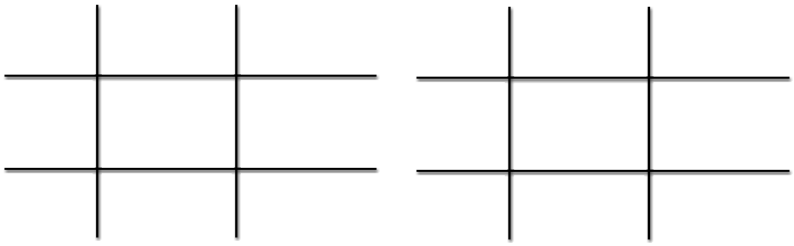
Co-Dominance, Incomplete Dominance, and Epistasis Worksheet by C Kohn, WUHS

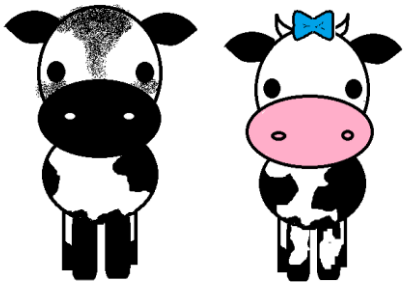
Partner Names: _____ Hour _____ Date_____

Date Due: _____Score:_____/

Directions: Complete the worksheet below. Work with your table partners if you need assistance.

1. Brad the Bull has no horns (polled). Polled (or hornless) is dominant to having horns. We don't know if he is homozyous dominant (HH) or heterozygous (Hh). To test this, Ms. Bustos mates Brad the Bull with a horned cow. For a cow to be horned, it has to be homozyous recessive (hh).





Complete the Punnett Squares above for each possible genotype for Brandy. Then answer the questions below.

a. If Brandy is homozygous dominant, what would be his possible genotypes: _____

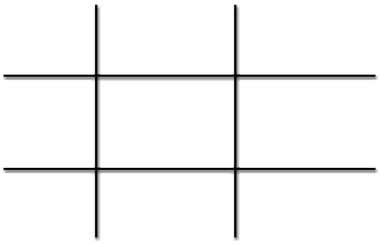
b. If Brandy is heterozygous, what would be his possible genotypes: _____

c. If Brandy is homozygous dominant, what would be his offspring's possible phenotypes: _____

d. If Brandy is heterozygous, what would be his offspring's possible phenotypes: _____

2. Jack is heterozygous for Type A blood. Jill is heterozygous for Type B blood. Neither Jack nor Jill are Type AB. Create a Punnett Square below showing their possible childrens' blood types.

Complete the Punnett square for bloody type. Then answer the questions below.



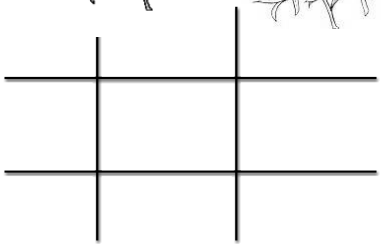
a. What possible blood types could their children have?

_____

b. Which genotype could receive any kind of blood? _____

c. Which genotype could give blood to anyone? _____

3. Spotted flowers are an example of co-dominance. A red snapdragon flower (RR) is paired with a white snapdragon (WW). What will their offspring look like if both red and white are dominant traits?



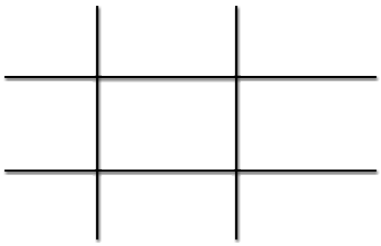
The offspring of a red and white snapdragon will be _____

_____

because _____

4. Human hair curliness is a good example of incomplete dominance. Straight hair is recessive to curly hair. However, someone who is heterozygous for hair curliness will have wavy hair that is kind of curly but kind of straight.

If a couple, both with wavy hair, have children, what possible genotypes and phenotypes would they have? Show in the Punnett Square and then explain.



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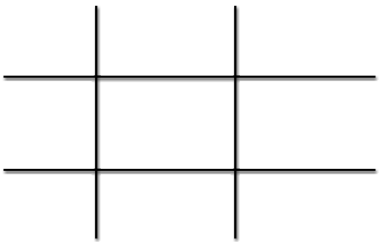
_____

_____

_____

5. A white rooster is crossed with a black hen. The rooster is homozygous, and so is the hen.

If the black is **<u>incompletely dominant</u>** to white, what color(s) will the chicks be? Explain below and show with a Punnett Square.



_____

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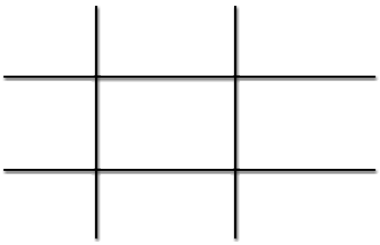
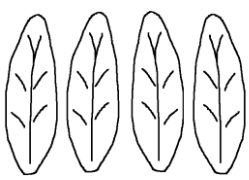
If on the other hand the black and white colors are **<u>co-dominant</u>**, what color(s) will the chicks be? Explain below and show with a Punnett Square.

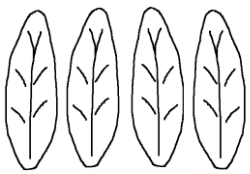


_____

_____

In the space below, draw what the chicks' feathers would look like for <u>incomplete dominance</u> on the <u>left</u> and what they would look like for **co-dominance** in this case on the **right**.

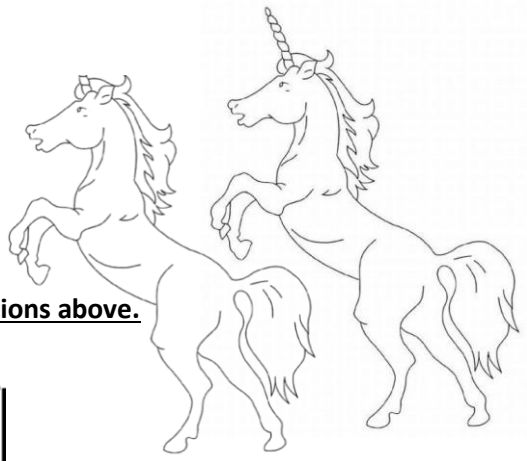




6. It is a little known 'fact' that unicorns demonstrate epistasis for their horn presence and color. The presence of a unicorn's horn is *recessive (hh)*, while no horn (polled) is *dominant (HH or Hh)*. The color of the horn can be either white (*dominant – WW or Ww*) or black (*recessive - ww*). If the horn is not present, the genes for color are not expressed. Use this information to complete the questions below.

First, write a definition for epistasis: _____

Two unicorns mate. One unicorn has a white horn and has genotype hhWw (has horns and the horn is white). The other unicorn has the genotype Hhww (it has genes for a black horn, but has no horn). What is the likelihood that they will have…



a. A colt with a white horn? _____/16

b. A colt with a black horn? _____/16

c. A colt with no horn? _____/16

Note: your numbers for A, B, and C should add up to 16!

Complete the dihybrid Punnett Square below before answering the questions above.

Could two unicorns with no horn have offspring with a horn? Explain and include a Punnett square.

_____

_____

Could two unicorns with a horn have offspring with no horn? Explain and include a Punnett square.

_____

_____

Read the following and then answer the accompanying questions.

In dairy cattle, the production of milk after the birth of a calf requires the breakdown of body fat to produce the large quantities of milk needed.

The genes that regulate the breakdown of body fat needed for milk production also affect the immune system of the cow. The genes that are activated to cause the breakdown of body fat also affect the immune system of the cow. As body fat is broken down, the amount of white blood cells in the body is reduced, impairing the cow's immune system. This makes the cow more susceptible to infections and disease immediately after the birth of their calf.

Source: http://physiolgenomics.physiology.org/content/39/1/28

7. Define pleiotropy: _____

_____

8. How is the breakdown of body fat in a cow after the birth of the calf an example of pleiotropy? _____

_____

_____

_____

9. Milk production is a polygenic trait. What does this mean? _____

_____

_____

_____

