Biology
Ms. Ye

Name _____
Date _____ Block _____

Other Patterns of Inheritance:

- **Incomplete Dominance**
  - One allele is not completely dominant over the other, resulting in a _____ _____
  - Incomplete dominance is not support for the blending theory of inheritance; the white gene doesn't blend with the red gene because the _____ _____
  - With incomplete dominance, since one trait is not dominant over the other the use of capital and lowercase letters could be confusing. So, _____ _____ to distinguish between the two alleles.

Ex: Homer has decided he wants to go into the dog breeding business and wants to use Santa's Little Helper. Santa's Little Helper is heterozygous for light brown fur (F^BF^W), a combination of dark brown (F^B) and white (F^W). Homer wants to get puppies that are dark brown, light brown and white and has two choices of dogs he can mate with Santa's Little Helper: Penelope, who is also light brown (F^BF^W) or Samantha, who is white (F^W). Create Punnett Squares for each dog to help Homer figure out the answer.

Penelope

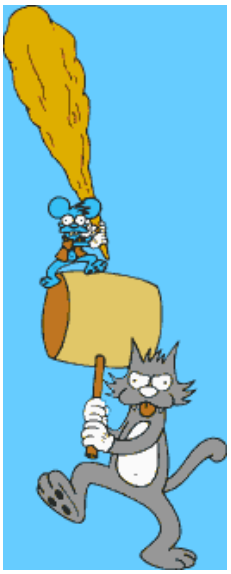
Samantha

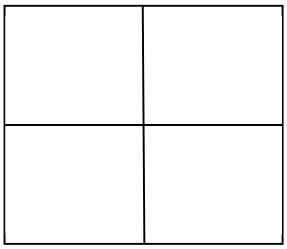
Which dog would be best to mate with Santa's Little Helper to get the most different colored puppies?

a. Penelope b. Samantha c. Neither one d. Either one (same odds)

- **Codominance**
  - _____

Ex: Itchy and Scratchy created two brand new breeds of flowers: one lime green (GG) and one bright orange (OO). Green is codominant with orange. Itchy and Scratchy know that because of codominance, if they cross these two plants, the flowers should be both green and orange. If they cross these two plants, how many will be both green and orange?



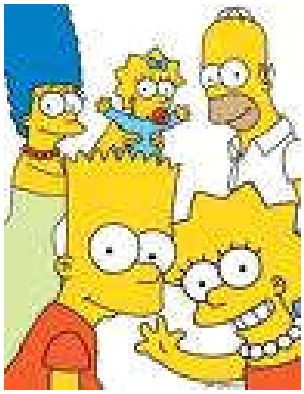


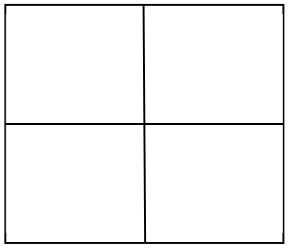
What percentage of the flowers will be orange and green?

a. 0 b. 50 c. 75 d. 100

- **Multiple Alleles**
  - A gene can have _____
  - This results in the possibility of _____
  - Ex: human blood type

Ex: Mr. Burns is in desperate need of a blood transfusion but unfortunately has blood type O (ii) and needs a donor that is also blood type O. He offers a reward to anyone who could help him (enter Homer). Homer knows unfortunately that his blood type is heterozygous type **A (I^Ai)** and that Marge is heterozygous type **B (I^Bi)**. What is the probability that one of the Simpson's children will have the blood type to match Mr. Burns?





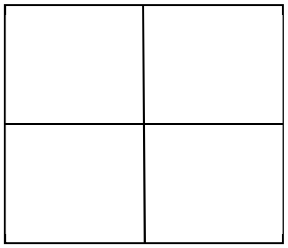
What is the likelihood that one of the Simpson children has type O blood?

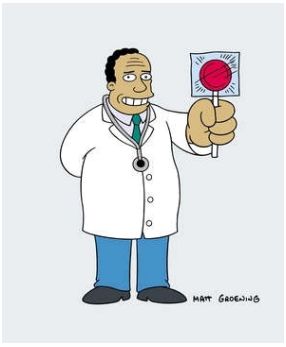
a. 0 % b. 25 % c. 50% d. 75%

- **Sex-linked Alleles**
  - The gene of interest is located on the _____.
    This means that regardless of whether the allele is dominant or recessive, _____
    _____
    because they only have one X chromosome.
  - Examples: Hemophilia, red-green color-blindness.

Ex: Dr. Hibbert is treating a young Springfield couple who are having a child. The parents are worried that since the mom is a carrier for the disorder of color blindness **(X^NX^n)**, which is linked only to the female sex chromosome **X^n**, that the child will have color blindness as well. The father does not have color blindness **(X^NY)** which is the dominant gene. What are the odds that the child will **NOT** have color blindness?

X^N = no color blindness (dominant)
X^n = color blindness (recessive)





What are the odds that their child will not be colorblind?

a. 0% b. 25 % c. 50% d. 75%

- **Polygenic Inheritance**
  - _____
  - Ex: Eye Color
    - Brown B_ _ _
    - Green bbG_
    - Blue bbgg

ALTERNATE PATTERNS OF INHERITANCE WORKSHEET

Incomplete Dominance Problems

1. In snapdragons, flower color is controlled by incomplete dominance. The two alleles are red (F^R) and white (F^W). The heterozygous genotype is expressed as pink.

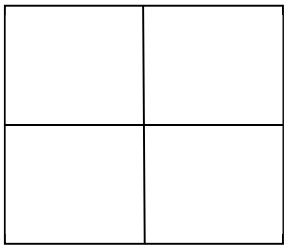
a. What is the phenotype of a plant with the genotype F^RF^R? _____

b. What is the phenotype of a plant with the genotype F^WF^W? _____

c. What is the phenotype of a plant with the genotype F^R F^W? _____

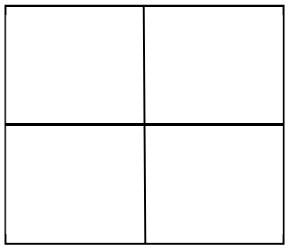
2. A pink-flowered plant is crossed with a white-flowered plant. What is the probability of producing a pink-flowered plant? ____%

Parents: ____ X ____



3. A pink-flowered plant is crossed with a red-flowered plant. What phenotypes will be seen in the offspring?

Parents: ____ X ____



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Multiple Alleles and Codominance (Blood types)

Human blood types are determined by genes that follow the CODOMINANCE pattern of inheritance. There are two dominant alleles (I^A and I^B) and one recessive allele (i).

Blood Type (Phenotype)	Genotype	Can donate blood to:	Can receive blood from:
O	ii	A,B,AB and O (universal donor)	O
AB	I^AI^B	AB	A,B,AB and O (universal receiver)
A	I^AI^A or I^Ai	AB, A	O,A
B	I^BI^B or I^Bi	AB,B	O,B
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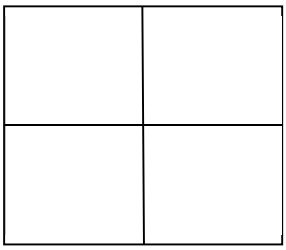
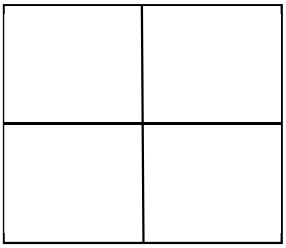
1. Write the genotype for each person based on the description:
   a. Homozygous for the "B" allele
   b. Heterozygous for the "A" allele
   c. Type O
   d. Type "A" and had a type "O" parent
   e. Type "AB"
   f. Blood can be donated to anybody
   g. Can only get blood from a type "O" donor

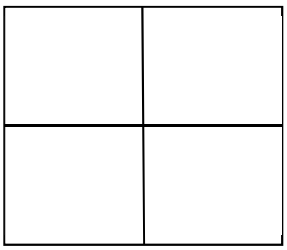
2. Pretend that Brad Pitt is homozygous for the type B allele, and Angelina Jolie is type "O." **What are all the possible blood types of their baby?** (show your work)



3. Draw a Punnett square showing all the possible blood types for the offspring produced by a type "O" mother and an a Type "AB" father



4. Two parents think their baby was switched at the hospital. Its 1968, so DNA fingerprinting technology does not exist yet. The mother has blood type "O," the father has blood type "AB," and the baby has blood type "B."
   a. Mother's genotype: _____
   b. Father's genotype: _____
   c. Baby's genotype: _____ or _____
   d. Punnett square showing all possible genotypes for children produced by this couple
   e. Was the baby switched?



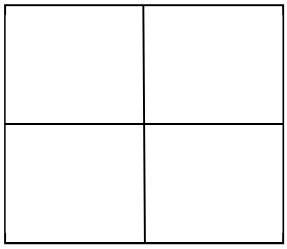
X-linked Traits

In fruit flies, eye color is a sex linked trait. Red (X^R) is dominant to white (X^r).

1. What are the sexes and eye colors of flies with the following genotypes:
   a. $X^R X^r$ _____
   b. $X^R Y$ _____
   c. $X^R X^R$ _____
   d. $X^r Y$ _____

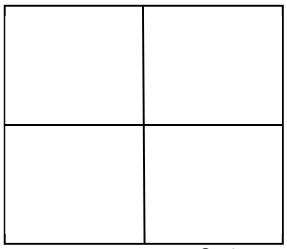
2. What are the genotypes of these flies:
   a. white eyed, male _____
   b. red eyed female (heterozygous) _____
   c. white eyed, female _____
   d. red eyed, male _____

3. Show a cross between a pure red eyed female and a white eyed male.



   a. What are the genotypes of the parents _____& _____
   b. How many are white eyed, male___
   c. How many are white eyed, female ___
   d. How many are red eyed, male ____
   e. How many are red eyed, female ____

4. Show the cross of a red eyed female (heterozygous) and a red eyed male.



   a. What are the genotypes of the parents? _____ & _____
   b. How many are white eyed, male___
   c. How many are white eyed, female ___
   d. How many are red eyed, male ____
   e. How many are red eyed, female ____

5. In humans, hemophilia is a sex linked trait. Females can be normal, carriers, or have the disease. Males will either have the disease or not (but they won't ever be carriers)

X^HX^H = female, normal

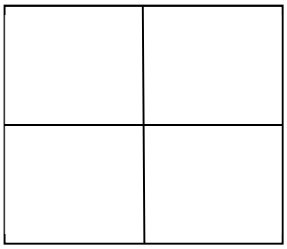
X^HX^h = female, carrier

X^hX^h = female, hemophiliac

X^HY = male, normal

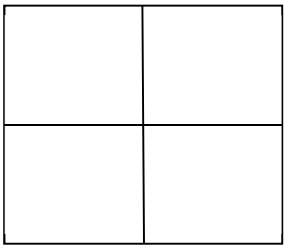
X^hY = male, hemophiliac

a. Show the cross of a man who has hemophilia with a woman who is a carrier.



b. What is the probability that their children will have the disease? _____

6. A woman who is a carrier marries a normal man. Show the cross.



a. What is the probability that their children will have hemophilia?

b. What sex will a child in the family with hemophilia be?