**Thursday - Punnett Squares**

Period: 55 minutes

Subject: Biology I Date: January 2014

Objectives:

* TSW determine the genotypic and phenotypic ratios of a genetic cross by utilizing the information gained from completion of a Punnett square (5b DOK 1).

Materials:

* PowerPoint, Dry Erase Markers, HW Worksheet

Bell Work (7 minutes):

* The following directions will be written on the white board:
  + “Using the question on the Promethean board, explain why all **three** of the incorrect choices are wrong, and explain why the correct answer is right.”
* The following state test style question will be displayed on the Promethean board:
  + Which of the following choices describes the definition of a gene?
    - a. the outward appearance of an individual
    - b. the combination of alleles for a given trait
    - c. a piece of DNA that provides information about a trait
    - d. a form of a specific gene

Set (3 minutes):

* What do punnet squares have in common with dollar bills?
* Display an abridged multiplication table with only the outer numbers, or multipliers, filled in. Have the students complete the table, and then ask them how they did it. Explain to them that a Punnett Square works just like a multiplication table; items are crossed, resulting in predictable products.
* “Today we’re going to be examining the Punnett Square. First we’ll check out all of its parts, relating them to the different terms we learned yesterday, and then we’ll practice using them to predict the possible genotypes and phenotypes that could result from a specific genetic cross between two organisms.”

**Key Question/Big Picture Question: How are traits passed down from one generation to another? How can we predict what children/offspring will look like? Why don’t I look exactly like my mom/dad?**

Procedures (40 minutes):

1. 7 minutes. Explain Mendel’s Laws of Inheritance. Provide examples of each using pictures and text.
   * **Law of Segregation**: alleles separate during meiosis
   * **Law of Independent Assortment**: alleles separate independently
   * **Law of Dominance**: If a dominant allele is present, it will be reflected in the phenotype of the organism
2. 6 minutes. Have the students draw a Punnett square, and point out how the Punnett square tells us the genotype of the father, the genotype of the mother, and the genotypes of the possible offspring. Phenotypes can then be determined from these genotypes.
3. 8 minutes. Working as a class, have the students complete a genetic cross using a Punnett square. While students are working on the cross, have them not only fill out the genotypes, but also the phenotypes. After performing the cross, go over the genotypic and phenotypic percentages and ratios.
4. 7 minutes. Have the students do the second example on their own. Students will be expected to complete the cross, label all of the genotypes and phenotypes, and determine the genotypic and phenotypic percentages and rations. This will then be gone over as a class.
5. 6 minutes. Have the students do the third example on their own. Students will be expected to complete the cross, label all of the genotypes and phenotypes, and determine the genotypic and phenotypic percentages and rations. This will then be gone over as a class.
6. **Real World/Other Subject:** 
   * **Punnet squares are like times tables (drop down from the top and swoop in from the left side)**
   * **Punnet Squares are like dollar bills: Each square is like a quarter. If I have 1 quarter how much am I worth? 25 cents, so my percent is 25%**
7. 6 minutes. Have the students do a fourth example, but instead of giving them the genotypes cross, have them cross a heterozygous purple flowered plant with a homozygous white flowered plant. This ensures they understand both the terminology and how to perform a cross. Students will be expected to complete the cross, label all of the genotypes and phenotypes, and determine the genotypic and phenotypic percentages and rations. This will then be gone over as a class.

Closure (3 minutes):

* “Today we learned what Punnett squares are, and how they can be used to predict the possible offspring that might arise from a genetic cross. In doing this, we also go to practice using the terminology commonly used in the study of genetics.”
* Have the students complete a WDILT, where they each list two things that they learned and one thing that they are still confused about.
* “Tomorrow we’re going to continue practicing the material in genetics that we’ve covered thus far. After that we’re going to take a brief written quiz. Make sure you do your homework, because doing so will ensure that you have a much easier time on the quiz tomorrow.”

Assessment/Evaluation:

Objective: TSW determine the genotypic and phenotypic ratios of a genetic cross by utilizing the information gained from completion of a Punnett square (5b DOK 1).

* Informal: 1. Oral questioning will be done throughout the lesson (M) to assess the students’ understanding of the utilization of a Punnett square (C). 2. While students are working on completing their sample Punnett squares (C), the teacher will be walking around and questioning students to assess their understanding of how a Punnett square can be used to determine genotypic and phenotypic ratios (M).
* Formal: A test will be given at a later date (M) that covers the terminology commonly used in the study of genetics and Mendel’s Laws of Inheritance (C). The grade will be recorded in a grade book (D).