Name: Class: Date:

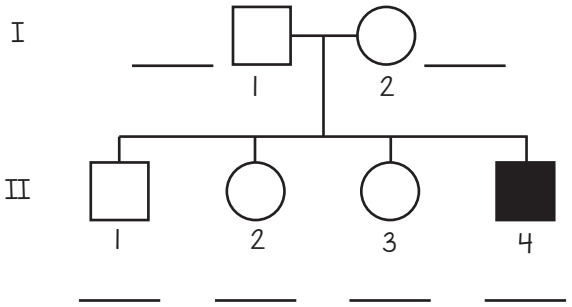
Pedigree Genetics Problems: Autosomal Recessive

Read each scenario, label each individual in each family with their genotype, and answer the questions. If you are not sure whether an individual, write the allele you do know and a blank "_" next to the allele you know.
For example, if you are not sure if an individual is AA or Aa, you would write A _ .

Allele Notation Key:
E = wet earwax e = dry earwax

Two people with wet earwax get married and have 4 children. When the fourth child is born, they notice that this child has dry earwax! Dry earwax is a recessive allele and more rare in European populations.

Dry Earwax Wet Earwax



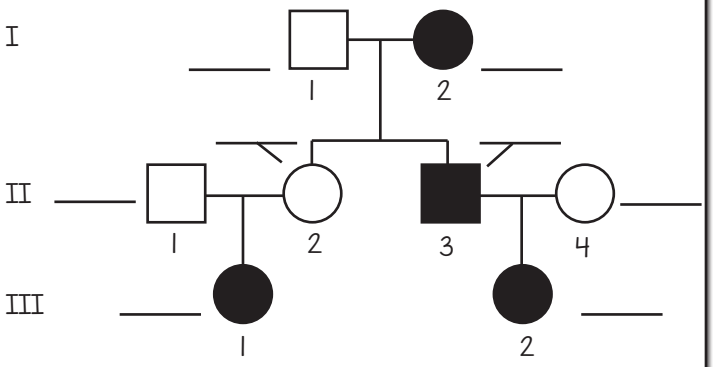
1. Write each individual's genotype in the blank next to each one.

2. If individuals I-1 and I-2 have a 5th child, what is the probability that he or she will have dry earwax?

Allele Notation Key:
A = normal pigments a = albino

There is a recessive allele that causes albinism in humans. People with albinism lack melanin pigment in their skin. The following family has many members who are albinos.

albino normal pigments



3. Write each individual's genotype in the blank next to each one.

You are a genetic counselor and you meet with a couple who are planning to have a baby. Fill in the pedigree on the right with their family history details. They are concerned that several members of their family have cystic fibrosis and they want to you to tell them the probability that their future child will have cystic fibrosis, a disorder caused by a recessive allele. Both the woman and the man have healthy lungs, but each of them has a sibling who died from cystic fibrosis at and early age. The woman has a younger brother who died from cystic fibrosis and the man has an older brother who died from cystic fibrosis. The father's parents were also healthy and the mother's parents were also healthy.

4. In the space provided on the right, draw a pedigree for this family. Make sure you include generation numbers, individual numbers, and a key to describe your shading choices. Decide what the probability is that they will have a child afflicted by cystic fibrosis. Explain your answer below the pedigree.

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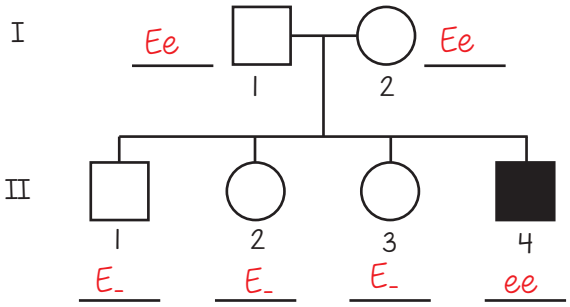

1. Write each individual's genotype in the blank next to each one.

2. If individuals I-1 and I-2 have a 5th child, what is the probability that he or she will have dry earwax?

1/4

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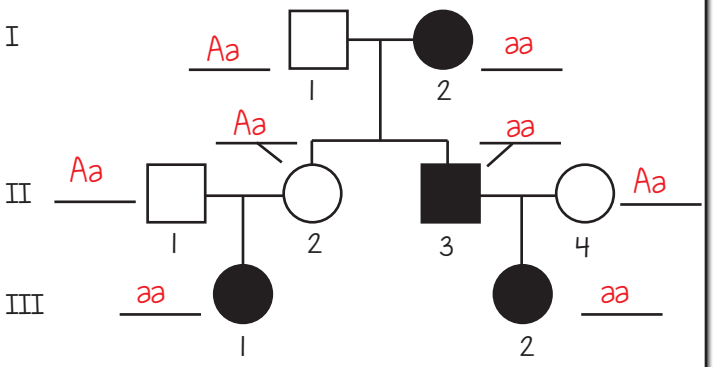

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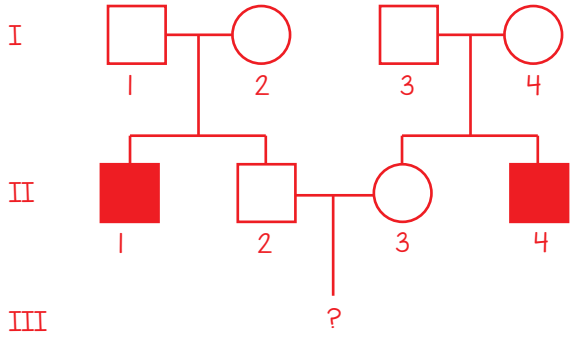
healthy lungs
cystic fibrosis



We don't know if the II-2 and II-3 are carriers. If they are carriers, then their child has a 1/4 chance of being affected by cystic fibrosis.

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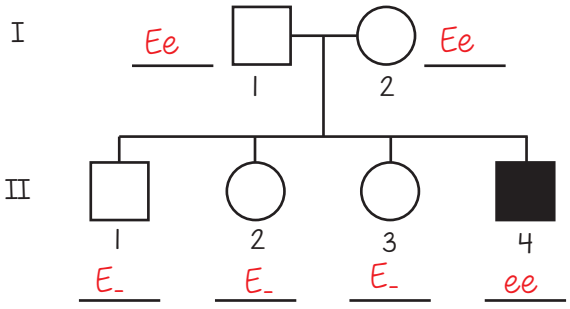

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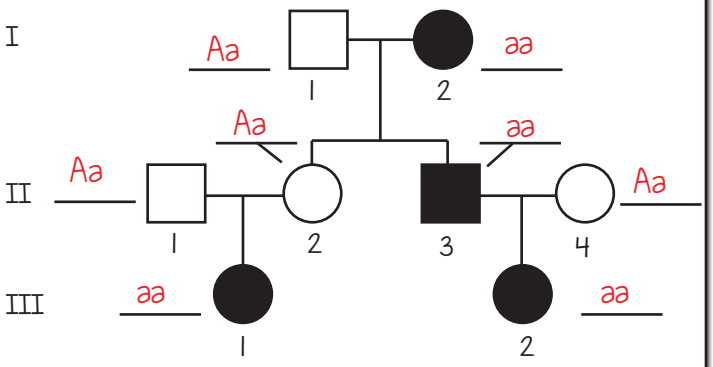

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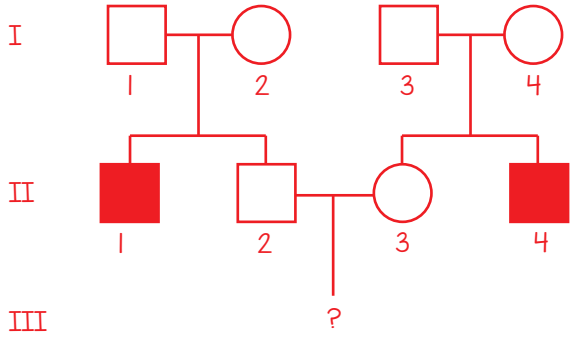
cystic fibrosis



The probability that II-2 is a carrier is 2/3. (because he's not affected)
The probability that II-3 is a carrier is 2/3. (because she's not affected)
The probability that given both parents are carriers is (2/3)(2/3) = 4/9.
If both parents are carriers, their child has a 1/4 chance of having cystic fibrosis. So the probability is (2/3) (2/3) (1/4) = 4 / 28

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