Mendel’s Laws (remember he laid groundwork for genetics but these rules can all be broken looking at chromosome theory and molecular genetics)

a. Law of Dominance - one allele will be expressed over another (ex. Aa – if big A is purple it will be seen over little a which is white)

b. Law of Segregation - alleles pairs separate from each other during meiosis

c. Law of Independent Assortment - alleles assort independently during meiosis IF they are on separate chromosomes (i.e. AaBb can make gametes AB, Ab, aB or ab)

Probability, Patterns and Exceptions to Mendel’s Rules

a. product rule - multiply chance of one event happening by the chance of another event happening to get the chance of both events occurring together

b. autosomal vs. sex-linked (on the X or Y chromosome)

c. monohybrid cross; one trait; 3:1 (Aa x Aa); 1:1 (Aa x aa) or 4:1 (AA x _), (aa x aa)

d. dihybrid cross; 9:3:3:1 genotype (AaBb x AaBb) or test cross 1:1:1:1(AaBb x aabb)

a. incomplete dominance - red x white \(\rightarrow\) pink; both protein product are expressed and blended

b. codominance - red x white \(\rightarrow\) red and white; both protein products are equally expressed ex. AB blood type

c. linked genes - genes on same chromosome that are inherited together (can be unlinked by crossing over); recombination frequency calculated by recombinants/total; used for chromosome mapping; genes further apart cross over more often

d. gene/environment - phenotypes affect by environment, Siamese cat, flower color with soil pH, seasonal color in arctic animals, human height and weight

Human Genes

a. karyotype - 22 pair autosomes & 1 pair sex chromosomes + 46 total chromosomes

b. Chromosomal Mutations (occur during gamete formation)

1. deleon, inversion, addition of genes as a result of crossing over mistakes

2. chromosomal number abnormalities