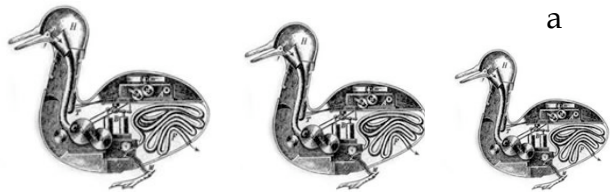
MCDB 1111:Biofundamentals '07 Write your name on the back of the last page

Mostly multiple choice (20 questions, each worth a maximum of 4 points): If you pick



A, B, or C and you are correct, you get +4 pts
A, B, or C and you are wrong, you get -2 pts
A or B, B or C, or A or C and one is correct, you get +2 pts
A or B, B or C, or A or C and neither is correct, you get -1 pt
If you are aware that you do not know ("no idea"), you get +1 point.
If your answer requires a written response, and your answer does not make sense, you may receive -1 point.

1. If genetic information were encoded in the living structure of cells, rather than in DNA, Griffith's studies on transformation in bacteria would ...

- ❑ **A**. not have worked
- ❑ **B**. not have been effected
- ❑ **C**. would have identified proteins as the genetic material
- ❑ **A and B** ❑ **B and C** ❑ **A and C** ❑ **no idea**
- ❑ This question cannot be answered unless I know_____
  _____

❑ I am picking ___because I am assuming _____
_____

2. Which process must occur to generate a tRNA?

- ❑ **A**. transcription
- ❑ **B**. translation
- ❑ **C**. replication
- ❑ **A and B** ❑ **B and C** ❑ **A and C** ❑ **no idea**
- ❑ This question cannot be answered unless I know_____
  _____

❑ I am picking ___because I am assuming _____
_____

3. Consider a polypeptide in which all of the amino acid residues are hydrophilic, and positively charged. In water, the polypeptide would most likely be ….

- ❑ **A**. compact
- ❑ **B**. highly elongated
- ❑ **C**. randomly coiled
- ❑ **A and B** ❑ **B and C** ❑ **A and C** ❑ **no idea**
- ❑ This question cannot be answered unless I know_____
  _____

❑ I am picking ___because I am assuming _____
_____

Multiple choice points on this page _____

4. A protein has a short half-life, that means….

❑ A. it is rarely synthesized
❑ B. it is inactive except in the presence of an allosteric effector
❑ C. it is rapidly degraded
❑ **A and B** ❑ **B and C** ❑ **A and C** ❑ **no idea**
❑ This question cannot be answered unless I know_____
_____

❑ I am picking ___because I am assuming _____
_____

5. A mutation occurs in the region of a gene recognized by a transcription factor; such a mutation would most likely alter ….

❑ A. the rate of transcription in all genes
❑ B. the rate of transcription in the mutated gene
❑ C. the rate of translation of the mutated mRNA
❑ **A and B** ❑ **B and C** ❑ **A and C** ❑ **no idea**
❑ This question cannot be answered unless I know_____
_____

❑ I am picking ___because I am assuming _____
_____

6. Information can easily be stored in DNA because…

❑ A. the pattern of nucleotides is constant and unchanging
❑ B. the pattern of nucleotides alters the overall structure of the molecule
❑ C. the sequence of nucleotides has little effect on the structure of the molecule
❑ **A and B** ❑ **B and C** ❑ **A and C** ❑ **no idea**

❑ This question cannot be answered unless I know_____
_____

❑ I am picking ___because I am assuming _____
_____

7. A mutation occurs in the region of a polypeptide that, in the normal case, is buried within the molecules' interior. The mutation replaces of the hydrophobic amino acid with a one that is positively charged. You would expect that this mutant polypeptide would …

❑ A. produce a dramatic change in structure
❑ B. have only minor changes in structure
❑ C. function normally ❑ **A and B** ❑ **B and C** ❑ **A and C** ❑ **no idea**
❑ This question cannot be answered unless I know_____
_____

❑ I am picking ___because I am assuming _____
_____

8. Mutations can occur throughout the sequence of gene. Consider a mutation that leads to a change in an amino acid normally found on the surface of the encoded polypeptide; compared to the mutation described in question 7, such a mutation would be

- ❑ **A**. more likely to alter polypeptide function.
- ❑ **B**. less likely to alter polypeptide function
- ❑ **C**. equally likely to alter polypeptide function
- ❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
- ❑ This question cannot be answered unless I know_____

_____

❑ I am picking ___because I am assuming _____

_____

9. Early cell biologists suspected that chromosomes were the structures within which hereditary information was stored because…

- ❑ **A**. they were located in nuclei
- ❑ **B**. they contained DNA
- ❑ **C**. during cell division each daughter cell appears to received a copy of each chromosome
- ❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
- ❑ This question cannot be answered unless I know_____

_____

❑ I am picking ___because I am assuming _____

_____

10. In his studies, Griffith found rough colonies of Streptococcus (R-strains) that no longer caused disease. Assume that he examined the frequency of the appearance of R-strains from an S-strain in culture, and S-stains from an R-strain; which is most likely to be the case.

- ❑ **A**. R from S is more frequent
- ❑ **B**. S from R is more frequent
- ❑ **C**. R to S and S to R are equally frequent
- ❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
- ❑ This question cannot be answered unless I know_____

_____

❑ I am picking ___because I am assuming _____

_____

11. In class and in tutorial, we discussed a class of mutations that allowed a stop codon to be read as an amino acid; such mutations occur in genes that encodes ....

❑ **A**. a tRNA
❑ **B**. the enzyme that adds an amino acid to a tRNA
❑ **C**. the mRNA
❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
❑ This question cannot be answered unless I know_____
_____

❑ I am picking ___because I am assuming _____
_____

12. The hydrophobic part of a nucleotide (the subunit of nucleic acids) is …

❑ **A**. the base
❑ **B**. the phosphate
❑ **C**. the sugar
❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
❑ This question cannot be answered unless I know_____
_____

❑ I am picking ___because I am assuming _____
_____

2 point extra credit: The hydrophobic part of an amino acid is _____

13. You are studying a reaction pathway in which the final product Z is a <u>negative</u> allosteric regulator of the first enzyme in the pathway (enzyme A). If the concentration of Z increases, the activity of A …

❑ **A**. is unchanged ❑ **B**. goes up ❑ **C**. goes down
❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
❑ This question cannot be answered unless I know_____
_____

❑ I am picking ___because I am assuming _____
_____

14. What is the physical basis for Chargaff's rule that in DNA, the amount of A equals the amount of T, and the amount of C equals G?

❑ **A**. The fact that DNA encodes information
❑ **B**. The fact that the bases are hydrophobic
❑ **C**. The fact that A binds to T, rather than C or G
❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
❑ This question cannot be answered unless I know_____
_____

❑ I am picking ___because I am assuming _____
_____

15. You isolate RNA from of a cell, and analyze its base composition (i.e. the ratio of A:U:C:G). This ratio will be …

- ❑ **A**. A=U
- ❑ **B**. A=G
- ❑ **C**. A+U = G+C
- ❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
- ❑ This question cannot be answered because _____
  _____

❑ I am picking ___because I am assuming _____
_____

16. You identify a mutation that reduces the level of a specific mRNA. This mutation is most likely to be ….

- ❑ **A**. in a gene encoding a transcription factor
- ❑ **B**. in the gene encoding the enzyme that makes mRNA
- ❑ **C**. in the gene that encodes the mRNA
- ❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
- ❑ This question cannot be answered because _____
  _____

❑ I am picking ___because I am assuming _____
_____

17: Living organisms use a common set of 20 amino acids. One might reasonably assume that this is …

- ❑ **A**. an analogous trait
- ❑ **B**. a homologous trait
- ❑ **C**. determined by specificities of tRNAs
- ❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
- ❑ This question cannot be answered because _____
  _____

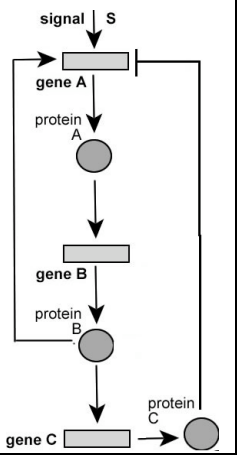
❑ I am picking ___because I am assuming _____
_____

18. A particular trait (such as the inability to make vitamin C) is most likely to be due to a mutation …

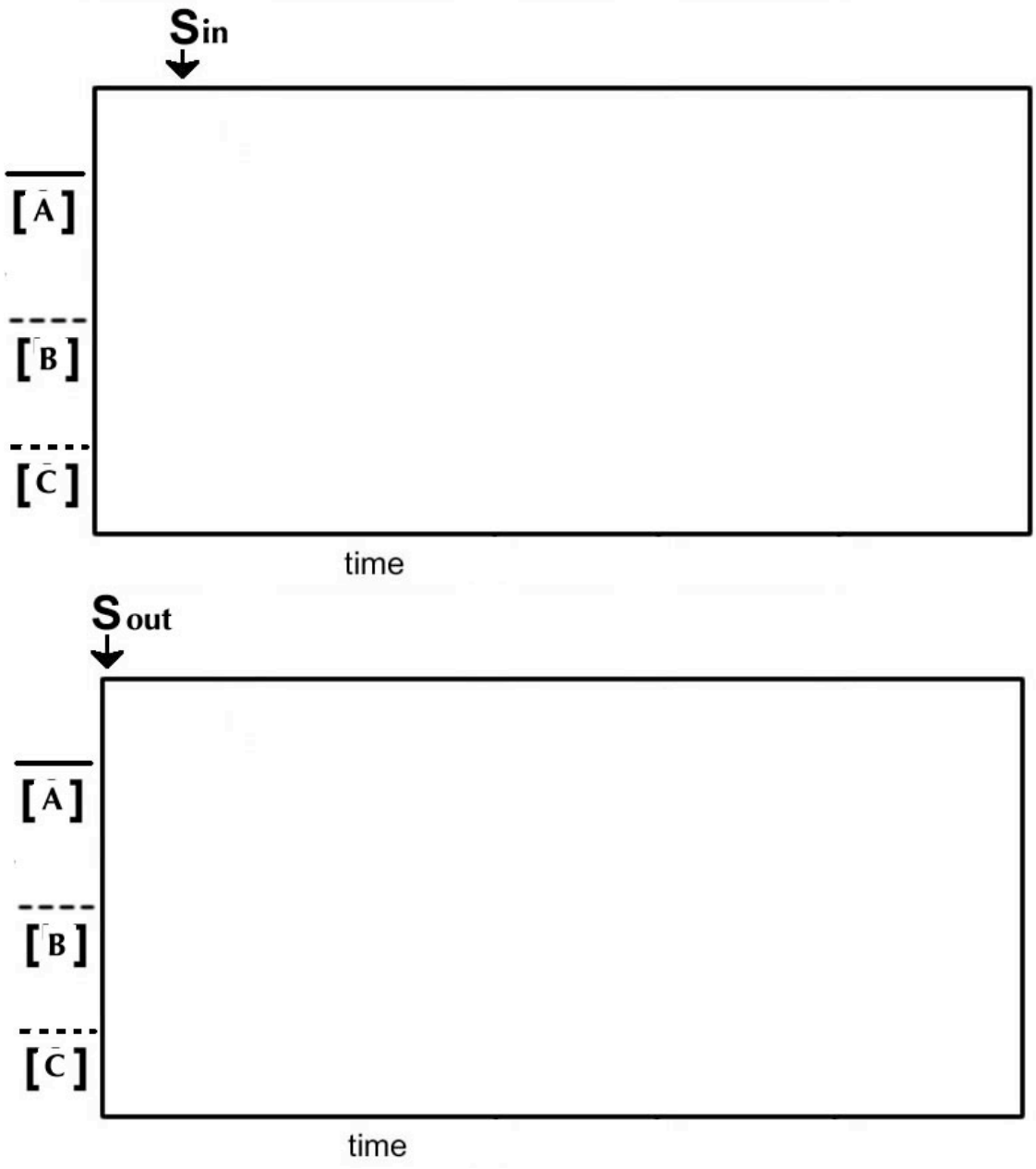
- ❑ **A**. in a gene encoding a transcription factor
- ❑ **B**. in a gene encoding an enzyme
- ❑ **C**. in a gene that encodes a tRNA
- ❑ **A or B** ❑ **B or C** ❑ **A or C** ❑ **no idea**
- ❑ This question cannot be answered because _____
  _____

❑ I am picking ___because I am assuming _____
_____

19 : Here is a network of genes (rectangles) and proteins (circles). Lines that end in arrows indicate a positive effect; lines that end in a bar indicate a negative effect. Originally the genes A, B and C are off. **A** turns on in response to the compound **S**. Assume that the A, B & C proteins are similar in terms of lenght and stabiliy. On the graph indicate how the concentrations of A, B and C proteins change after S is added.



Extra credit (2 points): what happens when S is removed...



20: Why is it faster to regulate the level of a protein inside a cell by controlling its turn over (degradation) rather than its synthesis? (open answer).

NAME HERE: _____

Score: _____