Unit 3 Exam Review Part 1: Diagrams

Name: __Answer Key_________________________ Period: _____ Score: _____

1. What kind of cell is this? __plant cell__
   Identify the structures and their functions.
   Letter A__nucleus_________: __controls all cell
   activities________________________
   Letter B__cell membrane_____: __regulates what
   enters and leaves the cell____________
   Letter C__vacuole_________: __________
   ___storage________________________
   Letter D__chloroplast_____: __________
   ___site of photosynthesis________________
   Solar energy is used to produce energy-rich
   compounds in structure _____D__________

2. What kind of cell is this? __plant cell__
   What type of nutrition does it carry out? __
   ___autotrophobic____________________
   What organelle is indicated by letter A? __
   ___chloroplast_______________________

3. The arrow labeled A would most likely represent the direction of movement of what
   material listed below? Circle the materials.
   oxygen, __carbon dioxide, water, glucose, solar energy, heat energy

   The diagram below represents a cross section of a leaf of a green plant.

4. Identify the structures:
   Structure A: __guard cell________
   Structure B: __stomate________________

   Structure B in the lower surface of
   the leaf has a function most similar to
   the function of which cell structure?
   ___cell membrane___________________
5. The diagram below represents levels of organization within a cell of a multicellular organism.

5. What is indicated by letter X? _DNA

What does “composed of” mean? ____ made up of ___________________________

What is the level represented by letter X composed of? _four types of base subunits (A, T, C, G)__________

6. What is shown in the diagram to the left? _DNA double helix_____

Identify the following parts:
Letter A: _deoxyribose (sugar)____
Letter B: ___phosphate____________
Letter C: ___molecular bases (nitrogenous bases)

7. A pattern of reproduction and growth in a one-celled organism is shown below.

7. What types of reproduction is shown? 
   Sexual or Asexual
   Where does all the genetic material come from?
   One parent, Two parents

What type of division is this? 
   Mitosis or Meiosis

What types of cells does this occur in? (Circle all that apply)
   Sex cells, body cells, single celled organisms, liver cells, skin cells, sperm, egg
The diagram below illustrates reproduction in yeast.

9. A technique used to reproduce plants is shown in the diagram below. What type of reproduction is this? **asexual reproduction** or **sexual reproduction**

10. Explain why putting stoppers in the test tubes could be dangerous.
   - the stoppers would pop out of the heated tubes and possible injure someone
   - the test tubes may explode

11. A biological process that occurs in both plants and animals is shown below.

   ![Diagram of cellular respiration]

   Identify this process: **cellular respiration**

   Identify the lettered substances in this process.
   - A: glucose
   - B: oxygen
   - C: enzymes
   - D: carbon dioxide
12. The diagram below shows two different kinds of substances, A and B, entering a cell.

The material “B” is moving from H_____ \( \rightarrow \) L______ concentration.

The material “A” is moving from L_____ \( \rightarrow \) H______ concentration.

What is ATP? ___Short term energy storage molecule produced in cellular respiration____

Is ATP being used for--
- substance A to enter the cell?  Yes  No
- substance B to enter the cell?  Yes  No

13. A biological process that occurs in plants is represented below.

What process is this? __photosynthesis________________________

Match the letters to the correct substance.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Number</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3</td>
<td>1. enzymes</td>
</tr>
<tr>
<td>B</td>
<td>4 (or 2)</td>
<td>2. glucose</td>
</tr>
<tr>
<td>C</td>
<td>2 (or 4)</td>
<td>3. carbon dioxide</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>4. oxygen</td>
</tr>
</tbody>
</table>

14. What molecule is this? DNA double helix________________

One characteristic of this molecule is that it is the _template__________ for the replication of genetic information.
15. What biochemical process is represented by letter A?
   - cellular respiration

What molecule is represented by letter X?
   - ATP

16. What kind of cell is this?
   - Plant cell

What is structure A?
   - mitochondria

What process takes place in structure A?
   - cellular respiration

17. The diagram below represents a process that occurs in a structure of a specialized cell.

Identify the letters in the diagram.

A: __chloroplast__________
B: __carbon dioxide__________
C: __water__________________
D: __glucose________________
18. A model cell setup is represented in the “Initial State” diagram below. In the space provided indicate the areas where each of these substances would be located after 20 minutes.

![Initial State Diagram](image)

19. Part of a molecule found in cells is represented below.
   A) Which process is most directly affected by the arrangement of components 1 through 4? __protein synthesis__(directs the order of amino acids)
   B) What substances are represented by components 1 through 4? __molecular bases (nucleic acids)__

![DNA Helix](image)

20. What process is occurring in the diagram below?
    __Photosynthesis____
    An experiment was set up like this could be to testing:
    __The effect of light intensity on the rate of photosynthesis__
21. An experimental setup using a model cell is shown in the diagram to the left. What cell structure is represented by the dialysis tubing? **cell membrane**

22. A student observes some cells with a compound light microscope as shown in view A below. What did the student most likely do to obtain view B? __________________________
   **applied a biological stain**

What does the word “obtain” mean? __________
   **to get**

23. This laboratory technique of lowering the coverslip at an angle is used to: __________
   **reduce the formation of air bubbles**

24. The diagram below illustrates what happens when a particular solution is added to a wet-mount slide containing red onion cells being observed using a compound light microscope. Identify a process that caused the change in the cells. __________
   **osmosis / diffusion / passive transport**
26. What would this laboratory setup most likely be used to demonstrate? _______________
the process of diffusion__________________________

27. Two molecules, A and B, and their distribution inside and outside of a cell are represented in the diagram below. State one possible reason why molecule A could diffuse across the membrane of the cell but molecule B could not. (anyone of the following) ____________
→ molecule A is smaller than molecule B
→ molecule B is too big
→ the membrane is selectively permeable to A_

28. A small water plant (elodea) was placed in bright sunlight for five hours as indicated below. Bubbles of oxygen gas were observed being released from the plant. Since oxygen gas is being released, it can be inferred that the plant is carrying out what process? __photosynthesis__________________________
What else is the plant producing in this process? __glucose__________________________
What substance did the plant most likely absorb from the water for the process that produces the oxygen gas? __carbon dioxide__________________________
29. In a cell, a variety of structures perform specific functions and interact to maintain homeostasis. The diagram below represents a typical cell with three cell structures labeled 1, 2, and 3. Explain how each cell structure helps maintain homeostasis in a cell.

<table>
<thead>
<tr>
<th>Structure #</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>→ identify the cell structure</td>
<td>Ribosome</td>
<td>Nucleus</td>
<td>mitochondria</td>
</tr>
<tr>
<td>→ state one function of this cell structure</td>
<td>Site of protein synthesis</td>
<td>Control of all cell activities</td>
<td>Site of cellular respiration</td>
</tr>
<tr>
<td>→ identify one substance that is often associated with the cell structure</td>
<td>Amino acids</td>
<td>DNA</td>
<td>ATP</td>
</tr>
<tr>
<td>→ state how that substance is associated with the cell structure</td>
<td>Used to make proteins</td>
<td>Makes up the chromosomes in the nucleus</td>
<td>Produced in the mitochondria</td>
</tr>
<tr>
<td>→ identify one other cell structure and explain how it interacts with the cell structure you selected to maintain homeostasis in the cell</td>
<td>Nucleus → the ribosome gets instructions from the nucleus determining which proteins are made by the cell</td>
<td>Ribosome → nucleus sends instructions to ribosome for protein synthesis</td>
<td>Cell membrane → allows glucose to enter the cell and be used by the mitochondria after energy release</td>
</tr>
</tbody>
</table>
30. Complete the chart below by identifying two cell structures involved in protein synthesis and stating how each structure functions in protein synthesis.

<table>
<thead>
<tr>
<th>Cell Structure</th>
<th>Function in protein synthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>— nucleus</td>
<td>– contains template/blueprint/instructions for protein synthesis</td>
</tr>
<tr>
<td>— ribosome</td>
<td>– assembles proteins; synthesizes proteins</td>
</tr>
<tr>
<td>— mitochondrion</td>
<td>– provides energy</td>
</tr>
</tbody>
</table>

31. An experiment was carried out to determine whether drinking caffeinated soda increases pulse rate. The pulse rates of two groups of people at rest were measured. Group A was then given caffeinated soda and group B was given caffeine-free soda. One hour after drinking the soda, the pulse rates were measured. The participants in the experiment were all the same age, and they were all given the same amount of soda. The dependent variable in this experiment is the __pulse rate__________________________________________________

Write down the hint we use to identify the variables.

   The effect of caffeine (the “I”) on pulse rate (the “D”)

32. A biology class conducted an experiment to determine the rate of respiration of yeast in bread dough at various temperatures. Bread dough will rise due to the production of carbon dioxide by the yeast present in the dough. An equal amount of dough was placed in the bottom of each of five graduated cylinders. Each cylinder was then placed in a different water bath to maintain a particular temperature. The amount of expansion of the dough in each cylinder was measured after 15 minutes. The independent variable in this investigation was: ___temperature__________________________________________________

Write down the hint we use to identify the variables.

   The effect of temperature (the “I”) on respiration rate (the “D”)

33. Complete the chart below with the complementary DNA base pairs.
   (Note: it does not have to be in this order but you must have the correct pairs)

<table>
<thead>
<tr>
<th>DNA</th>
<th>DNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>T</td>
</tr>
<tr>
<td>T</td>
<td>A</td>
</tr>
<tr>
<td>C</td>
<td>G</td>
</tr>
<tr>
<td>G</td>
<td>C</td>
</tr>
</tbody>
</table>

34. Complete the chart below with the mRNA is transcribed from DNA..
(Note: it does not have to be in this order but you must have the correct pairs)

<table>
<thead>
<tr>
<th>DNA</th>
<th>mRNA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>U</td>
</tr>
<tr>
<td>T</td>
<td>A</td>
</tr>
<tr>
<td>C</td>
<td>G</td>
</tr>
<tr>
<td>G</td>
<td>C</td>
</tr>
</tbody>
</table>

35. What type of organic molecule is DNA? _Nucleic acid___________

36. DNA carries the code for making what types of organic molecule? _PROTEIN_____ 

37. Proteins are long chains of _Amino Acids ______________

38. What molecule copies the DNA code? __mRNA________________

39. What organelle is the site of protein synthesis? _ribosome____________

40. Place these terms in a sequence that represents the levels of biological organization from smallest to largest. organism, cell, tissue, organelle, organ system, organ
_ organelle __ → __ cell → _ tissue → _ organ → _ organ system → _ organism _____

41. Cellular respiration temporarily stores energy in what molecules? _ATP__________

42. The leaves of a plant are dotted with openings known as stomata. When open, stomata allow the plant to exchange gases and allow moisture to evaporate, helping to draw water from the roots up into the plant. These activities help the plant to __maintain homeostasis________________

43. Which structures carry out life functions within cells? ___organelles______________

44. The shape of a protein is most directly determined by __the type of amino acids and the order they are in________________________________

45. How many independent variables can be use in a controlled experiment? one__________

46. What type of cell division occurs in human liver tissue? __mitosis________________

47. Why would we add stain to a wet-mount slide preparation of a specimen? ___________ 
____so we can see it (see the structures) better___________________________

48. Complete the chart below:
<table>
<thead>
<tr>
<th></th>
<th>Photosynthesis</th>
<th>Cellular Respiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organelle it takes place in</td>
<td>Chloroplast</td>
<td>mitochondria</td>
</tr>
<tr>
<td>Source of Energy</td>
<td>Sun</td>
<td>glucose</td>
</tr>
<tr>
<td>Raw materials</td>
<td>Water and CO₂</td>
<td>Glucose and oxygen</td>
</tr>
<tr>
<td>Energy rich molecule produced</td>
<td>Glucose</td>
<td>ATP</td>
</tr>
<tr>
<td>When it occurs</td>
<td>In the light</td>
<td>All the time</td>
</tr>
</tbody>
</table>

the experiment should be large. Acceptable responses include, but are not limited to:

- Allow 1 credit for identifying the type of data that will be collected based on the student’s hypothesis. Acceptable responses include, but are not limited to:
  - Allow 1 credit for describing experimental results that would support the student’s hypothesis. Acceptable responses include, but are not limited to:

49. **Experimental Design**

Many plants can affect the growth of other plants near them. This can occur when one plant produces a chemical that affects another plant. Design an experiment to determine if a solution containing ground-up goldenrod plants has an effect on the growth of radish seedlings.

A) State a hypothesis to be tested: **Note:** no credit allowed for a hypothesis in the form of a question! **Any one of these:**
- Radish seedlings grow faster when exposed to goldenrod solution
- Radish seedlings treated with the solution will not grow as tall as the control group.
- The solution will not affect the height of radish seedlings.

B) Describe how the experimental group will be treated differently from the control Group: **Any one of these**
- The experimental group will be given the solution while the control group is given plain water.
- The experimental group will have ground up goldenrod in the soil.

C) Explain why the number of seedlings used for the experiment should be large: **Any one of these**
- A large sample will increase the validity of the results.
- Since some may die, there will be enough left to do the experiment.

D) Identify the type of data that will be collected: **Any one of these**
- The number of seedlings that survive in each group will be counted.
- The height of the seedlings

**Note:** no credit will be given for just “growth.” The type of data must be measurable.
E) Describe experimental results that would support your hypothesis:
— Radish seedlings exposed to goldenrod solution were twice as tall as the control group in two weeks.
— If the radish seedlings treated with the solution do not grow as tall as those in the control group, the hypothesis is supported.
— If there is no difference between the height of the group treated with the solution as compared to the control group, the hypothesis will be supported.

50. **Experimental Design** → A scientist conducted an experiment to test the hypothesis that maple seeds exposed to acid rain will take longer to germinate than seeds exposed to normal rain, which has a pH of 5.6. The scientist set up four groups, each containing 200 maple seeds. The water used for each group had a different pH value: 5.6, 4.0, 3.0, and 2.0. All other conditions were kept the same. After ten days, the number of seeds that had germinated in each group was counted.

A) Identify the control group in this experiment. **Either one of these**
— group with normal rainwater
— group with water of pH 5.6

B) Identify the dependent variable in this experiment. **Either one of these** — number of seeds that germinated at different pHs
— how many seeds grew
— germination of seeds

A student prepared four different red blood cell suspensions, as shown in the chart below.

<table>
<thead>
<tr>
<th>Suspension</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>red blood cells in normal blood serum (0.7% salt solution)</td>
</tr>
<tr>
<td>B</td>
<td>red blood cells in 10% salt solution</td>
</tr>
<tr>
<td>C</td>
<td>red blood cells in distilled water</td>
</tr>
<tr>
<td>D</td>
<td>red blood cells in tap water</td>
</tr>
</tbody>
</table>

51. Which suspension would contain red blood cells that would appear wrinkled and reduced in volume? ____B____________

52. Which suspension would contain red blood cells that would appear swollen and increased in volume? ____C____________

53. The movement of what material was the main cause of the change in red blood cell volume? _water________________________

54. Which process is most likely involved in the change in red blood cell volume? __diffusion (or osmosis—the diffusion of water)________________________
Unit 3 Exam Review Part 4

Base your answers to the following questions on the Universal Genetic Code Chart below and on your knowledge of biology.
55. Fill in the missing mRNA bases and the amino acid sequence that corresponds to the DNA base sequence below.

DNA  CAC  /  GTG  /  GAC  /  TGA
mRNA  __GUG__  ___CAC__  ___CUG__  ___ACU__
Amino acids  __VAL__  ___HIS__  ___LEU__  ___THR__

56. Fill in an mRNA codon that would code for each amino acid shown.

Amino acid:  ASP     TRP     CYS
mRNA codon:  __   __   __

ASP = GAU or GAC, TRP = UGG, CYS = UGU or UGC

57. Identify one of the mRNA codons that would stop the coding process.
_UGA__ or UAA or UAG ______

69. Which three codons would code for a different amino acid sequence from that coded for by the mRNA base sequence AGU-UCA-CCA?

(1) AGC-UCU-CCU  (2) AGU-UCC-CCG
(3) AGC-UCA-CUU  (4) AGU-UCG-CCC
Vocabulary ---define the following terms:

Cellular respiration: __release of energy from the chemical bonds in the nutrients

Photosynthesis: __trapping the sun’s energy in the chemical bonds in the nutrients

Active transport: __using ATP (energy) to move materials (L→H)

Passive transport: __do not use ATP (energy) to move materials (H→L) (diffusion, osmosis)

Diffusion: __move materials (H→L) without the use of energy (ATP)

Osmosis: __move water from H→L without the use of energy (ATP), a type of diffusion

ATP: __a short term energy storage molecule formed in the mitochondria in the process of cellular respiration.

Concentration gradient: __the difference in the concentration

Permeability: __how easily it can move through

Semi-permeable: __some thing can move through and others cannot

Aerobic cellular respiration: __respiration in the presence of oxygen, releases the most energy (ATP)

Anaerobic cellular respiration: __respiration without the presence of oxygen, releases the least energy (ATP)

mRNA: __(messenger) copies the DNA message and carries it to the ribosome

tRNA: __(transfer) carries the correct amino acid to the ribosome

rRNA: __(ribosomal)__combines with a special protein to form a ribosome

Asexual reproduction: __reproduction with one parent, offspring are identical to the parent

Mitosis: __making 2 exact copies of the cell –same number and type of chromosomes as the parent cell, functions in asexual reproduction in single cell organisms and growth and repair in multicellular organisms in non sex cells.