Name _____ Period ____

DNA Fingerprinting Activity

Introduction: DNA fingerprinting relies on the fact that the DNA code is universal for all living things and that there are differences between individuals within that code. Because human DNA is very similar to every other human's DNA, DNA fingerprinting primarily focuses on the areas of the genetic code that vary greatly amongst individuals. These non-coding regions of DNA, called introns, have the most variable coding sequences within members of a species because they do not code for proteins.

Scientists use restriction enzymes to cut intron segments of DNA. They "run" the fragments of DNA in a gel electrophoresis, and then use the cried bonding patterns (created by the fragments) between individuals to determine identity. Uses for DNA fingerprinting include: crime scene investigation, missing person identification, paternity testing, diagnosing genetic disorders, species identification and many others.

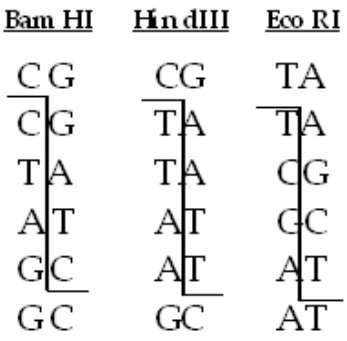
Instructions:

1. Using the restriction enzymes Bam HI, Hin dIII and Eco RI, identify and label the sites where each would cut the DNA sequence provided.
2. Record the number of cuts, the number of fragments and the length of each fragment created by each of the three enzymes. **NOTE**: To count fragment lengths, only count the number of bases on the **longest side** of the DNA strand.
3. Using the data collected, draw the banding patterns that would result if these fragments were run on an electrophoresis gel.

Data Table:

Restriction Enzyme	# of cuts	# of fragments	Length of DNA fragments
Bam HI			
Hin dIII			
Eco RI			

Restriction Enzyme and where the cut:



DNA Sample:

1	2	3	4	5	6
T A	G C	T A	T A	G C	T A
G C	A T	T A	T A	T A	T A
G C	G C	C G	C G	A T	C G
G C	A T	G C	G C	T A	G C
C G	T A	A T	T A	T A	A T
C G	T A	A T	C G	C G	A T
T A	C G	G C	C G	G C	C G
A T	T A	G C	T A	A T	G C
G C	T A	T A	T A	A T	G C
G C	A T	A T	A T	C G	G C
C G	A T	C G	A T	T A	G C
A T	G C	A T	G C	C G	C G
C G	T A	C G	C G	C G	C G
A T	C G	C G	T A	T A	C G
T A	A T	T A	T A	T A	T A
T A	A T	A T	T A	A T	A T
C G	G C	G C	T A	A T	G C
G C	C G	G C	A T	G C	G C
A T	A T	C G	A T	A T	A T
A T	G C	T A	A T	A T	C G
G C	G C	C G	T A	T A	C G

Results:
Draw the fragments created by each restriction enzyme in the diagram below:

		Bam HI	Hind III	Eco RI
		Start	Start	Start
Fragment Length (number of base pairs)	100			
	75			
	50			
	25			
	0			

Analysis Questions:

1.. What is the relationship between the DNA fragment length and the distance it traveled in the Gel?

2. What characteristic about the DNA molecule fragments allows them to separate when an electrical current is applied to gel in the electrophoresis box?

3. What is the advantage of using multiple restriction enzymes to cut the DNA during DNA fingerprinting?

Crime Scene Analysis:
Case #1: A stolen car was found on the side of the road with an empty bottle of Sprite. Detectives were able to collect enough DNA from the saliva left on the top of the bottle to create a DNA fingerprint. Below are the DNA fingerprints from the crime scene and two suspects who were seen near the abandoned car.

Crime Scene DNA Sample		
	Bam HI	Hind III
100	—	
75	—	
50		—
25		—
0		

Sally "Sticky" Finger		
	Bam HI	Hind III
100		—
75	—	
50		
25	—	
0		—

Bubba "Ballistic" Ray		
	Bam HI	Hind III
100	—	
75	—	
50		—
25		—
0		

Analysis Questions:

1. Who stole the car?

2. How do you know?

Case #2: A mother files a lawsuit for child support against a man she claims is the father of her child. The man claims that he has no children and does not even know the woman and so shouldn't have to pay child support. Below are the DNA fingerprints of the child, the mother and the man. Remember, children receive half of their DNA from their mother and the other half from their father.

Child's DNA		
	Bam HI	Hind III
100		
75		—
50	—	
25		—
0		

Mother's DNA		
	Bam HI	Hind III
100	—	
75		—
50	—	—
25		
0		

The Man's DNA		
	Bam HI	Hind III
100		
75	—	
50		— —
25	—	
0		

Analysis Questions:

1. Could the man be the father of this child?

2. How do you know?