

CHAPTER 14

1. The two general ways are mutation and independent assortment.
2. False. RNA genes code for the production of tRNA and ribosomal RNA (rRNA). mRNA is made as a result of a gene that codes for the production of a protein being transcribed.
3. False. Less than 1% of the total amount of human DNA actually codes for protein production. The remaining DNA codes for the production of RNA or has no known function.
4. Tandem repeats are DNA segments containing two or more nucleotides that are repeated over and over again along a continuous segment of DNA. Tandem repeats do not code for the production of proteins; their function is unknown.
5. A gene mutation is a change in the normal sequence of a gene. The large majority of DNA that does not code for protein production protects against mutation because when a mutation occurs, it is far more likely to occur in a segment of DNA that does not code for the production of a protein than to occur within a gene.
6. Many mutations occur within the large portion of DNA that does not code for protein production. Also, silent mutations do not result in alteration of the protein or the function of the protein.
7. Addition mutation.
Deletion mutation.
Substitution mutation.
8. False. Addition mutations do cause shift in the reading frame. Substitution mutations do not.
9. If a point mutation causes an amino acid codon to be mutated into a stop codon, it is called a nonsense mutation.
10. A missense mutation is a type of substitution mutation that causes an incorrect amino acid to be inserted into a protein.
11. True.
12. False. The type of mutation being described is a germ cell mutation. Organisms formed from germ cell mutations carry the mutation in every cell of the body.
13. 50% chance.
14. There are several answers for this question depending upon your viewpoint. Normal genetic variation is produced as a result of independent assortment and crossing over. Abnormal variation is produced as a result of mutation. Normal genetic variation results in normal variation of the phenotype. Abnormal genetic variation results in abnormal variation of the phenotype. Normal genetic variation is good for individuals and populations but abnormal genetic variation is not.
15. False. Germ cell mutations may be passed to offspring.
16. A nondisjunction chromosomal mutation can occur during mitosis, meiosis I or meiosis II (we just learned this type of mutation related to meiosis). In meiosis I, when the homologous pairs are aligned across from one another, the chromosomes do not separate properly during anaphase I. Instead of one pair separating from the other and moving to opposite ends of the cell (putting one set of homologous pairs into one new cell and the other set into the other new cell), either one, or sometimes both, of the pairs don't separate, leading to one set plus one extra chromosome (3 total chromosomes) moving to one side of the cell and only one individual chromosome to the other side, OR all 4 chromosomes moving to one side of the cell and none to the other side. If nondisjunction occurs during meiosis II, instead of one chromosome separating to one side of the cell and the other chromosome to the other side, they are both pulled to the same side. This means that one gamete receives no chromosomes of that number (it should receive one), while the other gamete receives two chromosomes of that number (again, it should receive only one).