Biotechnology

* Selective Breeding
* Breeding so that \_\_\_\_\_\_\_\_\_\_\_\_ are passed to the next generation.
  + Ex: Dog breeds
  + Breeding plants for large fruits
  + Breeding cows with better milk production

Hybrids

* \_\_\_\_\_\_\_\_\_\_\_ organisms with different forms of a trait in order to produce organisms that have a “competitive edge.”
  + Ex: more nutritious rice hybrids, disease resistant corn

Inbreeding

* Breeding two closely related organisms to get desired traits and eliminate \_\_\_\_\_\_\_ ones.
* This is how pure breeds are maintained.
  + Ex: Clydesdales bred for heavy load pulls.
* Disadvantages: Passing on \_\_\_\_\_\_\_\_ recessive traits is more common.

Test Cross

* Used to determine the \_\_\_\_\_\_\_\_\_\_ of organisms.
  + The organism with an unknown genotype is crossed with an organism homozygous recessive.
  + If the offspring show a 1:1 dominant to recessive phenotypic ratio, the unknown organism must be heterozygous.

DNA Technology

* Genetic \_\_\_\_\_\_\_\_\_
  + Manipulating the DNA of an organism to \_\_\_\_\_\_\_ DNA of another organism.
    - Usually, a glowing protein, \_\_\_\_\_\_ is also placed into the organism to verify the presence of exogenous DNA.
    - The \_\_\_\_\_\_\_\_ of GMO organisms have the inserted traits.
  + Ex
    - Our fishies!
    - Crops

Many benefits:

* + The benefits of selective breeding, but more \_\_\_\_\_\_\_\_\_\_
  + Robust crops
  + Studying the expression of specific genes
  + Studying certain \_\_\_\_\_\_\_\_

Restriction Enzymes

* Restriction enzymes cut DNA into \_\_\_\_\_\_\_\_\_ to be used.
  + DNA fragments can have sticky or blunt ends and can be combined with other DNA fragments to make sequences.

Gel Electrophoresis

* Uses an electric current to separate DNA \_\_\_\_\_\_\_\_\_ by size.
* DNA is loaded into a negative end of a gel \_\_\_\_\_\_\_\_\_\_\_ machine.
* When the machine is turned on, the opposite end has a \_\_\_\_\_\_\_\_\_charge, which the DNA molecules move toward.
* Smaller fragments move to the positive end faster, and can move farther.
* Can be compared to known DNA for \_\_\_\_\_\_\_\_\_

Recombinant DNA Technology

* Combines a fragment of DNA with DNA from \_\_\_\_\_\_\_\_\_
* A carrier called a \_\_\_\_\_\_\_\_\_ transfers recombinant DNA into a bacterial host cell.
* Plasmids, small circular double stranded DNA molecules, and viruses are common vectors.
* The genomic DNA (\_\_\_\_\_\_\_\_\_) is cleaved to the vector using DNA polymerase.

Gene Cloning

* The vector is mixed with bacteria
* Some are \_\_\_\_\_\_\_\_\_and reproduce the recombinant DNA.
* This is used to produce large amounts of \_\_\_\_\_\_\_\_\_ DNA

DNA Sequencing

* Used to identify the sequence of cloned recombinant DNA molecules.
* Free \_\_\_\_\_\_\_\_\_ are tagged and DNA is replicated. When a free nucleotide is used, the reaction stops.
* A machine reads the color of each nucleotide and the order of tagged fragments allows scientists to determine the original \_\_\_\_\_\_\_\_\_.

Polymerase Chain Reaction (PCR)

* + Target DNA, DNA polymerase, RNA primer and nucleotides are placed in a tube and \_\_\_\_\_\_\_\_\_
  + Heat separates the two strands of DNA and RNA primer bonds to the strands
  + \_\_\_\_\_\_\_\_\_adds correct nucleotides
  + Two identical copies of the target DNA are made
* Used to copy DNA for forensic investigations and for medicine.

Human Genome Project

* The goal was to determine the sequence of the \_\_\_\_\_\_\_\_\_nucleotides that make up human DNA.
* HGP is finished, but the analysis of the data will continue for many \_\_\_\_\_\_\_\_\_.

Coding vs. Non-Coding DNA

* About \_\_\_\_\_\_\_\_\_of DNA directly codes for proteins
* The rest is non-coding.
* Non coding DNA is unique to individuals and can be used to identify people by DNA \_\_\_\_\_\_\_\_\_.

Positives

* Bioinformatics allows us to predict \_\_\_\_\_\_\_\_\_ and function of genes based on sequence.
* Variations of genes that lead to disease, SNPs, can be determined and tested for.
* \_\_\_\_\_\_\_\_\_ helps us understand how inherited traits affect how a body responds to a drug.
* Gene therapy can help mend mutated genes.

Negatives

* Legal issues
  + Gene discrimination
  + Cloning
* Treatment Issues
  + Do patients want to know?
  + Ethics