

## Baseball Lab

### Math Instructor Notes

- Course Level/Topic: Pre-algebra/Rational and decimal fractions
- Materials: calculators if desired
- Time Required: 20 minutes including instructions
- Brief Description: Using batting averages, students will create ratios and convert them to rounded decimals (3 places). In addition, they will take decimals and determine several possible equivalent ratios. Then using the relationship that batting average = hits/at bats, the students can use proportions or equations to find either the number of hits or the number of at bats for a given situations.
- Prerequisite Skills
  - Conversion between rational and decimal fractions
  - Rounding of decimals
  - Solving proportion problems
- General Notes:
  - The amount of explanation necessary will depend on the student's familiarity with the game of baseball.
  - The method for solving the last two problems can be either using proportions:  $\frac{\text{batting average}}{1000} = \frac{\text{hits}}{\text{at bats}}$  or using the decimal form of the batting average, solving the equation  $\text{batting average} = \frac{\text{hits}}{\text{at bats}}$ . The choice of method is left to the discretion of the instructor. If the students have not covered this topic the last two questions can be eliminated from the lab.
- Follow Up/ Discussion Questions:
  - Students who follow baseball may want to research their favorite player.
  - Similarly students who play or have friends or relatives who play may want to apply what they have learned to their real life interest.

# Baseball Lab

Name(s): KEY

Are you interested in being a sports caster or are you just interested in what those stats on your favorite player really mean? Perhaps you have a friend, sibling or child who is playing ball and you are interested in how they are doing.

Players are often rated by their batting average. This is the ratio of the number of times a player safely hits the ball divided by the number of times he is at bat. A safe hit means that he has reached one of the bases successfully after hitting the ball. An 'at bat' does not include the times the player is walked, hit by a pitch or gets to the base on an error because these allow him to reach the base without having to hit the ball.

To find the batting average:

- Create a ratio of 'hits' to 'at bats'.
- Convert this ratio to a decimal rounded to the nearest thousandth. This is how batting averages are reported in the newspaper.
- The decimal value is multiplied by 1000 when reported by the announcers on TV or radio.

**Example:** If a player has hit the ball safely 12 times in 96 at bats

- the batting average would be  $\frac{12}{96}$
- converted to a decimal it is 0.125, which is how it is reported in the paper
- multiplying by 1000 gives 125 which is how it is referred to by the announcers

If the decimal does not terminate in the thousandths place, it is rounded. For

examples:  $\frac{23}{135} \approx 0.1703$  which rounds to 0.170 or announced as 170  
 $\frac{19}{43} \approx 0.44186$  which rounds to 0.442 or announced as 442

**For the following information, determine the correct ratio and the batting average as reported by the newspaper and the announcers.**

1. Tony Gwynn has hit safely 18 times in 80 at bats.  $\frac{18}{80}$ ; 0.225; 225

2. Roberto Alomar has hit safely 20 times out of 88 at bats.  $\frac{20}{88}$ ; 0.227; 227

3. Alex Rodriguez has hit safely 24 times out of 95 at bats.  $\frac{24}{95}$ ; 0.253; 253

When you hear that your favorite player is batting 125, this represents an infinite number of possible 'hits' to 'at bat' ratios such as  $\frac{125}{1000}$  or  $\frac{5}{40}$  or  $\frac{250}{2000}$  or  $\frac{249}{1994}$  (this one rounds to 0.125).

4. Hank Aaron has a batting average of 325. List at least 3 possible ratios of 'hits' to 'at bats'.

possible answers:  $\frac{325}{1000}$ ,  $\frac{13}{40}$ ,  $\frac{65}{200}$

5. Barry Bonds has a batting average of 212. List at least 3 possible ratios of 'hits' to 'at bats'.

possible answers:  $\frac{212}{1000}$ ,  $\frac{106}{500}$ ,  $\frac{53}{250}$  others may required rounding

Given the batting average for a player and either the at bats or hits, the missing information can be found by using the relationship:

$\text{batting average} = \frac{\text{hits}}{\text{at bats}}$ , where the batting average can be either the decimal value or the rational fraction equivalent.

Using this relationship, solve the following:

6. If your favorite player has a batting average of 125 and has been to bat 104 times, how many hits did he have? 13 hits

7. If your favorite player has a batting average of 0.255 and hit 24 times, how many at bats did he have? (round to the whole number) 94 at bats