Name: _____ **Date Due**: _____ Block: _____

"Meet the Aliens"

Genetics Project

(Alien Life Form)

Overview

Closely related siblings are most often different in both genotype (the actual genes) and phenotype (the appearance of the genes). This is due to both the great variety of traits in a human population and the continuous creation of new combinations that occur through reproduction. Each parent contributes half of their genes to their offspring. These genes can combine to form a multitude of arrangements.

For example, Boba's mother has freckles on her face, but his father does not, so there is a good chance that Boba will have freckles on his face. Freckles are a dominant trait that we will represent with the capital letter "F." Boba's mother has freckles so she must have at least one "F" in her genotype. She could be _____ or _____. Boba's father does not have freckles so he has the recessive trait; his genotype is _____.

Set up the Punnett squares to illustrate both possible scenarios. Circle all of Boba's possible genotypes that have him with freckles as a phenotype.

_____ _____%

_____ _____%

_____ _____%

_____ _____%

_____ _____%

_____ _____%
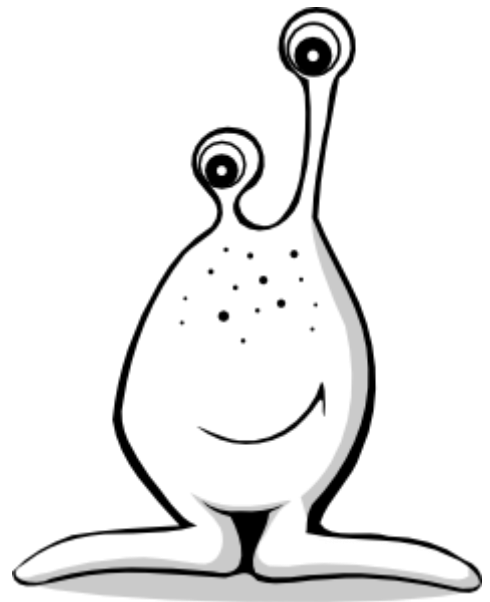
Directions

This packet contains all of the activities and information you will need to put together your final product for this project. Please refer to the rubric for scoring and use it to check against your project before the due date.

Scenario:

      You are an **exobiologist** (one who studies extraterrestrial life) who has located a new planet inhabited with a friendly species of higher-thinking aliens. NASA has asked you to put together a presentation on them to share at the next ALF conference.

<u>NASA has asked you to do the following prep work* for your presentation:</u>

- **Describe** your aliens' life on their planet (background information).

- **Select traits** for your aliens.

- **Model fertilization** and determine the sex and traits of the alien offspring.

- **Illustrate the trait frequency** for the offspring using Punnett squares.

- **Specify the alien family's environment** and whether their traits either enhance or weaken their chance for survival.

- **Create a family pedigree chart** to show the degree to which the trait that interacts with the environment is represented by the family.

- **Draw** a draft of your alien parents and their offspring.

- **Create** alien family art pieces and show them in their environment.

You will use this packet to organize your prep work.

FINAL PRODUCT: Presentation

1. **Create your alien family art piece—both parents and all offspring**.
   - You may draw, paint, sculpt/construct, or design on the computer.
   - Show them in their environment.
2. *Compile the rest of your presentation in one of the following formats*:
   - Power Point Presentation
   - Keynote (iPad)
   - Prezi
   - Movie
   - Animated movie
   - (*Please let me know if you have another possible idea.*)

   Your project will include:
   - Alien background—Compile into complete sentences.
   - Trait charts (genotypes & phenotypes)
   - Trait selection for parents
   - Trait frequency for offspring—Punnett squares
   - Fertilization—trait selection for offspring
   - Family pedigree—follow the trait that interacts with the home environment
   - Oral presentation (Refer to rubric)

You must create your own tables and Punnett Squares. You are not to scan or photograph any part of this packet for your final product.

What does creative effort mean?

- Use of color!
- A variety of materials are used.
- Details are noticeable.
- Aesthetically pleasing (nice to look at).
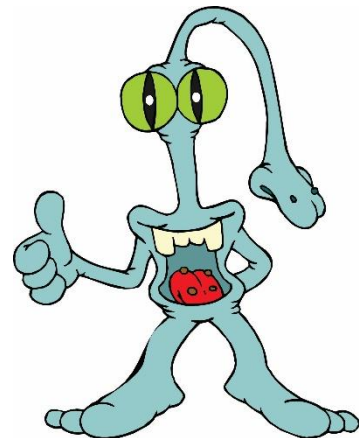
Alien Background

Family Name: _____

Mother's first name: _____   Father's first name: _____

Children's names: _____ & _____

Name of home planet: _____

Favorite alien sport or hobby: _____

Most common form of transportation: _____

Earthling most admired by your fellow aliens: _____

Brief description of the home environment:

_____

_____

_____

_____

Family's unique physical traits:

1. _____
2. _____
3. _____
4. _____
5. _____

Describe how ONE of the above traits interacts with the home environment (in either a positive or negative way).

_____

_____

_____

_____

_____

_____

Alien Traits

Determine 5 traits that your aliens will possess. 2 of the traits must be codominant. Write the genotypes and phenotypes for each trait. Be sure to use a different letter for each trait. Use the charts below to set up traits. Trait letters usually come from the first letter of the dominant trait.

Dominant-Recessive Traits				
Trait	**Dominant**		**Recessive**	
	Genotype	Phenotype	Genotype	Phenotype
Ex: Skin color	*GG, Gg*	*green*	*gg*	*purple*

Codominant Traits						
Trait	**Dominant**		**Recessive**		**Codominant**	
	Genotype	Phenotype	Genotype	Phenotype	Genotype	Phenotype
Ex: Skin stripes	*HH*	*horizontal*	*hh*	*vertical*	*Hh*	*plaid*
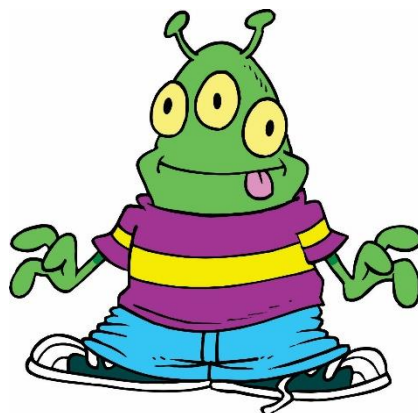
Alien Trait Selection-Parents

You will need a penny to continue.

1. Assign each side of the coin to be either dominant or recessive. Write it down.
   Heads=_____   Tails=_____
2. Flip the coin twice to determine genotype. You will do this **twice** for each parent.
3. For a heterozygous genotype, refer to your traits page (6) to check if it will result in a dominant or codominant phenotype.
4. Complete the chart below.

Mother's Genes	
Genotype	**Specific Phenotype**

Father's Genes	
Genotype	**Specific Phenotype**

Offspring Trait Frequency

For each trait you will construct a Punnett square to predict that trait's frequency in the offspring. Remember that the male genotype goes across the top and the female genotype goes down the side. Be sure to include:

1. The name of the trait
2. The completed Punnett square
3. The probability of each genotype and phenotype*

Phenotypes will vary depending on whether the trait is codominant or not.

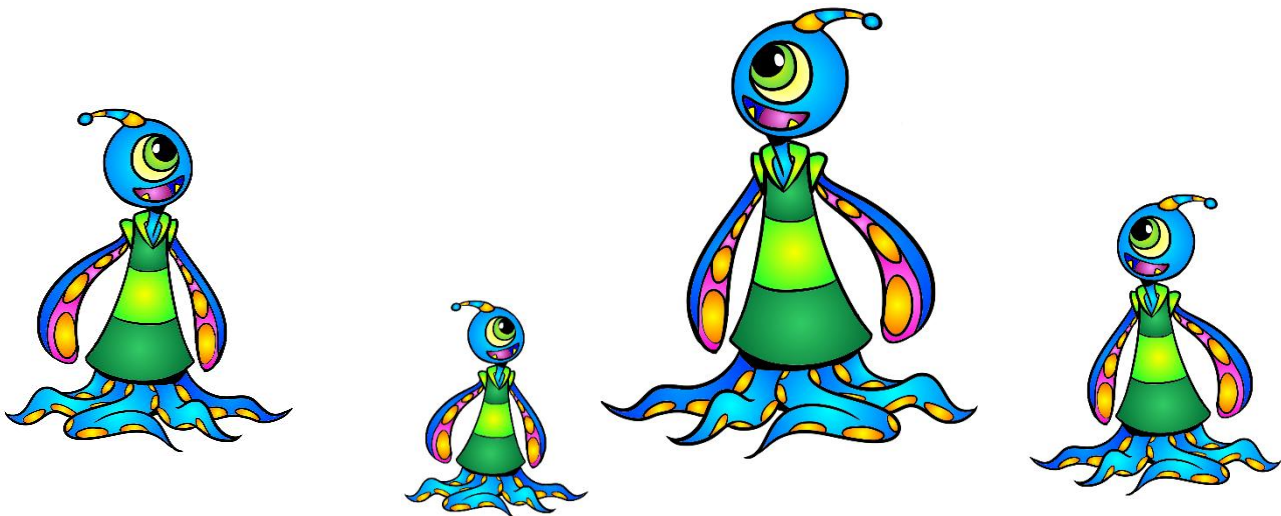**Your work must match the format of the example given below.**

Example:

Trait: <u>Skin Color</u>

	G	g
G	GG	Gg
g	Gg	gg

GG = 25%   Green skin

Gg= 50%   Green skin

gg= 25%   Purple skin

Complete your draft on the following page.

Trait #1 _____

_____ = _____%

_____ = _____%

_____ = _____%

Trait #2 _____

_____ = _____%

_____ = _____%

_____ = _____%

Trait #3 _____

_____ = _____%

_____ = _____%

_____ = _____%

Trait #4 _____

_____ = _____%

_____ = _____%

_____ = _____%

Trait #5 _____

_____ = _____%

_____ = _____%

_____ = _____%

Fertilization!

Alien Trait Selection-Offspring

In sexual reproduction, each parent contributes half of their genes to the offspring. How is it determined which gene from the pair goes to the offspring? It's totally random! Each gene has a 50/50 chance of being passed from the parent to offspring. You will toss a penny to determine which one will be passed on.

You must have a minimum of 2 offspring. You may create additional offspring—they must be included in your final product, though!

You will need 2 pennies to continue.

To determine gender:

1. Mark one of the pennies with an **X on both sides** for mom. Mark the second penny with an **X on one side and a Y on the other**.
2. Toss both at the same time to determine the sex of alien baby #1. Write the combination down for gender.
3. Repeat for alien baby #2. Name your alien babies. Congratulations!

It's a _____ !   It's a _____!

#1 _____ _____   #2 _____ _____
  Gender   Name   Gender   Name
(chromosomes)   (chromosomes)

You will need a plain penny to continue.

To determine genotype and phenotype:

1. Complete for one child at a time.
2. Look at the Punnett square for trait #1 (pg. 9). Determine what gene(s) each parent can offer the offspring. If either/both parent(s) is a hybrid--has a heterozygous genotype-- you will have to toss the penny to determine which of the genes the parent will provide. **Use the same coin sides as you did on page 6**. Determine the expressed phenotype. Record your data in the chart on the next page.
3. Repeat step 2 for traits #2-5.
4. Complete the chart for the second offspring.

Offspring #1	
Sex: M or F Name: _____	
Genotype	Phenotype
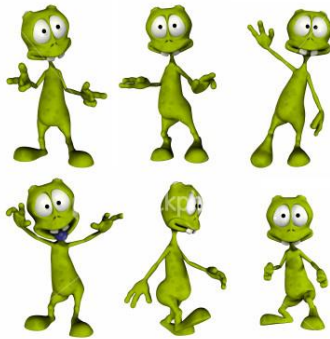
Offspring #2	
Sex: M or F Name: _____	
Genotype	Phenotype

Family Pedigree

A pedigree follows just <u>one</u> trait through the family tree. You will use the trait that you have determined to **interact with the aliens' home environment** and make a pedigree for your alien family.

About pedigrees:

◯ = female   ☐ = male

- ❖ An open shape represents the **dominant pure** trait.
- ❖ A completely shaded in shape represents the **recessive** trait.
- ❖ A half-shaded in shape represents a **hybrid**.
- ❖ A horizontal line connecting two shapes represents a mating pair.
- ❖ A vertical line represents a birth with the offspring at the end. Multiple offspring will use an additional horizontal line above the offspring (see example below).

Your work must match the format given in the example below (pedigree and genetic information).

Example: *Refer to the trait and Punnett square from page 6.*

Trait: <u>Skin Color</u>

Fill in the missing chart information using the pedigree below.

Barba   Boba

Ba   Min   Gru
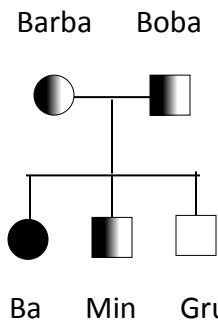
Name	Sex	Genotype	Phenotype
Barba			
		Gg	
	F		
			Green skin
Gru			

Draft your pedigree on the next page.

Create your alien family pedigree and fill in the chart below. Only use the boxes needed for your family. The chart below will accommodate up to 4 offspring. Add more boxes, if needed.

Pedigree Trait: _____

The _____ Family

Name	Sex	Genotype	Phenotype

My Alien Family

Finally! Now you get to create your aliens. Use this page to draft out what your aliens will look like based on their phenotypes and **your creativity**.

- ❖ Create an ORIGNAL visual representation of **each family member <u>and</u> their environment**.
- ❖ You may draw, paint, sculpt, construct, and/or design your aliens on the computer. If you construct, try to use recycled or repurposed materials. Creative effort is a must!