

FULL NAME: _____

HONORS HUMAN PHYSIOLOGY SUMMER PACKET

This summer, you are expected to review concepts that are essential to the understanding of this course. To guarantee success in this class, you **MUST** complete the following tasks in this packet:

- **NOTES--on two assigned chapters (in outline form)**
 - **Chapter 2: Introductory Chemistry**
 - **Chapter 3: Cells**
- **OPEN-ENDED QUESTIONS**
- **REVIEW WORKSHEETS**

In order to accomplish these tasks, you will need to obtain a copy of the *Introduction to the Human Body, 9th Edition* textbook from the library. You may/will use internet sources to complete the open-ended questions and review worksheets. **READ ALL DIRECTIONS**, everywhere in this packet. Nothing is meant to trick or confuse.

The summer work is due your first day of school in class. An exam will be given in the second week; it is required of **ALL** students, regardless of the time of enrollment **OR** the effort or time you made available over the summer.

➤ NOTES TO TAKE

Copy the following outline onto lined paper as you read through your textbook, and as you work, incorporate additional information, diagrams or examples to help you review and understand background knowledge that is necessary for this course.

****Note: you do not need to include topics not given in this outline...*

CHAPTER 2: INTRODUCTORY CHEMISTRY ---pages 25-47

I. Introduction to Chemistry

(1) Define matter

(2) Define mass

A. Chemical Elements and Atoms

1. Definition of chemical elements

2. Major elements in human body (with chemical symbols, percentages, and significance---Table 2.1 may help here)

3. Lesser elements in human body (with chemical symbols, percentages, and significance)

4. Trace elements in human body (with chemical symbols, percentages, and significance)

5. Definition of atoms

6. Basic structure of atoms (include all structures)

B. Ions, Molecules, and Compounds

1. Definition of ion

2. Definition molecule

3. Definition compound

4. Definition free radical (give example and explain)

C. Chemical Bonds

1. Definition chemical bonds

2. Definition valence shell

3. Define and explain ionic bonds

4. Define and explain covalent bonds (include single, double, triple covalent bonds)

a. Define and explain nonpolar covalent bond

b. Define and explain polar covalent bond

5. Define and explain hydrogen bonds

D. Chemical Reactions

1. Define chemical reaction (include what bodily functions can happen because of them)

2. Define energy

3. Define potential energy

4. Define kinetic energy

5. Define chemical energy

6. Define and explain the following types of chemical reactions:

- a. Synthesis (Dehydration) Reactions
- b. Decomposition (Hydrolysis) Reactions
- c. Exchange Reactions
- d. Reversible Reactions

7. Define metabolism

II. Chemical Compounds and Life Processes

(1) Define inorganic compounds

(2) Define organic compounds

A. Inorganic Compounds

1. Define water (include percentage of body mass)

a. Explain each of the following five properties of water

- a. Water is an excellent solvent (include key terminology)
- b. Water participates in chemical reactions (include key terminology)
- c. Water absorbs and releases heat very slowly
- d. Water requires a large amount of heat to change from a liquid to a gas
- e. Water serves as a lubricant

2. Definition acid

3. Definition base

4. Definition salt

5. Explain relationship between acid, base, and salt

6. Explain what an acid-base balance is

7. Definition pH scale

8. Definition acidic

9. Definition alkaline

10. Explain how pH maintained through buffer system

11. Definition buffer

12. Define and explain carbonic acid-bicarbonate buffer system

B. Organic Compounds

1. Definition carbohydrates

a. Elements

b. Structure

c. Explain each of the following groups:

(1) Monosaccharides (include function and examples)

(2) Disaccharides (include explanation of key terminology and examples)

(3) Polysaccharides (include key terminology/functions and examples)

2. Definition lipids

- a. Elements
- b. Structure
- c. Function (address solubility)
- d. Define and explain:
 - (1) saturated fats
 - (2) monounsaturated fats
 - (3) polyunsaturated fats
- e. Explain phospholipids
- f. Explain steroids

3. Definition proteins

- a. Elements
- b. Structure
- c. Function
- d. Define amino acids (include structure and bonds)
- e. Define and explain:
 - (1) Peptide
 - (2) Dipeptide
 - (3) Tripeptide
 - (4) Polypeptide
 - (5) Give example of result in alteration of amino acids sequences
- f. Definition denaturation and explain problem it causes

4. Definition enzymes

- a. Define catalysts
- b. Explain significance of ending in '-ase'
- c. Explain how enzymes get their name
- d. Explain the following properties of enzymes:
 - (1) Specificity
 - (2) Efficiency
 - (3) Control (include key terminology)
- e. Explain how an enzyme works (drawing may help)

5. Definition nucleic acids

- a. List the two main types of nucleic acids
- b. Define nucleotides
- c. List and explain the three parts of a nucleotide
- d. Define DNA; list the four bases found in DNA

- e. Explain the structure of a DNA molecule
- f. Define gene (include how many humans have and gene functions)
- g. Define mutation
- h. Define RNA; list the four bases found in RNA
- i. List three types of RNA and include their functions
- 6. Definition adenosine triphosphate
 - a. Function of ATP
 - b. Structure
 - c. Energy transferred how (include enzyme)
 - d. Define adenosine diphosphate (include structural information)

CHAPTER 3: CELLS ---pages 48-77

I. A Generalized View of the Cell

- (1) List and explain three main parts of a cell (include key terminology)

II. The Plasma Membrane

- (1) Definition lipid bilayer
- (2) Definition phospholipid
- (3) Definition cholesterol
- (4) Explain difference between integral proteins and peripheral proteins
- (5) Definition glycoproteins
- (6) Definition selectively permeable
- (7) Explain ion channels
- (8) Explain carriers (transporters)
- (9) Explain receptors
- (10) Explain cell identity markers

III. Transport Across the Plasma Membrane

- (1) Why is transport biologically important
- (2) Define intracellular fluid (ICF)
- (3) Define extracellular fluid (ECF)
- (4) Define interstitial fluid
- (5) Define plasma, lymph, and cerebrospinal fluid (CSF)
- (6) Define and explain solute, solvent
- (7) Define concentration gradient
- (8) Define and differentiate between passive processes and active processes

A. Passive Processes

- 1. Define diffusion
- 2. Define equilibrium
- 3. Define and differentiate simple diffusion and facilitated diffusion (include substance examples)

4. Define osmosis
5. Explain osmotic pressure
6. Explain each of the following types of solutions (include key terminology):
 - a. Isotonic solution
 - b. Hypotonic solution
 - c. Hypertonic solution

B. Active Processes

1. Define and explain carrier protein (pump)
 - a. Briefly explain why the sodium-potassium pump is biologically important
2. Define and explain transport in vesicles
3. Differentiate and explain the following types of vesicular transport (include key terminology):
 - a. Endocytosis
 - (1) Phagocytosis
 - (2) Bulk-phase endocytosis
 - b. Exocytosis

IV. Cytoplasm

(1) Define cytoplasm

A. Cytosol

1. Define cytosol
2. Define cytoskeleton
3. Define and explain the following parts of the cytoskeleton:
 - a. Microfilaments
 - b. Microvilli
 - c. Intermediate filaments
 - d. Microtubules

B. Organelles

1. Define organelles
2. Define flagella
3. For the following organelles, indicate location and function:
 - a. Ribosomes
 - b. Endoplasmic reticulum (include smooth and rough)
 - c. Golgi complex
 - d. Lysosomes
 - e. Peroxisomes
 - f. Proteasomes
 - g. Mitochondria

V. Nucleus

- (1) Define nucleus; list and explain each structure of the nucleus
- (2) Explain what chromosomes and chromatin are
- (3) Define genome

VI. Gene Action: Protein Synthesis

- (1) Define transcribed and translated as they relate to DNA
- (2) Define base triplet
- (3) Define codon
 - A. Transcription
 1. Define promoter
 2. Briefly explain this process
 3. Define terminator
 - B. Translation
 1. Define anticodon
 2. Briefly explain this process
 3. Define polyribosome

VII. Somatic Cell Division

- (1) Define cell division
- (2) Define meiosis
- (3) Define somatic cells
- (4) Result of somatic cell division
- (5) Define cell cycle
- (6) Briefly explain what happens in each of the following phases (include key terminology):
 - a. Interphase
 - b. Mitotic phase
 - (1) Mitosis
 - (2) Prophase
 - (3) Metaphase
 - (4) Anaphase
 - (5) Telophase
 - (6) Cytokinesis

VIII. Cellular Diversity

- (1) Number of cells in average human body
- (2) Cell size measured in what unit
- (3) Explain relationship between cell size, cell shape, and functionality

IX. Aging and Cells

- (1) Define aging
- (2) Define geriatrics
- (3) Define gerontology
- (4) Define telomeres and explain what they have to do with aging
- (5) Role of glucose in aging
- (6) Role of free radicals in aging

➤ OPEN-ENDED QUESTIONS

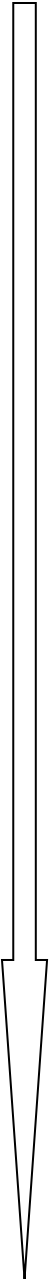
Answer the following questions in complete sentences on lined paper unless otherwise specified. Please answer all questions with respect to HUMAN cells and systems only (i.e. mammalian/eukaryotic animal cells).

1. Define homeostasis and give an example from the human body.
2. Explain why homeostatic regulation is physiologically important.
3. Define metabolism and differentiate between catabolic reactions and anabolic reactions. Provide an example of each.
4. Describe how the following processes enable the synthesis of the ATP inside human cells:
 - a. Glycolysis
 - b. Lactic Acid Fermentation
 - c. Cellular Respiration
5. Write and describe examples of dehydration synthesis and hydrolysis reaction in peptide bonding.
6. Sequentially list all phases and stages of the cell cycle and describe major events in each.
7. Describe the importance of the cell cycle for cell growth and maintenance.
8. Explain how cells become cancerous (relate it to the cell cycle).
9. List the 4 major classes of organic compounds in biochemistry. For each, give the generic name of the monomer, include examples of monomers and polymers for each family.
10. Using the concepts of energy, substrates/reactants and products, explain how an enzyme functions in cells.
11. What factors can speed or slow the rate of enzyme activity? What is denaturation, and what causes it?
12. Sometimes a "lock and key model" is said in reference to enzyme-substrate complex. Explain and give examples.
13. How and why is the cell membrane said to be selectively permeable? Give examples.
14. Compare and contrast the passive and active methods cells use to move materials across the membrane, incorporating the concept of protein channels.
15. In a few sentences, describe why you signed up for this course. There are no right or wrong answers.
16. The idea of hierarchy, or levels of organization, are very important in this course. List the terms below in order of hierarchy from simplest to most complex on the chart on page 9 of this packet. You may need to research what some of these terms are.

***Once you have them in order, give two examples in the human body for each level.

 - cell
 - element
 - functional group
 - macromolecule
 - organelle
 - organ
 - organism
 - system
 - tissue

ORGANIZATIONAL LEVELS IN BIOLOGY **Please refer to Open-Ended Question number 15!**

Order	Organizational Term	Example 1	Example 2
Simplest  Most complex			

➤ WORKSHEETS

Study all worksheets on this page and the next several pages carefully, and label and fill-in as needed. A few may require lined paper. You may need to perform additional research and/or add to your notes. As always, read directions carefully for success. If you are downloading this packet from the internet, please print out the worksheets so they can be collected.

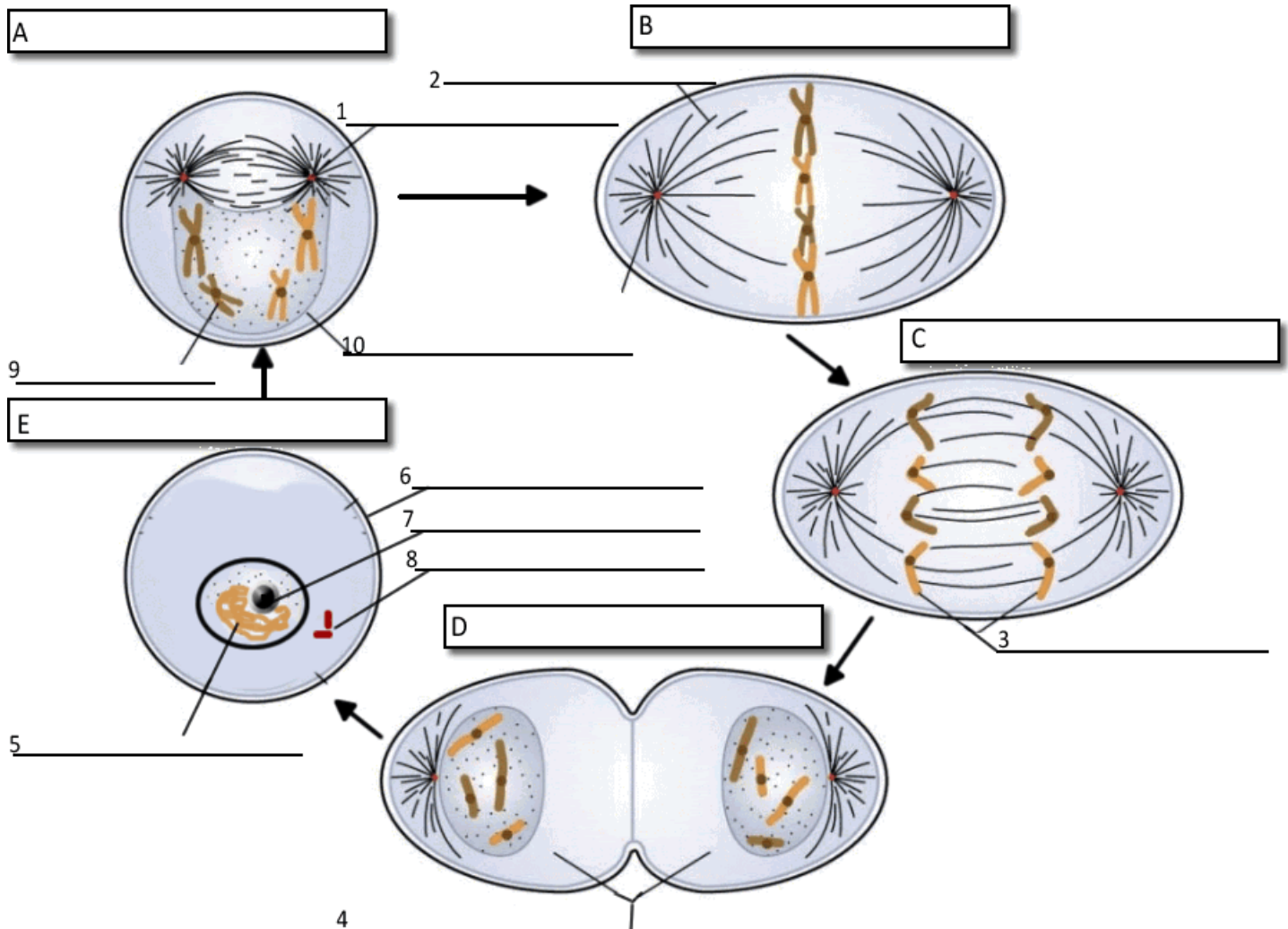
Fill in the phase names in the boxes A-E.

Then fill in the structure names for items 1-10 using the word bank below:

centriole
nucleolus
chromosome (two chromatids)
plasma membrane
centrosome

mitotic spindle
chromatin
nuclear membrane
cytosol
chromosome (one chromatid)

CELL CYCLE REVIEW SHEET



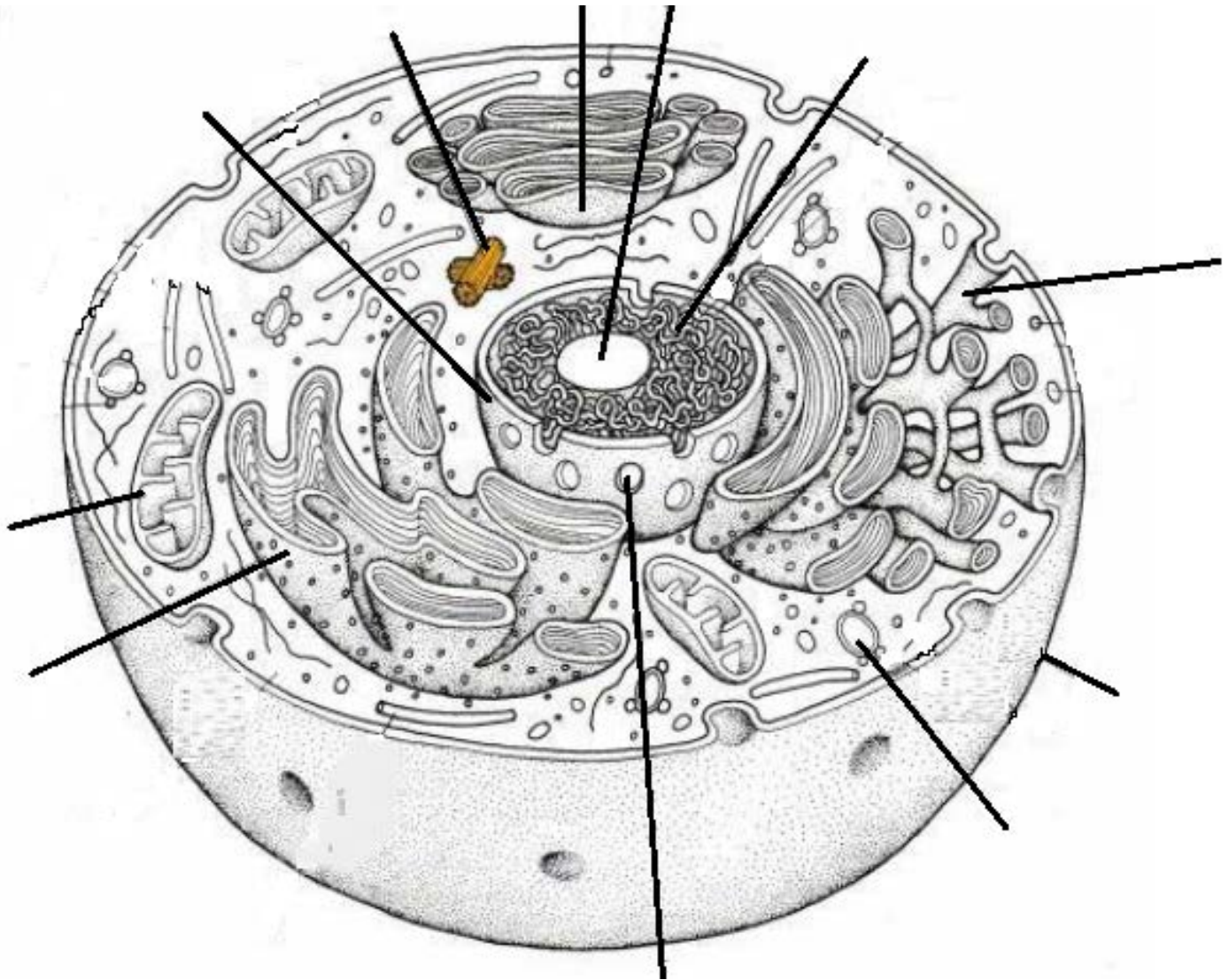
THE EUKARYOTIC ANIMAL CELL

First briefly list the functions for each organelle given, then go to the diagram on page 12 and number each organelle using their numbers 1-11 from this chart. Next color each of the numbered organelles and fill in the colors you used in this chart.

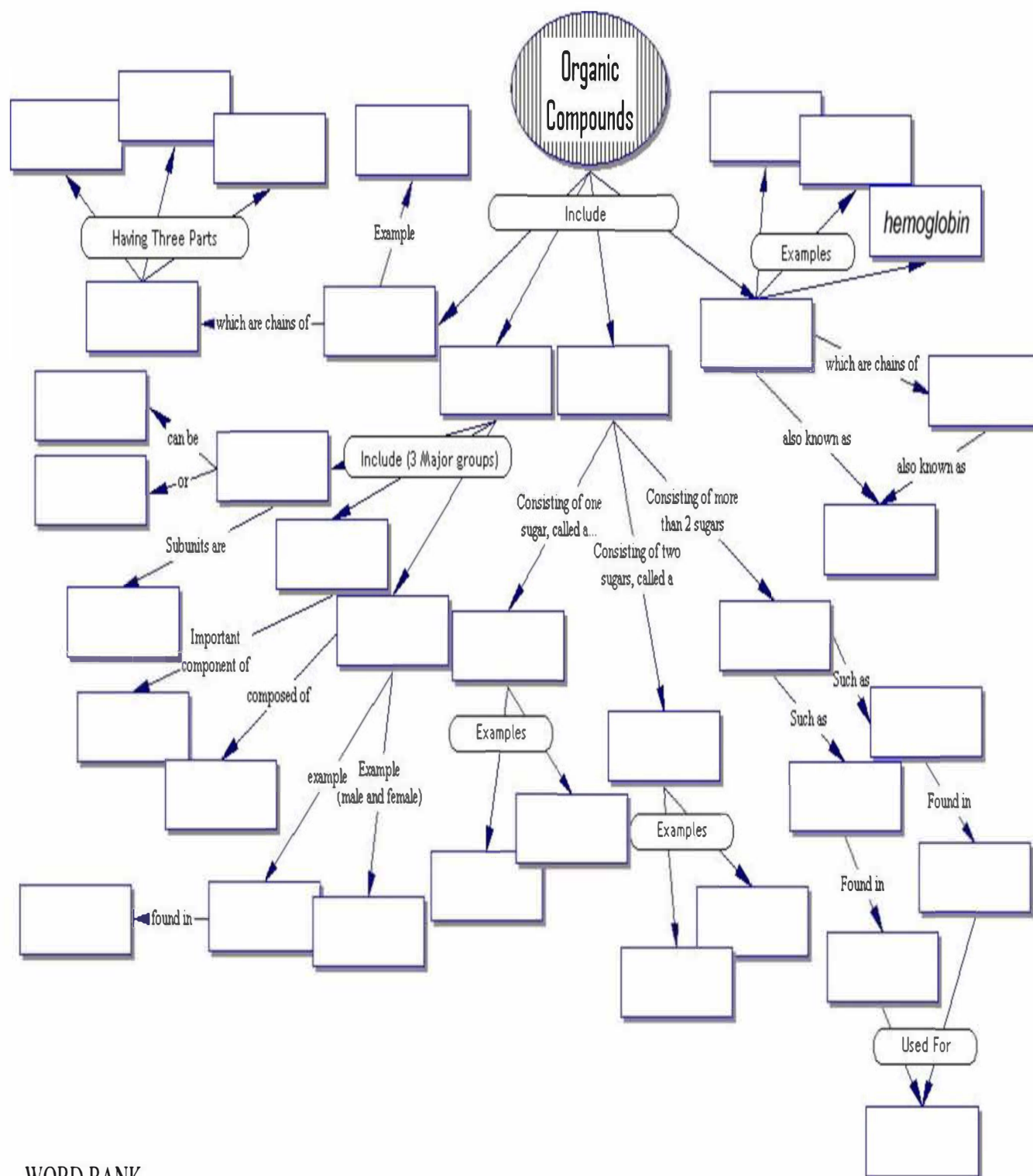
Cell Structure	Color	Function
1. Smooth endoplasmic reticulum		
2. Rough endoplasmic reticulum		
3. Lysosome		
4. Nucleolus		
5. Nuclear envelope		
6. Chromatin		
7. Nuclear pore		
8. Centriole		
9. Mitochondrion		
10. Cell membrane		
11. Golgi complex		

THE EUKARYOTIC ANIMAL CELL

Carefully number the organelles 1-11 to coordinate with the numbers on the chart on page 11 of this packet. Then color each numbered organelle in the cell below, using a DIFFERENT color for each structure or organelle. Next fill in the color column of the chart on page 11 to show what color you used for each listed organelle.



Organic Compounds Concept Map--use the given word bank below to complete this



WORD BANK

Amino acids, animals, Carbohydrates, Cell membrane, Cholesterol, DNA, Disaccharide, Egg yolk, Energy storage, Enzymes, Fats, Fatty acid, Fructose, Glucose, Glycogen, Hemoglobin, Hormones, Insulin, Lactose, Lipids, Monosaccharide, Nitrogen Base, Nucleotide, Nucleic Acids, Phosphate Group, Phospholipid, Plants, Polypeptides, Polysaccharides, Proteins, Saturated, Starch, Steroids, Sucrose, Unsaturated, 4 rings of carbon, 5 carbon sugar

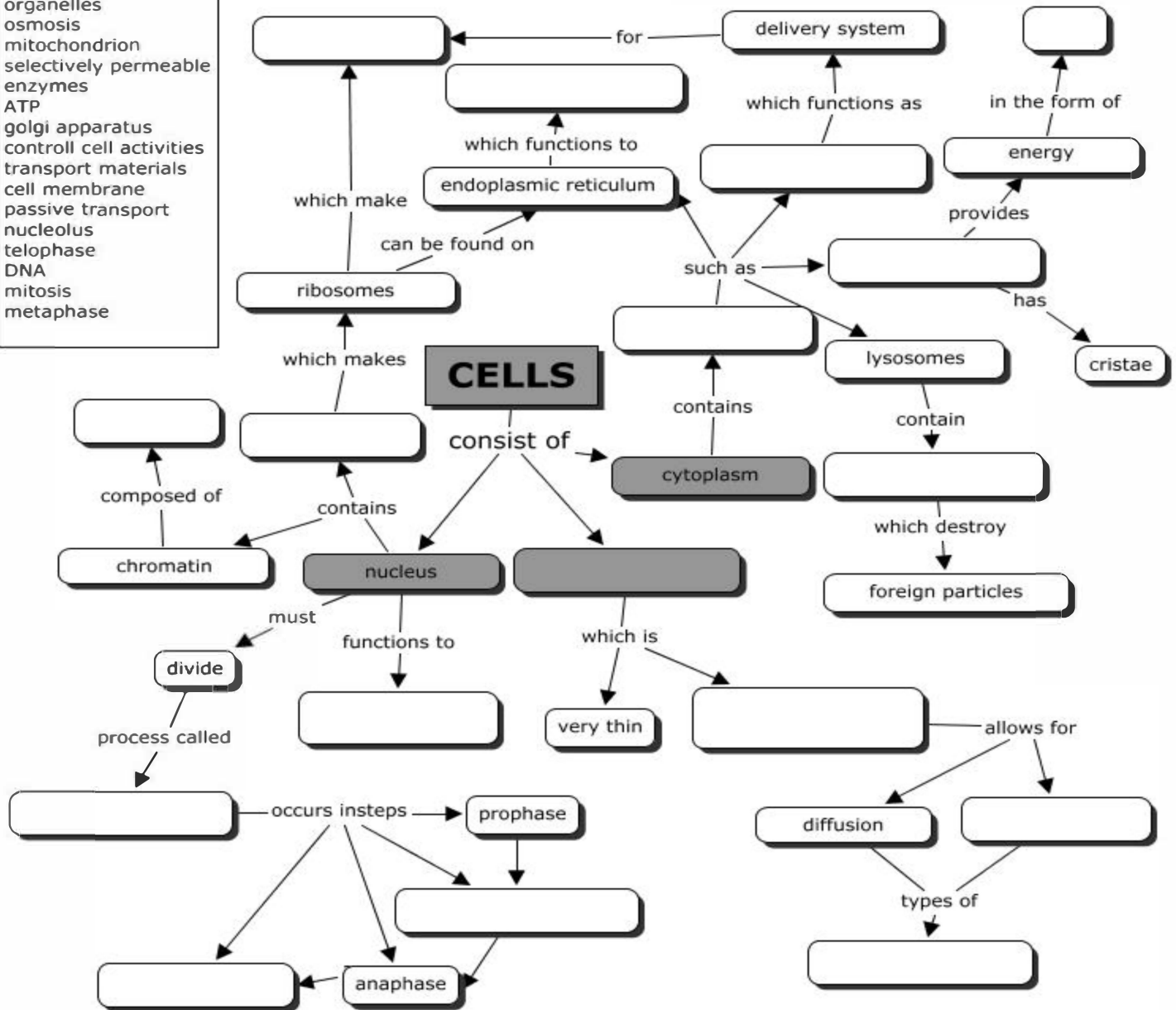
CELL CONCEPT MAP

NAME _____

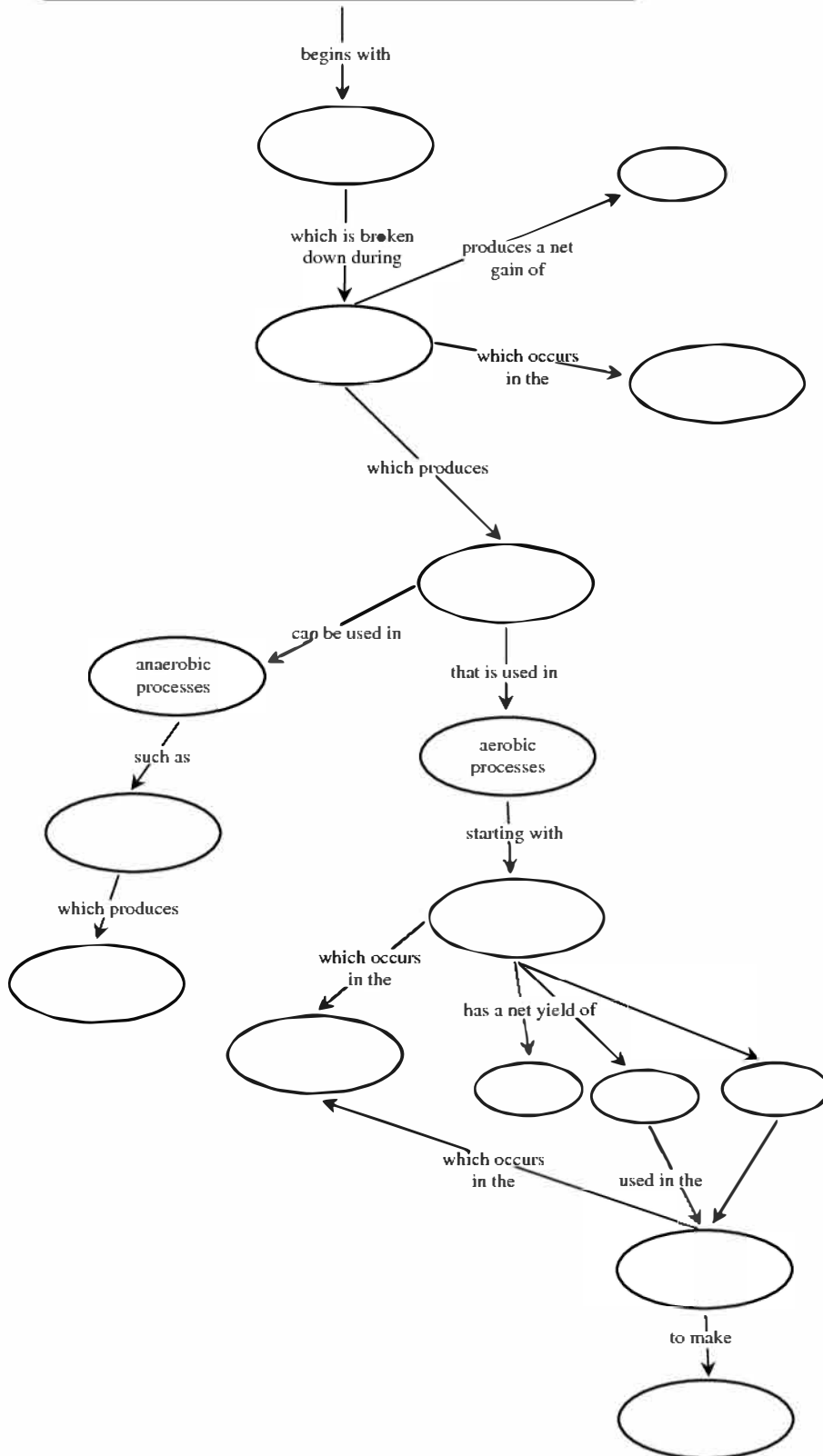
WORD BANK

proteins
organelles
osmosis
mitochondrion
selectively permeable
enzymes
ATP
golgi apparatus
control cell activities
transport materials
cell membrane
passive transport
nucleolus
telophase
DNA
mitosis
metaphase

Use this word bank to complete this...



Cellular Respiration Concept Map



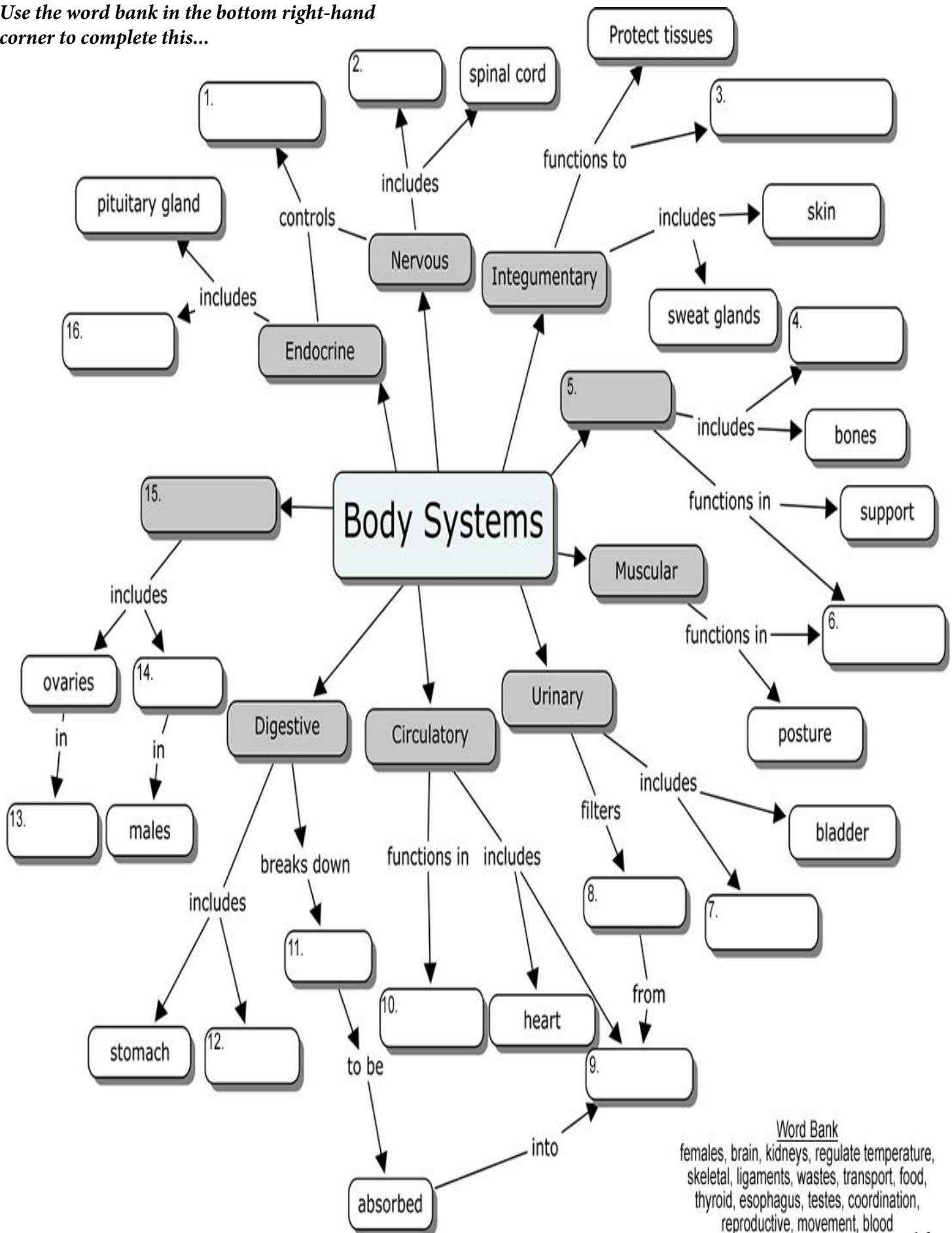
Word Bank

Use *only this word bank*

1 ATP
 2 ATP
 36 ATP
 4 NADH
 1 FADH
 Electron Transport Chain
 Mitochondrion
 Cytoplasm
 Fermentation
 Glycolysis
 Glucose
 Pyruvic Acid
 Lactic Acid
 Kreb's Cycle

Body Systems Concept Map

Use the word bank in the bottom right-hand corner to complete this...



HAND-IN INSTRUCTIONS

- 1. If you separated the pages of this packet, put them back into numerical order facing right-side up and staple the packet back together.
---MAKE SURE YOUR FULL NAME IS ON THE FIRST PAGE...**
- 2. Gather your Chapter 2 and Chapter 3 outline notes. make sure all copies are in order and right-side up, staple them together. Write your full name on the upper left hand side of the first page. These will be handed in separately.**
- 3. Next get your answers to the Open-Ended questions number 1-15 (question 16 was completed on page 9 of this packet). Write your full name on the upper left hand side and staple them together in order and right-side up. These will be handed in separately.**

**SO YOU WILL BE HANDING IN THREE SEPARATELY STAPLED PACKETS TO ME...
Please double check that your name is on all three packets, the pages are all face-up and in order. Thank-you:)**