# Applied Learning Activity: Mendelian and Non-Mendelian Inheritance in Cats

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## Background:

We can find examples of Mendelian and non-Mendelian inheritance in plants and animals in our daily lives. Today, we will use domestic cats to practice skills including Mendelian inheritance, testcrosses, and non-Mendelian inheritance patterns including sex-linked traits, incomplete dominance, epistasis, variable expressivity, lethal alleles, and the environmental influence on phenotype.

This practice focuses on using one organism to tie together multiple inheritance patterns in one organism (domestic cats) to better understand how these types of inheritance relate to one another. All examples in this practice are real, which means that you can apply what you learn here to other cats for extra study opportunities.

Even if you don’t like cats, don’t worry! Remember, even though these specific examples are from cats, the concepts apply in other animals as well as plants.

## Prerequisite knowledge:

* [*Genetics, Agriculture, and Biotechnology*](https://iastate.pressbooks.pub/genagbiotech/), Chapters 13, 14, and 15
* Mendelian inheritance, including:
  + Law of Segregation
  + Law of Independent Assortment
* Punnett squares
  + Applications to one gene
  + Applications to multiple genes
* Testcrosses
* Common types of non-Mendelian inheritance including:
  + Sex-linked traits
  + Incomplete dominance
  + Epistasis
  + Lethal alleles
  + Variable expressivity
  + Environmental influence on phenotype

## Learning objectives:

* Use a single, well-known organism and real examples to review concepts including:
  + Mendelian inheritance
    - Single- and multi-locus inheritance
  + Testcrosses
  + Common types of non-Mendelian inheritance including:
    - Sex-linked traits and Barr bodies
    - Incomplete dominance
    - Epistasis
    - Variable expressivity
    - Lethal alleles
    - Environmental influence on phenotype
* Demonstrate how all these concepts connect in one organism.
* By using a single, common organism, provide additional opportunities to practice any time they see a cat or by looking at photos of cats online.

## Materials:

* Slides with:
  + Images of cats
  + Practice questions