BIOLOGY 121 TARGETED TUTORIALS

**TOPIC: Genetics Problem Solving**

1. Buckskin horses have a golden yellow coat, bay horses have a red coat, and perlino horses have a coat that is almost white. A series of crosses between the three different types of horses produce the following progeny:

Cross Offspring

buckskin x buckskin 13 buckskin, 6 bay, 5 perlino

bay x bay 16 bay

perlino x perlino 15 perlino

buckskin x bay 8 buckskin, 7 bay

buckskin x perlino 12 buckskin, 10 perlino

bay x perlino 19 buckskin

Explain the inheritance of buckskin, bay and perlino phenotypes in horses. Show how you reached your conclusion.

2. Having taken some genetics classes, you are approached by a friend who is a cat breeder. She would like to breed cats with wavy hair and no tails. She has documented her attempts and is puzzled by the results. She asks your help in understanding the mode of inheritance of hair characteristics and tail presence or absence. Based on the data collected by your friend, explain the mode of inheritance of each of the traits. Justify your answer with results from specific crosses indicating the genotypes for all individuals in the cross, using gene and allele symbols of your choice.

|  |  |
| --- | --- |
| Parents | Offspring |
| Straight hair, No tail x wavy hair, tail | Wavy hair, no tail = 22  Straight hair, no tail = 26  Wavy hair, tail = 28  Straight hair, tail = 23 |
| Curly hair, No tail x Curly hair, No tail | Curly hair, tail = 23  Curly hair, No tail = 48 |
| Straight hair, no tail x Straight hair, no tail | Straight hair, tail = 37  Straight hair, no tail = 70 |
| Straight hair, tail x Straight hair, tail | Straight hair, tail = 68 |
| Wavy hair, tail x Wavy hair, tail | Curly hair, tail = 8  Straight hair, tail = 11  Wavy hair, tail = 23 |

After you determine the mode of inheritance for hair characteristics and tail presence or absence, you perform the following cross and count the progeny. Based on the results of the cross, do the genes assort independently. Justify your answer.

|  |  |
| --- | --- |
| Parents | Offspring |
| Wavy hair, no tail x curly hair, tail | Curly hair, no tail = 50  Curly hair, tail = 4  Wavy hair, tail = 48  Wavy hair, no tail = 1 |

Draw a cell from the wavy hair, no tail parent at G1, metaphase 1 and metaphase 2. Draw only the chromosomes with the genes of interest. Indicate the alleles on each of the chromosomes.