**Genetic Engineering Guided Notes**

**What is genetic engineering?**

Genetic engineering is defined as the direct \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an organism’s genes including heritable and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ genes. The result is an organism with a new set of \_\_\_\_\_\_\_\_\_. It’s possible because the genetic code is \_\_\_\_\_\_\_\_\_\_\_\_ by ALL organisms.

**CRISPR**

CRISPR is a way to edit \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It alters DNA sequences and \_\_\_\_\_\_\_\_\_\_\_\_ gene function. Its potential applications include correcting genetic \_\_\_\_\_\_\_\_\_\_\_\_, treating and preventing the spread of diseases and improving \_\_\_\_\_\_\_\_\_\_. However, its promise also raises ethical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It contains an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that acts like a pair of scissors, capable of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ strands of DNA. It uses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DNA (DNA from more than one organism) to make potential cures for diseases like HIV. Restriction \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are used to cut the DNA at a specific sequence to make a change in the code.

**What does CRISPR mean, and what makes it different from normal DNA?**

CRISPR stands for "clusters of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ interspaced short palindromic repeats." It is a specialized region of \_\_\_\_\_\_\_\_ with two distinct characteristics: the presence of nucleotide repeats and \_\_\_\_\_\_\_\_\_\_\_\_. Repeated sequences of nucleotides are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ throughout a CRISPR region. Spacers are bits of DNA that are interspersed among these \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ sequences. In the case of \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the spacers are taken from viruses that previously attacked it. They serve as a bank of \_\_\_\_\_\_\_\_\_\_\_\_\_\_, which enables bacteria to recognize the \_\_\_\_\_\_\_\_\_\_\_\_ and fight off future attacks.

**Cloning**

A clone is a genetically \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ copy of a gene or an organism. Scientists are studying how to use \_\_\_\_\_\_\_\_\_\_\_ from cloned mammals for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into humans. The success rate in cloning mammals is low. Cloned animals in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ would reduce biodiversity because the clones would be genetically \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Stem Cells**

Stem cells are \_\_\_\_\_\_\_\_\_\_\_\_ because they can divide and renew themselves. They also have the ability to turn into any \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cell in the body (ex: blood cell, liver cell, skin cell etc.). The use of stem cells is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The way they harvest them is done by destroying the \_\_\_\_\_\_\_\_\_\_\_\_\_.

**DNA Fingerprinting**

A DNA fingerprint represents parts of an individual’s DNA that can be used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a person at the molecular level. It focuses on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ regions of DNA. It can be used \_\_\_\_\_\_\_\_\_\_\_\_\_ a suspect or prove someone’s innocence in legal cases. It is also used to identify different \_\_\_\_\_\_\_\_\_\_\_\_\_, as well as to see how closely related two organisms are.