Recombinant DNA Activity

In your science class, you have been learning bout biotechnology and the potential risks and benefits of allowing genetic engineering of organisms (including humans). You have learned about the overall process of how a gene or part of a DNA sequence can be replicated via the use of bioengineering. Bioengineering is a very controversial topic in which there has been some resistance to its use with plants, animals and even humans.

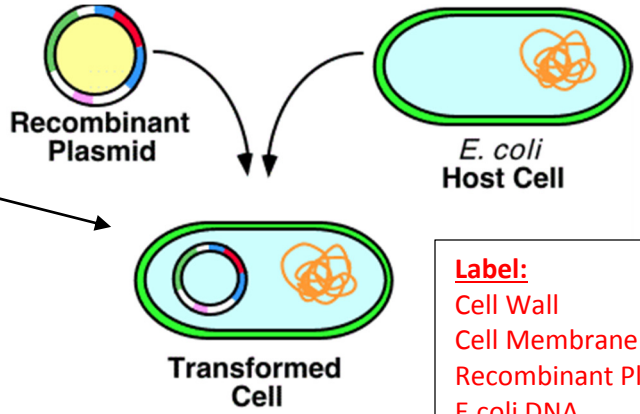
An example of genetic engineering is recombinant DNA. This is where DNA from one organism is placed in the DNA of another. Recombinant DNA technology has made it possible to isolate one gene or any other segment of DNA, enabling researchers to determine its nucleotide sequence, study its transcripts, mutate it in highly specific ways, and reinsert the modified sequence into a living organism.

Restriction enzymes are enzymes that cut a DNA molecule at a particular place. They are essential tools for recombinant DNA technology. The enzyme "scans" a DNA molecule, looking for a particular sequence, usually of four to six nucleotides. Once it finds this recognition sequence, it stops and cuts the strands.

A plasmid is a small DNA molecule within a cell that is physically separated from a chromosomal DNA and can replicate independently. Plasmids naturally exist in bacterial cells, and they also occur in some eukaryotes. Often, the genes carried in plasmids provide bacteria with genetic advantages, such as antibiotic resistance.

Instructions:

- You will be simulating recombinant DNA using DNA from a frog and a plasmid from an E. coli bacteria to produce a specific trait.
- Cut out your bacterial plasmid.
- Then cut open the plasmid to show where you will remove the bad gene and insert the good gene.
- Cut the good gene from the frog DNA and glue it to the bacterial plasmid.
- Once your plasmid has been created, using a large piece of construction paper, create an E. coli bacteria. Make it large enough so that you can glue your modified bacterial plasmid inside it.
- Make sure to include the DNA of the E. coli. It usually looks like one long spaghetti strand. Use yarn provide to you.
- Also draw the cell membrane and cell call of the bacteria.
- Your final product should look like the transformed cell on the right.



Label:
Cell Wall
Cell Membrane
Recombinant Plasmid
E.coli DNA

Questions: **ANSWER ON YOUR OWN PAPER**

1. Explain what genetic engineering consists of?
2. How can bacteria such as E. coli be used in order replicate a particular gene or DNA sequence?
3. How can genetically engineered organisms benefit society?
4. How can genetically engineered organisms harm society?
5. Do you feel that regulation should be required in order to allow or prevent human cloning from occurring in the United States?