Honors Biology Mid-Term Study Guide

Date of midterm exam: ___________  Time of midterm exam: ___________  Room #: ________

DON’T BE LATE!

This study guide packet is due the day of the mid-term exam. You must complete it and bring it with you when you come to take the test.

The following review covers the chapters in the first semester. To properly prepare for the exam you should:

1. Review this packet
2. Organize and review your notes
3. Review old tests & quizzes
4. Start now!!

Bring to the exam: A couple #2 pencils with erasers and a book or magazine to occupy you should you finish early. You will not be able to leave and go to your locker so bring everything with you.

Good Luck!

Remember: Your exam accounts for 10% of your final grade!

Chapter 1:

1. List the characteristics of all living things:
   1)
   2)
   3)
   4)
   5)
   6)
   7)
   8)

2. What is biology?
3. What is homeostasis? Give two specific examples of how your body maintains homeostasis.

4. Define sexual and asexual reproduction.

Experimental Design

5. Read the experimental design and answer the questions:
   A group of students was trying to determine which type of soil would rose bushes grow the tallest in. They had five rose bushes that they planted in five different types of soil. The size of the pots were the same, they were watered the same amount and kept in the same light and temperature conditions.
   
   a. What was one possible hypothesis given the information above?
   
   b. What was the independent variable?
   
   c. What was the dependent variable?

6. Another group of students were trying to determine at what temperature a newly discovered fish will thrive. They set up four different aquariums and kept each at different temperatures. They put 100 fish in each tank and then counted how many were alive at the end of a week.
   
   a. What was one possible hypothesis given the information above?
   
   b. What was the independent variable?
   
   c. What was the dependent variable?
   
   d. What conditions need to be kept constant during the experiment?
Microscopes

1. Label the diagram of the microscope.

What is the function of the following parts of the microscope?

   a. diaphragm:
   b. course adjustment:
   c. fine adjustment:
   d. stage clips:
   e. eyepiece
   f. revolving nosepiece

Chapter 2:

1. Give the location and charges of the 3 subatomic particles in an atom.

2. What is an isotope?

3. What is the atomic number of an atom? What is the atomic mass (mass number) of an atom?

4. What is the pH scale? Draw the scale and show where acids and bases are located.

5. What is a catalyst?
6. What are the unique properties of water? Explain each property and be specific in regard to what it allows water to do.

7. Water is considered a polar molecule. Explain why. Draw a diagram to support your discussion.

Chapter 3:

1. What is an organic compound?

2. Fill out the following table about organic compounds:

<table>
<thead>
<tr>
<th>Organic Compound</th>
<th>Monomer</th>
<th>Examples</th>
<th>Where is it found in the body</th>
<th>Linkage between monomers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbohydrate</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Lipid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nucleic Acid</td>
<td></td>
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</tr>
</tbody>
</table>

3. Hydrolysis and dehydration synthesis are two processes that macromolecules use. Describe how each process works and what each process creates.

4. What is an enzyme?
5. What is the lock and key model of enzyme activity? Use the following terms in your description (active site, enzyme, products, substrate).

6. For each of the following statements, label as true or false
   ______ a. Enzymes are types of proteins
   ______ b. Enzymes slow down the rate of chemical reactions
   ______ c. Each enzyme is specific, it only works on one type of substance
   ______ d. Enzymes become denatured at high temperatures
   ______ e. Enzymes work best at a narrow pH range
   ______ f. Enzymes can not be reused.
   ______ g. Proteins are made of building blocks called amino acids
   ______ h. Proteins are made in the mitochondria of cells
   ______ i. Proteins make up our blood, hair, skin, heart, muscles, and bones

7. Use the graphs above to answer the questions:
   a. Does enzyme number one function at a pH of 5.5? ______
   b. What is the best pH for enzyme number two? ______
   c. Which enzyme has the broadest pH range? ______

8. List three factors that can affect enzyme activity.


10. What are the three elements found in both lipids and carbohydrates? How are the two molecules different in terms of the amount of these elements that are present?
Chapter 4:

1. What is a cell?

2. What are the three parts of the cell theory?

3. What is a prokaryotic cell? What is a eukaryotic cell?

4. What are three differences between a plant cell and an animal cell?

5. Explain the function of the Golgi apparatus, lysosome, and cytoskeleton.

6. Matching: Next to each organelle, write the letter of its function

   ______ mitochondria    a. where proteins are made
   ______ cell membrane    b. site of photosynthesis in plants, contains chlorophyll
   ______ cell wall        c. transport system of the cell
   ______ endoplasmic reticulum  d. provides support and protection for plant cell
   ______ nucleus          e. storage area for the cells
   ______ vacuole          f. powerhouse of the cell, makes energy
   ______ chloroplasts     g. control center of the cell, contains the genetic information
   ______ ribosome         i. is selectively permeable, controls what goes in and out of the cell
7. Label the diagrams of the cells below:

Animal Cell:
A.
B.
C.
D.
E.
F.
G.
H.
I.

Plant Cell:
A.
B.
C.
D.
E.
F.
Chapter 5:

1. What does selectively permeable mean?

2. What types of organic molecules make up a cell membrane?

3. Describe how the chemistry of the cell membrane classifies it as having a “dual nature”. Draw a sketch of the membrane to support your discussion.

4. What is the function of the cell membrane?

5. What is the difference between simple diffusion and facilitated diffusion?

6. What does it mean when a cell has reached “equilibrium”?

7. What is osmosis?

8. Define the following terms: isotonic solution, hypotonic solution, and hypertonic solution.

9. What is active transport?

10. What type of organic molecule is needed for both facilitate diffusion and active transport?

11. What are the processes of endocytosis and exocytosis? Describe the steps in each process.

12. Define the following methods of transport: pinocytosis and phagocytosis.

13. What is the difference between diffusion and active transport?

Chapter 6 and 7:
1. Define photosynthesis.

2. What is the equation for photosynthesis?

3. What are the three stages of photosynthesis and where do each of them occur?


5. Where do the light reactions of photosynthesis occur? Where does the light independent reaction occur?

6. List the products of the light reactions and the products of the Calvin cycle.

7. What two molecules are recycled from the Calvin cycle back to the light reactions?

8. Trace the flow of electrons through Photosystem I and II in photosynthesis.

9. What is the most important energy harvesting molecule in organisms and what does it do? Draw a picture of the structure of this molecule below.

10. Does respiration require oxygen?

11. What are the two types of fermentation? Differentiate between their products. What do they both recycle?
12. What type of respiration yields more ATP? Why?

13. What is the equation for cellular respiration?

14. What are the three stages of cellular respiration and where does each stage occur?

15. Complete the chart below.

<table>
<thead>
<tr>
<th>Stage</th>
<th># of ATP made</th>
<th># of NADH</th>
<th># of FADH₂</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycolysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidation of pyruvate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citric Acid Cycle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxidative Phosphorylation</td>
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</tbody>
</table>

Chapter 8:

1. What is the difference between a chromosome, a sister chromatid and homologous chromosomes? Draw a picture to support your discussion.

2. What is the difference between mitosis and cytokenesis?

3. What is a centromere?

4. List the five stages of the cell cycle.

5. Write the following stages of mitosis in order: telophase, metaphase, interphase, prophase, anaphase

6. What are the 3 parts of interphase? What happens in each one?
Draw a picture next to the description on the left for each stage of mitosis

INTERPHASE
• Longest stage
• Chromatin not chromosomes is visible
• Centrioles together

PROPHASE
• Individual chromosomes are visible
• Centrioles move to opposite sides of the cell
• Spindle apparatus assembles
• Nucleolus and nuclear membrane disappear

METAPHASE
• Sister chromatids line up along the equator of the cell

ANAPHASE
• Sister chromatids are pull apart and move to opposite poles of the cell

TELOPHASE
• The chromosomes are at opposite sides of the cell
• Nuclear membrane and nucleolus reappears

7. What is the difference between cytokinesis in animal cells and plant cells?

8. What does the term diploid mean? Give the diploid number for humans.

9. What does the term haploid mean? Give the haploid number for humans.

10. What are gametes? What are the two types of gametic cells?
11. Define the process of meiosis? What are three specific differences between mitosis and meiosis?

12. What is the process of crossing-over? What does it enable in all organisms that mitosis doesn’t?

13. List the stages of meiosis?

14. Complete the chart below.

<table>
<thead>
<tr>
<th></th>
<th>Mitosis</th>
<th>Meiosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of cell to start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of cells created</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of cells created</td>
<td></td>
<td></td>
</tr>
<tr>
<td># of cells created</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stages</td>
<td></td>
<td></td>
</tr>
<tr>
<td># of divisions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Misc. Items:**
Define the following terms:
Theory
Hypothesis
Prediction

**Be able to do the following:**

- Be able to read and interpret a graph
- Be able to calculate the magnification of an object for a microscope
- Calculate the number of protons, neutrons, and electrons in an atom
- Understand the pH scale