

Gummy Bear Genetics

Purpose

To determine the genotypes of parents by counting and sorting the phenotype ratios of their offspring.

Procedure:

1. Empty the contents of the bag onto your desk. Count the gummy bears and record the total in Table
2. Sort the gummy bears into groups based on phenotype differences that can be easily observed and quantified, such as colour.
3. Count and record the number of bears of each phenotype in the table below.
4. Repeat Steps 2 to 5 for each of the different bags.

Monohybrid Cross sample	Total number of gummy bears	Phenotypes and numbers	Phenotype Ratio	Genotypes	Parental Cross
A					
B					
C					

Analyze and evaluate:

- a) For each bag, calculate the phenotype ratio of bears in the bag. Record this ratio in the table.
- b) Determine which bear colour is dominant and which bear colour is recessive. Use **T** to represent the dominant allele and **t** to represent the recessive allele. Hint: look at the phenotype ratio of Bag C.
- c) Use the ratios and your knowledge of Mendelian genetics to determine the likely genotype(s) of each type of bear found in the bags. Record these genotypes in the table.
- d) Determine the genotypes of the parents that produced the off spring in each of the bags. Record this information in the table.
- e) For each bag, draw a Punnett square to show that the cross of the genotypes you predict for the parents that would produce the ratio that you observed.

Cross A

Cross B

Cross C

My Genetic Profile Worksheet

Human genetic characteristics and phenotypes

Characteristic	Dominant Phenotype	Recessive Phenotype
Dimples	Present (D)	Absent (d)
Hairline	Widow's peak (W)	Straight (w)
Tongue rolling	Roller (R)	Non-roller (r)
Thumb placement with folded hands	Left thumb on top (P)	Right thumb on top (p)

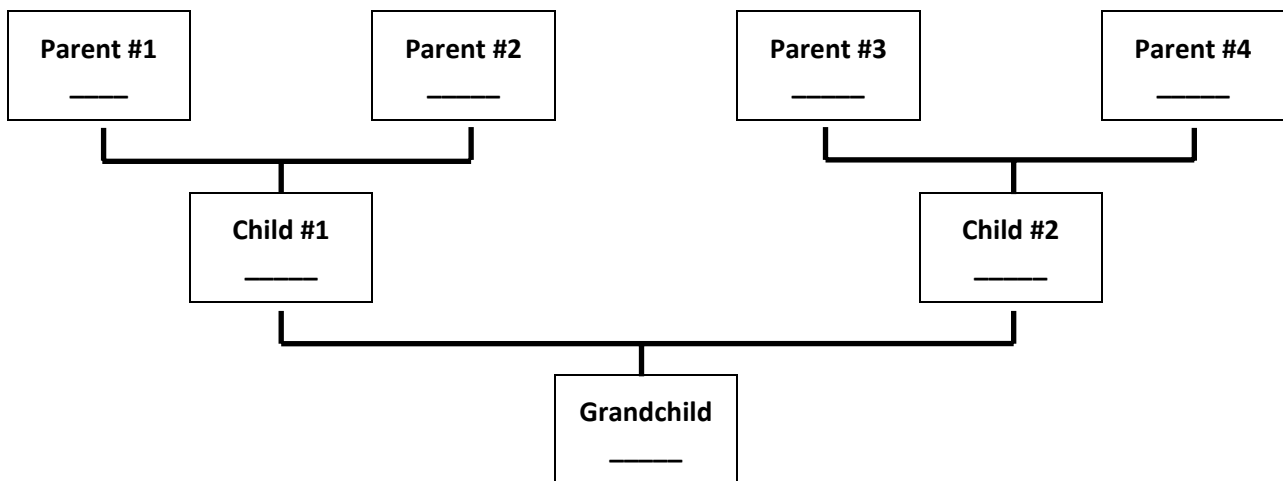
Parent #1	
Phenotype	Genotype
Dimpled	<i>Dd</i>
Straight hairline	<i>ww</i>
Tongue roller	<i>Rr</i>
Right thumb on top	<i>pp</i>

Parent #2	
Phenotype	Genotype
Dimpled	<i>Dd</i>
Widow's peak	<i>Ww</i>
Non-roller	<i>rr</i>
Right thumb on top	<i>pp</i>

Child (F1)	
Phenotype	Genotype

Grandchild (F2)	
Phenotype	Genotype

Pedigree Chart for a SINGLE characteristic



What are the chances?

In this investigation you will model a cross between two heterozygous individuals. You will then determine the genotype and phenotype ratios of your model F1 generation. In addition, you will investigate the role that sample size and probability play in producing a 25:50:25 ratio in the F1 generation.

Equipment and Materials: two small opaque bags containing 40 beads each (20 blue beads and 20 red beads)

Note: Red beads are the dominant allele, R, for red flowered, and the blue beads are the recessive allele, r, for blue flowered. Together, the two pouches represent the parent generation.

Without looking, draw one bead from bag 1 (P1) and one bead from bag 2 (P2).

This represents the joining of two gametes to form a new individual. Record the "genotype" of this offspring. Return the "gametes" to their original bags. Repeat for a total of 20 times.

Offspring Genotypes

1	2	3	4	5	6	7	8	9	10

11	12	13	14	15	16	17	18	19	20

Expected Genotype ratio: _____ RR : _____ Rr: _____ rr

Expected Phenotype ratio: _____ Red : _____ Blue

Actual Genotype ratio: _____ RR : _____ Rr: _____ rr

Actual Phenotype ratio: _____ Red : _____ Blue

How did your results compare to the expected ratio?

How did the total class results compare to the expected ratio?

Explore an Issue in Genetic Screening: Who Wants to Know? Who Needs to Know?

The Issue

The ethics of legal access to, and ownership of genetic information needs to be considered carefully as technology for collecting and testing genetic disorders and other inherited characteristics increases.

Who decides? Who wants to know? Who should know? Who should we be required by law to tell?

Brainstorm a list of FIVE people that might have an interest in knowing YOUR DNA – then list the possible benefits and risks of their knowing – to them and to you!

Who?	Benefits	Risks

You may wish to consider the following situations:

- Parenting: Should parents be able to test their children for any genetic disorder or trait?
- Relationships: Should people have access to a potential partner's genetic information? What if your partner might develop Huntington's disease? Should you have the legal right to know?
- Employment: Should prospective employers have access to genetic information about an applicant? If so, how much of this information should be used to determine eligibility for employment? For example, should an airline be able to screen its pilots for a gene that increases the risk of a heart attack?