**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