BIOLOGY 101
EXAM III – October 29, 2008
Instructor – Dr. Boots

For questions 1 – 10, use the following:
thymine  codon
uracil  guanine
AUG  ribose
DNA  adenine
cytosine  deoxyribose

1. Every organism carries its genetic information in what molecule?

2-5. DNA has four nucleotide bases. They are:

6. In RNA, the nucleotide base thymine is replaced by what?

7. The sugar in DNA is what?

8. The MRNA complement of each set of three nucleotide bases in DNA is called what?

9. The MRNA codon that begins the synthesis of each protein is what?

10. The sugar in RNA is called what?

For questions 11 – 20, use the following:
adenine  amino acid
nucleus  x chromosome inactivation
anticodon  guanine
thymine  genetic code
cytoplasm (on the ribosome)  human insulin

What nucleotide base bonds to the following in DNA?

11. adenine

12. cytosine

13. uracil

14. Where in the cell does transcription of DNA take place?

15. Where in the cell does translation of DNA information occur?

16. The table of MRNA codons for all 20 amino acids is known as what?

17-18. tRNA molecules have two very different structures on each end of the molecule. They are:

19. The Barr body in females comes from what?
20. Recombinant DNA technology has produced many useful products. An example would be______________________________.

Given the following strand of mRNA, make its complementary DNA template and tRNA anticodons:

<table>
<thead>
<tr>
<th>MRNA</th>
<th>mRNA</th>
<th>DNA</th>
<th>tRNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-22.</td>
<td>U-</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>23-24.</td>
<td>U-</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>25-26.</td>
<td>A-</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>27-28.</td>
<td>C-</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>29-30.</td>
<td>G-</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>31-32.</td>
<td>G-</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>33-34.</td>
<td>U-</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>35-36.</td>
<td>A-</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>37-38.</td>
<td>C-</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

39. The color of tortoiseshell cats is determined by x chromosome inactivation. Are these cats:
   a. male
   b. female

For questions 40-45, use the following terms:

<table>
<thead>
<tr>
<th>lactose</th>
<th>inducible</th>
</tr>
</thead>
<tbody>
<tr>
<td>oncogenes</td>
<td>skin cell</td>
</tr>
<tr>
<td>constitutive</td>
<td>recombinant DNA technology</td>
</tr>
<tr>
<td>oocyte</td>
<td></td>
</tr>
</tbody>
</table>

40. The genes that code for the enzymes used in glycolysis and the Krebs cycle are examples of what kind of genes?______________________________

41. The genes that code for the three enzymes of the lactose operon are examples of what kind of genes?______________________________

42. The inducer molecule for the lactose operon is what?______________________________

43. Proto-oncogenes can mutate, forming ________________ which can lead to cancer.

44. Cloning of animals requires a donor cell with a complete set of genes for the organism. An example of a cell that would be satisfactory for cloning might be what?______________________________
45. Splicing a nucleotide sequence (a gene for example) from a human into a bacterial chromosome is called what?

For questions 46-55, use the following:

muscle
connective
cardiac
homeostasis
monosaccharides

nervous
epithelial
fatty acids
amino acids
glycerol

The four types of tissue found in the human body include:

46. ____________________________
47. ____________________________
48. ____________________________
49. ____________________________

50. Control of many of the bodies' functions involves the concept of negative feedback which is an important component of ____________________.

51. Name the type of muscle tissue found in the heart. ____________________

During digestion, hydrolysis of the biological molecules carbohydrates, fats and proteins occurs. In these processes, what smaller molecules are produced?

52. ____________________________
53. ____________________________
54. ____________________________
55. ____________________________

Match the following organ systems (56-64), with their functions (taken from the following list):

respiratory
excretory
circulatory
digestive
reproductive

nervous
muscular
endocrine
skeletal

56. Absorbs nutrients ____________________________
57. Exchanges $O_2$ and $CO_2$ between blood and air ____________________________
58. Transports substances throughout the body ____________________________
59. Removes waste products from the body
60. Produces offspring
61. Moves the body
62. Processes sensory information
63. Physically supports the body
64. Secretes hormones

For questions 65-75, use the following terms:

filtration  excretion
nephron  small intestine
salivary  esophagus
reabsorption  stomach
colon  anus
secretion

List the four major functions of the excretory system.

65. __________________
66. __________________
67. __________________
68. __________________

69. The “working” unit of the kidney is the: __________________

70. Glands, found in the mouth that contributes water, mucus and enzymes to the digestive process are called what? __________________

List the digestive system organs in the order that food takes after leaving the mouth.

71. __________________
72. __________________
73. __________________
74. __________________
75. __________________
Use the following choices for questions 76-82.
right ventricle  
left atrium  
aorta  
right atrium  
left ventricle  
lungs  
 systemic circulation

Blood from the superior and inferior vena cava enters the heart where? \( \text{(76)} \)__________
From there it is pumped into the \( \text{(77)} \)___________. The blood now travels via the pulmonary arteries to the \( \text{(78)} \)___________. After being oxygenated here, the blood goes into the \( \text{(79)} \)___________. The \( \text{(80)} \)___________. the \( \text{(81)} \)___________. and finally on to the \( \text{(82)} \)___________. of the body.

For questions 83-91, use the following terms:
capillaries  
right atrium  
45%  
one-way valves  
hemoglobin  
alveoli  
75%  
coronary  
varicose veins  
O\(_2\) and CO\(_2\) exchange

83. A unique feature of veins, not present in arteries is what? \( \text{__________} \)
84. The smallest blood vessels in the body are what? \( \text{__________} \)
85. Oxygen is bound to what molecule while being transported in the circulation \( \text{__________} \).
86. The hearts pacemaker is found where? \( \text{__________} \)
87. The "working" units of the lungs are called what? \( \text{__________} \)
88. When blood clots, what proportion is made up of blood cells? \( \text{__________} \)
89. What are the names of the blood vessels that circulate blood in the heart? \( \text{__________} \)
90. When venous valves become dysfunctional in leg veins, what condition may develop? \( \text{__________} \)
91. In our tissues, capillaries are the site of what process? \( \text{__________} \)
For questions 92-100, use the following terms to trace components of air through the respiratory system and body:

trachea  alveoli
hemoglobin  tissue cells
nasal cavity  lungs
CO₂  air
bronchi

Oxygen enters the body during inhalation through the (92) ___________. From here it enters the (93) ___________, passes through the (94) ___________, and finally arrives in the lungs. Within the lungs, blood is oxygenated in the (95) ___________. The oxygen combines with (96) ___________ in the blood and is carried to all of the (97) ___________ of the body. A waste product of cellular respiration (98) ___________ now diffuses into the circulation and is transported back to the (99) ___________ and diffuses into the (100) ___________ and exhaled.