BILL #39 Alien Traits – Genetics and Inheritance Project

Name:_____
Group Members:

_____ _____ _____

Introduction

You are going to be creating and breeding your *own* aliens! These aliens have many traits that are quite fascinating, and the mechanisms of genetic inheritance for these traits are truly remarkable. You and your group will create two parental aliens, and you will then cross them to create a *cute* baby alien. The traits of the baby alien will be determined by the inheritance patterns that are outlined in this handout. You will create Punnett squares to determine the possible genetic outcome of the offspring, and roll dice to determine which genotype is inherited. Then, you will cross your baby alien with the baby alien from another group, creating an F2 offspring, following the same process for identifying its genetic traits.

ANSWER QUESTIONS IN YOUR BILL.

1. Each person carries _____ copies of each gene. Each copy is called a(n)_____.
2. Each person can only pass on _____ copy of each gene to their offspring.
3. Which copy of each trait gets passed on to our offspring is decided by _____.
4. How will we approximate this in our lab? _____
5. Genes can be either dominant or recessive. A _____ gene shows its phenotype no matter what the other parent contributes. A _____ gene shows its phenotype only if both parents contribute a recessive.
6. For this lab, we'll assume that your parent aliens are both HETEROZYGOUS for every phenotype. How many different combinations will there be for each trait? _____
7. Based on what you know so far about dominant and recessive genes, which phenotype do you except to observe more often, the dominant or recessive one? Why? Make a prediction here:

   _____
   _____

Procedure

- The genotypes for your parental generation of aliens is listed for each trait. This will, in turn, determine their phenotype.
- Next, create your parental aliens, displaying the traits you selected, by drawing them on the pages available
- Complete a Punnett Square to determine the probability of each trait occurring in their offspring
- Then, roll a die to determine which traits the F1 offspring will actually inherit.
  - 1= Top left square
  - 2= Top right square
  - 3= Bottom left square
  - 4= Bottom right square
  - 5, 6 = Re-roll until you get 1, 2, 3, or 4

1	**2**
3	**4**

- After your group has created an F1 alien, you can cross it with the F1 alien from another group. Use the second Punnett Square next to each trait in order to determine the traits of the F2 offspring.
- **IN YOUR BILL, ANSWER OPENING QUESTIONS 1-7 AND AFTER THE ACTIVITY, ANALYSIS QUESTIONS 8-11. CHOOSE ONE TRAIT THAT YOU STUDIED AND IN YOUR BILL DRAW THE TABLE AND PUNNETT SQUARES COMPLETED.**

Description of Traits and Punnett Squares

Trait: Body Shape
Pattern of Inheritance: Mendelian
Description: Plutonian aliens can have either a round body shape or a square body shape
Alleles:
A is a dominant allele, coding for a round body shape
a is a recessive allele, coding for a square body shape

Dice roll:

Alien	Genotype	Phenotype
Mom	Aa	
Dad	Aa	
F1 Offspring		
Mate of F1		
F2 Offspring		

Dice roll:

Trait: Saliva Production/Drooling
Pattern of Inheritance: Mendelian
Description: This determines whether or not the alien drools
Alleles:
B is a dominant allele, coding for saliva production
b is a recessive allele, coding for no saliva production

Dice roll:

Alien	Genotype	Phenotype
Mom	Bb	
Dad	Bb	
F1 Offspring		
Mate of F1		
F2 Offspring		

Dice roll:

Trait: Arm type
Pattern of Inheritance: Mendelian
Description: This determines if they have short, stubby paws, or long wavy arms
Alleles:
C is a dominant allele, coding for long, wavy arms
c is a recessive allele, coding for short, stubby paws

Dice roll:

Alien	Genotype	Phenotype
Mom	Cc	
Dad	Cc	
F1 Offspring		
Mate of F1		
F2 Offspring		

Dice roll:

Trait: Presence of bald spots
Pattern of Inheritance: Mendelian
Description: Some aliens have patchy bald spots
Alleles: Bald spots are dominant to no bald spots
B= Bald spots
b= No bald spots

Alien	Genotype	Phenotype
Mom	Bb	
Dad	Bb	
F1 Offspring		
Mate of F1		
F2 Offspring		

Dice roll:

Dice roll:

Trait: Teeth/No teeth
Pattern of Inheritance: Mendelian
Description: Whether or not aliens have teeth for eating spaghetti, their favorite food
Alleles: Each dominant allele adds one tooth
T= A row of three sharp teeth
t= no teeth

Alien	Genotype	Phenotype
Mom	Tt	
Dad	Tt	
F1 Offspring		
Mate of F1		
F2 Offspring		

Dice roll:

Dice roll:

Trait: Fur color
Pattern of Inheritance: Incomplete Dominance
Description: Aliens can have blue fur, white fur, or grey fur. Blue is dominant, white is recessive, and grey is the intermediate.
Alleles:
BB=Blue
Bb=Grey
bb=white

Alien	Genotype	Phenotype
Mom	Bb	
Dad	Bb	
F1 Offspring		
Mate of F1		
F2 Offspring		

Dice roll:

Dice roll:

Trait: Eye Color
Pattern of Inheritance: Mendelian
Description: Aliens can have red or white eyes
Alleles: Red is dominant to white
R=red
r=white

Dice roll:

Alien	**Genotype**	**Phenotype**
Mom	Rr	
Dad	Rr	
F1 Offspring		
Mate of F1		
F2 Offspring		

Dice roll:

Trait: Moustache (optional)
Pattern of Inheritance: Sex Linked
Description: Aliens have a similar mechanism to humans for determining biological sex. Male aliens have a Z chromosome and a Q chromosome, whereas female aliens have two Q chromosomes. This trait determines if the aliens have a moustache or not.
Alleles:
Q^M=dominant allele coding for moustache
Q^m=recessive allele coding for no moustache
Z =male sex chromosome

Dice roll:

Alien	**Genotype**	**Phenotype**
Mom	$Q^M Q^M$	
Dad	Q^mZ	
F1 Offspring		
Mate of F1		
F2 Offspring		

Dice roll:

ANALYSIS AND CONCLUSIONS: ANSWER IN BILL

8. Compare your three generations of aliens, did they look alike? Different? How do they compare to aliens from the rest of the class?
9. Name at least 2 ways this lab was realistic in terms of symbolizing the "real world" situation of producing offspring.
10. Name at least 2 ways this lab was NOT realistic in terms of symbolizing the "real world" situation of producing offspring.
11. In the F1 alien you drew, how many times was the dominant trait expressed out of the total number of traits expressed? What percent is this? Does this result make sense? Is it what you predicted? What about your F2 alien?

Parental Aliens:

F1 and F2 Aliens: