

Non-Mendelian Genetics Practice

Use your knowledge of codominance, sex linked traits, and incomplete dominance to help you solve these Punnett Square scenarios

Scenario 1: Cal Kestis is an avid gardener whose favorite plant on Zeffo is Royal Fuzz. Royal Fuzz is a plant that exhibits incomplete dominance.

The hybrid genotype (Rr) produces a purple plant, the homozygous dominant genotype (RR) produces a red plant, and the homozygous recessive genotype (rr) produces a blue plant. Use this information to help you solve the Punnett Squares and determine the ratios.

Purple Flower x Purple Flower

Genotype Ratios:

RR :

Rr :

rr :

Phenotype Ratios:

Red:

Purple:

Blue:

Red Flower x Purple Flower

Genotype Ratios:

RR :

Rr :

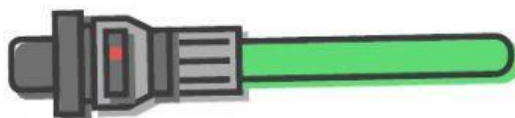
rr :

Phenotype Ratios:

Red:

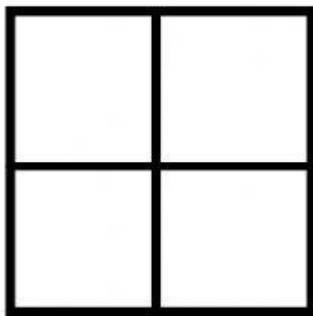
Purple:

Blue:



Scenario 2: Scientist recently discovered a friendly new creature called a **wyvern**. This adorable creature comes in three colors: blue, green, and yellow. The coloring of the **wyvern** is controlled by a single gene with incomplete dominance. A homozygous dominant **wyvern** (BB) is blue, a homozygous recessive (bb) is yellow, and a heterozygous (Bb) is green. Use this information to help you solve the Punnett Squares and determine the ratios.

Yellow Wyvern x Green Wyvern



Genotype Ratios:

BB:

Bb:

bb:

Phenotype Ratios:

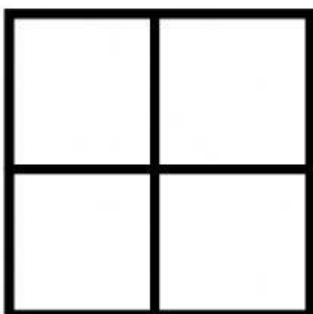
Blue:

Green:

Yellow:



Blue Wyvern x Green Wyvern



Genotype Ratios:

BB:

Bb:

bb:

Phenotype Ratios:

Blue:

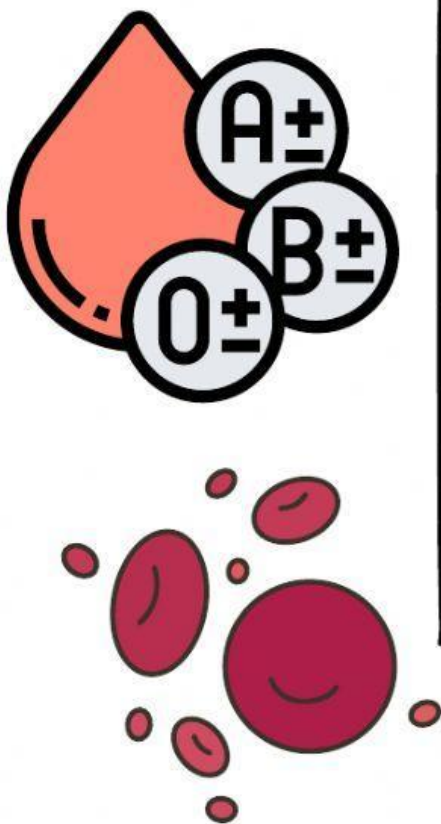
Green:

Yellow:

Scenario 3: Human blood types are determined by three different alleles. I^A and I^B are codominant and the i allele is recessive. The phenotypes that can be produced are type A, type B, type AB, and type O. Use this information to help you solve the Punnett Squares, determine the ratios, and answer the questions.

Type AB x Type O

What blood types could the offspring have?



A father with Type A blood and a mother with Type B blood have a child with Type O blood.

- Is this possible?
- What would the genotypes of the parents need to be?
- What other genotypes could their children have?
- If both parents were homozygous for Type A or Type B blood, could they still have a child with Type O blood?

Scenario 4: Red-green color blindness is a sex-linked trait. Use X^B for the dominant normal vision phenotype and X^b for the recessive color-blind phenotype. Use this information to help you solve the Punnett Squares, determine the ratios, and answer the questions.

A boy is red-green color blind (X^bY).

His parents and grandparents all had normal vision. What are the genotypes for:

- His mother?
- His father?
- His grandmother?
- His grandfather?

Cross of Parents

	X^bY

A woman that has red-green color blindness (X^bX^b) has a mother with normal vision ($X^B X^b$). Knowing that color-blindness is a sex-linked recessive gene, what is her father's phenotype?

Father's phenotype:

	X^B	X^b
		X^bX^b

