# IMPORTANT: PLEASE READ BEFORE CONTINUING

This curriculum guide was created to provide you with a learning "compass" to help guide your students through a truly rewarding "out-of-class" experience. The ideas and lesson plans included within stand to serve as a *guide* for educators to create appropriate, educational ideas to assist in the "Education Days" at Canal Park (May 3, May 4, May 16, and May 17, 2006).

Each of the last six years, local educators have answered the call to pool their resources and produce this guide. They have committed time, expertise, and enthusiasm. They represent what is right in our schools today -- educators who care about making learning exciting for their students.

The curriculum has been designed by educators for educators. **It is intended to meet the initiatives set forth by the Reference to Ohio Academic Content Standards. For your convenience, Grade Level Bands and Benchmarks are listed within the curriculum.**
Regardless of the activity, theprocedures and methods can easily be substituted to fit the appropriate grade level.

***This curriculum has been organized with the following in mind:***
a) Educators tailor their lesson plans to meet the needs of their students.
b) Educators may use bits and pieces of a lesson plan to create their own lesson plan.
c) Educators have the flexibility to use this curriculum and lesson plans to integrate ideas into current studies.

This curriculum guide has been divided into four basic areas of study: **MATHEMATICS, SCIENCE, SOCIAL STUDIES, and LANGUAGE ARTS**. There is also a special section included on **COMMUNITY AWARENESS**. The provided lesson plans have been designed as complete, top-to-bottom lesson plans. Each focused lesson plan contains exercises to be dealt with in the classroom, at the Education Day games, and after the game has been completed as follow-up or additional learning.

We sincerely appreciate your school's/class's participation, and we truly hope that you find this event worthwhile, educational, and enjoyable. Additionally, we welcome any specific ideas or comments that would aid or improve Education Day or the curriculum guide for future Education Days.

- Was the guide easy to use?
- Were there any errors? If so, please inform us so that we may correct them.
- Was there an activity that stood out from the rest - one which your students truly enjoyed?
- Did you enhance any of the activities in ways others might want to know?
- Were there any activities that "struck out" or should have never been placed within the guide?

Just as in baseball, teaching only gets better with practice. So, we'd like your ideas for future editions of this curriculum guide. Send your lesson plan(s) or ideas to:

Akron Aeros Education Day
Canal Park
300 South Main Street
Akron, OH 44308-1204

Be sure to include your name and school.

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Humane Society of Greater Akron
Keep Akron Beautiful

# PLEASE SELECT YOUR LESSONS*

For Mathematics lessons for all grade levels,
please continue forward to the green colored lesson plans.

For Science lessons for all grade levels,
please continue forward to the yellow colored lesson plans.

For Social Studies lessons for all grade levels,
please continue forward to the blue colored lesson plans.

For Language Arts lessons for all grade levels,
please continue forward to the pink colored lesson plans.

To view the appendices for all levels,
please skip ahead to the white pages.

* The fifth and last section of this curriculum contains lessons and an appendix for all age levels regarding various activities in community awareness.
Please continue foward to the grey colored lesson plans.

# Table of Contents

# MATHEMATICS CURRICULUM

## Lesson Plan I
## "The Shape of the Game"

Children combine common shapes to create a model baseball field or other part(s) of a baseball stadium.

### Reference to Ohio Academic Content Standards:
K-2/Number, Number Sense and Operations: F. Count, using numerals and ordinal numbers.
K-2/Geometry & Spatial Sense: A. Describe and create plane figures: circle, rectangle, square, triangle, hexagon, trapezoid, parallellogram and rhombus and identify them in the environment.

### Objectives:
The child will observe and identify common shapes in the environment; to combine shapes to make a new whole, to develop concepts of properties of shapes, especially the constancy of the properties regardless of orientation of the shape.

### Materials:
Pictures of baseball fields/stadiums, (in lieu of, or in addition to, experience with a real field); pattern blocks, building blocks or parquetry blocks; paper versions of those blocks (commercial or child-made)

### Before the Game:
Begin a collection of items which will be used to build a model after the game. Practice identifying shapes in the environment by noting those in the classroom, the playground and at home (homework assignment?). Similar shapes should be available in the classroom which would also be found at the stadium. Look for what might be found at the game by looking at pictures of baseball fields or talking about children's previous experiences with baseball fields from playing, watching TV or seeing games before.

### At the Game:
Examine the baseball field to find shapes such as circles, squares, spheres, triangles, rectangles, ovals and other shapes. Record by drawing on pad, listing, reporting to a recorder (adult) or by reporting back after the game. Be sure to draw attention to the baseball diamond.... it IS a square! Have children stand at various places when taking their seats to see the square from a variety of perspectives. Have each child tally the number of shapes that he/she identifies at the field. Incorporate actual landmarks and their shapes which can be seen to and from the stadium as well as during the game.

### Beyond the Game:
Children can work in teams to make a drawing or model of a baseball field, stadium, scoreboard or portion of any of those using a combination of simple shapes. These can be made using pattern blocks, building blocks, tangrams, parquetry blocks or any combination of those. Paper versions or photographs can record the work. Children should be able to name the shapes they used and what they represented. Use any gathered data to create a variety of graphs (pie, bar, line) and interpret the information.

Provide students a sheet with a baseball diamond and have the students determine how many of a shape (square, triangle, etc.) will fill the diamond.

## Lesson Plan 2
## "Double Play"

Children combine two (or three or four) numbers taken from players' jerseys to make a target total (100, 50, 25, etc...).

### Reference to Ohio Academic Content Standards:
K-2/Number, Number Sense: M. Add and subtract two-digit numbers with and without regrouping.

### Objectives:
The child will use a variety of strategies to determine a variety of number combinations that would meet a target number such as 100.

### Materials:
Aeros' program or listing of players by jersey number (Appendix E), paper and pencil, calculator

### Before the Game:
Practice combining numbers to make target numbers... especially combinations which equal 10 or 100. Use tens charts, hundreds charts, two-color chips, unifix cubes, place value blocks and more to explore combinations. Also, explore using a calculator.

### At the Game:
Informally use mental computations to add pairs of numbers, such as the total of the value of the jersey numbers of the pitcher and catcher or the pitcher and the current batter; the total of the jerseys of two (or more) players making a double play (or of those caught in a double play), etc...OR give the students a target number and have them find two players whose numbers may be added or subtracted, to get the same total.

### Beyond the Game:
Set a target number (such as 100) and have the children work in teams using copies of the player roster (see appendix E) to find as many combinations of player numbers to equal that target. How many can you find using just two numbers? What is the highest number of player numbers to total 100? What player's numbers can be added or subtracted, to get the target number?

*Other variations:* Play with other ways to reach a target number: Can you find two people in class whose weight is equal to 100 (or other target number)? Can you research the building population to find 2 (or 3 or more) classrooms whose total number of children is 100 (or other target number)?

## Lesson Plan 3
## "Ninety Feet"

Children explore the magic distance of 90' (the distance between bases) through movement, estimation, measurement, counting and the use of a variety of measurement units.

### Reference to Ohio Academic Content Standards:
K-2/Measurement: C. Develop common referents for units of measure for length, weight, volume (capacity) and time to make comparisons and estimates. D. Apply measurement techniques to measure length, weight and volume.

### Objectives:
The students will use a variety of materials and strategies to analyze a specific distance, concentrating on estimation strategies.

### Materials:
A variety of materials to use for measuring units (unifix cubes, large paper clips, pencils, books, baseball bats, toothpicks, etc...), stopwatches, paper and pencil.

### Before the Game:
Measure and mark off 90' in the hallway or outside. Determine how many _____s (hands, feet, cubes, blocks, books, baseball bats, pencils, babysteps, giant steps, scissors steps, etc.) would equal the 90'.

### At the Game:
Give groups of 3 - 5 children a stopwatch, pencil and paper to record. Assist students with the stopwatch if necessary. Periodically, children may time the speed of a player's run from one base to another and record the number of seconds. Also have students note distances around the ballpark (home plate to center field fence, etc.).

### Beyond the Game:
Using the 90' distance you marked off at school, and the timed runs as recorded at the game as baselines, estimate how quickly you can run it? Walk it? Skip it? Hop on one foot? Walk backwards? etc.
Estimate how many baseball bats laid end to end would it take to equal the distance from home plate to the center field fence, etc. Do the various activities to find out how accurate the estimates were. Chart the estimate against the actual.

## Lesson Plan 4
## "How much time has elapsed?"

Children will learn to determine how much time has passed during given events and grasp the use of clocks and telling time.

### Reference to Ohio Academic Content Standards:
K-2/Measurement: B. Select appropriate units for length, weight, volume (capacity) and time, using: objects; i.e., non-standard units; U.S. customary units; inch, foot, yard, ounce, pound, cup, quart, gallon, minute, hour, day, week and year; metric units; centimeter, meter, gram and liter.

### Objectives:
Child will use a variety of strategies to solve problems regarding time and in telling time.

### Materials:
Clock or watch, paper, pencil, calendars

### Before the Game:
Explore different time pieces - watches, clocks (including digital), an hourglass, etc. Discuss "elapsed time" using the classroom clock with an example of the day. (i.e.: school day began at 8:30 am and now its 10:00 am, how much time has elapsed?) Have students give examples of their own.
Pass out calendars and discuss how many days, months have "elapsed" since the school year began, since a field trip, since a holiday, etc...or how long is it until an event will occur? Use birthdays or even a student's favorite television show. As a class predict how long the game, certain innings, or the National Anthem will take. How long will it take to get to the game?

### At the Game:
Break students into groups having them responsible for a particular inning and note the beginning and ending times of their assigned inning. Students would also be responsible for noting when the National Anthem began, how long it took to get to the game, what time the 7th inning stretch occurred and what time the last out occurred.

### Beyond the Game:
Develop classroom chart of how long each inning was. Each group will record the data that they collected. Compare the class predictions versus the actual times and create graphs to show the similarities or differences.
Class discussion about how long the season is using days and months.
How much time "elapses" until the next season?
Using the class chart that is made the students will answer:
*What was the shortest/longest inning?
*How much time elapsed between 1st and 3rd inning?
*How much time elapsed between beginning of game and the 7th inning stretch?
Using a calendar:
*How much time "elapses" between the school year beginning and ending?
*Summer vacation?

Teachers may wish to graph student data using a line or bar graph.

## Lesson Plan 5
## "Scoreboard Math"

Children will play with variations of numbers as organized on a baseball scoreboard.

### Reference to Ohio Academic Content Standards:
3-4/Data Analysis & Probability: H. Use the set of possible outcomes to describe and predict events.

### Objectives:
The child will use a variety of strategies to predict, estimate and compute using the scores earned by teams during a baseball game.

### Materials:
Student-made nine-inning scoreboards, paper and pencil.

### Before the Game:
The teacher should make a 2 X 9 matrix (so it is uniform) to represent the scoreboard, placing the opponent's team name and the Aeros name in front of the rows of nine. Include columns for runs, hits and errors with a 2 X 12 matrix. Students then predict the score for each team per inning and then compute their prediction for the final score. Make a blank scoreboard to take to the game.

### At the Game:
Children mentally compute the total score per inning. They may take a blank scoreboard to record the actual score per team, per inning. OR, take and use their predictions:

* How many runs would the Aeros have to score in an inning to make the predicted total for that inning?
* How many runs will the Aeros (or their opponents) need to score the remainder of the game to equal the total predicted score for that team? (e.g.... If you predicted the two teams would score 5 runs in the 3rd inning and the other team scored 1 in the 3rd, how many would the Aeros have to score that inning to make your prediction accurate?)

### Beyond the Game:
Use blank scoreboards to make up all the ways on this scoreboard that a team can score 15 runs in 9 innings, all the ways a team can go ahead of a team up by 6 in the 7th inning, or all the ways a team can score X number of runs in X number of innings. Compare the predictions made to the actual scores on the scoreboards. Each student can analyze their predictions by inning and by team. How close were your predictions? Which inning came closest to the predicted score?

## Lesson Plan 6
## "Calculating"

Children use calculators to play with a variety of number computations.

### Reference to Ohio Academic Content Standards:
3-4/Numbers, Number Sense: L. Use a variety of methods and appropriate tools (mental math, paper and pencil, calculators) for computing with whole numbers.

### Objectives:
The child will use a variety of strategies (and a calculator) to solve mathematical problems.

### Materials:
Calculators, newspaper sports pages (especially the box scores for the game the children just attended)

### Before the Game:
List all of the things that a person can quantify (use numbers to talk about) related to a baseball game. These can include all the statistics that the newspapers include about the game as well as fan attendance, food sales, money taken in through ticket sales, number of non-players in uniform, number of times your row had to stand up to let someone in or out, number of water fountains or restrooms, and as many others as the children can imagine.

### At the Game:
Children choose some events or items they would like to count and record and maintain their count(s).

### Beyond the Game:
Children can use information from the game, the newspapers, and the appendices of this guide to calculate the following, using their calculators:

* the number of hits by outfielders for a season... if for the whole season the three outfield positions hit, on average, the same as they did the day of the game
* the number of females attending the game if each section had the same number as their own section
* the number of inches of mustard, if spread from one end of a hot dog to the other on every hot dog, if each person who bought a ticket that day averaged one hot dog each
* the number of times people in a row would stand if every person in it got up two times each during the game.... for one game, and then for the season and more

The children will be able to think of MANY things!

## Lesson Plan 7
## "Making Change"

### Reference to Ohio Academic Content Standards:
3-4/Numbers, Number Sense: F. Count money and make change using both coins and paper bills. K. Analyze and solve multi step problems involving addition, subtraction, multiplication and division of whole numbers.

### Objectives:
To find solutions to story problems involving the use of money (decimals). Make a budget plan and evaluate spending.

### Materials:
Appendix D (concessions price list), story problem worksheet (teacher will create), lined paper

### Before the Game:
Provide Appendix D to the class. Distribute story problems created by the teacher made from Appendix D. For example:

If you brought $32.00 To the game, could you afford …?
How much would it cost if you, your brother, and your grandmother purchased Aeros tickets?
What would your change be if you bought…?

Using Appendix D, have the students create their own story problems.
After looking over Appendix D, have students create their own budget plan. Include what they intend to purchase at the game and how much money they will need.

### At the Game:
Students should record and track their purchases, and make note of other prices throughout Canal Park, including Merchandise, Game Programs, etc.

### Beyond the Game:
Have students evaluate their own purchases. Did they stick to their budget plan? Was the plan unrealistic or sound? How could money have been better spent? Teachers may wish to graph student individual expenditures compared to their classmates or graph totals of items purchased (number of cotton candy, number of popcorn, number of hot chocolates ,etc.).
Determine the average amount spent per student for the class. Students may then compare their spending to the class average.

## Lesson Plan 8
## "Baseball IS Math!"

"Mathematics is the Alphabet with which God has written the Universe!" - Galileo
"ALL Things Exist Through Mathematics." - Author unknown

### Reference to Ohio Academic Content Standards:
5-7/Geometry and Spatial Sense: D. Identify, describe and classify types of line pairs, angles, two-dimensional figures and three dimensional objects using their properties.

### Objectives:
To identify two and three dimensional shapes, line relationships, classify angles, and determine the ways that math is used in baseball.

### Materials:
Paper and pencil

### Before the Game:
Write the above quotes on the board. Allow students to share their thoughts regarding the quotes. Chart the responses. Use an overhead transparency of a baseball field or a picture. Have students identify perpendicular lines, parallels, angles, etc. Brainstorm a list of shapes found at a baseball park. Discuss "regular" shapes vs. "non-regular" shapes (congruent shapes, congruent sides, congruent angles). Are there "shapes" which are symmetrical? Asymmetrical? Why does the baseball diamond need to be a regular quadrilateral? Why would it not be fair if it wasn't?

### At the Game and Beyond the Game:
Classify objects seen at Canal Park into two and three dimensional shapes. Have a scavenger hunt to find perpendicular lines, parallel lines, angles (obtuse, right and acute), and geometric shapes such as cones, spheres, etc. Find out how many lines of symmetry exist through the infield? Through the entire field? Students may work in small groups to develop a list of all the different ways mathematics is used in the game of baseball (each student group should generate a list of at least 10 examples). Remind students to think about math uses before the game and after the game. Back in the classroom, compare lists. Identify: Who has the longest list? Who has the most unique response?
Add to student generated lists.
Create a diorama using geometric shapes.

## Lesson Plan 9
## "Locating the Opponents"

The Akron Aeros play in a 12-team "AA" baseball league known as the "Eastern League." Teams are located throughout the northeastern United States.

### Reference to Ohio Academic Content Standards:
5-7/Measurement: D. Select a tool and measure accurately to a specified level of precision. Data Analysis & Probability: E. Collect, organize, display and interpret data for a specific purpose or need. Mathematical Processes: D. Recognize whether an estimate or exact solution is appropriate for a given problem situation.

### Objectives:
To interpret a map of the Eastern League teams. To estimate the distance from Akron, Ohio to each opposing team. Students will complete the given chart and calculate the actual distances.

### Materials:
Appendix H (Map of Eastern League teams), Appendix K (Eastern League Mileage Chart), and a map of the United States

### Before the Game:
Study Appendix H. Use the information to complete the chart below. Estimate the distance from Akron, Ohio to each opposing team. Ask students to compare their measurements with classmates. Next, measure the actual distance. Teach students to use string to measure the distance from city to city on a map. Using Appendix K, how close were your estimates?

| TEAM NAME | LOCATION (state) | ESTIMATION (miles) | MEASUREMENT (miles) | DIRECTION TRAVELLED |
|---|---|---|---|---|
| Altoona Curve | | | | |
| Binghamton Mets | | | | |
| Bowie BaySox | | | | |
| Connecticut Defenders | | | | |
| Erie SeaWolves | | | | |
| Harrisburg Senators | | | | |
| New Britain Rock Cats | | | | |
| New Hampshire FisherCats | | | | |
| Portland Sea Dogs | | | | |
| Reading Phillies | | | | |
| Trenton Thunder | | | | |

### At the Game:
Students can list things at the ballpark located, North, South, East, and West of where their seats are located.

### Beyond the Game:
Using an Aeros 2005 schedule and Appendix K, calculate the total number of miles the Akron Aeros will travel this season, in a month, or in a week.
If the Aeros are travelling by bus, at 60 miles per hour, how long would it take to go from Akron to the various cities?

## Lesson Plan 10
## "What an Average"

### Reference to Ohio Academic Content Standards:
5-7/Number, Number Sense: I. Use a variety of strategies, including proportional reasoning to estimate, compute, solve and explain solutions to problems using integers, fractions, decimals and percents. Data Analysis & Probability: A. Read, create and use line graphs, histograms, circle graphs, box-and-whisker plots, stem-and-leaf plots, and other representations when appropriate. B. Interpret data by looking for patterns and relationships, draw and justify conclusions, and answer related questions. E. Collect, organize, display, and interpret data for a specific purpose or need.

### Objectives:
To calculate averages with decimal points.

### Materials:
Appendix A (Akron Aeros Individual Batting/Pitching Statistics) with total column whited-out,
Appendix B (Individual Statistics) with totals whited-out, notebooks/pencils, and calculators

### Before the Game:
Review how to find an average. Discuss the procedure for finding a batting average. (Refer to Appendix C). Use Appendix B to calculate the total batting average for all batters on the team. Follow the same procedures to calculate the ERA for all pitchers on the team. Instruct the students how to track the hits made at a baseball game.

### At the Game:
Divide team players among class members (ex. 1B, 2B, RF, etc.). With a larger class, 2-3 students could be responsible for one position/player. Assign a position as opposed to a player name as the players could change before you get to the game! Students will record statistics in notebooks for their assigned player. Be sure that students record the number of times at bat with the number of hits, etc.

### Beyond the Game:
Calculate each player's batting average for the game. Make Appendix S into an overhead and record all players' statistics. Then calculate the teams overall batting average for the game. From the data collected, make a worksheet similar to Appendix B leaving out one players average but leaving a total this time. Then have students calculate and solve for the missing number.

Discussion:
*What are the lowest and highest possible batting averages?
*Which batter had the best performance? Why?
*What does the batting average tell you about a batter's performance?
*How often would you expect a .300 hitter to get a hit?

Have students graph their results or graph results as a class.

## Lesson Plan 11
## "Show me what this means"

### Reference to Ohio Academic Content Standards:
5-7/Data Analysis & Probability: A. Read, create and use line graphs, histograms, circle graphs, box-and-whisker plots, stem-and-leaf plots, and other representations when appropriate. B. Interpret data by looking for patterns and relationships, draw and justify conclusions, and answer related questions. E. Collect, organize, display and interpret data for a specific purpose or need. Mathematical Processes: D. Recognize whether an estimate or an exact solution is appropriate for a given problem situation. Number, Number Sense and Operations: I. Use a variety of strategies, including proportional reasoning, to estimate, compute, solve and explain solutions to problems involving integers, fractions, decimals and percents.

### Objectives:
To interpret statistics and create graphs and pie charts.

### Materials:
Appendix P (Aeros Demographics), Graph paper, pencil, colored pencils or markers

### Before the Game:
Examine Appendix P and from that information, create with the class, or have students in groups, or have students individually create graphs and pie charts that visually display these statistics. Create by hand, or on computers if available. Discuss predictions the students may have about Education Day demographics.

### At the Game:
Have students observe the crowd, or a specific section, to estimate attendance using categories:
1) Male/Female
2) Age (0-2, 3-18, 19-50, 51 or older)
3) The number of innings people stay at the game
4) The number of fans wearing team apparel

Jot down some notes...Does the crowd match the findings on our graphs? What is different?

### Beyond the Game:
Estimate the changes that occur on Education Days with the Aeros demographics. Create new graphs that might better demonstrate demographic break downs on Education Days.

Determine which group within the various categories had the least representation. What could the Aeros organization do to market to the minority group in each category?

## Lesson Plan 12
## "Time & Distance"

### Reference to Ohio Academic Content Standards:
8-10/Measurement: A. Solve increasingly complex non-routine measurement problems and check for reasonableness of results. F. Write and solve real world, multi-step problems involving money, elapsed time, and temperature and verify the resonableness of results. Patterns, Functions and Algebra: Use algebraic representations, such as tables, graphs, expressions, functions and inequalities, to model and solve problem situations.

### Materials:
Calculator, paper, pencil, watch or stopwatch

### Before the Game:
1. Convert the distance from the city of the Aeros opponent to Akron from miles to meters, yards, feet, inches, and centimeters.
2. Before "Education Day", determine how long was the visiting team's trip if they traveled at a rate of 55 mph and stopped for a one hour lunch?
3. Have your students estimate the distance and the time it will take your class to arrive at Canal Park.

| | Distance to Akron (miles) |
|---|---|
| Binghamton, NY | 350 |
| New Britain, CT | 538 |
| Manchester, NH | 709 |
| Norwich, CT | 555 |
| Portland, ME | 706 |
| Trenton, NJ | 414 |
| Altoona, PA | 187 |
| Bowie, MD | 336 |
| Erie, PA | 121 |
| Harrisburg, PA | 310 |
| Reading, PA | 350 |

### At the Game:
1. On the way to the game, with the help of your driver, determine how many miles your class traveled to Canal Park and record the length of the trip. What was your average speed?
2. Using the data your class collected on the trip to the game, determine what time your class must leave Canal Park in order to return to school on time? What's the maximum length of time the game can last for your class to see the entire game?

### Beyond the Game:
1. Using a mileage chart (Appendix K) and the Aeros 2005 schedule (Appendix L), determine the total number of miles that the Aeros will travel this season.
2. Use the Aeros roster (Appendix E) and a map to determine how far the players are from their hometown.

## Lesson Plan 13
## "Size/Dimensions of a Baseball Field"

### Reference to Ohio Academic Content Standards:

8-10/Measurement: E. Estimate and compute various attributes including length, angle measure, area, surface area and volume, to a specified level of precision. Geometry: C. Recognize and apply angle relationships in situations involving intersecting lines and parallel lines. D. Use coordinate geometry to represent and examine the properties of geometric figures. E. Draw and construct representations of two and three dimensional geometric objects using a variety of tools, such a straightedge, compass and technology. Mathematical Processes: G. Write clearly and coherently about mathematical thinking and ideas. Data Analysis & Probability: C. Compare the characteristics of the mean, median and mode for a given set of data, and explain which measure of center best represents the data. D. Find, use and interpret measures of center and spread, such as mean and quartiles, and use those measures to compare and draw conclusions about sets of data.

### Materials:

Dimensions of your school's baseball field and those of Canal Park (Appendix F & G)
Rulers, Paper, Pencil, Protractors (optional), Graph Paper, Stopwatch, string, tape measure

### Before the Game:

1. Measure the dimensions of your school's baseball field.
2. Instruct students to use the dimensions of the your school's baseball field and Canal Park to create a scale drawing. For younger students, a pre-drawn field may be used.
3. Using their scale drawings, calculate the following:

| | CANAL PARK | SCHOOL'S FIELD |
|---|---|---|
| Area of infield in square feet | | |
| Area of infield in square inches | | |
| Distance from pitcher's mound to home plate in feet | | |
| Distance from pitcher's mound to home plate in inches | | |
| Distance from base to base in feet | | |
| Distance from base to base in inches | | |

4. How many square inches larger is Canal Park's infield compared to your school's field?
5. Find the perimeter of each infield. What is the difference in perimeter between the two fields?
6. If a runner is travelling at 10 feet/second, how long would it take to get from home plate to first base? For a double? For a triple? Determine for both your school's field and Canal Park?
7. Would the rate change when a home run is hit? Why or why not?

### At the Game:

1. Using a stopwatch, time the players as they run to first base, second, etc. Which players clocked the fastest speeds? How fast were they traveling (feet per second)?
2. Plot the landing point of each fair ball hit (whether caught or not) for one full inning or more. Estimate the distance of each fair ball and the total distance traveled.

### Beyond the Game:

1. Using your choice of materials, construct a 3-D model of Canal Park to scale.
2. Determine the area of a chalkboard eraser. How many chalkboard erasers would it take to cover the Canal Park field?
3. Analyze the data students colected at the game. Calculate average speeds for singles, doubles, triples, homeruns and stolen bases.

## Lesson Plan 14
## "Calculating Costs"

### Reference to Ohio Academic Content Standards:
8-10/Number, Number Sense: G. Estimate, compute, and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions. Data Analysis & Probability: D. Apply reasoning processes and skills to construct logical verifications or counter examples to test conjectures and to justify and defend algorithims and solutions. Patterns, Functions & Algebra: D. Use algebraic representations such as tables, graphs, expressions, functions and inequalities to model and solve problem situations.

### Materials:
calculator, pencil, paper, graph paper, ruler

### Before the Game:
Create a data sheet/chart for personal spending information. Collect this sheet after the game and include some calculations for each student to complete (i.e. cost per ounce of drink, etc.).

### At the Game:
1. Have each student record the total amount of money spent at "Education Day" on their tickets, food and souvenirs.
2. Have students (perhaps 1 or 2) collect cups and prices for various size drinks. Compare cost per ounce when students are back in class. Which is the better value?

### Beyond the Game:
1. Determine the total amount of money spent by the class followed by the average per student.
2. Plot the total amount of money spent by each student on a graph. Compare these figures with the class average.
3. Using the Aeros attendance for "Education Day" and your class average, estimate how much revenue the Aeros earned on this particular day? If these numbers held true for the entire 71-game home season, how much money would the Aeros earn for the year. Discuss whether students feel that this is an accurate figure.

### Beyond the Game (2):
1. Using actual costs at an Aeros game (see Appendix D), determine the total amount of money that the class would have spent as well as the average per student had certain prices not been discounted.
2. Explain that this is how companies forecast profits for a year and the importance of having a model that is reflective of the entire population.
3. Discuss potential costs that come out of Aeros revenue (management salaries, gameday labor, electricity, etc...).

## Lesson Plan 15
## "Box Score Statistics"

### Reference to Ohio Academic Content Standards:

8-10/Data Analysis & Probability: A. Create, interpret and use graphical displays and statistical measures to describe data. C. Compare the characteristics of the mean, median, and mode for a given set of data, and explain which measure of center best represents the data. F. Construct convincing arguments based on analysis of data and interpretation of graphs. Number, Number Sense and Operations: E. Compare, order and determine equivalent forms of real numbers. G. Estimate, compute and solve problems involving real numbers, including ratio, proportion and percent, and explain solutions.

### Materials:

Aeros baseball box score (Appendix T), Baseball Box Score Glossary (Appendix V), paper, pencil, Scoresheet (Appendix S)

### Before the Game:

Using Appendices T & U, have students answer the following questions or create your own:

a) Who played first base for the Aeros?
b) What position did Sizemore play for the Aeros?
c) Who were the two opposing shortstops?
d) If Church came into the game batting .262 (38 hits in 145 at-bats), what is his new batting average after the game?
e) What was the Aeros team batting average for the game? the opposing team? both teams combined?
f) How many hits did the Aeros third baseman get?
g) Which player drove in the most runs?
h) In which innings did the Aeros score two or more runs?
i) How many outs did the Aeros starting pitcher record? How many batters did he face?
j) How many more Aeros were left on base than the opposing team?
k) If the Aeros scored this many runs per game over the 142-game season, how many runs would they score this year?
l) What was the winning pitcher's ERA (earned run average) for the game? the winning teams?
m) How many more strikeouts did the winning pitcher have than the losing pitcher?
n) How many more hits did the losing pitcher give up than the winning pitcher?
o) If all the men left on base would have scored, what would have been the final game score?
p) If the Aeros came into the game with 75 doubles on the year and this game was their 61st game of the year, how many doubles per game do they average after this game?
q) The playing time was how many minutes less than three hours?
r) How many times did all players go to bat?
s) How many people attended the game?
t) If each person at the game paid $10.00 per ticket, what was the total ticket revenue?

### At the Game:

1. Have students keep score or collect the appropriate game information in order to create their own box score after the game. (See Appendix S for a sample score sheet)

### Beyond the Game:

1. Create your own box score based on a class exhibition game or a baseball game on television.
2. Use hitters averages to predict the outcome of certain pitcher/batter match-ups.
3. Invent a new box score for a different class game. For example, if your class plays "Chalkboard Jeopardy," create statistics for each participant and organize them into a unique box score.
4. Learn to keep the official score at a baseball game. See Appendix S.

## Reference to Ohio Academic Content Standards:

5-7/Number, Number Sense: A., B., C., F., I. Measurement: B. Patterns, Functions & Algebra: L., J. Data Analysis & Probability: B., F. Mathematical Processes: B., I.
8-10/Data Analysis & Probability: C., D., E., G. Mathematical Processes: B.

### • Calculating a Pitcher's Earned Run Average

ERA stands for Earned Run Average which is the average number of times batters earn a run against a pitcher. The lower a pitcher's ERA, the better. Use Appendix C to view the calculation for ERA.

a) Calculate the average ERA of the Akron Aeros pitching staff using Appendix A.
b) Using the statistics from the daily boxscore from "Education Day," find the ERA for each starting pitcher.
c) Write a paragraph explaining why you think an ERA becomes more accurate with more innings pitched.

### • Calculating Batting Average

Using Aeros team statistics, compute batting averages and graphically compare from one game to the next. Use www.akronaeros.com to locate Aeros gameday boxscores and daily statistics.

a) Did the student correctly compute the averages?
b) Did the student display the results correctly?
c) At "Education Day," calculate the Aeros batting average for one inning.

### • Basic Math Skills

Use paper and pencil or the calculator to find the answers to these problems.

a) I had 40 total hits for the season. I had 22 singles and 10 doubles. I had the same number of triples as home runs. How many home runs did I have?
b) For the season, Joe had 47 total hits. He had 12 doubles, 3 triples, and 5 home runs. How many singles did he have?
c) I had 3 triples for the season. I had twice as many home runs as triples. I also had twice as many doubles as home runs. How many extra base hits did I have?

### • Using Formulas to Calculate Statistics about Batting and Pitching

a) Estimate/calculate how fast a pitcher throws for either one inning or ten pitches. Students could use stopwatches to time how long it takes a pitch to get from the pitcher's hand to the catcher's glove. In class, use the formula "Distance = Rate x Time" to calculate the speed of the pitches. Students could create a spreadsheet of the information to compare speeds. In addition, compare speeds of students within the class or compare against Aeros pitchers at "Education Day."
b) Record the pitches thrown for an inning at "Education Day" and calculate the ratio of balls versus strikes thrown by the pitcher.

- **Use the Students' Experience and Activities from "Education Day" to Estimate Totals for an Entire Game or Season**

a) Use the announced attendance for "Education Day" to create calculations.
   * If the Aeros averaged the same attendance as "Education Day," what would their total attendance be for the season (based on a 71-game home season)?
   * If everyone paid $2 per ticket, how much money was collected for admission for the day?
   * Create a chart comparing how much money each student spent for the day. Calculate the average amount of money spent per student on food and souvenirs. Using that average, calculate how much the entire crowd spent.

b) Have students keep track of how they spent their time at the game. What percentage of their time was spent where?

- **Comparison of Student/Player Information**

a) Using Appendix E, calculate the average height, weight, and age for the Aeros players. Have students select a player and compare their height, weight, and age with those of that player. Students can calculate differences and find percent differences, etc.

- **Using Maps**

a) Using Appendix E, have students calculate the distance each Aeros player is from their hometown to Akron. Convert miles to yards to feet to inches or into metric units. Which players are the farthest from home or the closest to home?
b) Using Appendix K, determine how far the opposing team travels to get to the game.
c) Using an average speed, calculate how long it will take the visiting team to get to the game.
d) Use the same calculations to compare how long it will take your class to get to the game. Estimate the distance prior to the trip and compare the estimations to actual data. Compare this to the travels of the visiting team.

- **Mock Draft**

Using the team's roster sheet (Appendix E) and player statistics (Appendix A), divide students into teams and hold a mock draft of Aeros players.

a) Why were some players taken before others? Ask students to support their selections with the statistics given.
b) Did students use the statistical information to make sound decisions as to who to draft?
c) Discuss how this process is similar to real drafts.
d) How was it determined who received the 1st pick? What were the chances that your team was going to receive the first pick in the draft?

- **Calculating Baseball Statistics**

Using Appendix B, have students fill in the missing numbers along the Aeros' player statistics sheet.