



Lesson 5 – Post-Visit Other Baseball Statistics

Objective: Students will be able to:

- Review that there are many different statistics and averages that show an athlete's success.
- Examine statistical data from five baseball players to determine their home run averages.
- Use statistical data to try to predict a player's future success.

Time Required: 1 class period

Materials Needed:

- Copies of the "Home Run Statistics" sheet for each student
- Calculators
- Scrap Paper
- 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 and analysis of numerical data



Applicable Common Core State Standards:

CCSS.Math.Content.3.OA.A.2 Interpret whole-number quotients of whole numbers,

CCSS.Math.Content.3.OA.A.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

CCSS.Math.Content.3.OA.A.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers.

CCSS.Math.Content.3.OA.B.5 Apply properties of operations as strategies to multiply and divide.

CCSS.Math.Content.3.OA.B.6 Understand division as an unknown-factor problem.

CCSS.Math.Content.3.OA.C.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations.

CCSS.Math.Content.3.NBT.A.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

CCSS.Math.Content.3.NF.A.1 Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.

CCSS.Math.Content.3.NF.A.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

CCSS.Math.Content.4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.



Applicable Common Core State Standards (Continued):

CCSS.Math.Content.4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.

CCSS.Math.Content.4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

CCSS.Math.Content.4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100.

CCSS.Math.Content.5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.

CCSS.Math.Content.5.NBT.A.3 Read, write, and compare decimals to thousandths.

CCSS.Math.Content.5.NBT.A.4 Use place value understanding to round decimals to any place.

CCSS.Math.Content.5.NBT.B.6 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

CCSS.Math.Content.5.NF.B.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.



Lesson & Activity

1. To begin this lesson, review the formula for batting average and review that a player's batting average indicates his or her success at a hitter. Also discuss that the most successful major league batters in history have completed a whole season with a batting average around .400.
2. Ask students to brainstorm ways that averages might relate to other baseball skills. Ask, "What are some activities that baseball players are expected to perform on the field at which they might not be successful every time." *Possible answers include: pitching a winning game, pitching many strikes, successfully stealing a base, etc.*
3. Discuss that there could be (and there are) many different types of statistics for all sorts of activities that take place on the field. Students will now take a closer look at players' home run averages.
4. Break students into small groups and give each the home run statistics attached at the end of this lesson. The statistics represent number of home runs hit by power hitters Babe Ruth, Henry "Hank" Aaron, Mike Schmidt, Ken Griffey, Jr., and Albert Pujols during their careers (or career-to-date).
5. Have students calculate how the average number of home runs hit each year by each player during his career (or career-to-date). You may need to review that this average can be found by adding up the total number of home runs and dividing that number by the number of years played.
6. Ask students to discuss the following: "If Albert Pujols plays 10 more seasons, can you use his current HR totals and average to predict how many home runs he will hit in his career?"



Statistics: Batter Up! - Level 1

7. Now have students look at the careers of the other players listed. Ask, “Did they consistently meet their average number of HR’s in the last few years of their careers? How do your observations of what happened to their numbers as they neared the end of their careers alter your predictions for Pujols?” Have students share their observations and predictions with the larger group.

Conclusion:

To complete this lesson and check for understanding, have students pretend to be newspaper sportswriters and create articles about a recent baseball game, either real or fictional. Have students use vocabulary terms from this unit that describe the game's action and its statistical highlights.




Home Run Statistics

Babe Ruth		Hank Aaron		Mike Schmidt		Ken Griffey, JR.		Albert Pujols	
Year	HR	Year	HR	Year	HR	Year	HR	Year	HR
1914	0	1954	13	1972	1	1989	16	2001	37
1915	4	1955	27	1973	18	1990	22	2002	34
1916	3	1956	26	1974	36	1991	22	2003	43
1917	2	1957	44	1975	38	1992	27	2004	46
1918	11	1958	30	1976	38	1993	45	2005	41
1919	29	1959	39	1977	38	1994	40	2006	49
1920	54	1960	40	1978	21	1995	17	2007	32
1921	59	1961	34	1979	45	1996	49	2008	37
1922	35	1962	45	1980	48	1997	56	2009	47
1923	41	1963	44	1981	31	1998	56	2010	42
1924	46	1964	24	1982	35	1999	48	2011	37
1925	25	1965	32	1983	40	2000	40		
1926	47	1966	44	1984	36	2001	22		
1927	60	1967	39	1985	33	2002	8		
1928	54	1968	29	1986	37	2003	13		
1929	46	1969	44	1987	35	2004	20		
1930	49	1970	38	1988	12	2005	35		
1931	46	1971	47	1989	6	2006	27		
1932	41	1972	34			2007	30		
1933	34	1973	40			2008	18		
1934	22	1974	20			2009	19		
1935	6	1975	12			2010	2		
		1976	10						

Special Thanks to Thomas E. Campbell, 6-12 Math Teacher & Dean of Faculty at Waynflete School in Portland, ME – and – Daniel T. Crocker Math Teacher at Hall-Dale Middle School in Farmingdale, ME for their contributions to this lesson.