

Analyzing Mendel's Data and Developing a Model to Predict Outcomes

Students analyzed the data provided in the vignette looking for patterns and then progressing to suggesting a model that could assist in predicting the outcomes. Student responses ranged from mathematical models that attempted to develop an equation to visual models that resemble Punnett squares and pedigrees, even though these ideas had not been discussed or learned in class. The following samples illustrate student analysis and modeling.

Student Analysis 1:

Mendel's Accomplishments: Pea Plants
Part A:

From the summer of 1856 through 1863, Mendel researched on pea plants because of their purity and more easily observable characteristics. His research question was *How many different forms would result from the random fertilization of two kinds of pea plants?* He hypothesized that the existence of factors for each characteristic responsible for different variations of a trait don't occur together.

In other words, Mendel wondered if you crossed a long stem pea plant with a short stem pea plant, could you predict the result of creating a long stem or short stem pea plant? Mendel carried out his experiment and collected the following data.

Characteristic			Is this		Ratio
Seed Shape	Round	5,474	Angular	1,850	2.959:1
Pod Color	Green	428	Yellow	152	2.816:1
Stem length	Long	787	Short	277	2.841:1
TOTAL	Dominant	6,689	Recessive	2,279	2.935:1

Data are used to inform conclusions and help scientists learn new things. Take a close look at Mendel's data. What patterns do you see in the data? How can the data help explain the traits and how they are inherited?

The ratio says that for every 2.935:1 Dominant characteristic plant there is one Recessive characteristic plant.

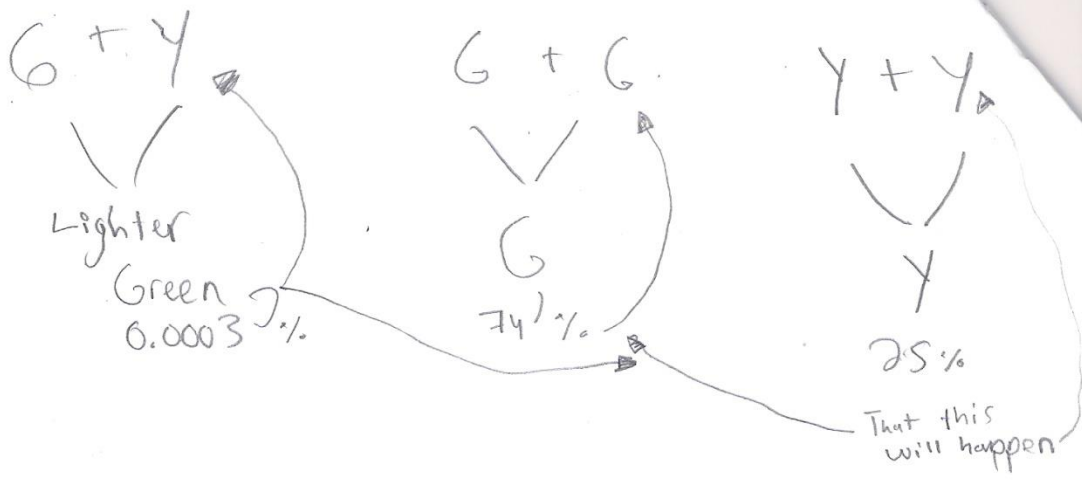
Dominant will always be more Dominant in #'s for characteristics than recessive.

Probability

What will happen with the Hybrid Pea Plant?
where will it fall under? what will occur to the #'s?

Handwritten notes:
more seeds less stuff
Most
one p with a percentage
0.0003
it's neither
Develop an equation:
74.28874
2.88775 : 1
amount of Dominant
amount of recessive
2.935:1

Student Model 1 - Mathematical Approach:



$L + G$
Green
with the
slightest hint
of yellow

$L + Y$
Yellow
with slightest
hint of green

L, G, Y
2.8 = 1

Student Model 2 - Visual Approach (similar to Punnett square):

Environment



long	short
long	long

3/4 long

characteristics:

Seed shape	round Long	angular Short	round Long	round Long
Pod color	Long green	short yellow	Long green	Long green
Stem length	Long	short	Long	Long

Student Model 3 Visual Approach (similar to pedigree):

Dominant is the Most common pea. The green ^{pea},
when you divide the numbers in a row
you get the ratio.

The recessive is less common. The yellow pea

What would the offspring look like?
- Prediction

