

Biology Midterm Exam Study Guide 2014-2015

Studying for exams can be overwhelming, however if you break it into chunks of work the task will not be so intimidating. Here are a few tips on how to succeed on this exam.

1. Start NOW and schedule your time to study. Determine when, where, and what material you will cover at that time.
2. Answer all of the questions on this study guide by writing something down. Just looking at it and saying to yourself, "Oh I know that." is not going to cut it.
3. Use your resources. If you don't remember the answer then look it up. Use your notes from that unit, the textbook, online resources, your friends, and even your TEACHER as a resource. Again, do not wait until the last minute. Ask for help as you go. There is room on the last page for you to note any additional questions you may need to ask.
4. Take responsibility. If you want to walk in to the exam feeling confident then you need to work very hard every day. Your teacher is more than willing to help but do not hand them your study guide the day before the exam and ask them, "Is this right?"
5. Prepare your body and mind. Turn off the phone and computers early. Get a good night of sleep. Nourish your body with a good variety of carbohydrates, proteins, lipids, and water.

Biology and You

Scientific Method, Metric Measurement, Word Roots, Microscopes

1. Match the term with the correct definition.

- | | |
|------------------------------------|---|
| <u>e.</u> Qualitative Observation | a. A prediction based on prior knowledge that <u>must be testable</u> |
| <u>d.</u> Quantitative Observation | b. a variable that is not controlled by the scientist |
| <u>a.</u> Hypothesis | c. a variable that is altered (controlled) by the scientist |
| <u>g.</u> Controlled Experiment | d. an observation that includes numbers (ex: 5 cm) |
| <u>f.</u> Data | e. an observation that does not include numbers (ex: smell) |
| <u>c.</u> Independent Variable | f. information gathered in an experiment |
| <u>b.</u> Dependent Variable | g. an experiment in which only one variable is being tested |

2. A teacher wanted to know if energy drinks increased the academic achievement of his students. He gave each student in his 1st period class an energy drink before their Cell Biology test and recorded their scores. When the same class went to take their Genetics test he did not give them the energy drink and he recorded their scores. Identify the parts of the experiment below.

- | | |
|--------------------------------|--|
| <u>b.</u> Independent Variable | a. students who had used the energy drink |
| <u>c.</u> Dependent Variable | b. the amount of energy drink consumed |
| <u>d.</u> Control Group | c. the test scores of the students |
| <u>a.</u> Experimental Group | d. the students who did not use the energy drink |

He redesigned his experiment to see how the energy drink affected different students in his class and the results can be seen in the data table below. Use this data table to answer the questions that follow.

Students	Volume of Energy Drink (mL)	Test Score	Volume of Energy Drink (mL)	Test Score
Kanye W	12	72	0	85
Sam S	12	89	0	94
Iggy I	8	88	0	90
Bob M	12	85	0	87

With which student did the teacher make a mistake in his experiment? IGGY

What was the mistake? IGGY SHOULD HAVE BEEN GIVEN 12 ML OF THE ENERGY DRINK.

Excluding the student with the experimental mistake, what could this teacher conclude from his experiment?

THE STUDENTS HAD BETTER TEST SCORES WITHOUT THE ENERGY DRINK.

3. Match the unit of measurement with the base unit, definition, or tool used for measurement.

- a. mass b. volume c. length d. temperature

- | | |
|--|-------------------|
| <u>b.</u> the amount of space an object takes up | <u>d.</u> Celsius |
| <u>c.</u> the distance of or between objects | <u>a.</u> grams |
| <u>a.</u> the amount of matter in an object | <u>b.</u> liters |
| <u>c.</u> meter | <u>b.</u> beaker |
| <u>a.</u> balance scale | |

4. Put the following metric prefixes in order from largest to smallest. (Hint: King Henry...)

deci	milli	Deca	Base	Hecto	Kilo	centi
<u>Kilo</u>	<u>Hecto</u>	<u>Deca</u>	<u>Base</u> ↳ LITER, METER, GRAM	<u>deci</u>	<u>centi</u>	<u>milli</u>

5. Use the conversion order above to solve the following problems.

1.4 L = 1400 mL
1.4 →

20 Kg = 20,000 g
20. →

332 cm = .332 m
332. →

6. Determine the meaning of the following word roots.

bio- LIFE a- NOT, WITHOUT homeo- SAME

hetero- DIFFERENT multi- MANY hyper- UP, ABOVE hypo- LOW, UNDER

7. Match the microscope term with the correct function.

- | | |
|-------------------------------------|---|
| <u>f.</u> Compound Light Microscope | a. only focusing on one depth at a time |
| <u>b.</u> Stereomicroscope | b. a microscope that focuses on surface details |
| <u>e.</u> Eyepiece | c. the image appearing upside down and backwards |
| <u>d.</u> Objective Lense | d. the additional lens used with the CLM |
| <u>c.</u> Image Reversal | e. the lens at the top of the body tube |
| <u>a.</u> Depth of Field | f. a microscope that is used to see inside of objects |

8. If the eyepiece has a magnification of 10x and the objective lens you are using has a magnification of 30x, what is the total magnification of the object? 10 x 30 = 300x

Cells and Cell Processes

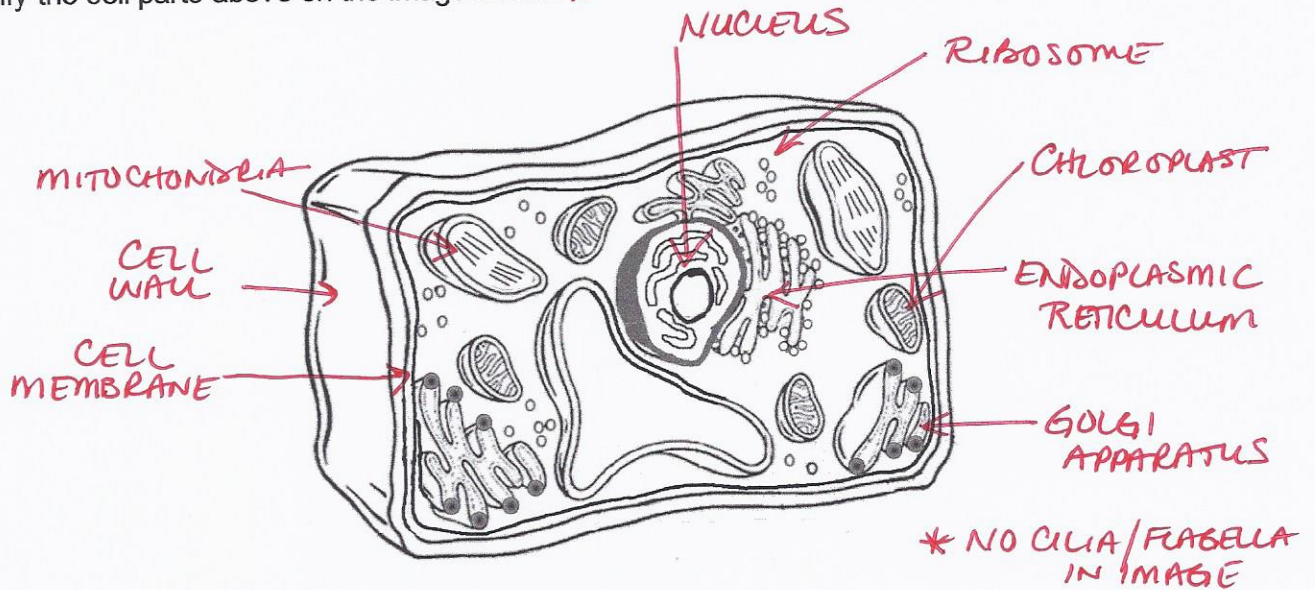
Cell Structure and Function, Cell Membrane and Osmosis, Cell Cycle and Reproduction

1. All living things are made of one or more CELLS. There are two types of cells. Cells that do not have a nucleus are called PROKARYOTIC cells. An example of an organism like this is a BACTERIA. Cells that do have a nucleus are called EUKARYOTIC cells. An example of an organism that has cells like this is a PLANT/ANIMAL. To be most efficient, cells should be SMALL.

2. Eukaryotic cells have many specialized cell parts called ORGANELLES. Write a few words describing the function of each cell part below.

- Cell Membrane: OUTER BARRIER OF ALL CELLS; CONTROLS MATERIALS IN + OUT
 Cell Wall: STRENGTH AND SUPPORT FOR PLANT CELLS & SOME BACTERIA
 Nucleus: CONTROL CENTER OF THE CELL; CONTAINS DNA
 Endoplasmic Reticulum: TRANSPORTS MATERIAL THROUGHOUT CELL
 Golgi Apparatus: PACKAGES AND LABELS MATERIALS
 Cilia/Flagella: MOVEMENT - CILIA: HAIR LIKE FLABELLA: TAIL LIKE
 Chloroplast: MAKES FOOD (GLUCOSE) FOR PLANT CELLS DURING PHOTOSYNTHESIS
 Mitochondria: CONVERTS FOOD (GLUCOSE) TO ENERGY (ATP) IN CELLULAR RESPIRATION
 Ribosome: MAKES PROTEINS; CHAINS AMINO ACIDS TOGETHER

3. Identify the cell parts above on the image below. *



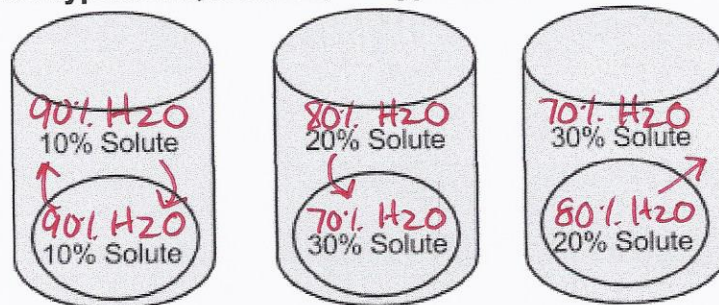
4. Is the cell above an animal or plant cell? PLANT How did you know? CELL WALL, CHLOROPLAST, LARGE VACUOLE

5. The cell membrane is made of a double layer of PHOSPHOLIPID molecules.

6. OSMOSIS is the diffusion of WATER across the cell membrane from high to low concentrations.

7. Use the images below to

- Find the water then draw an arrow representing the direction of water movement.
- Identify the solution as **hypertonic, isotonic, or hypotonic**.



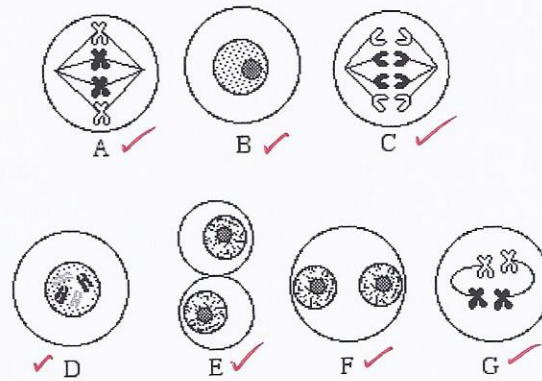
ISOTONIC

HYPOTONIC

HYPER TONIC

8. The cell membrane controls materials passing in and out of a cell. The characteristic of life that describes an organisms ability to maintain stable internal conditions is called HOMEOSTASIS.

9. Complete the chart below using the given cell images.

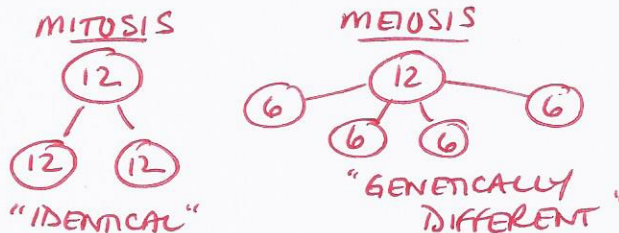


Order of Phases	Cell Letter	Name of Phase	What happens during this phase?
1	B	G1 of Interphase	cell is doing normal cell function
2	D	S of Interphase	chromosomes are copied
3	Not Shown	G2 of Interphase	cell grows; organelles copy
4	G	PROPHASE	NUCLEUS DISSOLVES, SPINDLES FORM
5	A	METAPHASE	CHROMOSOMES LINE UP IN MIDDLE
6	C	ANAPHASE	SISTER CHROMATIDS PULLED APART
7	F	TELOPHASE	2 NUCLEI FORM
8	E	CYTOKINESIS	CYTOPLASM DIVIDES INTO 2 CELLS

10. Match the term with the correct definition.

- f. Mitosis a. a cell with half the chromosome number as a regular body cell
- g. Meiosis b. a cell with two complete sets of chromosomes; one from each biological parent
- B. Diploid Cell c. a reproductive cell
- d. Sister Chromatid d. an identical copy of a chromosome
- a. Haploid Cell e. homologous chromosomes exchanging genetic information; creates genetically different cells
- C. Gamete f. a type of cell division that creates two genetically identical cells each time
- e. Crossing Over g. a type of cell division that creates four genetically different reproductive cells

11. If an organism has a diploid number of 12, what is the haploid number? 6 How many chromosomes are in the regular body cells? 12 reproductive cells? 6



Chemistry of Life

Atomic Structure and Bonding, Water Chemistry, Carbon Compounds, Energy and Metabolism

1. Use your periodic table to complete the information below regarding the element **Magnesium**.

Chemical Symbol	<u>Mg</u>	# of Protons	<u>12</u>	# of Valence Electrons	<u>2</u>
Atomic Number	<u>12</u>	# of Electrons	<u>12</u>	Dot Diagram	<u>Mg:</u>
Atomic Mass	<u>24</u>	# of Neutrons	<u>12</u>	Ion Formed	<u>Mg⁺²</u>

2. Use your periodic table to complete the information below regarding the element **Oxygen**.

Chemical Symbol	<u>O</u>	# of Protons	<u>8</u>	# of Valence Electrons	<u>6</u>
Atomic Number	<u>8</u>	# of Electrons	<u>8</u>	Dot Diagram	<u>:Ö:</u>
Atomic Mass	<u>16</u>	# of Neutrons	<u>8</u>	Ion Formed	<u>O⁻²</u>

3. Sodium commonly makes an ion of Na⁺¹. How many electrons does this sodium ion have? 11-1=10
— LOSES ONE ELECTRON.

4. What will happen if we put Magnesium and Oxygen near each other? Mg WILL LOSE 2e- TO O. Mg BECOMES A POSITIVE ION. O BECOMES A NEGATIVE ION. OPPOSITE CHARGES WILL ATTRACT.
This bond is called a(n) IONIC bond.

5. When two or more atoms all need electrons, they will come together and share electrons. This is a(n) COVALENT bond. Two or more covalently bonded atoms are called MOLECULES.

6. The chemical formula for water is H₂O. Water is made by two atoms of H and one atom of O covalently bonding. The hydrogen ends of a water molecule are slightly POSITIVE and the oxygen end is slightly NEGATIVE. This makes water a POLAR molecule.

7. When one polar molecule is attracted to another polar molecule it is called a HYDROGEN bond.

8. Match the water property with it's description.

- | | |
|---------------------------|---|
| <u>c.</u> surface tension | a. the measurement of how acidic or basic a solution is; water is 7 |
| <u>b.</u> cohesion | b. <u>water</u> molecules hydrogen bonded to other <u>water</u> molecules |
| <u>c.</u> adhesion | c. a tight "skin layer" on top of <u>water</u> that allows some objects to float |
| <u>a.</u> pH | d. <u>water</u> molecules hydrogen <u>bonding</u> to <u>other</u> polar molecules |

9. Match the biomolecules below with the molecule shape, example, use, and repeating molecule.

- | | | | |
|----------------------------|--------------------------|---------------------------|----------------------------------|
| a. carbohydrates | b. lipids | c. proteins | d. nucleic acids |
| <u>a.</u> ring structure | <u>a.</u> sugars | <u>c.</u> beaded necklace | <u>a.</u> monosaccharides |
| <u>c.</u> amino acids | <u>c.</u> meat, cheese | <u>b.</u> butter, oil | <u>b.</u> jellyfish <u>SHAPE</u> |
| <u>a.</u> immediate energy | <u>b.</u> energy storage | <u>c.</u> grow, repair | <u>d.</u> genetic information |

10. Chemical reactions are the breaking and reforming of chemical BONDS. The molecules that "go in" to a reaction are called REACTANTS and the molecules that "come out" are called PRODUCTS.

REACTANTS → PRODUCTS

11. Proteins that speed up chemical reactions are called ENZYMES. The shape and therefore function of an enzyme can be affected by TEMPERATURE and pH.

12. The sum of all chemical reactions in a living organism is called METABOLISM. There are two types of metabolism. Chemical reactions that break down large molecules and release energy are called CATABOLIC. Chemical reactions that build up large molecules and require an input of energy are called ANABOLIC.

13. Write the equations for Photosynthesis and Cellular Respiration below.

Photosynthesis Word Equation: CARBON DIOXIDE + WATER + LIGHT → GLUCOSE + OXYGEN

Photosynthesis Chemical Equation: $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{LIGHT} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

Cellular Respiration Word Equation: GLUCOSE + OXYGEN → CARBON DIOXIDE + WATER + ATP

Cellular Respiration Chemical Equation: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{ATP}$

14. Is Photosynthesis anabolic or catabolic? ANABOLIC Cellular Respiration? CATABOLIC

15. Where in the cell does Photosynthesis take place? CHLOROPLAST Cellular Respiration? MITOCHONDRIA

16. Cellular Respiration begins with GLYCOLYSIS which is the breakdown of glucose.

17. When oxygen is NOT available, some organisms or cells can still make ATP from glucose. This process is called FERMENTATION. Is this process aerobic or anaerobic? ANAEROBIC
"WITHOUT OXYGEN"

18. Organisms that make their own food (self-feeders) are called AUTOTROPHS. Organisms that consume other organisms for energy (different-feeders) are called HETEROTROPHS.

19. What gas is produced by plants in the light? O₂ What gas is produced by plants in the dark? CO₂. What gas do animals give off in the light? CO₂ What gas do animals give off in the dark? CO₂ PLANTS - PHOTOSYNTHESIS PLANTS + ANIMALS - C.RESP.

If you complete this study guide and bring it with you to the midterm exam, you may also bring and use one hand written, standard sized, index card with any information you like. This index card will be collected with your exam.

Notes/Questions for your Teacher: