Biophysics Flash Cards

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Experimental Error Flash Cards

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Instructions
Print the flash cards from the templates on pages 2-3. Each page has 4 flash cards. The concept is on the left side of the template and the explanation is on the right side.

To create individual flash cards:
1) Trim the margins on the top, bottom, and sides of the page where you see the scissors icon.
2) Cut between the cards where you see the scissors icon to create individual cards.
3) Fold the cards in half at the dashed "Fold" line and align the front and back edges of each card.
4) Each template makes 4 flash cards of 2.5 x 3.75 inch (H x W). There are 8 cards in a set.

Objectives & Grade Level
Teach students basic concepts about biophysics. Appropriate for middle school to high school students. Students can use the flash cards singly or in groups by studying the cards and testing themselves or others on concepts from the cards.

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Mean Value

Average of values: sum of all values divided by number of values (n)

Standard Error of Mean

A measure of how much measurements differ from one another and from the mean, given as sem:

$$\text{sem} = \frac{\text{SD}}{\sqrt{n}}$$

SD = Standard Deviation
n = number of values

Standard Deviation

$$\text{SD} = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$

n = number of values
x = each value in data set
\( \bar{x} \) = mean of values in data set

Gaussian Distribution

A normal or Poisson distribution

www.biophysics.org/biophysics-basics
| **Median** | Middle value of a set of numbers or data set  
\[
\begin{align*}
3 & 5 & 6 & 10 & 18 & 25 & 26 \\
\text{Median} & = 10 \\
3 & 5 & 6 & 8 & 10 & 18 & 25 & 26 \\
\text{Median} & = (8 +10)/2 = 9
\end{align*}
|  
| **Outlier** | A data point that is very different from the rest: lies outside the Gaussian distribution  
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| **Replicates** | Repeating tests to limit the effects of experimental error  
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| **Experimental Error** | Differences from measurement to measurement  
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