**DNA Technology Notes**

**DNA Technology**: the manipulation of DNA in organisms for the purpose of analyzing, duplicating, or modifying a genome.
 - determining DNA sequences - making proteins - treating diseases

Made Possible by **Restriction Endonucleases** ( restriction enzymes)
 - cut DNA at specific sequences and makes sticky ends

**Making a Vector**
 - need gene of interest (what you want to copy) – gene for human insulin
 - need plasmids – small circular DNA in bacteria
 - expose both to the restriction enzyme
 - combine together and hope they mix
 - expose to DNA ligase to bind them together
 - allow bacteria to pick up the plasmids
 - grow the bacteria and test for the protein

**Cloning DNA**: Polymerase Chain Reaction
- use heat to separate the strands
- cool and use DNA polymerase to build the new DNA
- repeat

**DNA Analysis**:
- get DNA
- clone 🡪PCR (place DNA in test tube with DNA primers, DNA polymerase, heat, cool, repeat – DNA separates, Primers bind, polymerase builds)
- cut with Restriction enzymes
- gel electrophoresis
 - Agarose separates the DNA fragments by size – big pieces move slower and small pieces move faster – pulled by the positive charge of electricity
 - DNA fragments form bands in the gel
 - since each person’s DNA is different the restriction enzymes cut it into different sized pieces which separate differently forming different band patterns
 - may have to use fluorescent tags to distinguish between samples that are closely related

**Transgenic Organisms**: adding DNA to other organisms – makes the **Genetically Modified Organisms**
**Plants**: cloned DNA and shoot it into plant cells with a DNA gun
**Animals**: use DNA needles to insert DNA into cells

**Viral Vectors**: Take a virus that infects specific cells, remove the DNA of the virus and implant the genes of choice – virus carries those genes to the target cells
**Cloning**: remove the nucleus from one cell and insert it into the denucleated egg cell of the host – shock and implant