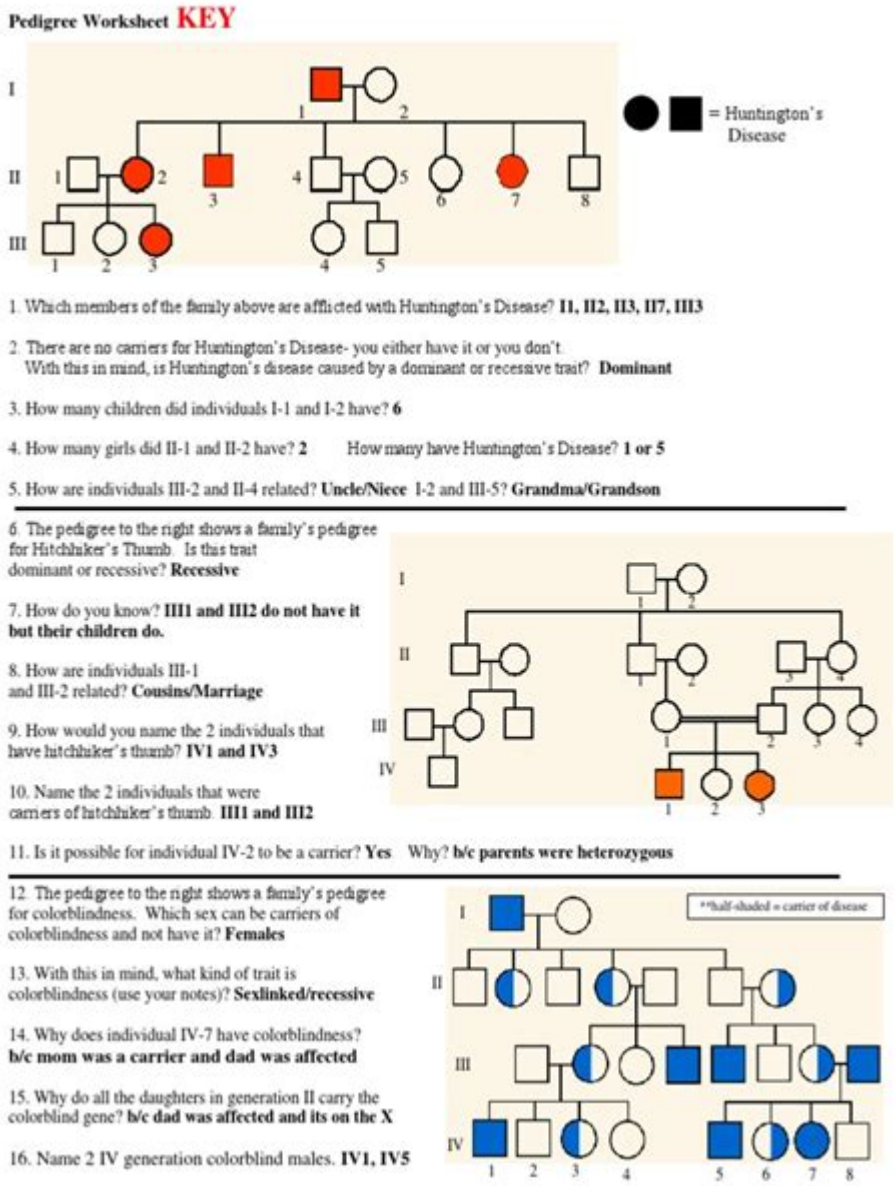
Genetic Pedigree Worksheet Answer Key



Pedigree Worksheet KEY

= Huntington's Disease

1. Which members of the family above are afflicted with Huntington's Disease? **I1, II2, II3, II7, III3**

2. There are no carriers for Huntington's Disease- you either have it or you don't. With this in mind, is Huntington's disease caused by a dominant or recessive trait? **Dominant**

3. How many children did individuals I-1 and I-2 have? **6**

4. How many girls did II-1 and II-2 have? **2** How many have Huntington's Disease? **1 or 5**

5. How are individuals III-2 and II-4 related? **Uncle/Niece** I-2 and III-5? **Grandma/Grandson**

6. The pedigree to the right shows a family's pedigree for Hitchhiker's Thumb. Is this trait dominant or recessive? **Recessive**

7. How do you know? **III1 and III2 do not have it but their children do.**

8. How are individuals III-1 and III-2 related? **Cousins/Marriage**

9. How would you name the 2 individuals that have hitchhiker's thumb? **IV1 and IV3**

10. Name the 2 individuals that were carriers of hitchhiker's thumb. **III1 and III2**

11. Is it possible for individual IV-2 to be a carrier? **Yes** Why? **b/c parents were heterozygous**

12. The pedigree to the right shows a family's pedigree for colorblindness. Which sex can be carriers of colorblindness and not have it? **Females**

13. With this in mind, what kind of trait is colorblindness (use your notes)? **Sexlinked/recessive**

14. Why does individual IV-7 have colorblindness? **b/c mom was a carrier and dad was affected**

15. Why do all the daughters in generation II carry the colorblind gene? **b/c dad was affected and its on the X**

16. Name 2 IV generation colorblind males. **IV1, IV5**

Genetic pedigree worksheet answer key is an essential tool for students and professionals in genetics and biology. Pedigree charts are graphical representations that depict the inheritance patterns of traits through generations within a family. Understanding how to analyze these charts is crucial for anyone studying genetics, as they provide insights into genetic disorders, inheritance patterns, and familial relationships. This comprehensive article will explore the components of a genetic pedigree worksheet, explain how to interpret pedigree charts, and provide an answer key for common scenarios encountered in educational settings.

Understanding Pedigree Charts

Pedigree charts are used to track the inheritance of specific traits or conditions through

generations. These charts use standardized symbols to represent individuals and their relationships. The primary components of a pedigree chart include:

Symbols Used in Pedigree Charts

- Circles: Represent females.
- Squares: Represent males.
- Horizontal Lines: Indicate mating or unions between individuals.
- Vertical Lines: Show the connection between parents and offspring.
- Shaded Symbols: Indicate individuals expressing the trait being studied.
- Unshaded Symbols: Represent individuals who do not express the trait.

Generational Notation

- Roman Numerals: Indicate generations (I, II, III, etc.).
- Arabic Numbers: Identify individuals within a generation (1, 2, 3, etc.).

Understanding these symbols allows for the effective interpretation of the chart, helping to identify patterns of inheritance for traits, whether they are autosomal dominant, autosomal recessive, or X-linked.

Analyzing Inheritance Patterns

To analyze a pedigree chart, one must recognize how traits are passed from one generation to the next. Various inheritance patterns can be observed:

Autosomal Dominant Inheritance

In autosomal dominant inheritance, only one copy of the allele (from one parent) is sufficient to express the trait. Key features include:

- The trait typically appears in every generation.
- Affected individuals have at least one affected parent.
- Two affected parents can produce unaffected offspring.

Autosomal Recessive Inheritance

In autosomal recessive inheritance, two copies of the recessive allele are required for the trait to be expressed. Key features include:

- The trait may skip generations.

- Affected individuals can be born to unaffected parents (carriers).
- If both parents are carriers, there is a 25% chance of having an affected child.

X-Linked Inheritance

X-linked traits are associated with genes on the X chromosome. Key features include:

- Males are more frequently affected than females.
- An affected male cannot pass the trait to his sons but will pass it to all of his daughters.
- Affected females may pass the trait to both sons and daughters.

Creating a Genetic Pedigree Worksheet

Creating a genetic pedigree worksheet involves several steps. The worksheet typically consists of a pedigree chart, questions about the inheritance pattern, and a space for conclusions.

Components of a Genetic Pedigree Worksheet

1. Pedigree Chart: A blank chart for students to fill in based on provided information.
2. Traits Information: A list of traits, including whether they are dominant or recessive.
3. Questions: Questions that require analysis of the pedigree chart.
4. Conclusion Section: A space for students to summarize their findings.

Example Scenario for Pedigree Worksheet

Consider a family with the following characteristics:

- Trait in question: Earlobe attachment (free earlobes are dominant over attached earlobes).
- Family Members:
- Generation I: Individuals 1 (affected) and 2 (unaffected).
- Generation II: Individuals 3 (affected), 4 (unaffected), 5 (affected), and 6 (unaffected).
- Generation III: Individuals 7 (unaffected) and 8 (affected).

Questions might include:
- Identify the inheritance pattern of earlobe attachment in this family.
- What is the probability that individual 8's offspring will have attached earlobes?

Answer Key for Genetic Pedigree Worksheet

Providing an answer key is crucial for educators and students alike. Below is an example of an answer key corresponding to the scenario outlined above.

Answer Key Example

1. Inheritance Pattern: The inheritance pattern for earlobe attachment in this family is autosomal dominant. This is evident as the trait appears in every generation, and affected individuals have affected parents.

2. Probability Calculation:
- Individual 8 (affected) must have at least one dominant allele for free earlobes. Assuming individual 8 is heterozygous (one affected and one unaffected parent), the potential genotypes are:
- AA (homozygous dominant) or Aa (heterozygous).
- Individual 7 is unaffected, indicating they are homozygous recessive (aa).
- Therefore, a cross between individual 8 (Aa or AA) and individual 7 (aa) results in:
- If individual 8 is AA: All offspring will have free earlobes.
- If individual 8 is Aa: There is a 50% chance of offspring having free earlobes (Aa) and a 50% chance of having attached earlobes (aa).

Thus, the probability of individual 8's offspring having attached earlobes is 0% if AA and 50% if Aa.

Conclusion

In summary, a genetic pedigree worksheet answer key serves as a valuable educational resource for understanding inheritance patterns and genetic traits. By analyzing pedigree charts, students can gain insights into the complexities of genetics and the transmission of traits across generations. Mastery of these concepts is not only pivotal for academic success but also for practical applications in genetics and related fields. Understanding how to interpret and create pedigree charts can empower individuals to make informed decisions regarding genetic counseling, disease prevention, and family planning.

Frequently Asked Questions

What is a genetic pedigree worksheet used for?

A genetic pedigree worksheet is used to map out the inheritance patterns of genetic traits within a family, helping to identify carriers of genetic conditions and assess risks for future generations.

How do you read a genetic pedigree chart?

In a genetic pedigree chart, squares represent males and circles represent females. Shaded shapes indicate individuals expressing a trait, while unshaded shapes indicate those who do not. Lines connect parents to their offspring, illustrating relationships.

What symbols are commonly used in a genetic pedigree worksheet?

Common symbols include circles for females, squares for males, shaded shapes for affected individuals, and horizontal lines connecting partners, with vertical lines leading to their children.

Why is it important to identify carriers in a genetic pedigree?

Identifying carriers is important because carriers can pass on genetic disorders to their offspring even if they do not exhibit symptoms themselves. This information is crucial for family planning and risk assessment.

What challenges might arise when completing a genetic pedigree worksheet?

Challenges can include incomplete family history, reluctance of family members to share genetic information, and accurately interpreting complex inheritance patterns such as those involving multiple genes or environmental factors.

Where can I find an answer key for a genetic pedigree worksheet?

An answer key for a genetic pedigree worksheet can often be found in educational materials, textbooks, or online resources related to genetics education. Teachers may also provide specific answer keys for their assignments.

Genetic Pedigree Worksheet Answer Key

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