Meiosis(5.1)

Meiosis	The process that all organisms go through in order to produce gametes(sex cells). The purpose it to create variation within the population. The daughter cells look similar to the parent cells but no exactly identical. It involves one round of DNA replication and two round of cellular division. The resulting cells are haploid, meaning they have half of the genetic content of a typical cell.
Meiosis 1	The same as mitosis
Meiosis 2	Same as meiosis 1 except for the last phase where the cells divide into haploids.

Meiosis and Genetic Diversity(5.2)

Crossing Over	Takes place during the first round of cellular division in meiosis. It is where homologous chromosomes share genetic material. Homologous chromosomes are two different versions of the same gene, one from mom and one from dad. Homologous chromosomes exchange parts of their chromosomes at the same location, therefore, no adding or subtracting genes, just exchanging the version of the gene.

Meiosis and Genetic Diversity(5.2) (cont)

Independent Assortment	The way that chromosomes line up for both the first and second rounds of meiosis. Depending on the original orientation of these chromosomes, different daughter cells will form.
Random Fertilization	Means that there is a random chance that each egg and sperm will join one another. There are around a thousand sperm cells that can fertilize the one mature egg and the genetics found in each of them is distinct. The specific sperm that joins the specific egg for each fertilization is random, meaning that the same two parents are not going to produce the same child twice.
Nondisjunction	Where meiotic errors occur. Creates cells with too many or too little chromosomes which happens if the chromosomes failed to separate properly during anaphase I or II. The result of nondisjunction is miscarriages or genetic defects.

Mendelian Genetics(5.3)

Gregor Mandel	Came up with laws about genetics and inheritance including the law of independent assortment which allows scientists to determine how genes are inherited from generation to generation
DNA	DNA and RNA are the genetic material of life. RNA is used to create proteins, so ribosomes are also found in all life
Law of Segregation	States that two alleles from each parent are segregated during gamete formation(AKA meiosis). Basically, each gamete gets only one of the two copies of a specific gene.
Law of Independent Assortment	States that two alleles get split up without regard to how the other alleles get split up. Basically, someone can get their father's copy of genes for eye color but that doesn't mean they would also get their father's genes for hair color

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Mendelian Genetics(5.3) (cont)

Punnett Squares	Due to the rules that Gregor Mandel made, the frequency of inheritance can be determined when two individuals are crossed through a Punnett square When a heterozygous and homozygous recessive is crossed, there is a 50% chance that the offspring will show up as dominant and a 50% chance that the offspring will show up as recessive.
Laws of Probability	The laws of probability can calculate the probability of having a child with a certain trait. If A and B are mutually exclusive then: P(A or B) = P(A) + P(B) If A and B are independent then: P(A and B) = P(A)*P(B) Pattern of Inheritance

Mendelian Genetics(5.3) (cont)

Dihybrid	This inheritance is just like a monohybrid but instead of one gene being looked at and crossed, two genes are being crossed and looked at. Depending on the genotypes, different ratios can be made such as the 9:3:3:1 ratio
Sexlinked	Sexlinked genes involve genes that are linked to our X and Y chromosomes instead of other autosomal chromosomes. With these kinds of traits people will be affected if all of the X chromosomes have the sex linked gene. Since males only have one X chromosome they are more likely to be affected. Women would need both of their X chromosomes to have the sex linked gene depending if the disease or trait is dominant or heterozygous.
Evidence for Recessive	Two unaffected parents produce an affected child

Mendelian Genetics(5.3) (cont)

Evidence for Dominant	Two affected parents produce an affected child. The only way for it to be recessive is if the family happens to mate with a lot of carriers. This is certainly possible, but if you see this, there is a strong likelihood that it may just be a single dominant trait traveling through the family tree is high
Evidence for sexlinked recessive	If a mother is affected, all of her sons will be affected. Carrier females will produce a disproportionate number of affected males. If you see significantly more males shaded than females, there is a strong likelihood that the disorder is sex-linked recessive

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Mendelian Genetics(5.3) (cont)

Evidence for sexlinked dominant	If a father is affected, all of his daughters will be affected. If the mother is affected, her offspring will have a 50% chance of inheriting the condition, which isn't any different than if it were autosomal dominant. In other words, mothers are NOT helpful in diagnosing the mechanism of inheritance as sex-linked dominant
Evidence for mitochondrial	Yes, the chloroplasts are inherited exclusively from the mother, just like the mitochondria are (this applies to questions about plants). If a mother is affected, all of her offspring will be affected. If a father is affected, none of his offspring will be affected. These conditions involved disorder of ATP production (mitochondria) or G3P production (chloroplasts)

Non-Mendelian Genetics

Overall	Many traits do not follow Mendel's laws of dominant or recessive inheritance.
Multiple Alleles	Opposed to just having a dominant and recessive version of an allele, there many be more than two versions of a gene that contribute to the overall phenotype. Blood type is a strong example of this.
Sex-Linked Traits	Traits that exist on the sex chromosomes wither X or Y.
Incomplete Dominance	Traits where neither allele is dominant over the other. Example is flower colors where some species have both red and white coloration but neither is dominant
Co-dominance	Traits in which both alleles are equally dominant, example is spots on cows.
Non-Nuclear Inheritance	Inheritance from organelles. Chloroplast and mitochondria are randomly assorted so the traits are determined by chloroplasts and mitochondrion do not follow Mendelian rules.

Environmental Effects on Phenotype(5.5)

Natural Selection	Some individuals inherited traits or adaptations that raise their fitness, allowing them to survive and reproduce.
Environmental Changes	Coloration of mice. In an environment that has been covered in permafrost for the past thousand years will have a majority of mice in a light color. This allows the mice to easily blend in with their surroundings.
Phenotypic Plasticity	Environmental factors can also influence the physical expression of genes(Phenotypic plasticity). This occurs when individuals with the same genotype exhibit different phenotypes in different environments. Organisms with phenotypic plasticity can change its physical traits in response to changes in the environment. An example of this is foxes as their coat turns white in the winter and back to orange once the snow is gone. This of course increases the organisms fitness.

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