

1. When a cell becomes too large, a process is initiated to divide it into two daughter cells.
2. Mitosis is the first stage of cell division, and involves the division of the nucleus.
3. In the second stage, cytokinesis, the cytoplasm is divided.
4. The cell spends most of its time in interphase, made up the G₁, S and G₂ phases.
5. During the G₁ phase, the cell grows. In S phase, or synthesis phase, the DNA gets replicated. In the G₂ phase, the cell synthesizes new organelles and prepares for cytokinesis.
6. Except for sex cells, human cells contain 46 chromosomes. Each chromosome that comes from the mother has a homologous chromosome from the father.
7. After S phase when chromosomes get copied, each chromosome is then made up of two identical sister chromatids, which are attached in the middle at the centromere.
8. During the first phase of mitosis, prophase, the chromosomes condense and become visible.
9. In the next phase, metaphase, the chromosomes line up across the centre of the cell.
10. During anaphase, the chromosomes get pulled away from each other toward opposite ends of the cell.
11. In the final phase of mitosis, telophase, the nuclear envelope reforms around each cluster of chromosomes.
12. Proteins called cyclins regulate the cell cycle.
13. Cancer cells do not possess, or do not respond to cell regulating proteins.
14. Many cancers have been linked to a defect in gene p53.
15. In the reproductive organs, cells undergo meiosis, during which four haploid daughter cells are produced.
16. During meiosis, small sections of chromosomes can undergo crossing-over which dramatically increases the number of genetic combinations that are possible.

Mendelian Genetics & Inheritance

1. Mendel is known as the "father of genetics."
2. He studied pea plants and determined that true-breeding pea plants always produced offspring identical to themselves when allowed to self-pollinate.
3. In order to join male and female reproductive cells from different plants, Mendel used the process of cross-pollination.
4. A trait is a specific characteristic, such as seed color or plant height.
5. The offspring of crosses between parents with different traits are called hybrids.
6. Mendel concluded that factors are responsible for passing information from one generation to the next.
7. Mendel studied traits that were the result of two different alleles, which are different forms of the same gene.
8. The principle of dominance states that some alleles are dominant, and others recessive.
9. Mendel also discovered that alleles for different genes usually segregate, or assort independently.
10. When Mendel crossed true-breeding tall plants with short plants, he discovered that all the offspring in the F₁ generation were tall.
11. In the F₂ generation, the short pea plants reappeared, making up one-quarter of the offspring.
12. An organism's genetic makeup, for example "Aa", is called its genotype.
13. The physical characteristics that are observed or detected are the organism's phenotype; for example, blue eyes.
14. If an organism has two of the same allele, or what Mendel called "true-breeding," then they are homozygous.
15. An organism with two different alleles for the same gene, or a "hybrid," is called heterozygous for that trait.
16. The gene combinations that might result from a genetic cross can be determined by drawing a diagram called a Punnett square.
17. In cases of incomplete dominance, the heterozygous phenotype is somewhere in between, or a "blend" of the two homozygous phenotypes.
18. When both alleles contribute the phenotype, it is known as codominance.
19. Many genes have multiple alleles, which means there are more than just two alleles for the gene.
20. Many traits are produced by the interaction of several genes. These are known as polygenic traits.
21. A pedigree chart can be used to study the genetic relationships among members of a family.
22. Some disorders are considered to be sex-linked because they occur on either the X or the Y chromosome.