For each problem, create a complete Punnett square and then predict the offspring.
To know which allele is dominant, use the InstaGene app.

A homozygous shorthair cat mates with a cat who is heterozygous for hair length.

Offspring phenotypes:

____% _____

____% _____

A cat with a bobtail mates with a homozygous long-tailed cat.

Offspring phenotypes:

Two average-height cats, both heterozygous for height, breed together.

Station 1 – Background and Vocabulary

1. How many chromosomes does a typical human have in their body cells?

2. Where are these chromosomes located?

3. Name the three possible genotypes for any trait.

4. True or false:

   a) If you know somebody's genotype, you can determine their phenotype.

   b) If you know someone's phenotype, you can determine their genotype.

Station 2 – Types of Dominance

1. What is the difference between simple, incomplete, and co-dominance?

2. What are some human traits that follow polygenic inheritance?

(Hint: poly means many)

3. A dog breeder wants to create black-and-white spotted puppies. What type of dominance is necessary to make this happen?

4. What two parents would produce the largest number of spotted puppies? Show a Punnett square and use C^B for black fur and C^W for white fur.

Station 3 – Punnett Squares

1. In tomatoes, red fruit (R) is dominant over yellow fruit (r). A plant that is heterozygous is crossed with a plant that has yellow fruit. Calculate the probability of having 6 tomato plants, all with yellow fruit.

2. Predict the blood types of offspring resulting from a cross between a parent with $I^A I^B$ alleles, and a parent with $I^B i$ alleles.

3. In mice, the Agouti gene contains instructions for coat color as well as for metabolism. Homozygous dominant mice are brown and healthy; heterozygous mice are yellow and healthy. However, homozygous recessive mice do not survive to birth due to a defect in cholesterol metabolism. Use a Punnett square to predict the ratio of brown : yellow mice that would be born from a Gg x Gg cross.

Station 4 – Application

1. In wild pigs, solid color (G) is dominant and spotted color (g) is recessive. Use Punnett squares to show three different ways to breed a litter of 100% solid puppies.

2.   A piglet was born with spotted color, but both its biological parents were solid color. Explain how this is possible.

3.   Two brown rabbits mated. They had 12 babies, three with white coats and nine with brown coats. Explain fully what has happened. Include a Punnett square.

Station 5 – Application

A pedigree chart shows inheritance of traits over multiple generations. Free earlobes (E) are dominant over attached earlobes (e).

1. How many children do Persons 1 and 2 have?   (A) 0   (B) 1   (C) 2   (D) 3

2. Person 7 is has children.   (A) True   (B) False

3. How many **granddaughters** do Persons 1 and 2 have? (A) 0   (B) 1   (C) 3
(D) 4

4. How many **uncles** does Person 11 have?   (A) 0   (B) 1   (C) 2   (D) 4

5. The genotype of Person 12 is _____.

(A) EE   (B) Ee   (C) ee   (D) Not enough information

6. Person 14's square should be _____.   (A) shaded   (B) not shaded

7. Based on Person 2's children, the genotype of Person 2 is _____.

(A) EE   (B) Ee   (C) ee

8. The genotype of Person 5 is _____.

(A) EE   (B) Ee   (C) ee   (D) Not enough information

9. If persons 8 and 9 have another child what is the chance that their earlobes would be attached?

(A) 0%   (B) 25%   C) 50%   (D) 75%   (e) 100%

Free   Attached
earlobes   earlobes