Name: _____ TOC#

This is due by 11/12

Unit Test of 11/14

All late work due by 11/14

BIOTECHNOLOGY UNIT EXAM REVIEW PACKET

This review must be completed by 11/12. This covers most of what is on the exam. However, it does not cover EVERY SINGLE THING we learned, so make sure to still study with your notes/flashcards etc.

To do well on this unit test:

1. Complete this packet by filling in what you know from memory.
2. Go back and use your notes to fill in the blanks AND CHECK YOUR ANSWERS
3. Print and complete this packet again.
4. Use your flashcards to test yourself (assuming your flashcards are correct). To use flashcards correctly: go through the deck and separate the ones you know 100% and the ones you don't into two piles. Then go through the "I don't know this 100%" pile until you do know them. Do this again from the start until they all end up in the "I know this 100%" pile.
5. Print this packet and complete it again. You should be able to fill it out all from memory.

Yes, this is a lot, but this is what STUDYING really looks like. You should work on this for a couple of hours each day between now and the unit test if you want to do well. Do not try to study for 10 hours in one day. 1-2 hours Thursday, Friday, Saturday, Sunday, Monday, Tuesday, Wednesday is much more effective.

GENE MUTATIONS

Looking at Biotech Notes #1, and chapters 17-4 and 17-5 in the book as a guide, explain the following:

1. Define mutation:

2. Define gene mutation:

3. What are the two categories of gene mutations?

4. Why is a point mutation less likely to create a harmful mutation than a frameshift mutation?

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5. Define chromosomal mutation

6. Complete the following chart

	Nondisjunction	Deletion	Translocation	Inversion	Duplication
Definition					
Example					
Drawing					

BIOTECHNOLOGY TOOLS

1. Define Genetic engineering

2. Define recombinant DNA and draw and label a diagram.

3. What are the 6 steps of creating recombinant DNA (be sure to look at your notes so you get the correct ones)

4. What are transgenic organisms?

5. Why is bacteria a useful tool in genetic engineering?

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6. What is a plasmid?

7. Why are plasmids good for use in biotechnology

8. What is a genome?

9. What is a restriction Enzyme?

10. What is the DNA sequence called where a restriction enzyme cuts?

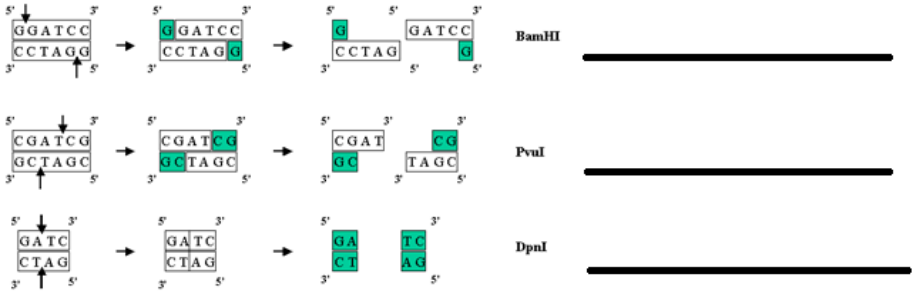
11. Where did Restriction Enzymes originate from?

12. What are the two types of cuts

13. Why are restriction enzymes important to recombinant DNA?

14. Why are restriction enzymes important to gel electrophoresis?

15. Label whether each restriction enzyme will create “sticky ends or “blunt ends”?



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16. Please identify the recognition sites for the following RE. Put a box around the recognition sites in the DNA sequence and arrows to indicate where the cuts will occur.

Restriction enzyme BamHI: 

ATCGGATCCTGTCGACGCCAATAGCTGTCGACTAGCTCCATTGTCA
TAGCCTAGGACAGCTGCGGTTATCGACAGCTGATCGAGGTAACAGT

APPLICATIONS OF BIOTECH:

1. Genetically modified organisms (crops and animals)
    a. Define genetically modified oraganism

    b. Explain the steps of creating genetically modified organisms (include the use of restriction enzymes, recombinant DNA, and transformation)

    c. Explain the example of an transgenic crop from class, Bt corn.

2. In Vitro Fertilization (sex selection and pre-implantation genetic diagnosis)
    a. Explain the steps of In-vitro Fertilization

    b. Why would a couple use IVF?

    c. Explain what sex-selection is.

    d. Explain what PGD is.

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e. How is sex-selection/PGD done? (please look at your notes, many missed this on the quiz).

f. Why is PGD done?

3. stem cell research
    a. What are embryonic stem cells, where are they found and what are their potential?

    b. What are somatic stem cells, where are they found and what are their potential?

    c. What are induced pluripotent stem cells, where are they found and what are their potential?

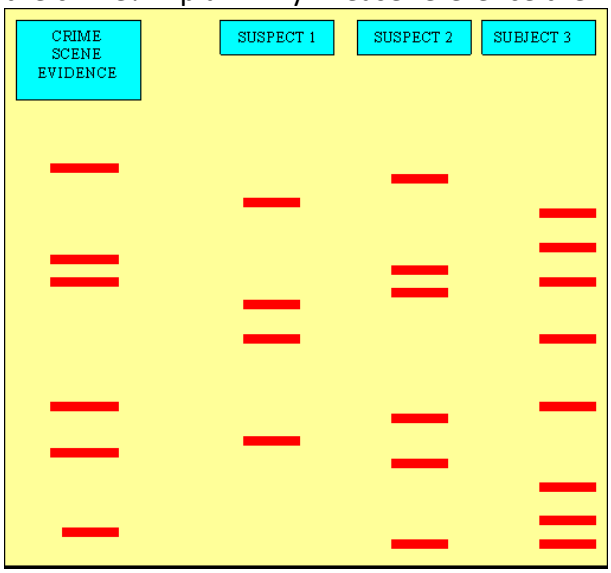
    d. Explain the controversy surrounding stem cell research.

4. DNA in crime solving
    a. Explain the process of gel electrophoresis (be sure to include the function of restriction enzymes)

b. What is a DNA fingerprint?

c. Why do we use DNA fingerprints and gel electrophesis to help in crime solving?

d. Using the gel electrophoresis below, examine each DNA fingerprint. Who should be arrested for the crime? Explain why. Please reference the "bands" and restriction enzymes and DNA sequence.



5. reproductive and therapeutic cloning
   a. What is the process of reproductive cloning?

   b. What is the process of therapeutic cloning?

   c. What is formed in reproductive cloning?

   d. What is formed in therapeutic cloning?

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GENE REGULATION

1. What is gene regulation?

2. Why do organisms regulate their gene expression?

3. One part of gene regulation is to be efficient, what are the 3 steps taken before mRNA translation to make the process more efficient? Explain each.

4. What is an operon?

5. Define the following terms:
    a. Regulatory gene:

    b. Repressor:

    c. Operator:

    d. Promoter:

    e. Inducer:

    f. RNA polymerase:

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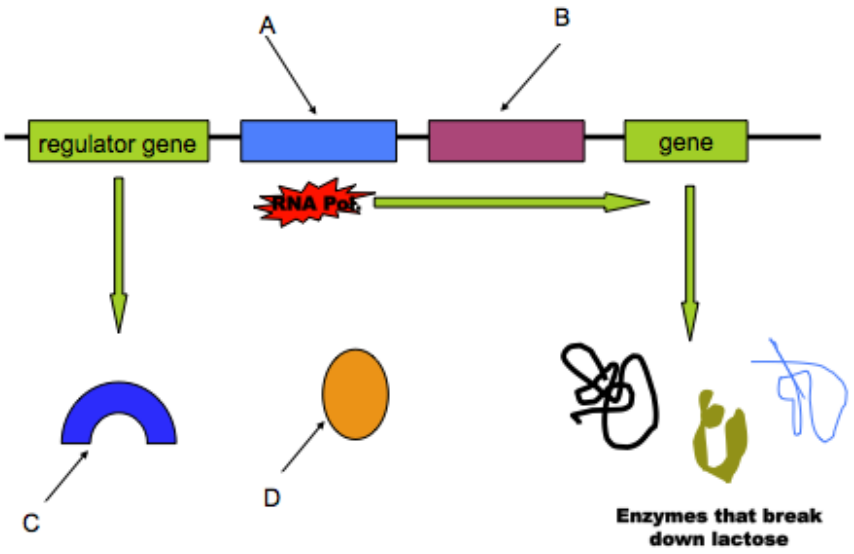
6. What is the figure below illustrating?



7. What is the figure labeled C? What does it bind to? How does it effect gene regulation?

8. What is the figure labeled D? What does it bind to? How does it effect gene regulation?

9. What is labeled as figure A and why is it important?

10. What is labeled as figure B and why is it important

11. Is the figure above showing a gene that is switched on or off? Why

12. In the space below, draw and explain the alternate form of the operon for gene expression.

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pGLO

1. Define transformation

2. How do you know if your transformation was successful?

3. Fill in the chart below

	LB/-DNA	LB/AMP/+DNA	LB/AMP/-DNA	LB/AMP/ara/+DNA
What does the plate contain?				
Growth?	Circle: Yes/no	Circle: Yes/no	Circle: Yes/no	Circle: Yes/no
Glowing?	Circle: Yes/no	Circle: Yes/no	Circle: Yes/no	Circle: Yes/no
Explanation Why each plate appears the way it does.				

4. What are the three genes of interest on the pGLO plasmid and what do they do?

5. Explain how the genes in the plasmid function together to regulate the expression of GFP. You may use drawings and words.

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6. What is the purpose of the following things in the lab?
    - Luria Broth:
    - Ampicillin:
    - Arabinose:
    - Transformation solution:
    - Heat shock:
    - -pGLO solution:
    - +pGLO solution:
    - e.Coli start plate:

7. What is the difference between arabinose and arac?

8. What is the difference between ampicillin and ampicillin resistance? Which is on the pGLO plasmid?