Whose Baby Is This? Learning about Genotyping Humans

There's been a mix-up in a maternity ward! There are three babies (Baby A, Baby B and Baby C) in a maternity ward, and three sets of confused and worried parents who do not know which child is theirs. (Father and Mother #1 are a couple, as are Father and Mother #2, and Father and Mother #3.) This exercise will show you how to determine which baby goes with each set of parents.

Some regions of the human genome are just series of repeated DNA sequences. Different humans can have different numbers of repeats at these regions (i.e. in the figure below, the variable "n" could be any number). Scientists can measure how many repeats someone has by running their DNA through a gel so that the DNA pieces from different people can be separated by size.

For instance, take the DNA sequence below. Say it is found somewhere on chromosome #15. Different humans may differ by the value of "n" (the number of TTAGGAT repeats).

```
5'...GCTAAGTATTGCTCAAGA...(TTAGGAT)<sub>n</sub>...GATAAATAACTGGCTAGTA...-3'
3'...CGATTCATAACGAGTTCT...(AATCCTA)<sub>n</sub>...CTATTTATTGACCGATCAT...-5'
```

dad#3

mom#3

BabyA

BabyB

BabyC.

You isolate that section of the DNA from chromosome #15 from each person you are examining, load the DNA samples into a gel, and run the gel.

mom#2

You obtain the following results:

mom#1

dad#2

dad#1

Ladder

	Laddel	dadπ1	$1110111\pi 1$	uauπ2	$1110111\pi 2$	uau _m 3	ΠΟΠΗ	DaoyA	БабуБ	БабуС
n = 50										
n = 45										
n = 40										
n = 35										
n = 30										
n = 25										
n = 20										

Analyzing and interpreting the data from Chromosome #15:

1. Given the data so far, which of the three babies can you already conclusively connect to a set of parents?
2. How did you conclude this?
3. Why can you not determine the parents of all of the babies at this point?
4. How do you think you would go about conclusively determining the parents of the remaining babies using DNA fingerprinting analysis?

You decide to test another site in the human genome, this time it is a site on chromosome #4. Different humans may differ by the value of "n" (the number of CAG repeats).

```
5'...ACTGTAAACGCTAGCTGGTTCACTG...(CAG)<sub>n</sub>...CCTATAGCTAGCTTTACGGA...-3'
3'...TGACATTTGCGATCGACCAAGTGAC...(GTC)<sub>n</sub>...GGATATCGATCGAAATGCCT...-5'
```

You isolate that section of the DNA from chromosome #4 from each person you are examining, load the DNA samples into a gel, and run the gel.

You obtain the following results:

	Ladder	dad#1	mom#1	dad#2	mom#2	dad#3	mom#3	BabyA	BabyB	BabyC
n = 90										
n = 80										
n = 70										
n = 60										
n = 50										
n = 40										
n = 30										

Analyzing and interpreting the data from Chromosome #4:

5. Given all the data in this problem, match the three sets of parents to the three babies.

6. Explain how this site on chromosome #4 allowed you to match parents #1 and parents #2 to the correct baby (B or C).