpark Figures” worksheet (included) – 1 for each student

Vocabulary:

**Acute Angle** - An angle measuring less than 90 degrees

**Area** - The surface inside a figure or shape

**Hexagon** - A six-sided polygon

**Length** - The measured distance from one end to the other of the longer side of an object

**Obtuse Angle** - An angle measuring greater than 90 degree and less than 180 degrees

**Octagon** – An eight-sided polygon

**Pentagon** - A five-sided polygon

**Perimeter** - The distance around the outside of a polygon
Vocabulary (Continued):

**Polygon** – A closed figure made up of line segments

**Quadrilateral** - A four-sided polygon

**Rectangle** - A quadrilateral with two pairs of congruent sides and four right angles

**Right Angle** - An angle measuring exactly 90 degrees

**Square** - A quadrilateral with four congruent sides and four right angles

**Triangle** - A three-sided polygon

**Width** - The measured distance from one end to the other of the shorter side of an object

Applicable Common Core State Standards:

**CCSS.Math.Content.3.G.A.1** Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

**CCSS.Math.Content.4.G.A.1** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

**CCSS.Math.Content.4.G.A.2** Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

**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.3.MD.C.5** Recognize area as an attribute of plane figures and understand concepts of area measurement.

- **CCSS.Math.Content.3.MD.C.5a** A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.

- **CCSS.Math.Content.3.MD.C.5b** A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.
Applicable Common Core State Standards (Continued):

CCSS.Math.Content.3.MD.C.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).

CCSS.Math.Content.3.MD.C.7 Relate area to the operations of multiplication and addition.
  - CCSS.Math.Content.3.MD.C.7b Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

CCSS.Math.Content.3.MD.D.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

CCSS.Math.Content.4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

CCSS.Math.Content.4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.

CCSS.Math.Content.4.MD.C.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
1. To begin, have students help you make a list of the concepts covered in this unit, and in your Baseball Hall of Fame experience, using their “Geometry Dictionaries” for assistance if necessary.

2. Review the types of angles:
   - **Right angle**: An angle measuring exactly 90 degrees
   - **Acute angle**: An angle measuring less than 90 degrees
   - **Obtuse angle**: An angle measuring greater than 90 degree and less than 180 degrees

3. Ask students if they can locate examples of the different types of angles in the classroom.

4. Next, review polygons. Draw a few different polygons on the board and have students identify them. Remind students that many polygons are named for their number of sides:
   - **Triangle**: A three-sided polygon.
   - **Quadrilateral**: A four-sided polygon.
   - **Pentagon**: A five-sided polygon.
   - **Hexagon**: A six-sided polygon.
   - **Octagon**: An eight-sided polygon.

5. Review area and perimeter. Ensure that students understand that perimeter is the measure of the distance around the outside of a polygon.

6. Use the example of a baseball diamond. Have students find the perimeter.
7. Review that 90’ + 90’ + 90’ + 90’ = 360’.

8. Ensure that students understand that area measures the amount of space inside a given object. Review the formula for area:

   Area = length x width

9. Have the students calculate the area of the baseball diamond.

10. Review that 90’x 90’ = 8100’²

11. Introduce the activity.
1. Tell students that they will now get a chance to put all that they have learned about baseball and geometry to use as they work in groups to create baseball fields.

2. Explain that each baseball field must include the following elements. You may want to write this list on the board for reference during this project.
   - 3 bases
   - Home plate
   - Batter’s box
   - Pitcher’s mound
   - Pitching rubber
   - Infield base paths
   - Outfield walls
   - Scoreboard

3. Students do not need to worry about making field dimensions properly scaled versions of a real field. Rather, they should just be concerned with recreating the correct shapes and the correct angles of a real field.

4. Have students count off by sixes, and then have each group go into a different part of the room.

5. Provide each group with 2 rulers, a sheet of poster board, markers, crayons, colored pencils, construction paper, and scissors. You may also choose to provide stencils or templates that students can use to draw squares, rectangles, and circles.

6. Allow student groups time to complete their 2-D baseball field models.

7. For the next phase of this activity, provide each group with pencils, a protractor, calculators, and “Ballpark Figure” worksheets for each student. Students may work together to answer the questions, but each student must turn in his or her own worksheet to receive credit.
Conclusion:
To conclude this lesson and check for understanding, once the measurement phase of the project is complete, have each group share their baseball field models with the class. Each group should be able to point out the shapes that they used for the various elements of the field, as well as the field measurements they calculated and the angles they found.
Instructions: Answer each of the questions using the measurements from your baseball field model. For each problem, explain how you arrived at the answer.

1. What is the perimeter of a base?

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________________________________________________________________________
________________________________________________________________________

2. What is the area of a base?

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________________________________________________________________________
________________________________________________________________________

3. What is the perimeter of home plate?

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________________________________________________________________________
________________________________________________________________________
4. What is the perimeter of the batter’s box?

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5. What is the area of the batter’s box?

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6. What is the perimeter of the pitching rubber?

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7. What is the area of the pitching rubber?

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___________________________________________________
___________________________________________________
8. What is the perimeter of the base path?

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________________________________________________________________________
________________________________________________________________________

9. What is the area of the infield?

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________________________________________________________________________
________________________________________________________________________

10. What is the perimeter of the scoreboard?

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________________________________________________________________________
________________________________________________________________________

11. What is the area of the scoreboard?

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________________________________________________________________________
________________________________________________________________________

12. Identify examples of 2 acute angles, 2 obtuse angles, and 2 right angles.