Name _____

Genetic Engineering (p. 228 – 237)

I. Basics Steps Of Genetic Engineering

(African clawed frog)

p. 228

1. **What achievement did Stanley Cohen & Herbert Boyer attain in 1973?**

   Produced the first genetically engineered organisms

2. **Define the term genetic engineering.**

   Genetic Engineering – process of manipulating genes for practical purposes

3. **Match he following terms with the correct definitions.**

75+ known restriction enzymes

1. C.	Recombinant DNA	A. Agent used to carry a gene of interest
2. E.	Restriction Enzymes	B. Circular rings of DNA in bacteria
3. A.	Vector	C. DNA made from two or more different organisms
4. B.	Plasmids	D. Many copies of a gene are made
5. D.	Gene Cloning	E. Bacterial enzymes; cut and bind DNA sequences

4. **List the four steps of genetic engineering.**

p. 229

"Sticky Ends" created

1. DNA from organism of interest (insulin) and vector (bacteria plasmids) are cut using restriction enzymes
2. Recombinant DNA is produced (DNA ligase bonds sticky ends of DNA fragments)
3. Gene is cloned when bacteria reproduce (unlimited copies of DNA)
4. Cells with gene of interest are separated (Colony of screened cells grown)

II. Confirmation Of A Cloned Gene

1. **List the steps of Southern Blot gene testing.** *(Gel Electrophoresis)*

p. 231

Used to identify specific genes

DNA = (-) charge → (migrates to positive)

1. DNA from clone colony is cut using restriction enzymes
2. DNA fragments separated using gel electrophoresis (gel with an electric charge that separates DNA fragments; smaller = faster → travel further)
3. DNA is transferred to filter paper (Probe added)
4. DNA fragments complementary to probe form visible bands

   Probe = complementary DNA or RNA that are fluorescent or radioactive

Name _____

III. The Human Genome Project

p. 233

- Started in 1990
- Dr. Francis Collins

1. **Define the term Human Genome Project.**

   Human Genome Project – project linking 30 labs in 6 countries to sequence the entire DNA of a human

2. **In what year was the Human Genome Project published?** 2001 (February)

3. **A large amount of DNA does not encode proteins.**

   Circle One : True False

4. **Differentiate between introns and exons.** (p. 218)

   DNA Splicing
   - occurs after transcription

   Introns : Long segments of nucleotides with no coding information

   Exons : Portions of a gene that are translated into proteins

5. **How many genes does a typical human cell contain?**

   30,000 - 40,000

   Expected 120,000 genes
   → # of mRNA molecules

IV. Genetically Engineered Drugs & Vaccines

p. 234

1. **List six types of genetically engineered medicines and their uses.**

Plasminogen Activator
- dissolves blood clots

Atrial peptides
- ↓ blood pressure

Medicine	Use
1. Erythropoetin	Anemia
2. Growth factors	Burns, ulcers
3. Somatotrophin	Growth defects (growth therapy)
4. Insulin	Diabetes
5. Interferon	Viral growth + cancer
6. Taxol	Ovarian cancer

V. DNA Fingerprinting

p. 237

1. **Define the term DNA fingerprint.** ("Junk DNA" does not code for proteins)

   DNA Fingerprint – pattern of dark bands on photographic film that is made when an individual's DNA restriction fragments are separated using gel electrophoresis

RFLP
Restriction Fragment Length Polymorphisms

2. **How are RFLPs used to create DNA fingerprints?**

   – Used to identify individuals and determine closeness of relation (No two banding patterns are similar)
   → except identical twins

3. **List three uses of DNA fingerprinting.**

   1. Convictions 2. Paternity Tests 3. Genetic Disorder Analysis

   Sources: Blood, Sperm, Hair

   Jerry Springer

   - Huntington's Disease
   - Sickle-Cell Anemia