Jonathan Quang 9/20/14

1WW

Lab #2 Write Up=

Question I: Are boys or girls taller?

Hypothesis I: Boys will be taller because they encounter their final growth spurt (puberty) later than girls. Males and females tend to grow roughly at the same rate, but after puberty, growth becomes much more slower.

Materials: Meter sticks

Procedure:  
1. Split into groups of four.  
2. Measure the height of everyone in the group.  
3.Record the height and gender of everyone in the group in the data table and class sheet.

Data:   
Mode= 157 cm  
 Median= 165.5cm   
Male mean= 171.1277778 cm  
Female mean= 162.1833331 cm  
 Male standard deviation = 8.788616003... cm  
Female standard deviation= 5.292006628... cm

Answers:

4a) Female student height displays bimodal data because there are two peaks, the 155-159.9cm and the 160-169.9 cm range. Male student height displays bimodal data. The peaks are at 165-169.9 cm and 175-179.9. If more data was available, a better conclusion could be drawn regarding the male and female students.  
4b) The groups are indeed different. More ninth grade females tend to be shorter than ninth grade men. Most females are in the 155 - 159.9cm category. However, no female is taller than 174.9 cm. Men tend to be more spread out among the ranges.   
4c) I am only somewhat confident in my answer because the sample size is not large enough. The current sample only represents one class of students. There may be outliers in this set

5a). The standard deviations between the ninth grade girls and the ninth grade boys among the four classes show that the standard deviation between ninth grade girls is less than the standard deviations between the boys. The standard deviations for girls are 5.292006628; 6.451370538; 6.525512064; and 4.874990842. The standard deviations for boys are 8.788616003; 7.749525602; 6.427234406; and 6.087077675 This implies that the girls are closer in height than boys.

5b) The bigger data set shows that the groups are different. Girls are close together in height, but generally shorter. I am still only somewhat confident with this conclusion because there are not students to measure in the female section. There are more males than females among the classes.

Question II: Which grain will have the greatest precision?

Hypothesis II: Measurement of the mass of rice grains will have the greatest precision because the differences between each grain are small enough to not make a difference.

Materials: balances, weigh boats, and grains.

Procedure:  
1. Place the weigh boat on the balance.  
2.Count out ten grains.  
3.Record the mass of the ten grains minus the weigh boat.  
4.Repeat steps 2-3 two more times, finding the mean of the three trials.  
5.Count out one hundred grains.  
6.Record the mass of the hundred grains.  
7.Repeat steps 5-6 two more times, finding the mean of the three trials.  
8.Count one grain.  
9.Record the mass of a single grain.  
10.Repeat 8-9 a total of three times, then find the mean of the three trials.  
11.Repeat step 10 a total of ten times.

Data: Grain Mass of Rice

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 10 grains | 100  grains | Grain 1 | Grain 2 | Grain 3 | Grain 4 | Grain 5 | Grain 6 | Grain 7 | Grain  8 | Grain  9 | Grain  10 |
| Trial 1 (grams) | 0.6 | 2.1 | 0.1 | 0.3 | 0.3 | 0.3 | 0.15 | 0.2 | 0.2 | 0.1 | .25 | .25 |
| Trial 2 (grams) | 0.6 | 2.2 | 0.1 | 0.3 | 0.3 | 0.3 | 0.15 | 0.2 | 0.2 | 0.1 | .25 | .25 |
| Trial 3 (grams) | 0.6 | 2.2 | 0.1 | 0.3 | 0.3 | 0.3 | 0.15 | 0.2 | 0.2 | 0.1 | .25 | .25 |
| Mean (grams) | 0.6 | 2.17 | 0.1 | 0.3 | 0.3 | 0.3 | 0.15 | 0.2 | 0.2 | 0.1 | .25 | .25 |

Answers:

1. The mean for 10 grains was 0.6 grams and the mean for 100 grains was 2.17 grams. The mean actually makes sense for 100 grains of rice. Repeated trials of different grains should not yield exactly the same measurements. A larger sample size seems to increase accuracy of measurements.

2.Black eye peas show the biggest difference between the average mass of 10 grains and the average mass of 100 grains. There are at least two possible factors that can contribute to this. The first one being that they are naturally bigger than the three other ones. This leaves room for more small peas to come into the mix of larger peas. The second possible factor is that the peas could have been harvested at different times, yielding different results.

Summary questions:

1. It is important for all scientists to use a standard system of measurements because of two reasons. One reason being that using a standard system of measurements allows for there to be less work calculating conversions such as converting from the customary system to the metric system. The second reason is that using a standard system lessens error. For example, if someone measured in lengths of a pinky, that number would change if another person used the same measurement because all people cannot have the same body part lengths.

2. Some advantages to using the metric system are an easier way to convert from smaller units to larger units, wide acceptance and usage, and a way to remember how to convert between smaller and larger units through prefixes. One disadvantage of the metric system may be accessibility. The customary system is commonly used in the United States. In addition, measurements, such as yards, can easily be visualized as the distance from the bottom of the door to the doorknob.

3. There are some potential sources of error when making measurements. One is improper calibration of measuring devices. For example, a triple beam balance could have been calibrated to treat ten actual grams of a substance as zero grams accidently through the use of the knob underneath the weighing plate.