

Teacher Guide for Baseball Statistics

Learning Objectives

Students will:

- Compute baseball statistics related to pitching and batting
- Solve problems related to baseball statistics
- Analyze different situations related to baseball statistics, and support a position based upon mathematics.

Materials

- Math journal or notebook
- Calculator (optional, but helpful)

Helping Questions

How might you begin?

Can you try some different numbers to see what would happen?

What do you notice? What else do you notice?

Have you asked one of your classmates if he or she could figure out a method to find the answer?

Why do you think that happens? (*Students may not know the answer to this question, but it helps them to think about it and try to explain it.*)

What did you try that didn't work? Can you learn something from that?

Can you explain it in a different way?

Mathematical Notes

On many of the questions in these lessons, students may have to do some numerical experiments (such as, "what happens if he had 19 hits? What about 20?") to figure out their answers. Encourage the students to write the results of experiments in their journals. Tracking experiments that don't work can teach them just as much as the experiments that do work.

On lesson 1, question 2, you don't come up with a whole number when you compute $0.256 \times 450 = 115.2$. Remember that batting averages are rounded, so $115/450 = 0.25555\dots$ which rounds to 0.256.

In Lesson 1, question 4, there isn't just one right answer. The students should pick an answer and be prepared to defend it with mathematics. In this problem, the .311 average comes from 14 hits. If the player strikes out next time, he'll have a 0.283 average, but if he hits next time, his average will be 0.326.

In Lesson 2, question 4 is quite challenging. Students should recognize that Dwight had 35 hits, and 55 bases. Then they'll need to experiment to come up with numbers that will help them get the right number of hits at the same time as the right number of bases.

In Lesson 3, question 3, the analysis that goes with the correct answer is this: Since Jesse's ERA was 3.00 after 57 innings, he averages 0.333 runs per inning ($0.333 = 3/9$), and has given up 19 runs so far. After this new lousy game, Jesse has given up $29+6 = 25$ runs in $57+5=62$ innings, making his

new ERA $(25/62)*9=3.63$. It is likely that students won't come up with the algebra to support their answer, but experiments with numbers are very good method for them to use.

In Lesson 4, question 3, the ERA of 3.06 came from 68 runs being scored, and the ERA of 4.41 came from 98 runs being charged against the pitcher in the 200 innings. Both pitchers allowed a total of $200*1.21 = 242$ walks plus hits, but one of the pitchers had more runs against him—so he probably allowed more doubles, triples, or home runs.

In Lesson 4, question 4, you can do this by trial and error—33 walks were allowed.

Assessment Options

- Look at the students' math journals. Ensure that they write down enough details so that they could look back and understand their work without having the lesson cards available.
- Students should be able to answer questions directly related to the baseball statistics presented in these lessons.

Extensions

In Lesson 2, question 4, students could analyze the possibilities and see which ones don't make too much sense. Does it make sense for a player to have more home runs than singles, for example?

A related lesson is at <http://illuminations.nctm.org/LessonDetail.aspx?id=L257>. Once students complete this lesson, they may want to play the game in that lesson (they will probably need some teacher assistance to understand the game).

Students could look up player statistics at http://mlb.mlb.com/stats/sortable.jsp?c_id=mlb&tcid=mm_mlb_stats, and compare their favorite players to each other. They could debate which batters are the best ones based on the different statistics.

Teacher Reflection

- How did the subject matter of baseball influence the students' interest in the topic?
- Did some students get frustrated if they couldn't find an answer immediately? What can you do to ease that frustration?
- Did some students work better individually or in pairs/small groups? What support can you provide to the students to work outside their comfort zone?
- What were the greatest challenges for the students?

Standards Addressed

Common Core State Standards (and Colorado Academic Standards in Mathematics)

1. Number Sense, Properties, and Operations
3. Data Analysis, Statistics, and Probability

NCTM (National Council of Teachers of Mathematics) Content Standards

Number and Operations

Algebra

Data Analysis and Probability

NCTM Process Standards

Problem Solving
Reasoning and Proof
Communication
Connections

References Used

Major League Baseball, *Baseball Basics: Abbreviations* at http://mlb.mlb.com/mlb/official_info/baseball_basics/abbreviations.jsp, accessed February 6, 2012.

This unit was written by Beth Schaubroeck, U.S. Air Force Academy, in conjunction with Colorado Springs School District 11. Please direct questions and comments to beth.schaubroeck@usafa.edu.