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Statistics & Fantasy Baseball

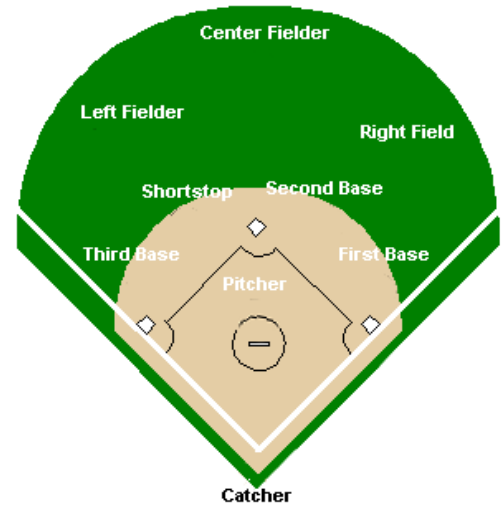


Introduction: During this unit, you will become managers of your very own baseball team. You will learn how to use decimals and ratios to analyze key statistical data, draft players, make trades, construct a lineup, and play simulated games. All of this will occur as we study the mathematics of baseball.

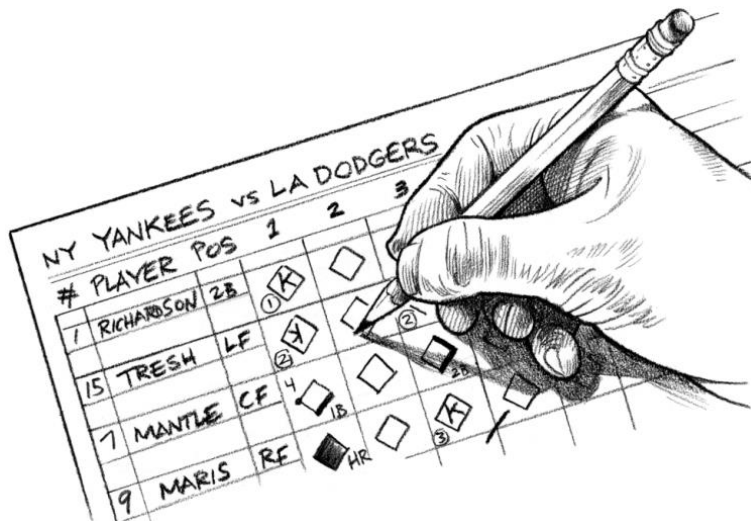
Baseball Basics: Baseball is a game played between two teams. On the field there will always be nine defensive players and one to four offensive players.

The game is divided into nine innings, each divided into two half innings called the top and bottom of the innings. In the top half of the inning, the players of one team are on offense while they go up to bat and attempt to get on base and score runs; the other team plays defense out in the field, attempting to stop the offensive team from scoring. In the bottom half, the teams swap places. The team with the most runs at the end of nine innings is the winner of the game.

The game is played on a large ice cream cone looking field. The infield is the diamond-shaped playing field where each corner is one of the bases (home plate, first base, second base and third base). In the middle of this is the pitcher's mound, where the pitcher throws the balls to the batter. The grassy area beyond the infield is called the outfield.



During an inning, the pitcher throws the ball toward home plate. The batter attempts to hit the ball, hoping that none of the defensive team members will be able to catch the ball or get it back to him before he reaches a base. If he is able to run around all the bases and return to home plate before the ball gets back to him, he scores a run. If the ball is caught by a player, or can be thrown to first base before he touches the base, then the batter is out. A batter is also out if he strikes out meaning he fails to hit the baseball three times during the pitching (We will get into the details later). The offensive team's time at bat is over when they gets three outs.



Source: Tuma, Rick. How to Keep Score at the Ballpark. 2011. Print. The Chicago Tribune.

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Baseball Glossary – Here is a look at some of the basic ways fans analyze a team. For each term, write the definition **In Your Own Words (IYOW)**.

<ul style="list-style-type: none">• Games (G) – The number of games the player appeared in for the team this season
<ul style="list-style-type: none">• Plate Appearances (PA) – This is the number of times a batter appears at the plate ready to swing.
<ul style="list-style-type: none">• At-Bats (AB) – This is the number of plate appearances minus the number of walks (will get to that in just a minute).
<ul style="list-style-type: none">• Runs (R) – The # of total times the player crossed home plate and got a point for his team during the game or season.
<ul style="list-style-type: none">• Hits (H) – The number of total hits a player got during the game or season.
<ul style="list-style-type: none">• Batting Average (BA or Avg.) – This average is the ratio of hits to at-bats. $BA = \frac{H}{AB}$
<ul style="list-style-type: none">• Double (2B) – The number of hits in which the player reached second base safely.• Triple (3B) – The number of hits in which the player reached third base safely.
<ul style="list-style-type: none">• Home Runs (HR) – The number of home runs the player hit during the game or season.
<ul style="list-style-type: none">• Runs Batted In (RBI) – This means that other players scored runs due to the player's hitting performance.
<ul style="list-style-type: none">• Walks or Base on Balls (BB) – The number of times a batter gets to go to first base as a result of four balls being pitched outside the strike zone.
<ul style="list-style-type: none">• On Base Percentage (OBP) – This is a measure of how many times a batter reaches base for a hit or walk. $OBP = \frac{H + BB}{AB + BB} = \frac{H + BB}{PA}$
<ul style="list-style-type: none">• Strikeouts (SO) – The number of times a batter has swung and missed on three pitches.
<ul style="list-style-type: none">• Stolen Bases (SB) – The number of times a base runner has successfully advanced to the next base without the help of the hitter.
<ul style="list-style-type: none">• Total Bases (TB) – This is how many bases a player crossed from just hitting the ball.
<ul style="list-style-type: none">• Slugging (SLG) - Slugging percentage is a measure of the power of a hitter. $SLG = \frac{1(1B) + 2(2B) + 3(3B) + 4(HR)}{AB}$

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Directions: The following data is for six of the greatest hitters of all time. Fill in the rest of the chart, then answer the questions that follow.

Player	G	AB	H	BB	$BA = \frac{H}{AB}$	$OBP = \frac{H + BB}{AB + BB}$	HR	HR:H	RBI	RBI:G
Shoeless Joe Jackson	1332	4981	1772	519	$BA = \frac{1772}{4981}$ = 0.356	$OBP = \frac{1772 + 519}{4981 + 519}$ = $\frac{2291}{5500}$ = .417	54	$= \frac{54}{1772}$ = 0.030	785	$= \frac{785}{1332}$ = 0.589
Ty Cobb	3034	11434	4189	1249			117		1938	
Lou Gehrig	2164	8001	2721	1508			493		1995	
Rogers Hornsby	2259	8173	2930	1038			301		1584	
Babe Ruth	2503	8399	2873	2062			714		2214	
Ted Williams	2292	7706	2654	2021			521		1839	

Source: "Baseball Encyclopedia of MLB Players | Baseball-Reference.com." *Baseball-Reference.com*. Sports Reference LLC, 2000-2014. Web.

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Questions:

A. In Your Own Words (IYOW), what is Batting Average (BA)?

B. Which three players have the best BA?

(1)

(2)

(3)

C. IYOW, what is On Base Percentage?

D. Which three players have the best OBP?

(1)

(2)

(3)

E. Rank these players by their BA in descending order (highest to lowest).

(1) _____

(2) _____

(3) _____

(4) _____

(5) _____

(6) _____

F. IYOW, what is Runs Batted In? And why is it important to a player and team?

G. Using the data, which player appears to be the best player in history? Why?

H. CHALLENGE – Last week David Wright had a batting average of .350. After the next night's game, Wright had 3 hits in 5 at bats, his average increased to .352. Determine the number of at bats and hits Wright has altogether.

I. At different times in the season, when David Wright had 3 hits for 5 times at bat, his batting average jumped from .350 to .351, from .350 to .365, and from .350 to .355. Explain why the increase is not the same amount each time.