

## **DNA**

### **STANDARD: #4 The Living Environment**

**KEY CONCEPT:** DNA provides for both the continuity of traits from one generation to the next and the variation that in time can lead to differences within a species and to entirely new species.

**GENERALIZATION:** A physical or mathematical model can be used to estimate the probability of real-world events.

### **BACKGROUND:**

Students have been learning about the fundamentals of genetics, including genes and chromosomes. Based on their responses to a quiz covering test crosses, genotypes, and phenotypes, students have been placed in one of three groups by the teacher.

Tiered in process according to readiness

#### **Mendel Group**

Students work in pairs. Each group has 50 red beans and 50 white beans in each of two coffee cans.

Assume the beans represent alleles for flower color in a certain plant. Red is dominant over white. Assume one can represents the female parent; the other can represents the male parent. Without looking into the cans, remove one bean from each can. Place the pair of beans into one of three separate groups: red/red, red/white, white/white. Continue until all beans are removed. Count the number of pairs in each group and record them in a table. Record the genotypes as well. How many genotypes have resulted from this exercise? What are they? What is the genotypic ratio? How many phenotypes have resulted? Describe them. What is the phenotypic ratio?

#### **Sutton Group**

Using a Punnett square to predict the results of a trihybrid cross.

In the fruit fly, *Drosophila*, the following genes are located on separate chromosomes:

GENE	DOMINANT ALLELE	RECESSIVE ALLELE
1	eyes (E)	eyeless (e)
2	hairy body (H)	hairless body (h)
3	large wings (L)	small wings (l)

Predict the results of a cross between two fruit flies, both heterozygous, for all the traits above. Use a Punnett square to show the results. What are the phenotypic ratios predicted by this cross?

### Franklin Group

Using a Punnett square to diagram polygenic inheritance, a case in which a single trait is the result of the interaction of a number of genes.

In wheat, the color of the kernel is controlled by two pairs of genes. These genes are R /r and R /r . Complete a Punnett square showing the result of a cross between two individuals heterozygous for both genes.

Use the following key to answer the questions below.

R R R R = dark red kernels r r R R = medium red kernels

R R R r = medium dark red kernels R r r r = light red kernels

**$R r R R =$  medium dark red kernels  $r r R r =$  light red kernels**

**$R r R r =$  medium red kernels  $r r r r =$  white kernels**

**$R R r r =$  medium red kernels**

**What is the phenotypic ration of red to white kernels**

**What is the phenotypic ratio of dark red to medium dark red kernels?**

**What is the phenotypic ratio of medium dark red to medium red kernels?**

**What is the phenotypic ratio of medium red to light red kernels?**

**What is the phenotypic ratio of dark red to white kernels?**