One example of a weighted average in sports is a batter’s slugging average (or percentage) in baseball.

1. What is the purpose of a slugging average (SLG)? (i.e. what is it used for, how is it used, etc.)
   - Measures the productivity of a hitter. Helps measure a player’s offensive production alongside on-base percentage.
   - Gives weight to extra base hits. Ex. doubles have a weight of 2.

2. How do you calculate the slugging average for a player?
   \[ \text{SLG} = \frac{(1B + (2 \times 2B) + (3 \times 3B) + (4 \times HR))}{AB} \]
   \[ \text{OR} \quad \text{SLG} = \frac{1S + 2D + 3T + 4HR}{AB} \]
   *Walks not included*

3. Who are some notable players throughout history that have some of the highest slugging averages to date?
   - Babe Ruth = 0.6897
   - Ted Williams = 0.6238
   - Lou Gehrig = 0.6324
   - Jimmie Foxx = 0.6093
   - Barry Bonds = 0.6069
   - Hank Greenberg = 0.6090

4. Research the slugging averages of some current-day professional baseball players. Then research the slugging averages of some college players. Based on your findings, which college players should professional scouts be watching? Support your answer with statistics.
   - **MLB**
     1. Mike Trout = 0.5667
     2. Albert Pujols = 0.5629
     3. Giancarlo Stanton = 0.5548
     4. Miguel Cabrera = 0.5537
     5. Ryan Braun = 0.5409
   - **College**
     1. Alex Faedo
     2. Jeren Kendall
     3. JB Bukauskas
     4. Brendan McKay
     5. Kyle Wright (looked at for more than just SLG)
5. Find the slugging average for a player with the following statistics:

\[
SLG = \frac{60 + 2(140) + 3(4) + 4(16)}{320} = \frac{224}{320} = 0.700
\]

6. **Reflection** Is it possible to have a slugging average of more than 1? Theoretically, what is the highest possible value for the slugging average? Could a player ever achieve this value during a baseball season? Give an example or explain why none exist.

Yes, the highest possible SLG is 4. For example, if a player hit 4 home runs for their first at bat for the season, their SLG would be 4.00. However, this normally doesn't last as the season progresses.

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**Extension** A slugging average of .500 or higher is considered a sign of an excellent player. Using 400 at-bats, what is the maximum number of singles a player could have with a slugging average between .500 and .700? Justify your answer.

\[
0.500 \leq \frac{s}{400} \leq 0.700
\]

\[
0.500 \leq \frac{s}{400} \leq 0.700
\]

\[
s \geq 200
\]

\[
s \leq 280
\]

**Extension** Suppose a player had 4 triples and a batting average of .300 in 400 at-bats (batting average = hits/at-bats). Determine one combination of singles, doubles, and home runs that gives this player a slugging average higher than .500. (Multiple Correct Answers)

- **What problem(s) are you trying to solve?**
  - Find one combination of singles, doubles, HRs that gives a player a SLG higher than 0.500.

- **What do you know?**
  - Player hits 4 triples.
  - 400 at-bats.
  - Batting average of 0.300.
  - \( SLG = \frac{1S + 2D + 3T + 4HR}{AB} \)

- **What do you need to know?**

- **Solution (work shown)?**

\[
0.300 = \frac{\text{hits}}{400}
\]

\[
\text{hits} = 0.300(400) = 120 \text{ total hits}
\]

\[
120 - 4 \text{triples} = 116 \text{ hits for singles, doubles, HRs}
\]

\[
\frac{1S + 2D + 3(4) + 4HR}{400} > 0.500
\]

Turn over
\[ 1S + 2D + 4HR > 108 \]
\[ S + D + HR = 116 \]
\[
\begin{align*}
50 \text{ singles} \\
50 \text{ doubles} \\
16 \text{ HR}
\end{align*}
\]

One possible combination

\[
(50) + 2(50) + 4(16) > 108 \\
50 + 100 + 64 > 108 \\
214 > 108 \checkmark
\]