

Competitive Exams: Genetics

Each individual inherits 50% of their genes from each parent. A gene contains information, and carries a set of instructions. It consists of long strands of DNA (deoxyribose nucleic acid), which has the function of controlling cellular activity. Every human has a genotype which is controlled by genetic makeup (this can be XX for women and XY for men). They also have a phenotype which is what the individual becomes when environment interacts with genetics.

The term genome refers to all the genes within a cell. Humans have 23 pairs of chromosomes in all body cells, except gametes (sex cells i.e.. Egg and sperm) which only have 23 chromosomes or one from each pair.

Genes can be separated into two groups. A dominant gene is one which will always lead to a certain characteristic in offspring. For example, having brown eyes is a dominant allele (version of a gene). It only takes one parent to have that allele and to pass it on in order for their child to share the allele. A recessive gene is one which has to be present in both chromosomes in a pair in order to have the characteristic. For example, having blue eyes is a recessive allele. A child will need to inherit that very allele from both parents in order to have blue eyes.

Use a Punnett square to solve this. The brown eyes allele (dominant) is shown with a capital letter using its initial, so B. The recessive allele takes the same letter of the lower case, in this example b. The Punnett square below shows the two parents which have the alleles Bb and bb respectively. The parent with Bb will have brown eyes, as although it has both the brown and blue eyes alleles, the brown eyed one is dominant so that is the result. The parent with bb will therefore have blue eyes there is no brown eyed allele present. As the two produce an offspring, 50% of the genes from each parent are inherited by that child. Therefore there are four possible outcomes for the child's alleles for eye colour as shown (only one allele from each of the parents' pairs is inherited). There is a 75% chance of the child having bb (blue eyes) and a 25% chance of the child having Bb (brown eyes).