



## Lesson 1: Batting Average

Objective: Students will be able to:

- Identify the meaning of abbreviations related to player statistics on baseball cards.
- Recognize statistics as whole numbers or decimals.
- Set up fractions representing batting averages and other similar averages.
- Practice converting fractions to decimals.
- Round decimal numbers.

Time Required: 1 class period

Advance Preparation:

- Set up 4 stations around the classroom as follows:
  - o Station 1: Quarters or other small change
  - o Station 2: A pair of dice
  - o Station 3: A deck of playing cards
  - o Station 4: Marbles of different colors in an opaque bag

Materials Needed:

- Baseball cards – enough for each student to have one
- Copies of the “Hall of Fame Hitters” worksheet (included) – 1 for each student
- Prepare packets of “Day 1 Station Worksheets” (included). Make enough packet copies for students to work in pairs or in small groups.
- Scrap Paper
- Graph Paper
- Calculators
- Pencils

Vocabulary:

**Batting Average** – A measure of a batter’s performance, calculated as the number of hits divided by the number of times at bat

**Statistics** - A branch of mathematics dealing with the collection, analysis, interpretation, and presentation of numerical data



## Lesson

1. Begin by asking students to name some of their favorite sports.
2. Choose an example from the sports named by students. Ask, "In this sport, how do you know which players are the best (or the best at their position)?"
3. Discuss that in almost every sport, players are evaluated or judged using numbers and mathematics. Players compete for distance, speed, goals scored, etc. This is especially easy to see during sporting events like the Olympic Games where the smallest differences in numbers could mean winning a medal or winning nothing.
4. Ask students, "How are baseball players evaluated or judged? How do we keep track of a player's success at the plate or on the mound?"
5. Give each student one baseball card and have students examine the information on the back of each. Ask, "What sort of information is available on a baseball card?"  
*Information examples include: player height, player weight, dominant hand, birthday, team, special accomplishments, and statistics.*
6. Point out that baseball has its own language. There are codes for different **statistics** listed on the back of the card. For example, BA = batting average, G = games played, AB = at bats, R = runs, H = hits, 2B = doubles, 3B = triples, HR = home runs, RBI = runs batted in, SB = stolen bases.
7. Ask students to identify which statistics are represented by whole numbers, and which are represented by decimals.
8. Discuss that all of these statistics, and others not listed on the cards, are used by team owners and managers when they are evaluating a player's talent.
9. Explain that students will be looking more closely at one of the most common baseball statistics: **batting average**

10. Discuss that this statistic is used to describe how successful a batter is at getting hits (singles, doubles, triples, home runs) when he or she gets a chance to bat. One complication is that many times that a batter goes up to bat, he is not given a chance to get a hit. Sometimes the player is walked or gets hit by a pitch, and sometimes the player is asked to make an out to benefit his team by helping a teammate advance around the bases (a “sacrifice bunt” or “sacrifice fly”).
11. Explain that a batting average is calculated by first counting the number of times that a batter reaches base by getting a hit. This number of hits is then divided by the number of times that he gets a chance to hit (an “At Bat”).
12. Write down the formula for batting average on the board: Hits (H)/At Bats (AB).
13. In a typical season, a good player, who plays in most of his or her team’s games, might get about 180 hits in about 600 at bats. This would give the player a batting average of  $180/600$  or .300.
14. Batting average is usually rounded off to the nearest thousandth (three digits after the decimal) and most people don’t bother writing the leading zero. In fact, most baseball statisticians do not mention the decimal point. If a player has a batting average of 0.256, we would say that he or she is a “two-fifty-six hitter.” Review decimal places and how to round decimal numbers.
15. Have students locate the columns for Hits (H) and At Bats (AB) on their baseball cards.
16. Ask students to share some examples of their players’ numbers of hits and at bats. For each example, set up the numbers as a fraction. *For example, a student reports that Nick Swisher had 117 hits and 422 at bats. You would set up the formula as  $117/422$ .*
17. Demonstrate how a player’s batting average is determined. Work through the examples provided by students, first setting up the problem, and then converting each fraction to a decimal rounded to the nearest thousandth.
18. Provide students with “Hall of Fame Hitters” worksheets (included) for practice **OR** you may assign this worksheet for homework. Have students determine each player’s batting average.



## Activity

1. Introduce the activity. Explain that students will be working together to figure out their own averages for performing different activities.
2. Divide students into pairs or small groups. Provide each pair or group with a prepared worksheet packet (included).

3. Explain instructions for each station you set up in advance of this lesson:

### Station 1: Quarters

*The goal of this station is for students to see how often they can spin a quarter or other coin and have it turn up "heads."*

Have one student spin and another student record the results of each spin.

**Station 1 Average = Number of "heads" results/Total number of spins**

### Station 2: Dice

*The goal of this station is for students to see how often they can roll the pair of dice and have the roll result in 2 even numbers.*

Have one student roll the dice and another student record the results of each roll.

**Station 2 Average = Number of rolls resulting in 2 even numbers/Number of total rolls.**

### Station 3: Playing Cards

*The goal of this station is for students to see how often they can randomly draw a red card.*

Students should mix up the deck of cards before beginning this activity.

Have one student draw a card at random and another student record the results of each draw.

**Station 3 Average = Number of red cards drawn/Number of total draws.**

#### Station 4: Marbles

*The goal of this station is for students to see how often they can randomly draw a blue marble.*

Have one student choose a marble from the bag at random. Have another student record the color of each chosen marble.

**Station 4 Average = Number of blue marbles/Number of marbles chosen.**

4. Students are to work through each station, documenting results and determining the average rate of success for each station. The total number of times the task is accomplished is divided by the number of times the task was attempted to get the average success rate for that particular task.
5. Remind students to round each average to the nearest thousandth.
6. Assist students with stations as necessary.

#### **Conclusion:**

To complete this lesson and check for understanding, come together as a class and have students compare the results of the different stations. What were group averages for each station? Discuss meaningful comparisons from class data. Have students create graphs showing the results of each station.

**\*NOTE\* Collect and save completed packets of “Day 1 Station Worksheets” for use in Lesson 2.**



## (Day 1) Station 1: Quarters

Names: \_\_\_\_\_

\_\_\_\_\_

### Instructions:

- 1) Choose a recorder for the group.
- 2) Choose one person who will spin the quarter 10 times.
- 3) The recorder should place a check in the box showing if each spin resulted in "heads" or "tails".

Spin #	Heads	Tails
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

- 4) Count the number of times the spin turned up "heads." \_\_\_\_\_
- 5) Set up a **fraction** showing the average number of spins that turned up "heads."  
$$\frac{\text{Number of "heads" results}}{\text{Total number of spins}} =$$
- 6) Calculate the **average** number of spins that turned up "heads." \_\_\_\_\_



## (Day 1) Station 2: Dice

### Instructions:

- 1) Choose a recorder for the group.
- 2) Choose one person who will roll the pair of dice 9 times.
- 3) The recorder should place a check in the box if the roll resulted in 2 even numbers.

Roll #	2 Even Numbers
1	
2	
3	
4	
5	
6	
7	
8	
9	

- 4) Count the number of times the roll came up as 2 even numbers. \_\_\_\_\_
- 5) Set up a **fraction** showing the average number of rolls that turned up 2 even numbers:  
$$\frac{\text{Number of rolls with 2 even numbers}}{\text{Total number of rolls}} =$$
- 6) Calculate the **average** number of rolls that turned up 2 even numbers: \_\_\_\_\_



### (Day 1) Station 3: Cards

**Instructions:**

- 1) Choose a recorder for the group.
- 2) Choose one person who will mix up the cards, then choose 7 cards without looking.
- 3) The recorder should place a check in the box showing if each card was a red card or a black card.

Draw #	Red	Black
1		
2		
3		
4		
5		
6		
7		

- 4) Count the number of times a red card was chosen. \_\_\_\_\_
- 5) Set up a **fraction** showing the average number of times that a red card was chosen:

$$\frac{\text{Number of red cards}}{\text{Total number of cards drawn}} =$$

- 6) Calculate the **average** number of times a red card was chosen: \_\_\_\_\_





## (Day 1) Station 4: Marbles

### Instructions:

- 1) Choose a recorder for the group.
- 2) Choose one person who will choose 11 marbles from the bag without looking.
- 3) The recorder should place a check in the box showing whether or not the marbles chosen were blue or another color.

Choice #	Blue	Another Color
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

- 4) Count the number of times a blue marble was chosen. \_\_\_\_\_
- 5) Set up a **fraction** showing the average number of times that a blue marble was chosen:

$$\frac{\text{Number of blue marbles chosen}}{\text{Total number of marbles chosen}} =$$

- 6) Calculate the **average** number of times a blue marble was chosen: \_\_\_\_\_



## Hall of Fame Hitters

Name: \_\_\_\_\_

Date: \_\_\_\_\_

All of the players below have been elected to the Baseball Hall of Fame. You have been given the number of at bats and hits each one had during his career. From those figures, determine each player's "lifetime" batting average.

Player	Position	At bats	Hits	Batting Average Fraction	Batting Average Decimal
Orlando Cepeda	First Base	7927	2351		
Rod Carew	Second Base	9315	3053		
Ty Cobb	Center Field	11434	4189		
Joe DiMaggio	Center Field	6821	2214		
Hank Aaron	Right Field	12364	3771		
Ozzie Smith	Shortstop	9396	2460		
Ted Williams	Left Field	7706	2654		
Brooks Robinson	Third Base	10654	2848		
Dave Winfield	Right Field	11003	3110		
Babe Ruth	Right Field	8399	2873		

**Hall of Fame Hitters Answer Key**

<b>Player</b>	<b>Position</b>	<b>At bats</b>	<b>Hits</b>	<b>Batting Average Fraction</b>	<b>Batting Average Decimal</b>
Orlando Cepeda	First Base	7927	2351	2351/7927	.297
Rod Carew	Second Base	9315	3053	3053/9315	.328
Ty Cobb	Center Field	11434	4189	4189/11434	.366
Joe DiMaggio	Center Field	6821	2214	2214/6821	.325
Hank Aaron	Right Field	12364	3771	3771/12364	.305
Ozzie Smith	Shortstop	9396	2460	2460/9396	.262
Ted Williams	Left Field	7706	2654	2654/7706	.344
Brooks Robinson	Third Base	10654	2848	2848/10654	.267
Dave Winfield	Right Field	11003	3110	3110/11003	.283
Babe Ruth	Right Field	8399	2873	2873/8399	.342

