Name_____ Date of Data Collection_____

Class Period _____ Lab Days/Period_____ Teacher_____

Determining Probability of an Event

Background: By now you have most likely discussed the basics of genetics, especially those that were described by Gregor Mendel, the Austrian monk that is commonly referred to as the "father of classical genetics". Many of these traits are influenced by several pairs of genes and the possibilities are seemingly limitless. For this activity we will attempt to calculate the probability of events, both single and double, and to reinforce the three laws that Mendel established regarding genetics: Dominance, Segregations and Recombination, and Independent Assortment.

Laboratory Safety Precautions: The following symbols represent the precautions that are required for this lab:

There are no precautionary measures needed in this laboratory exercise.

Purpose: the purpose of this laboratory experience is:

-to understand the mechanism of inheritance.
-to determine the probability of a single occurrence event.
- to determine the probability of independent events occurring simultaneously.
-to transfer the knowledge of probability to your understanding of genetics.

Materials: The following materials are required to complete this lab experience:

-lab papers -pen or pencil
-coins or poker chips -masking tape (if necessary)

Procedure: The following procedure is utilized to perform this experience:

1. Complete Data Table 1 by recording your results of the occurrence of a single event, that being flipping a single coin 20 times. Once you have determined the number of "heads" and "tails" for that event, flip it again for 30 trials, then again for 50 trials (you will end up flipping the coin 100 times for Data Table 1).
2. Calculate the "observed", "Expected", and "Deviation" for each event, then total your responses and answer the necessary questions provided in the "Questions" portion of this investigation.
3. Once you have completed the single occurrence event, you will investigate what happens during independent events occurring simultaneously.
4. Complete Data Table 2 by recording your results of the independent events occurring simultaneously, that being flipping two similar coins a total of 40 times. MAKE CERTAIN to record the same coin first each time. Arrange with your partner to have the same coin result recorded first every time. This becomes important when we try to determine the difference between "heads-tails" and "tails-heads".
5. Calculate the "observed", "Expected", and "Deviation" for each event, then total your responses and answer the necessary questions provided in the "Questions" portion of this investigation.

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Data: The following data was collected during this lab experience:

Date Table 1: Single Occurrence Probability

(Note: Record your occurrences with "tic" marks, then put the total number after the tics.)

		Heads	**Tails**
	Observed		
20 Tosses	Expected		
	Deviation		
	Observed		
30 Tosses	Expected		
	Deviation		
	Observed		
50 Tosses	Expected		
	Deviation		
	Observed		
TOTAL	Expected		
	Deviation		

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Data Table 2: Independent Events Occurring Simultaneously

(Note: Record your occurrences with "tic" marks, then put the total number after the tics.)

Combinations	Observed	%	Expected	%	Deviation
Heads/Heads					
Heads/Tails Tails/Heads					
Tails/Tails					
Total					

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Conclusion: The following can be concluded from this lab experience:

_____

_____

_____

_____

_____

_____

Analysis Questions: Answer the following questions in the space provided.

1. Do you think anyone in class will have the same exact results as you? Explain.

_____

_____

_____

_____

2. After talking with other people in your lab class, how close were your group's ratios for each trial to the ratios of the class as a whole? Whys is this so?

_____

_____

_____

_____

3. What does the data say about sample size and the accuracy of calculating ratios? Explain.

_____

_____

_____

_____

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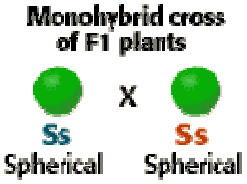
Mendelian Genetics Practice Problems

adapted from: http://www.biology.arizona.edu/mendelian_genetics/problem_sets/monohybrid_cross/01q.html

1. In pea plants, spherical seeds (S) are dominant to dented seeds (s). In a genetic cross of two plants that are heterozygous for the seed shape trait, what fraction of the offspring should have spherical seeds?



2. A genetic cross between two F1-hybrid pea plants for spherical seeds will yield what percent spherical-seeded plants in the F2 generation? (Recall, spherical-shaped seeds are dominant over dented seeds.)

3. A genetic cross between two F1-hybrid pea plants having yellow seeds will yield what percent green-seeded plants in the F2 generation? Yellow seeds are dominant to green.

4. Human blood type is determined by codominant alleles. There are three different alleles, known as I^A, I^B, and i. The I^A and I^B alleles are co-dominant, and the i allele is recessive. The possible human phenotypes for blood group are type A, type B, type AB, and type O. Type A and B individuals can be either homozygous (I^AI^A or I^BI^B, respectively), or heterozygous (I^Ai or I^Bi, respectively). A woman with type A blood and a man with type B blood could potentially have offspring with which of the following blood types?