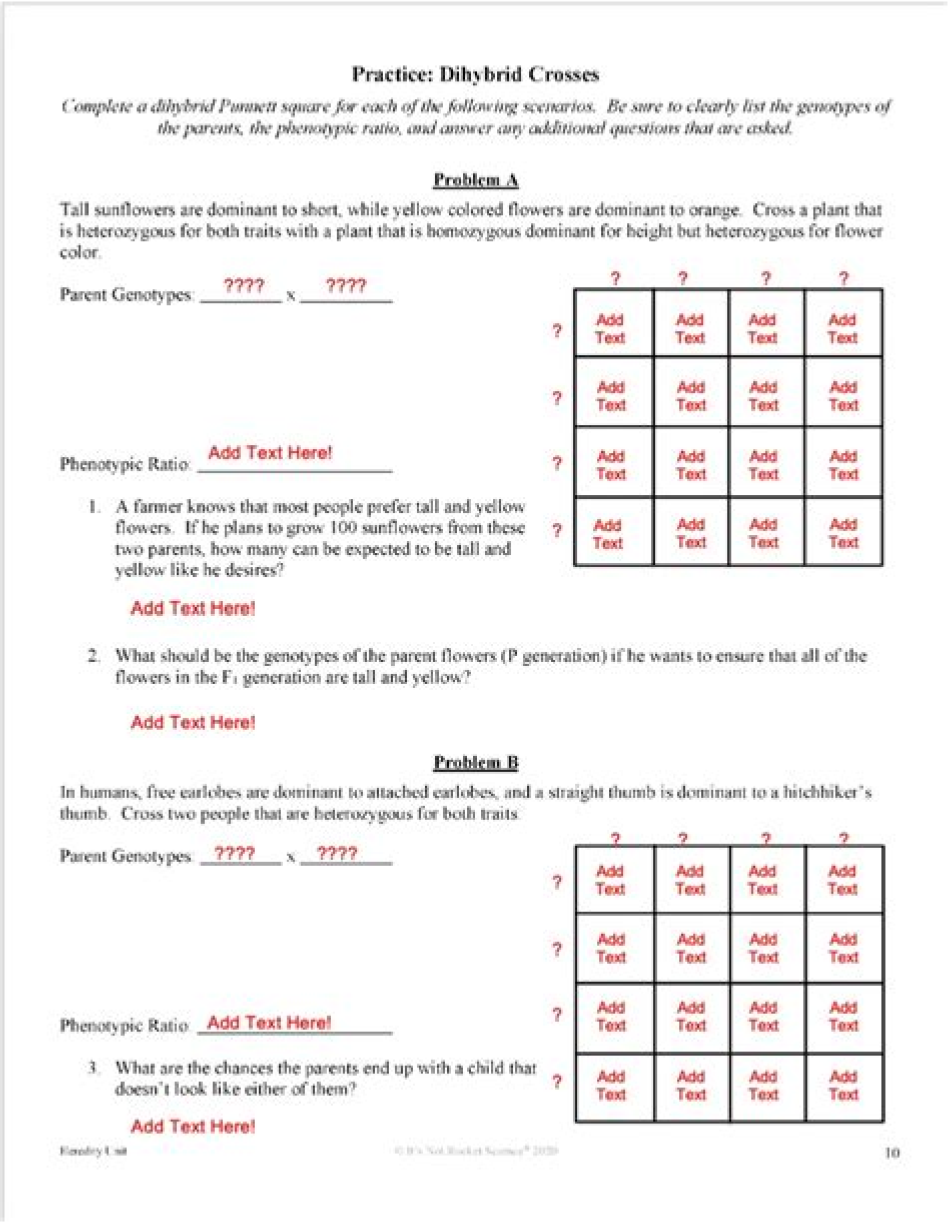
Practice With Dihybrid Crosses Answer Key



Practice: Dihybrid Crosses

Complete a dihybrid Punnett square for each of the following scenarios. Be sure to clearly list the genotypes of the parents, the phenotypic ratio, and answer any additional questions that are asked.

Problem A

Tall sunflowers are dominant to short, while yellow colored flowers are dominant to orange. Cross a plant that is heterozygous for both traits with a plant that is homozygous dominant for height but heterozygous for flower color.

Parent Genotypes: ____????____ x ____????____

	?	?	?	?
?	Add Text	Add Text	Add Text	Add Text
?	Add Text	Add Text	Add Text	Add Text
?	Add Text	Add Text	Add Text	Add Text
?	Add Text	Add Text	Add Text	Add Text

Phenotypic Ratio: ____Add Text Here!____

1. A farmer knows that most people prefer tall and yellow flowers. If he plans to grow 100 sunflowers from these two parents, how many can be expected to be tall and yellow like he desires?

   Add Text Here!

2. What should be the genotypes of the parent flowers (P generation) if he wants to ensure that all of the flowers in the F_1 generation are tall and yellow?

   Add Text Here!

Problem B

In humans, free earlobes are dominant to attached earlobes, and a straight thumb is dominant to a hitchhiker's thumb. Cross two people that are heterozygous for both traits.

Parent Genotypes: ____????____ x ____????____

	?	?	?	?
?	Add Text	Add Text	Add Text	Add Text
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Phenotypic Ratio: ____Add Text Here!____

3. What are the chances the parents end up with a child that doesn't look like either of them?

   Add Text Here!

Heredity Unit © It's Not Rocket Science® 2020 10

Practice with dihybrid crosses answer key is an essential resource for students and educators delving into the fascinating world of genetics. Understanding dihybrid crosses is crucial for grasping how traits are inherited through generations. This article will explore the principles behind dihybrid crosses, provide examples, and include a comprehensive answer key to help clarify the concepts.

Understanding Dihybrid Crosses

Dihybrid crosses examine the inheritance of two different traits simultaneously. This approach allows for a deeper understanding of Mendelian genetics and how alleles interact. In a dihybrid cross, we consider two traits, each represented by two alleles. For instance, let's consider the traits for seed shape and seed color in pea plants, where:

- Round seeds (R) are dominant over wrinkled seeds (r).
- Yellow seeds (Y) are dominant over green seeds (y).

The genotype combinations for these traits can be represented as follows:

- Round and Yellow: RRYY, RRYy, RrYY, RrYy
- Round and Green: RRyy, Rryy
- Wrinkled and Yellow: rrYY, rrYy
- Wrinkled and Green: rryy

The Punnett Square Method

A Punnett square is a visual tool used to predict the genotypes of offspring from a genetic cross. For a dihybrid cross, a 4x4 Punnett square is used because each parent can produce four types of gametes. Let’s consider a cross between two pea plants that are heterozygous for both traits (RrYy). The gametes produced by each parent would be:

- Parent 1: RY, Ry, rY, ry
- Parent 2: RY, Ry, rY, ry

The Punnett square would look like this:

```
RY Ry rY ry
___________________________
RY | RRYY | RRYy | RrYY | RrYy |
|---------|---------|---------|---------|
Ry | RRYy | RRyy | RrYy | Rryy |
|---------|---------|---------|---------|
rY | RrYY | RrYy | rrYY | rrYy |
|---------|---------|---------|---------|
ry | RrYy | Rryy | rrYy | rryy |
```

Determining the Ratios

From the completed Punnett square, we can count the phenotypic ratios of the offspring. The results from our example reveal the following phenotypes:

1. Round Yellow (RRYY, RRYy, RrYY, RrYy): 9
2. Round Green (RRyy, Rryy): 3
3. Wrinkled Yellow (rrYY, rrYy): 3
4. Wrinkled Green (rryy): 1

This leads to a classic phenotypic ratio of 9:3:3:1 for a dihybrid cross.

Practice Problems

To solidify your understanding of dihybrid crosses, here are some practice problems:

1. Perform a dihybrid cross between two plants that are heterozygous for both

traits (RrYy). What are the expected phenotypic ratios?
2. Consider a dihybrid cross between a homozygous round yellow (RRYY) and a homozygous wrinkled green (rryy) plant. What phenotypes can be expected in the offspring?
3. If you cross two plants with genotypes RrYy and RRYy, what will be the ratio of the phenotypes in the offspring?

Answer Key for Practice Problems

Let's provide answers for the practice problems listed above.

1. Dihybrid Cross: RrYy x RrYy

- Expected Phenotypic Ratio: 9 Round Yellow: 3 Round Green: 3 Wrinkled Yellow: 1 Wrinkled Green (9:3:3:1).

2. Dihybrid Cross: RRYY x rryy

- Expected Offspring: All offspring will be RrYy (Round Yellow). No variation will occur since all offspring will inherit one dominant allele from each parent.

3. Dihybrid Cross: RrYy x RRYy

- Gametes from RrYy: RY, Ry, rY, ry
- Gametes from RRYy: RY, Ry
- Phenotypic Ratios:
- Round Yellow: 7 (RRYY, RRYy, RrYY, RrYy)
- Round Green: 3 (RRyy, Rryy)
- Wrinkled Yellow: 1 (rrYY, rrYy)
- Wrinkled Green: 0 (rryy)

Thus, the ratio for this cross is approximately 7:3:0:0.

Conclusion

Practice with dihybrid crosses answer key offers a vital resource for understanding the inheritance of traits in genetics. By mastering the Punnett square method and the ratios that arise from dihybrid crosses, students can develop a solid foundation in genetic principles. As you continue your studies, remember that practice is key to mastering these concepts. With time and effort, you'll gain confidence in solving genetic cross problems and interpreting the results.

Frequently Asked Questions

What is a dihybrid cross?

A dihybrid cross is a genetic cross that examines the inheritance of two different traits, each controlled by different genes.

What is the phenotypic ratio expected from a dihybrid cross between two heterozygous parents?

The expected phenotypic ratio from a dihybrid cross between two heterozygous parents (AaBb x AaBb) is 9:3:3:1.

How do you set up a Punnett square for a dihybrid cross?

To set up a Punnett square for a dihybrid cross, list the possible gametes of each parent on the sides of a 4x4 grid, then fill in the squares to show allele combinations.

What are the genotypes of the parents in a typical dihybrid cross example?

In a typical dihybrid cross example, the genotypes of the parents could be AaBb and AaBb, where 'A' and 'a' represent one trait and 'B' and 'b' represent another.

What does the F2 generation represent in a dihybrid cross?

The F2 generation in a dihybrid cross represents the offspring resulting from the self-fertilization or cross-fertilization of the F1 generation.

What is the significance of Mendel's dihybrid cross experiments?

Mendel's dihybrid cross experiments were significant because they demonstrated the principle of independent assortment, showing that alleles for different traits segregate independently during gamete formation.

How can dihybrid crosses be used in real-world applications?

Dihybrid crosses can be used in agriculture to predict the inheritance of traits in plants or animals, aiding in selective breeding practices.

What challenges might arise when interpreting dihybrid cross results?

Challenges in interpreting dihybrid cross results may include incomplete dominance, epistasis, or environmental factors that affect phenotype expression.

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