

Unit 5/6:
Heredity &
Molecular Genetics

Inheritance Patterns

Complete Dominance

Homozygous dominant and heterozygous look the same

Codominance

Heterozygous is both dominant traits in organism

Incomplete Dominance

Heterozygous is a blend between the two dominant traits



	Y	y
Y	YY	Yy
y	Yy	yy

Yellow: $\frac{3}{4}$
Green: $\frac{1}{4}$

	R	r
R	RR	Rr
r	Rr	rr

Round: $\frac{3}{4}$
Wrinkled: $\frac{1}{4}$

Yellow & Round: $\frac{3}{4} \times \frac{3}{4} = \frac{9}{16}$
 Yellow & Wrinkled: $\frac{3}{4} \times \frac{1}{4} = \frac{3}{16}$
 Green & Round: $\frac{1}{4} \times \frac{3}{4} = \frac{3}{16}$
 Green & Wrinkled: $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

Monohybrid

Heterozygous for ONE trait
 Complete Dominance:
 3:1 ratio
 Incomplete or Codominance:
 1:2:1

Dihybrid

Heterozygous for TWO traits
 Complete Dominance:
 9:3:3:1 ratio
 Incomplete or Codominance:
 6:3:3:2:1:1



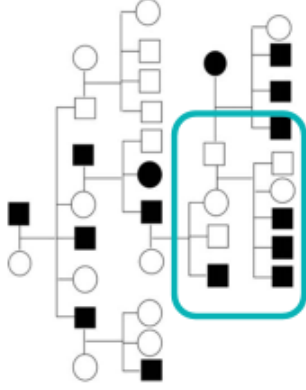
Inheritance Patterns

Autosomal Inheritance

Allele is located on an autosome (non-sex chromosome)

Sex-Linked

Allele is located on a sex chromosome



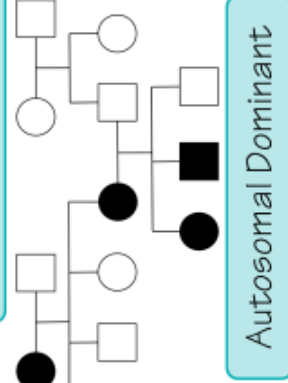
Maternal Inheritance

Allele is located on the DNA found in a mitochondrial or chloroplast

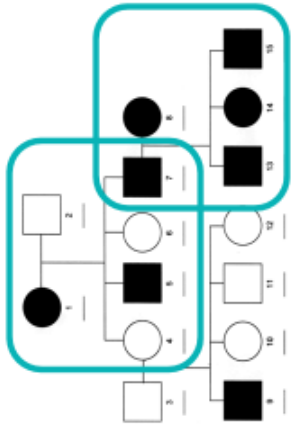
Linked Genes

Genes located on the same chromosome closely together

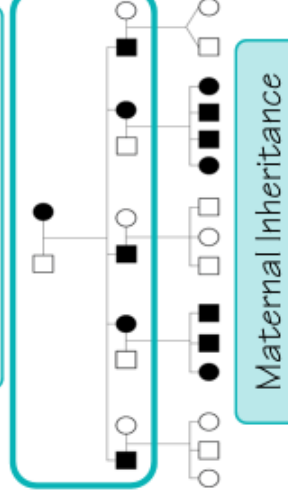
Autosomal Recessive



Autosomal Dominant



Sex-Linked Recessive



Maternal Inheritance

Central Dogma

replication



DNA \rightarrow RNA \rightarrow Polypeptide

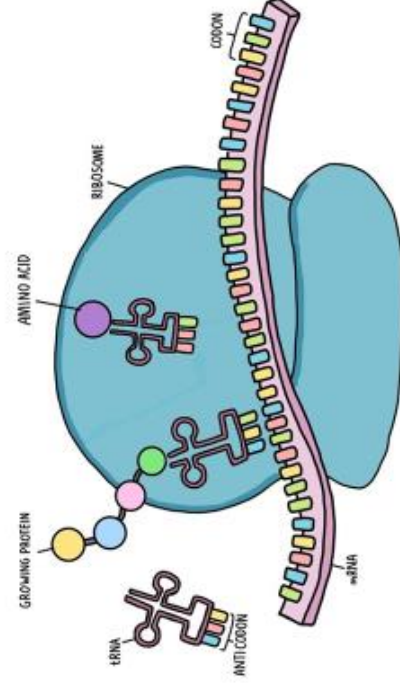
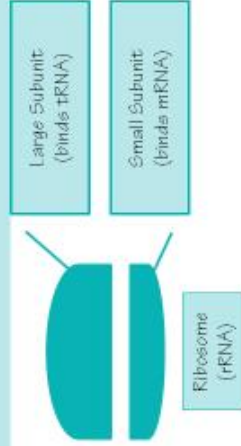
transcription \rightarrow

translation \rightarrow

Retroviruses will use reverse transcriptase to synthesize DNA from their RNA genome



Translation



Location

- Eukaryotes: cytosol/rough ER
- Prokaryotes: cytosol

Steps of Translation

- Initiation: start codon (AUG)
- Elongation: base pair between tRNA/mRNA with amino acid added
- Termination: stop codon (UAG, UAA, UGA)

Mutations

Point Mutations

Mutation at one nucleotide base pair

Silent

no change in amino acid (AA)

Missense

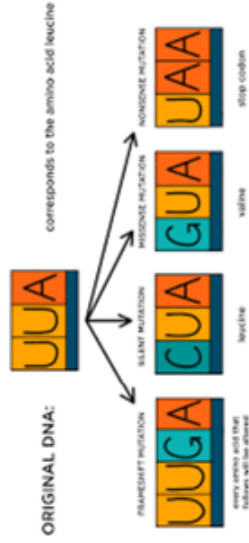
change from one AA to another AA

Nonsense

change from AA to STOP codon

Frameshift

insertion/deletion of 1 or 2 nucleotide base pairs shifts the reading frame for codons



Chromosomal Mutations

Rearrangement of chromosome parts or changes in chromosome numbers

Rearrangement

- Insertion
- Deletion
- Duplication
- Inversion
- Translocation

Changes in Chromosome Number

- Nondisjunction
- Polyploidy



