

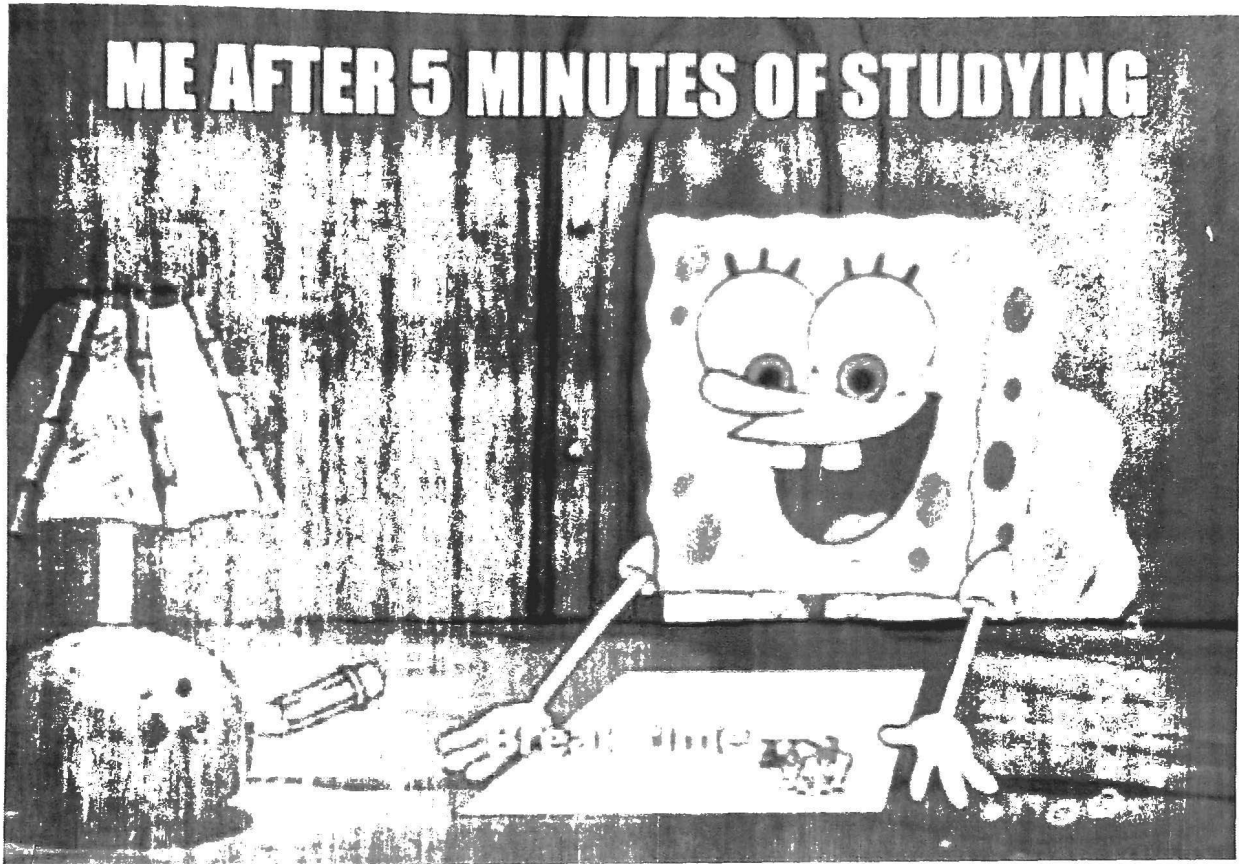
Name: _____

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Per: _____

Date: _____

Unit 10: DNA: Structure and Analysis Unit Test Review



Date:

- Wednesday, April 11, 2018

Format:

- **Part 1: Multiple Choice** (42 multiple choice questions straight from the notes each worth 2 points)
 - (84 points total)
- **Part 2: Drawing and Analyzing Gel Electrophoresis Results** (Answer the following questions and draw the gel electrophoresis results based on the data provided.)
 - (16 points total)

Suggested Materials to Review:

- Unit 10: DNA (Structure & Analysis) Note Packet
- Base Pair Matching Practice
- Restriction Enzyme Practice
- DNA Fingerprint Practice
- DNA Fingerprint Homework
- More on PCR
- PCR Virtual Lab
- DNA Extraction Virtual Lab
- DNA Quiz

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REMEMBER! YOU CAN USE A 3 X 5-INCH INDEX CARD WITH WHATEVER YOU WANT WRITTEN ON IT!

Vocabulary:

- DNA: deoxyribonucleic acid - contain all of the genetic information - found in nucleus & mitochondria
- Double helix: the shape of DNA
- Nucleotides: the rings that form the middle of the molecules (A, T, G, C)
- Genetic code: the order of the bases
- RFLP: restriction fragment length polymorphism - analyzes DNA by size
- Restriction enzymes: enzymes that cut DNA at specific sequences
- Gel electrophoresis: technique used to separate DNA based on size - DNA (-) moves toward (+) side - short pieces go further
- Genetic fingerprint: the banding pattern formed on the gel
- PCR: Polymerase Chain reaction - makes copies of a specific section of DNA
- STR: Short tandem repeats - short DNA sequences that repeat themselves
- CODIS: Combined DNA Index System - DNA evidence database
- Mitochondrial DNA: DNA from mitochondria that can be used in old cases/samples
- Nuclear DNA: DNA from the nucleus

Multiple Choice Questions:

- 1 1. Which simple formula can be used to determine the number of fragments produced during a restriction enzyme digest?
- a. # fragments = # cuts + 1
 - b. # fragments = # of cuts - 1
 - c. # fragments = # recognition sites - 1
 - d. # fragments = # cuts + 2
- 2 2. DNA is located in the _____
- a. Nucleus only
 - b. Mitochondria only
 - c. Nucleus and cell membrane
 - d. Mitochondria and cell membrane
 - e. Nucleus and ~~cell~~ mitochondria membrane
- 3 3. What is used to burst the cells open during DNA extraction?
- a. Sugar water
 - b. Salt water
 - c. Detergent
 - d. Alcohol

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1a 4. In gel electrophoresis, the DNA is pulled toward the _____ side of the gel.

- a. Positively charged
- b. Negatively charged
- c. Neutral

1b 5. _____ is a piece of lab equipment that allows for very small volumes of liquids to be accurately measured.

- a. Micropipette
- b. Centrifuge
- c. Restriction enzyme
- d. Warm water bath

b 6. Which of the following is the complementary strand of the DNA strand ACAGGACAT?

- a. ACAGGACAT
- b. TGTCCTGTA
- c. ATGTCCTGT
- d. TACAGGACA

Use the following information for questions 7 – 8. The restriction enzyme BamHI recognizes the sequence GGATCC and cuts in between the two G's (G | GATCC).

1b 7. How many times will the enzyme BamHI **cut** the following DNA Sequence?

DNA Sequence: GGATCCACGTAGGATCCATT

- a. 1
- b. 2
- c. 3
- d. 4

1c 8. How many **fragments** will be produced which the following sequence is digested by BamHI?

DNA Sequence: GGATCCACGTAGGATCCATT

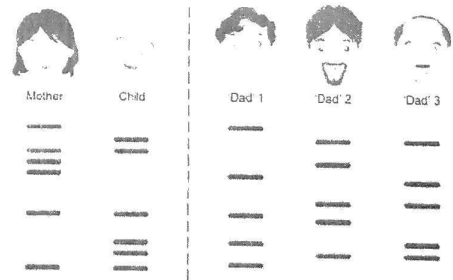
- a. 1
- b. 2
- c. 3
- d. 4

b 9. It takes approximately _____ PCR cycles to produce over a billion copies of the DNA.

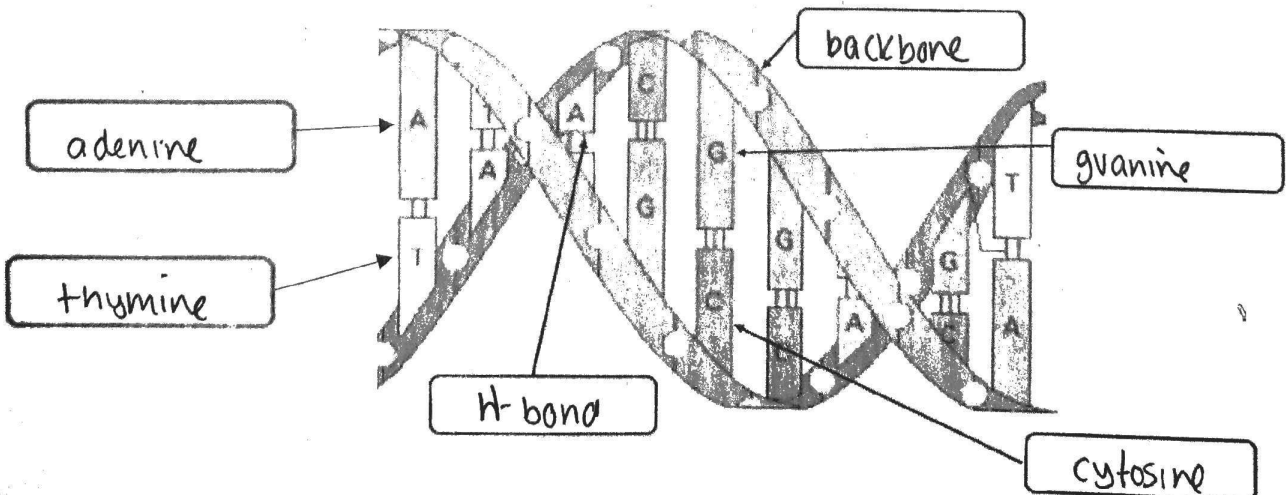
- a. 4
- b. 40
- c. 400
- d. 4000

C 10. Which of the following men is the father of the child?

- a. Dad 1
- b. Dad 2
- c. Dad 3






Label the Diagram:



The Virtual Labs: PCR:

• The Process: Describe the events that occur in the thermocycler:

- Denaturation:
the double stranded DNA separates \Rightarrow 
- Annealing:
the primers attach 
- Extension:
new nucleotides are added - the strand is copied 

The Virtual Labs: DNA Extraction:

• Describe the function for each of the following materials:



- Detergent: disrupts the cell membrane & nuclear envelope bursting cell open releasing DNA
- Salt Solution: causes proteins and other debris to clump together
- Centrifuge: causes the clumped debris to settle on bottom leaving DNA above in liquid
- Alcohol: allows for the DNA to clump together allowing you to see it

Restriction Enzyme/Gel Electrophoresis:

Forensic scientists found DNA samples at a crime scene and have three suspects. Use the restriction enzyme BamHI to digest the DNA. The restriction enzyme BamHI recognizes the sequence GGATCC and cuts in between the two G's (G | GATCC). Once you have identified the size of the fragments, draw what the gel would look like and determine which suspect was at the crime scene.

Suspect #1: ¹GGATCC¹⁰GAATG⁹GATCC⁹TTAA

Suspect #2: TTATC⁷AGGATCC⁵GAGGATCC⁵

Suspect #3: AAG³GATCC¹⁰GATCC⁶GATCCA

Suspect	DNA Fragment Lengths (kb)
Suspect 1	1, 10, 9
Suspect 2	7, 8, 5
Suspect 3	3, 10, 6

