Mendelian Inheritance and Exceptions
Worksheet

1. Mendel chose to experiment with pea plants and was able to make conclusions about inheritance that became known as Mendel’s Laws. Pea plants were a very fortuitous choice because all of the traits studied are located on different chromosomes and are controlled by dominant and recessive alleles. Inheritance of traits in pea plants is relatively simple and the probable outcome of genetic crosses can consistently be determined.

2. As a review of previous lessons, describe Mendel’s Law of Segregation in your own words.

3. As a review of previous lessons, describe Mendel’s Law of Dominance in your own words.

4. Review Mendelian inheritance by predicting the outcome of the offspring from these two parent pea plants. Open the Model Gallery in your Backpack and add the correct model(s) of the offspring that would result from this cross. Use the right stylus button to Resize your model(s) if needed. Use Notes to label the genotype and phenotype of the offspring. Then take a photo.
5. Organisms can demonstrate more complex patterns of inheritance. In some plants, flower color is an example of a pattern of inheritance called incomplete dominance. One allele is not completely dominant over another allele. For example, in some species, flowers must be homozygous in order to be red or white. Flowers that are heterozygous show a blending of the two colors, red and white. What color would these heterozygous flowers be?

6. Another non-Mendelian inheritance pattern that is demonstrated in coloring or pigmentation is codominance. An example is fur color. One allele codes for black fur and another allele codes for white fur. Homozygous organisms are either all black or all white. Heterozygous organisms produce some black fur and some white fur. How is codominance different from incomplete dominance?

7. Many traits in humans do not follow Mendelian inheritance patterns. What traits in humans have many variations?

8. Height, skin pigmentation, eye color, and hair color are all examples of traits that have multiple variations. These polygenic traits are controlled by more than one gene. The various combinations of the alleles from the different genes interact to produce the diversity we see in the human race.

9. Thomas Morgan Hunt chose to study Drosophila melanogaster as a model organism that demonstrated Mendelian inheritance. During his research, Hunt noticed that when he crossed certain males and females with the dominant red eyes, they would produce some male flies born with recessive white eyes. Only male offspring would have white eyes.

10. Many crosses later, Hunt determined that the gene for eye color in fruit flies is located on one of the sex chromosomes, the X chromosome. As in humans, two X chromosomes produce a female, and males have one X chromosome and one Y chromosome. Hunt described this inheritance pattern as sex-linked because the gene was part of one of the sex chromosomes.
11. Genetic inheritance can be simple, as demonstrated by the traits explored in pea plants, or very complex, as is the case for many human genetic traits. What curious question(s) do you have about genetics and inheritance?