

Name: _____

Sheet 811: Scoring a decathlon with z-scores

In a recent decathlon (really a three-a-thlon), there were three events in which **ten** competitors competed. The chart shows three competitors out of many. Remarkably, they each have a 1st, 2nd, and 3rd place finish. Who was the overall winner?

We must compare three fundamentally different events involving different units. How can we do this? Standard deviation is an answer. Standard deviation is the universal yardstick that we use in statistics.

By knowing the mean performance and standard deviation in each event, we can compute how far each performance is from the mean in number of standard deviations (called *z*-scores). Note that *z*-scores can be negative. They are unit-less and can be compared across different events. Here are the results of the three events.

Competitor	100 m Dash	Shot Put	Long Jump
Norm	10.1 sec	66'	26'
Cliff	9.9 sec	60'	27'
Oscar	10.3 sec	63'	27'3" (convert to decimal)
Mean of all ten competitors	10.0 sec	60'	26'
Standard Deviation of ten competitors	.2 sec	3'	6" (convert to decimal)

1. Calculate each of the competitors' *z*-scores in each of the events.

$$z = \frac{(\text{PERFORMANCE} - \text{mean})}{\text{standard deviation}} = \frac{(x - \bar{x})}{\text{SD}}$$

Competitor	100 m Dash	Shot Put	Long Jump	
Norm				
Cliff				
Oscar				

2. Using *z*-scores, calculate the overall winner. How?

3. Who would *you* award the gold medal to?

4. Using *z*-scores, who turned in the most remarkable performance in one event?

5. How are decathlons scored in real-world track and field meets?

6. What's the main difference between the scoring systems? Which method do you like better and why? Which method is best suited for a competition on our school grounds?