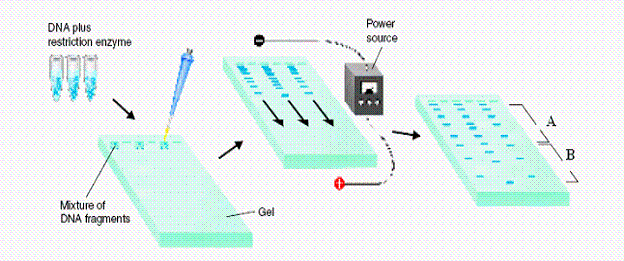
***Biotechnology***

1. What is the purpose of **restriction enzymes**?
2. What process is used to separate DNA?
3. What process is occurring below?



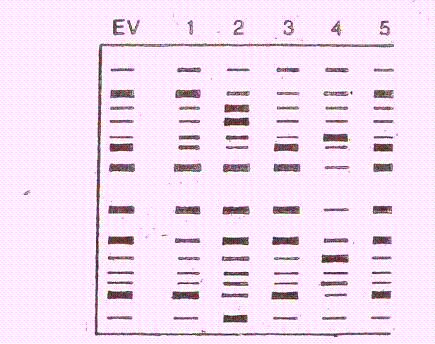
1. Which strands move further through the gel (A or B)?
2. What is the purpose of **DNA fingerprinting**?
3. *Put the steps of* ***gel electrophoresis*** *in order.*  
   \_\_\_\_\_“Load” fragments into a gel, run an electric current. DNA is (-) and will move to the (+) end.

\_\_\_\_\_ Collect DNA sample (blood, hair, etc.)

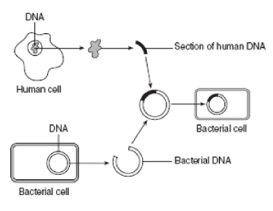
\_\_\_\_\_ Smaller fragments move faster creating a band pattern on the gel – then you read the pattern

\_\_\_\_\_ Cut DNA with restriction enzymes

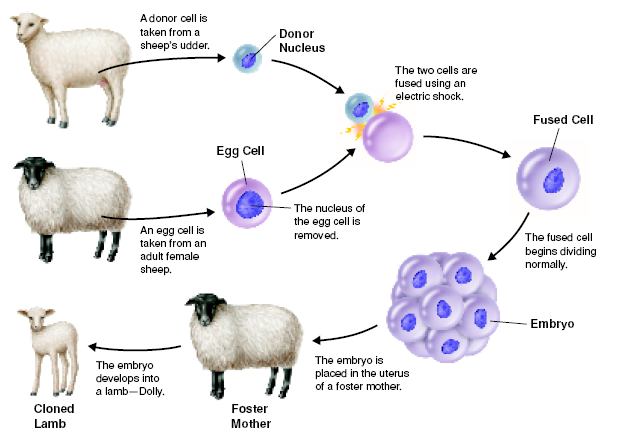
1. Which strand of DNA matches the DNA evidence below?



1. In the production of a **transgenic bacteria** to make the human growth hormone (HGH), put the following sequences in order.  
   \_\_\_\_ **Recombinant DNA** is transferred into a suitable bacterial host, creating a transgenic organism  
   \_\_\_\_ The **plasmid** and DNA fragment are cut with **restriction enzymes**  
   \_\_\_\_ The DNA fragment to be inserted into the plasmid is isolated.  
   \_\_\_\_ A plasmid is removed from a bacterial cell and a **gene** for HGH is removed from DNA

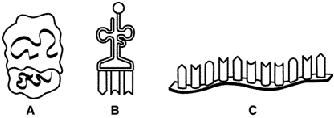


1. Labe the above diagram
2. What are some positives and negatives of **transgenic organisms**?
3. What was the purpose of the **human genome project**?
4. When a bad gene is corrected with a good gene, this is called?
5. Explain the steps of **cloning**.



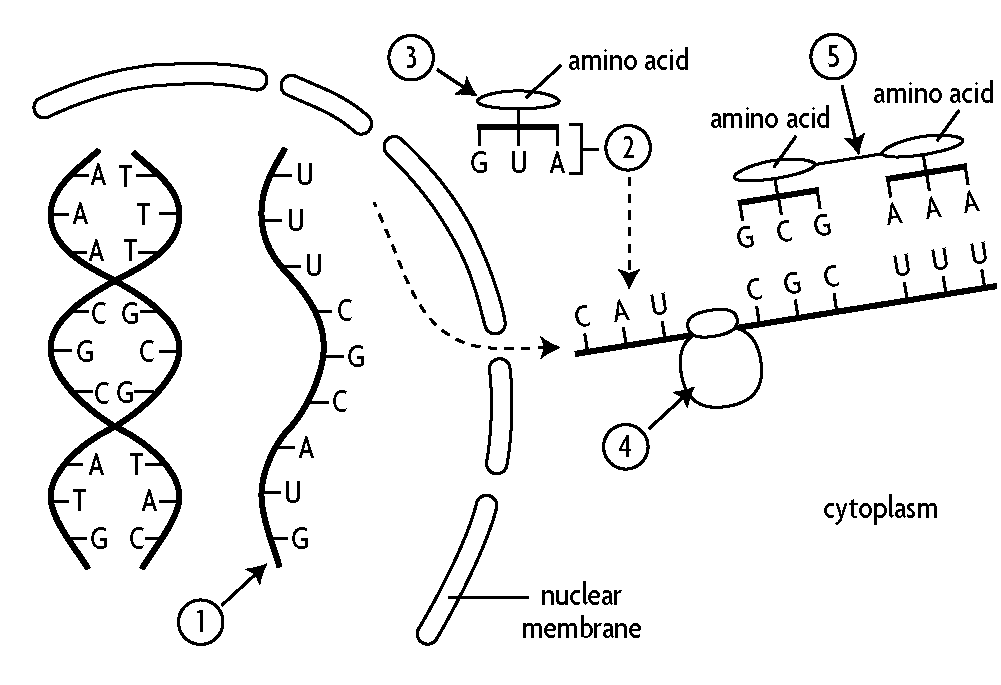
***DNA/Protein Synthesis***

1. How are human traits determined?
2. Why are there so many different physical appearances among humans?
3. What are the 3 main differences between **RNA** and **DNA**?
4. List the function of the following **RNA**



**rRNA tRNA mRNA**

1. What is the function of **DNA**?
2. What weak bond holds the nitrogen bases together?
3. What is a **codon** and what does represent?
4. What bond holds amino acids together?
5. What is a **mutation**?
6. What causes a mutation?
7. Which mutations can be passed to the offspring?
8. What type of mutation are the following?
   1. ATA CTA GGC AAC TAG GC
   2. ATA CTA GGC ATA CAA GGC
9. In what phase of the cell cycle does **replication** occur and where?
10. **Replicate** the following strand of DNA: TAC TTA GCC ACC GTA
11. **Transcribe** & **Translate** the following strand of DNA: TAC TTA GCC ACC GTA



1. Label the above diagram
2. What process is occurring at X?
3. What process is occurring at Y?
4. What is the shape of DNA? Who discover the shape?
5. What enzyme untwist DNA during replication and transcription?
6. If you have 20% Thymine; how much:
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_ Adenine
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_ Guanine
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_ Cytosine
7. **DNA mRNA Protein**

**DNA**