Definitions:

Dominant Gene:

Recessive Gene:

Carrier:

Punnett square:

Examples:

Punnett square: Suppose we are breeding pea plants, we have yellow pea plants and green pea plants. The yellow colour is carried on a dominant gene, while the green colour is carried on a recessive gene.

1. Write the Punnett square for breading a pure yellow plant with pure green plant, a mixed with a mixed, and a mixed with a pure green.

2. In each case find the probability that an offspring will be a green pea plant?

Genetic Disease: Suppose that a husband and wife each had a sibling with a genetic disease caused by a recessive gene, although both have parents without the disease. Neither the husband nor the wife has the disease, and they do not know whether they are carriers. If they have a child, what is the probability that the child will have the disease?

Sex-linked Traits: Sex-linked traits are inherited traits or diseases which are carried on the same chromosomes that determine a person's gender. Females have 2 X chromosomes while males have one X and one Y chromosome. There is an example in the book that deals with a recessive sex-linked trait; but, some sex-linked traits, such as vitamin D-resistant rickets, are caused by a dominant gene. In particular vitamin D-resistant rickets is carried on the X chromosome, let X_R denote an X chromosome carrying rickets and X and Y are normal chromosomes.

Suppose a woman who does not have vitamin D-resistant rickets is married to a man who has the disease. If they are expecting a child, what is the probability that the child will have the disease?

Carrier: The first child of a brown-eyed man and a brown-eyed woman has blue eyes.

1. What is the probability that their second child will have brown eyes?

2. If this second child has brown eyes and marries someone with blue eyes, what is the probability that a child of theirs will have brown eyes?