Classroom Activities:Computing the Games Behind Statistics

David R Duncan * Bonnie H. Litwiller†

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Abstract

Teachers are always on the lookout for real-world settings in which arithmetical formulas can be meaningfully employed. We will exemplify this using the sports concept of "games behind."

To explain the games behind statistics we employ the concept of "nominally tied." Let W and L represent respectively the number of games won and lost by a given team. Two teams are nominally tied if WL is the same number for both teams. This would certainly occur if two teams had identical won-lost records. But it can also occur in cases where two teams have played different numbers of games. For instance, if team A has won 10 games and lost 3 while team B has won 11 games and lot 4, A and B are nominally tied. In both cases $WL = 7$. In the standings, however, A would be ahead of B since As winning percentage ($\frac{10}{13} = .769$) is better than Bs winning percentage ($\frac{11}{15} = .733$). We will define the games behind statistics as follows: The number of games that team B is behind team A is the number of consecutive games in which team B would have to beat team A so that they would be nominally tied.

Example I

Team	W	L
A	10	3
B	8	7

Team B is three games behind team A because three consecutive victories by B over A would make them nominally tied with records of 10-6 and 11-7.

Example II

Team	W	L
A	10	3
B	9	7

If B defeats A two consecutive times, their records would be 10-5 and 11-7 and A is still ahead of B. If B defeats A three consecutive times, their records would be 10-6 and 12-7; B is now ahead of A. Since neither two nor three wins would produce a nominal tie, B is said to be $2\frac{1}{2}$ games behind A. This half-game situation is sometimes mystifying to fans.

We will now provide two different computational methods for determining games behind, together with their rationale.

*University of Northern Iowa

†University of Northern Iowa

Method I

Example I

Team	W	L
A	10	3
B	8	7

Steps to compute:

1. Compute WL for each team

$$\begin{aligned} D_A &= W_A - L_A = 10 - 3 = 7 \\ D_B &= W_B - L_B = 8 - 7 = 1 \end{aligned}$$

2. Compute $D_A - D_B = 7 - 1 = 6$
3. Each victory of B over A will increase D_B by 1 and decrease D_A by 1, thus decreasing $D_A - D_B$ by 2.

Since the teams are nominally tied when $D_A = D_B$ or $D_A - D_B = 0$, $\frac{(D_A - D_B)}{2}$ indicates the number of victories by B necessary to catch A. Consequently, $\frac{(DADB)}{2}$ is the number of games B is behind A. In this example $\frac{(DADB)}{2} = \frac{6}{2} = 3$. B is 3 games behind A.

Example II

Team	W	L
A	10	3
B	9	7

1. $D_A = 10 - 3 = 7$ and $D_B = 9 - 7 = 2$
2. $D_A - D_B = 7 - 2 = 5$
3. $\frac{(D_A - D_B)}{2} = \frac{5}{2} = 2\frac{1}{2}$

B is $2\frac{1}{2}$ games behind A.

Example III

Team	W	L
A	10	3
B	5	8

1. $D_A = 10 - 3 = 7$ and $D_B = 5 - 8 = -3$
2. $D_A - D_B = 7 - (-3) = 10$
3. $\frac{(D_A - D_B)}{2} = \frac{10}{2} = 5$ (Note the use of signed numbers.)

Example IV

Team	W	L
A	7	10
B	6	12

1. $D_A = 7 - 10 = -3$ and $D_B = 6 - 12 = -6$
2. $D_A - D_B = -3 - (-6) = 3$
3. $\frac{(D_A - D_B)}{2} = \frac{3}{2}$ or $1\frac{1}{2}$

Method II

We will now describe another method for computing games behind.

Example I

Team	W	L
A	10	3
B	8	7

Steps to compute:

1. $W_A - W_B = 10 - 8 = 2 = D_W$
2. $L_B - L_A = 7 - 3 = 4 = D_L$
3. $(D_W + D_L)/2 = \frac{2+4}{2} = 3$

B is still 3 games behind A:
To verify this procedure, note that:

$$\begin{aligned}
\frac{(D_W + D_L)}{2} &= \frac{[(W_A - W_B) + (L_B - L_A)]}{2} \\
&= \frac{[(W_A - L_A) + (L_B - W_B)]}{2} \\
&= \frac{[(W_A - L_A) - (W_B - L_B)]}{2} \\
&= \frac{(D_A - D_B)}{2}
\end{aligned}$$

This is the formula from Method I.

Example II

Team	W	L
A	10	3
B	9	7

1. $10 - 9 = 1 = D_W$
2. $7 - 3 = 4 = D_L$
3. $(D_W + D_L)/2 = \frac{1+4}{2} = 2\frac{1}{2}$

Example III

Team	W	L
A	10	3
B	5	8

1. $D_W = 10 - 5 = 5$
2. $D_L = 8 - 3 = 5$
3. $(D_W + D_L)/2 = 5$

Example IV

Team	W	L
A	7	10
B	6	12

1. $D_W = 7 - 6 = 1$
2. $D_L = 12 - 10 = 2$
3. $(D_W + D_L)/2 = 1\frac{1}{2}$

The reader should check the games behind statistics in the newspapers using the techniques of either Method I or II. Although the statistic is commonly reported for each team relative to the first-place team, it can equally well be employed for any two teams. For instance, you might wish to calculate the number of games that the third-place team is behind the second-place team.