

What is the probability that if a couple has 4 children all will be males?

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$P(\text{all males}) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$

2. What is the probability that if a couple has 4 children that all 4 will be females?  $\frac{1}{16} \leftarrow P(\text{all females})$

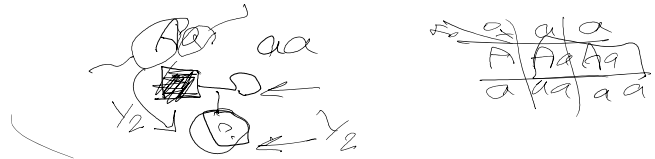
3. What is the probability that if a couple has 4 children that all 4 will be the same gender?

$\frac{1}{16} + \frac{1}{16} = \frac{2}{16}$

all 4 males  $\frac{1}{16}$  all 4 are females  $\frac{1}{16}$

$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} + \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{2}{16}$

A woman has a father who died of Huntington's disease. What is the probability that she will develop the symptoms of the disease?



A couple are both tested and found to be carriers of the cystic fibrosis gene. If they have 2 children,

what is the chance that both will be affected by cystic fibrosis?  $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

What is the chance that both will be carriers?

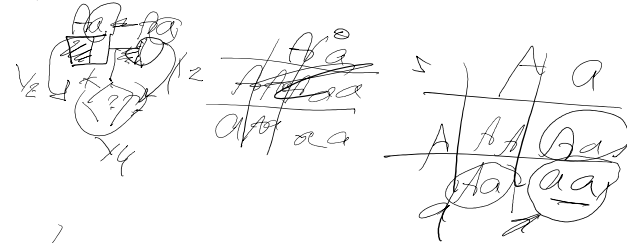
what is the chance that they will have 2 girls that are both affected by cystic fibrosis?

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

girl affected by CF  $\times$  girl affected by CF

$\frac{1}{2} \times \frac{1}{4} \times \frac{1}{2} \times \frac{1}{4} = \frac{1}{64}$

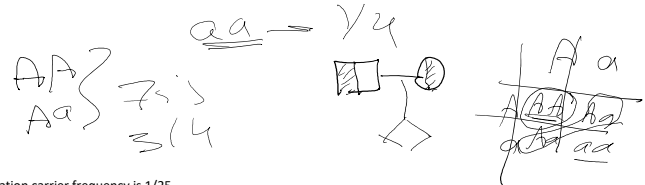
$\frac{1}{8} \times \frac{1}{8} = \frac{1}{64}$



The ability to taste the chemical PTC is determined by a single gene in humans with the ability to taste given by the dominant allele T and inability to taste by the recessive allele t. Suppose two heterozygous tasters (Tt) have a large family.

a. Predict the proportion of their children who will be tasters and nontasters.

What is the likelihood that their first child will be a taster?  $\frac{3}{4}$  What is the likelihood that their fourth child will be a taster?  $\frac{3}{4}$



For a Caucasian couple with no family history, what is the chance they will have a child with Cystic Fibrosis? Knowing that Caucasian population carrier frequency is 1/25

$\frac{1}{25} \times \frac{1}{25} = \frac{1}{625}$

$\frac{1}{25} \times \frac{1}{25} = \frac{1}{625}$