

Amoeba Sisters Dihybrid Crosses Answer Key

AMOEBIA SISTERS: VIDEO RECAP

DIHYBRID CROSSES (MENDELIAN)

Amoeba Sisters Video Recap: Dihybrid Crosses (Mendelian Inheritance)

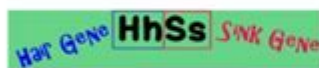
Vocabulary practice! You probably have had enough of cats with our video. On to peas! In pea plants, yellow peas (coded for by a dominant allele Y) are dominant to green peas (requiring two recessive alleles y). Round peas (coded for by a dominant allele R) are dominant to wrinkly peas (requiring two recessive r alleles). These are actual pea plant traits, by the way!

For the following, please write in the genotype or phenotype. Some are filled in for you.

Genotype	Phenotype
YYRR	Yellow, round
1. _____	Green, wrinkled
YyRr	2. _____
yyRR	3. _____
yyRr	4. _____
5. _____ or _____	Yellow, wrinkled
6. _____ or _____	Green, round

7. An allele is a form of a gene. In a dihybrid cross HhSs x hhss, how many alleles does a kitten inherit from the mother? _____

8. How many alleles does a kitten inherit from the father? _____



Step 2

	HS	Hs	hS	hs
hs				
hs				
hs				
hs				

9. Gametes, which are sex cells, carry the alleles. Why must a gamete carry one allele (represented by a letter) from each gene? Meaning, why can't a gamete carry an "hh" instead of an "hs" or an "Hh" instead of a "HS"?

The Dihybrid Problem Solve

Read the beginning part about pea plants again. Bernard really likes growing peas in his garden, but the peas he likes are green. He also likes them to have a wrinkled texture, because he thinks they look much more interesting that way. Please work out a YyRr x YyRr (heterozygous cross) on the back of this sheet or on another paper while showing all work.

10. After showing your work to use as support, what is the chance that Bernard will have pea plant offspring that match the phenotype he is looking for (green, wrinkled)? _____

11. What is the phenotype ratio of this heterozygous cross?

_____ (yellow, round) : _____ (yellow, wrinkled) : _____ (green, round) : _____ (green, wrinkled)

12. If Bernard did not receive any pea plants that were green and wrinkled in actuality, would you know for sure that the parent genotypes were incorrect? Why or why not? _____



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The Amoeba Sisters are renowned for their engaging educational content, especially in the field of genetics. One of the core topics they cover is dihybrid crosses, which are an essential concept in understanding heredity and the inheritance of traits. In this article, we will delve into the specifics of dihybrid crosses, their significance in genetics, and how the Amoeba Sisters facilitate learning through their answer key resources. We will explore the principles behind dihybrid crosses, perform a sample dihybrid cross, and discuss how to effectively interpret the results.

Understanding Dihybrid Crosses

Dihybrid crosses are genetic crosses that involve two traits, each represented by a pair of alleles. This type of cross allows us to observe how two different traits segregate independently of one another during gamete formation. The principles governing dihybrid crosses are rooted in Gregor Mendel's laws of inheritance, particularly the Law of Independent Assortment.

Key Concepts

1. Alleles: Different forms of a gene. For example, the gene for seed shape in peas can have a round (R) or wrinkled (r) allele.
2. Genotype: The genetic makeup of an organism, represented by the alleles. For example, a plant could have a genotype of RR, Rr, or rr for seed shape.
3. Phenotype: The observable characteristics determined by the genotype. In our example, round seeds are a phenotype associated with the genotype RR or Rr, while wrinkled seeds correspond to the genotype rr.

Mendel's Law of Independent Assortment

Mendel's Law of Independent Assortment states that alleles for different traits segregate independently during gamete formation. This means that the inheritance of one trait does not influence the inheritance of another trait. In a dihybrid cross, this principle allows for the combination of various allele pairs, leading to a diverse array of potential genotypes and phenotypes in the offspring.

Setting Up a Dihybrid Cross

To perform a dihybrid cross, one must first identify the traits being studied. For this example, let's consider two traits in pea plants:

- Seed shape (Round vs. Wrinkled)
- Seed color (Yellow vs. Green)

Let:

- R = Round seeds (dominant)
- r = Wrinkled seeds (recessive)
- Y = Yellow seeds (dominant)
- y = Green seeds (recessive)

We will cross two pea plants, both heterozygous for both traits (RrYy).

Step 1: Determine the Parent Genotypes

In this example, both parent plants have the genotype RrYy.

Step 2: Create the Gametes

Using the FOIL method (First, Outside, Inside, Last), we can determine the possible gametes produced by each parent:

- RrYy: RY, Ry, rY, ry

Each parent will produce four types of gametes, leading to a total of 16 possible combinations in the offspring.

Step 3: Set Up the Punnett Square

To visualize the results, we can set up a 4x4 Punnett square:

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

This table shows all possible combinations of alleles from the two parents.

Interpreting the Results

Now that we have filled out the Punnett square, we can analyze the results to determine the phenotypic and genotypic ratios.

Phenotypic Ratio

To determine the phenotypic ratio, we count the number of times each phenotype appears:

- Round Yellow (R_Y): 9 (RRYY, RRYy, RrYY, RrYy)
- Round Green (R_yy): 3 (RRYy, Rryy)
- Wrinkled Yellow (rrY_): 3 (RrYY, RrYy)
- Wrinkled Green (rryy): 1 (rrYY, rrYy, rryy)

Thus, the phenotypic ratio is:

- 9 Round Yellow : 3 Round Green : 3 Wrinkled Yellow : 1 Wrinkled Green

Genotypic Ratio

Next, we can analyze the genotypes:

- Homozygous Round Yellow (RRY): 4
- Heterozygous Round Yellow (RrY): 8
- Homozygous Wrinkled Yellow (rrY): 2
- Heterozygous Round Green (RRYy): 2
- Homozygous Round Green (Rryy): 2
- Heterozygous Wrinkled Green (rryy): 1

The genotypic ratio can be summarized as:

- 1 RRY : 2 RRYy : 2 RrY : 4 RrYy : 1 rrY : 1 rrYy : 1 rryy

Amoeba Sisters Educational Resources

The Amoeba Sisters provide a variety of educational resources that make learning about dihybrid crosses and other genetic concepts accessible and enjoyable. Their educational videos break down complex topics into digestible segments, often using humor and visual aids to reinforce understanding.

Answer Key for Dihybrid Crosses

The Amoeba Sisters offer an answer key that helps students verify their answers when working through dihybrid crosses. This resource typically includes:

- Sample problems and solutions
- Explanations of each step in the cross
- Visual aids like Punnett squares
- Tips for remembering key concepts

These resources are invaluable for reinforcing learning, allowing students to practice and confirm their understanding of dihybrid crosses.

Conclusion

Dihybrid crosses are fundamental in the study of genetics, illustrating how two traits can be inherited independently. By understanding the mechanisms of these crosses, students can gain insights into genetic variation and inheritance patterns. The Amoeba Sisters provide an engaging and informative approach to learning these concepts, making it easier for students to grasp the complexities of genetics. Utilizing their resources, including the answer key for dihybrid crosses, can enhance one's

comprehension and application of genetic principles, thus paving the way for further studies in biology and genetics. Whether you are a student, educator, or simply a biology enthusiast, diving into the world of dihybrid crosses with the help of the Amoeba Sisters can be both educational and enjoyable.

Frequently Asked Questions

What is a dihybrid cross?

A dihybrid cross is a genetic cross between individuals that differ in two traits, allowing the study of the inheritance patterns of those two traits simultaneously.

How do the Amoeba Sisters explain dihybrid crosses?

The Amoeba Sisters use visuals and examples to illustrate the principles of dihybrid crosses, including the use of Punnett squares to predict offspring ratios for two traits.

What is the phenotypic ratio expected from a dihybrid cross?

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

What are the steps to create a Punnett square for a dihybrid cross?

To create a Punnett square for a dihybrid cross, list all possible gametes from each parent, set up a grid with one parent's gametes along the top and the other parent's along the side, and fill in the squares with the possible genotype combinations.

What does the term 'independent assortment' refer to in dihybrid crosses?

Independent assortment refers to the principle that alleles for different traits segregate independently of one another during gamete formation, which is a key concept in dihybrid crosses.

Why is it important to understand dihybrid crosses in genetics?

Understanding dihybrid crosses is important in genetics because it helps predict the inheritance of multiple traits and understand the genetic variation in offspring.

Can dihybrid crosses be used to study linked genes?

Dihybrid crosses are typically used to study unlinked genes; however, they can also be adapted to study linked genes, which do not assort independently and may show different ratios.

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