

## Pedigree Analysis Performance Task/ 8th Grade Science

You are in training to be a genetic counselor. Several married couples, all in their late twenties, have been referred to you because of their questions regarding the possibility of starting a family. Using the couple's family history of various disorders and traits, develop a medical report that details the probability of producing an offspring with certain traits. Your report will be reviewed by and with other counselors in training and you will receive feedback on your analysis.

Couple 1) In humans, albinism is a recessive trait. The disorder causes a lack of pigment in the skin and hair, making an albino appear very pale with white hair and pale blue eyes. This disorder also occurs in animals; a common albino found in a laboratory is the white rat. The pedigrees below trace the inheritance of the allele that causes albinism. If the shape is shaded, that indicates that the individual displays the trait being studied. In the case below, shaded circles represent individuals who are albino (aa).

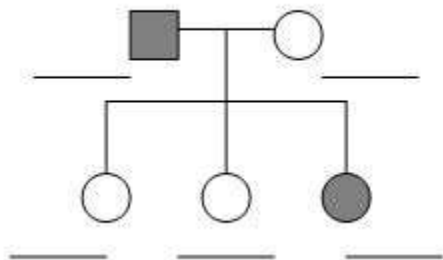
Given the following genotypes, describe the phenotypes (normal or albino)

AA = \_\_\_\_\_

Aa = \_\_\_\_\_

aa = \_\_\_\_\_

Fill out the blanks on the pedigree with the genotypes of each individual.



How many children does this family have? \_\_\_\_\_

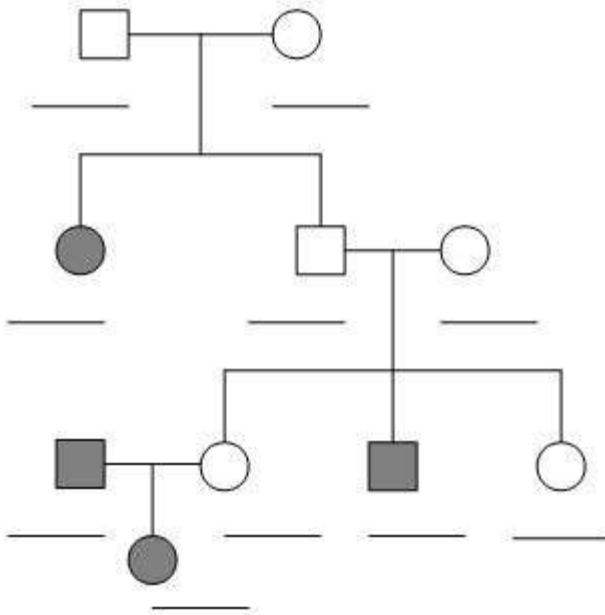
What are the sexes of the children? \_\_\_\_\_

Note: Couple 1 is represented in the **top row** of the pedigree chart.

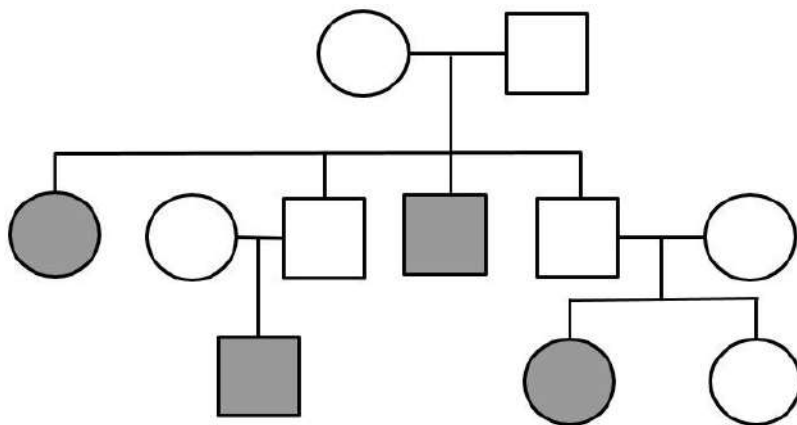
Fill out the blanks of the pedigree (AA, Aa, or aa)

How many children did the original couple have? \_\_\_\_

How many grandchildren do they have? \_\_\_\_\_



Couple 2) The following pedigree shows the inheritance of **Tay-Sachs** in a family. Tay-Sachs is a recessive disorder that causes lysosomes to be unable to break down waste products in the cell. These wastes build up in brain cells and cause damage and eventual death. Indicate the genotypes for each of the family members. Couple two is represented in the **top row** of the pedigree chart.

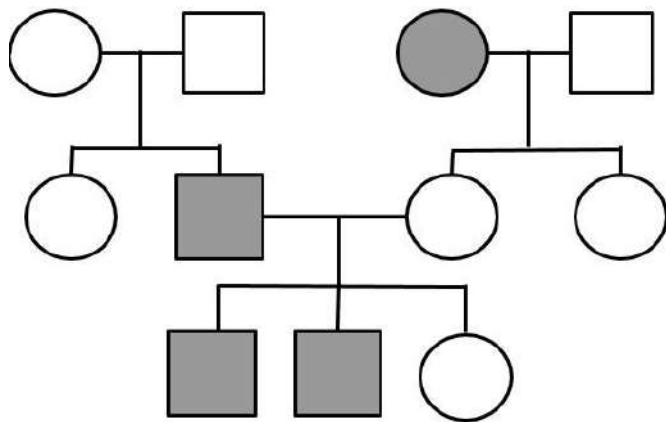


How many children did couple two have? \_\_\_\_\_

Which of their children were affected by the disease (identify by birth order; hint: you can number each offspring) \_\_\_\_\_

What can you say about the genotypes of both parents? \_\_\_\_\_

Couple 3) This pedigree shows the incidence of **cystic fibrosis** in two families. This disorder causes mucus to build up in the lungs, resulting in difficulties with breathing. Indicate the genotypes for each of the family members. Couple 3 is represented by the **unshaded square and shaded circle on the right side of the top row**.



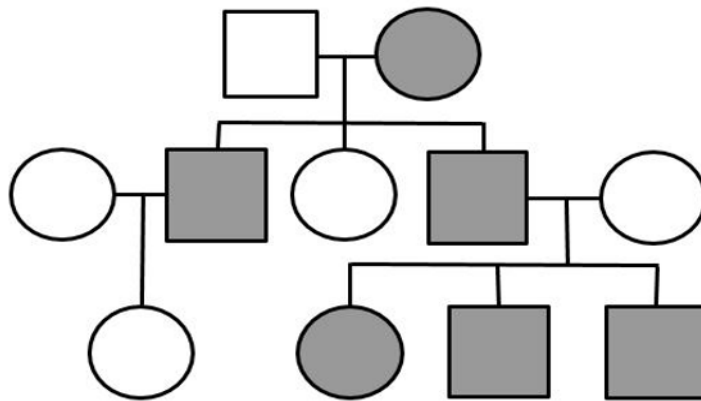
children). \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Couple 4) In humans, **polydactyly** is a condition where a person has extra fingers or toes. The allele that causes this trait is dominant. A person with Dd or DD will have extra digits. Fill out the pedigree of this family where polydactyly has been observed. Couple 4 is represented in the **top row** of the pedigree chart. Each symbol should be filled in with the individual's genotype.



Conclusion: Write your report to each couple. Include the following information for each:

- Information about their individual phenotypes and genotypes;
- Whether or not they are homozygous dominant, heterozygous dominant, or homozygous recessive for the trait or disorder they requested information about;
- The probability that they will have children that will either be a) not affected by the disorder; b) carriers of the disorder; and c) affected by the disorder;
- The risks of having a child that is affected by the disorder;
- Your advice to them as a genetic counselor.

**You will have a total of six paragraphs for your conclusion—an introduction explaining the role of a genetic counselor, one paragraph for each couple, and a conclusion about your ability as a genetic counselor.**

Reviewer's Name: \_\_\_\_\_ Class: \_\_\_\_\_

**Pedigree Analysis Performance Task Peer Review**

| Presentation Requirements   | Earned Points | Possible Points | Feedback |
|---|---------------|-----------------|----------|
| Pedigree Analysis<br>✓ Responded to each question accurately.   |               | 40<br>(10 x 4)  |          |
| Genetic Counselor's report<br>✓ Introduction  |               | 5               |          |
| Genetic Counselor's report<br>✓ Couple number one   |               | 10              |          |
| Genetic Counselor's report<br>✓ Couple number two   |               | 10              |          |
| Genetic Counselor's report<br>✓ Couple number three   |               | 10              |          |
| Genetic Counselor's report<br>✓ Couple number 4   |               | 10              |          |
| Genetic Counselor's report<br>✓ Conclusion  |               | 5               |          |
| Formatting (Including Spelling and Grammar)<br>✓ Is there evidence that the student proofread?<br>✓ Are all parts of the assignment complete? |               | 5               |          |
| Presentation (Is this a cookie or a cupcake?)<br>✓ Student shows evidence of pride in his/her work  |               | 5               |          |
|   |               |                 |          |
| <b>Total Points Earned</b>  |               | <b>100</b>      |          |

What did you like about the report? What could this counselor improve on?

Name: \_\_\_\_\_ Class: \_\_\_\_\_

**Pedigree Analysis Performance Task Rubric**

| Presentation Requirements   | Earned Points | Possible Points | Feedback |
|---|---------------|-----------------|----------|
| Pedigree Analysis<br>✓ Responded to each question accurately.   |               | 40<br>(10 x 4)  |          |
| Genetic Counselor's report<br>✓ Introduction  |               | 5               |          |
| Genetic Counselor's report<br>✓ Couple number one   |               | 10              |          |
| Genetic Counselor's report<br>✓ Couple number two   |               | 10              |          |
| Genetic Counselor's report<br>✓ Couple number three   |               | 10              |          |
| Genetic Counselor's report<br>✓ Couple number 4   |               | 10              |          |
| Genetic Counselor's report<br>✓ Conclusion  |               | 5               |          |
| Formatting (Including Spelling and Grammar)<br>✓ Is there evidence that the student proofread?<br>✓ Are all parts of the assignment complete? |               | 5               |          |
| Presentation (Is this a cookie or a cupcake?)<br>✓ Student shows evidence of pride in his/her work  |               | 5               |          |
|   |               |                 |          |
| <b>Total Points Earned</b>  |               | <b>100</b>      |          |