

Punnett Square Test Prep

Inheritance (Unit 4) – Biology

Name: _____

Block: _____ Date: _____

Completed Example

Trait: **Green Leaves vs Purple Leaves**

Parent 1

Genotype: Gg

Genotype description: heterozygous

Phenotype: green leaves

Parent 2

Genotype: GG

Genotype description: homozygous dominant

Phenotype: purple leaves

	G	G
G	GG	GG
g	Gg	Gg

Offspring Possibilities

Genotypes

Genotype descriptions

Phenotypes

GG

homozygous dominant

green leaves

Gg

heterozygous

green leaves

(The last line is blank because "gg" isn't a possible result of this cross.)

Genotypic ratio: 0 : 4 : 0 (0 homozygous dominant, 4 heterozygous, and 0 homozygous recessive)

Phenotypic ratio: 4 : 0 (4 with the dominant trait of green leaves, and 0 with the recessive trait of purple leaves)

What is the likelihood that a plant produced from this cross will **have** green leaves? 100%

What is the likelihood that a plant produced from this cross will be a **carrier** for purple leaves? 50%

Instructions

In each of the Punnett Squares that follows, you'll be given **partial information**. Use the information you're given to fill in all of the blanks, complete the Punnett Square, and answer the questions!

- Trait: **Tay-Sachs Disease** (a recessive disorder) – The homozygous dominant genotype is HH (H for healthy).

Parent 1

Genotype: Hh

Genotype description: _____

Phenotype: _____

Parent 2

Genotype: _____

Genotype description: Heterozygous

Phenotype: _____

Offspring Possibilities

Genotypes

Genotype descriptions

Phenotypes

What is the likelihood that this couple will have a child who **has** Tay-Sachs Disease? _____%

What is the likelihood that this couple will have a child who is a **carrier** for Tay-Sachs Disease? _____%

2. Trait: **Tay-Sachs Disease** (a recessive disorder) – The homozygous dominant genotype is HH (H for healthy).

Parent 1

Genotype: _____

Genotype description: **Heterozygous**

Phenotype: _____

Parent 2

Genotype: _____

Genotype description: **Homozygous** _____ (Hint: Look at the offspring)

Phenotype: _____

Offspring Possibilities

Genotypes	Genotype descriptions	Phenotypes
<u>hh</u>	_____	_____
_____	_____	_____
_____	_____	_____

What is the likelihood that this couple will have a child who **has** Tay-Sachs Disease? ____%

What is the likelihood that this couple will have a child who is a **carrier** for Tay-Sachs Disease? ____%

3. Trait: **Black Fur (B) vs White Fur (B') vs Gray Fur**

Parent 1

Genotype: **B'B'**

Phenotype: _____

Parent 2

Genotype: _____

Phenotype: **Gray Fur**

Offspring Possibilities

Genotypes	Genotype Descriptions	Phenotypes
_____	_____	_____
_____	_____	_____
_____	_____	_____

What is the likelihood that this cross will result in an offspring with gray fur? ____%

4. Trait: **Black Fur (B) vs White Fur (B') vs Gray Fur**

Parent 1

Genotype: _____

Phenotype: **Black Fur**

Parent 2

Genotype: **BB'**

Phenotype: _____

Offspring Possibilities

Genotypes	Genotype Descriptions	Phenotypes
_____	_____	_____
_____	_____	_____
_____	_____	_____

What is the likelihood that this cross will result in an offspring with gray fur? ____%

5. Trait: **Black Fur (B)** vs **White Fur (W)** vs **Black & White Stripes**

Parent 1

Genotype: **BB**

Phenotype: _____

Parent 2

Genotype: _____

Phenotype: **Black & White Stripes**

Offspring Possibilities

Genotypes

Phenotypes

What is the likelihood that this cross will result in an offspring with black & white stripes? _____%

6. Trait: **Black Fur (B)** vs **White Fur (W)** vs **Black & White Stripes**

Parent 1

Genotype: **BB**

Phenotype: _____

Parent 2

Genotype: _____

Phenotype: **White Fur**

Offspring Possibilities

Genotypes

Phenotypes

What is the likelihood that this cross will result in an offspring with black & white stripes? _____%

7. Trait: **Blood Type** (a real-life example of **codominance**)

Parent 1

Genotype: **ii**

Phenotype: Type _____

Parent 2

Genotype: **i^Ai**

Phenotype: Type _____

Offspring Possibilities

Genotypes

Phenotypes

Type _____

Type _____

Type _____

Genotype	Phenotype
I ^A I ^A (Homozygous dom.)	Blood Type A
I ^A i (Heterozygous)	Blood Type A
I ^B I ^B (Homozygous dom.)	Blood Type B
I ^B i (Heterozygous)	Blood Type B
I ^A I ^B (Heterozygous)	Blood Type AB
ii (Homozygous rec.)	Blood Type O

What is the likelihood that their offspring will be Type A? ____ / 4

8. Trait: **Blood Type** (a real-life example of **codominance**)

Parent 1

Genotype: $i^A i^B$

Phenotype: Type ____

Parent 2

Genotype: _____

Phenotype: **Type O**

Offspring Possibilities

Genotypes Phenotypes

_____ Type _____

_____ Type _____

_____ Type _____

Genotype	Phenotype
$I^A I^A$ (Homozygous dom.)	Blood Type A
$I^A i$ (Heterozygous)	Blood Type A
$I^B I^B$ (Homozygous dom.)	Blood Type B
$I^B i$ (Heterozygous)	Blood Type B
$I^A I^B$ (Heterozygous)	Blood Type AB
ii (Homozygous rec.)	Blood Type O

What is the likelihood that their offspring will be Type B? ____%

9. Trait 1: **Leaf shape**. Alleles: **Broad leaves (B) vs thin leaves (b)**

Trait 2: **Flower color**. Alleles: **Red flowers (R) vs yellow flowers (R')** (Heterozygous = orange flowers)

Parent 1

Genotype: **BbR'R'**

Phenotypes: _____ & _____

Parent 2

Genotype: **bbRR**

Phenotypes: _____ & _____

FOIL for BbR'R': _____

FOIL for bbRR: _____

Offspring Possibilities

Genotypes Phenotypes

_____ & _____

_____ & _____

_____ & _____

_____ & _____

_____ & _____

_____ & _____

_____ & _____

_____ & _____

What is the likelihood that a flower produced by this cross will have thin leaves **and** orange flowers? ____ / 16

What is the likelihood that a flower produced by this cross will be heterozygous for **both** traits? ____ / 16

10. Trait 1: **Leaf shape**. Alleles: **Broad leaves (B) vs thin leaves (b)**

Trait 2: **Flower color**. Alleles: **Red flowers (R) vs yellow flowers (R')** (Heterozygous = orange flowers)

Parent 1

Genotype: _____

Phenotypes: **Thin leaves with orange flowers**

Parent 2

Genotype: _____

Phenotypes: **Broad leaves (homozygous) with yellow flowers**

FOIL for Parent 1: _____

FOIL for Parent 2: _____

Offspring Possibilities

Genotypes

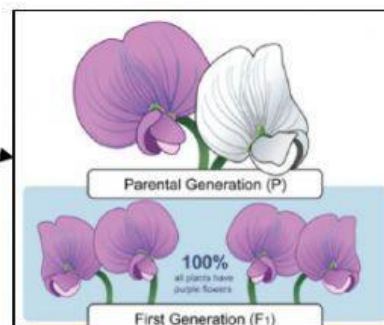
Phenotypes

_____	_____	&	_____
_____	_____	&	_____
_____	_____	&	_____
_____	_____	&	_____
_____	_____	&	_____
_____	_____	&	_____
_____	_____	&	_____
_____	_____	&	_____

What is the likelihood that a flower produced by this cross will have broad leaves **and** yellow flowers? ____ / 16

What is the likelihood that a flower produced by this cross will be heterozygous for **both** traits? ____ / 16

11. If we cross a plant with the same genotype as the white flower in the P generation with a plant that has an F1 genotype, what is the likelihood that they'll produce offspring that are white? ____%



12. The incomplete Punnett Square below is for a cross between two cows. One is brown. The other is white.

What is the likelihood that an offspring of theirs will be brown? ____%

What is the likelihood that an offspring of theirs will be white? ____%

One more phenotype is possible. Describe how cows with that phenotype would look: _____

	BW