DNA Profiling

Scenario: a woman has a baby and her jealous husband accuses her of having an affair—after all, he has had a vasectomy and cannot have kids. He suspects the gardener of being the real father. The gardener contests this and it is taken to court —they are all subject to DNA profiling. Who is the dad?

1. Outline the process used to *amplify DNA* samples to be used in DNA profiling.

use PCR to copy DNA

2. What is a *restriction enzyme* and what is its role in this process?

ATAGTGGCCTATA

ATAGTGG | CCTATA

fragments

7 6

3. Deduce the composition of the fluorescent marker which binds to CAT codons in the DNA fragments in order to show up the results on the gel.

GCCATAGC

4. Describe the use of gel electrophoresis in DNA profiling, including the role of the electric current and fragment size.

5. Using a large whiteboard and the DNA samples below, model this DNA profiling case. Record your results in the table by shading the bands which are tagged with the marker.

6. Analyse the DNA profile to determine the paternity of the baby.

7. Identify other possible uses of DNA profiling.

Standard	Mum	Dad	Gardener	Baby	origin
					20
					19
					18
					17
					16
					15
					14
					13
					12
					11
					10
					09
					08
					07
					06
					05

Standard

CCAAGACATTATGCAGATGGCCAATAGACATTACGGCCATACCAGAGGCCCAACATGGCCAAACACACCCATCAGGCCATGGCAGACGGGCCATACGGCCATGG

Mother

CCTAGACGGCCAGGCACAAGCCAGGCCATGGCCACATCAGTTAGACCGAGGCCGAATCAGGCCTTATTGCAGG

Husband

CCGAGGCCAGGGTATACCGGTATAGGCCAATTTGGCCGGCATGGGCCGATACAGCCGATGGCCATATAGGGGG

Gardener

CCGGTACATTACCAGGCCAAGGATACGGCAAGCAGGCCTTCATGGCCAAGGCCTTAGCACGGGCCAATGACGG

Child

CCACATCAGTTAGACCGAGGCCAAGGCCAACCGACGGCAAGGCCCGACAGGCCAAAGACGGCCATATAGGGGG

Further learning:

1. Try the PCR Virtual Lab (http://goo.gl/WMr...):
   http://learn.genetics.utah.edu/content/labs/pcr/
2. Try the Gel Electrophoresis Virtual Lab (http://goo.gl/...):
   http://learn.genetics.utah.edu/content/labs/gel/
3. Make sure you have made a decent set of notes on PCR and DNA profiling. Refer to the assessment statements in your course book and make use of your resources.

Resources here are adapted from:
http://www.ucr.excellence.org/NCAICNET/1995/mayo_dna.pdf

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Husband is father

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					19
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					17
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Gardener

CCGGTACATTACCAGGCCAAGGATACGGCAAGCAGGCCTTCATGGGCCAAGGCCTTAGCACGGGCCAATGACGG

Child

CCACATCAGTTAGACCGAGGCCAAGGCCAACCGACGGCAAGGCCCGACAGGCCAAAGACGGCCATATAGGGGG

Further learning:

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Resources here are adapted from: [illegible]