

Name: _____ Key _____ Class: _____ Date: _____

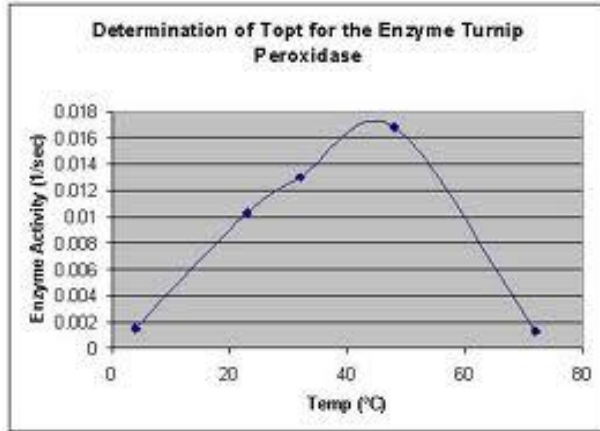
General Biology Midterm Exam Review Guide

Part I: Important Vocabulary

	Term	Definition
1	Polymer	Large molecule composed of many repeated subunits (monomers)
2	Monomer	A molecule that when combined with other monomers, forms large macromolecules or polymers
3	Catalyst	A substance that causes a chemical reaction to occur more quickly without being used up in the reaction.
4	Enzyme	Biological catalyst
5	Glucose	Sugar produced during photosynthesis, a monosaccharide
6	Organic	Molecules that contain carbon
7	Central Vacuole	Large storage vacuole found in plant cells and some protists that functions in storage of foods produced.
8	Glycoprotein	Special proteins found in the cell membrane that function in cell recognition.
9	Glycolipid	Glycolipids are lipids with a carbohydrate attached. Their role is to provide energy and also serve as markers for cellular recognition
10	Endocytosis	A substance gains entry into the cell without passage through the cell membrane
11	Exocytosis	A process of cellular secretion or excretion in which substances contained in vesicles are discharged from the cell
12	Pinocytosis	A form of endocytosis that involves bringing a liquid into the cell
13	Phagocytosis	A form of endocytosis that involves bringing a solid into the cell
14	Hypertonic	A solution that contains more solute than solvent (a cell placed in a hypertonic solution will shrink)
15	Hypotonic	A solution that contains more solvent than solute (a cell placed in a hypotonic solution will swell or burst)
16	Isotonic	A solution that has an equal ratio of solute to solvent (a cell placed in an isotonic solution will remain the same)
17	Selectively Permeable	A membrane that allows some molecules to pass through but not others
18	Active site	The part of the enzyme at which catalysis of the substrate occurs.
19	Chromatid	Either of the two daughter strands of a replicated chromosome that are joined by a single centromere and separate during cell division to become individual chromosomes.
20	ATP (adenosine triphosphate)	Energy storage molecule that stores chemical energy for living organisms
21	Hydrophilic	Attracted to water or water loving (in the cell membrane, the phospholipid head of the molecule is attracted to water)
22	Hydrophobic	Repelled by water or water hating (in the cell membrane the phospholipid tails are repelled by water)
23	Aerobic Respiration	Respiration that occurs in the presence of oxygen. This is most efficient
24	Anaerobic Respiration	Respiration that occurs in the absence of oxygen, this is not very efficient and can damage cells.
25	Chlorophyll	The green pigment of plants and photosynthetic algae and bacteria that traps the energy of sunlight for photosynthesis

Part II: Short Answer

1) Explain what is happening in the following graph with regard to enzyme function.



This graph is a measure of the enzyme activity as a function of temperature. It is showing that optimal temperature for the turnip enzyme occurs at about 45 degrees celsius.

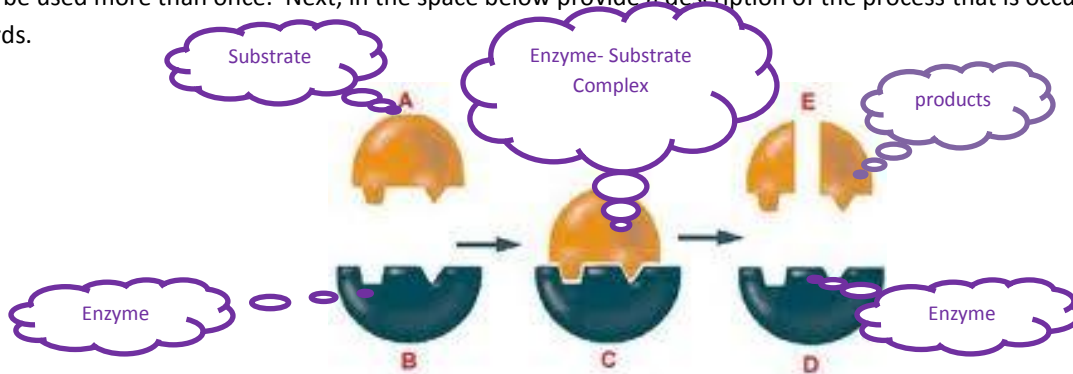
What is the independent (manipulated) variable on this graph? temperature

What is the dependent (responding) variable? enzyme activity

2) **Biomolecules: Complete the following table:**

	Monomer/building blocks	Functions
Carbohydrate	Monosaccharide	Energy, storage, structure
Lipid	Fatty acids & glycerol	High energy, energy storage, waterproofing, insulation, protection
Protein	Amino acids	Energy, transport, biochemical control, structure, movement, immunity
Nucleic Acid	nucleotides	Control of heredity, protein synthesis

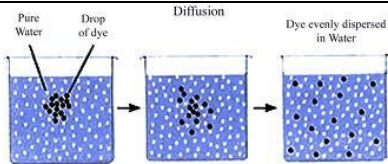
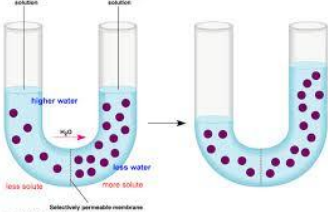
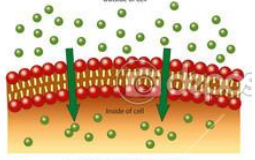
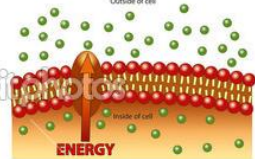
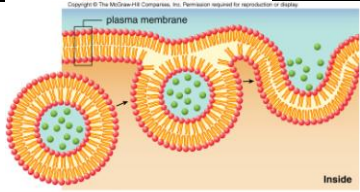
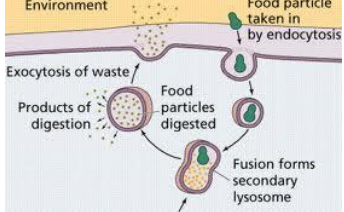
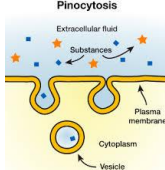
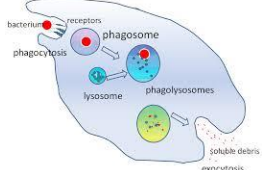
3) Please label the following diagram using the terms (enzyme, substrate, enzyme-substrate complex, product) Some terms can be used more than once. Next, in the space below provide a description of the process that is occurring in your own words.



The reaction starts out with an enzyme and a substrate. The enzyme then combines with the substrate to form the enzyme substrate complex. The enzyme catalyzes the reaction and then separates from the two products that result.

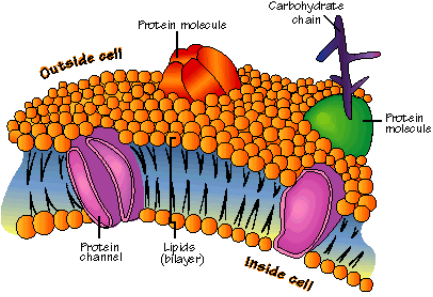
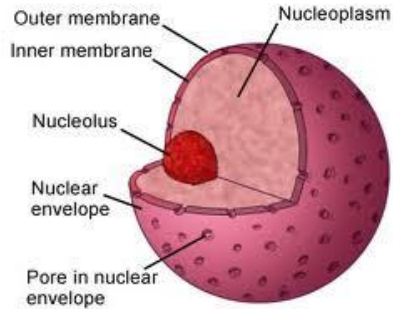
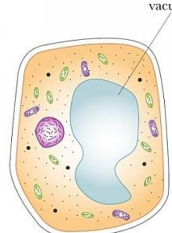
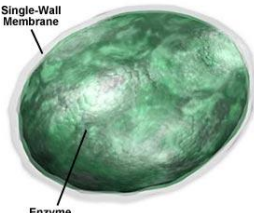
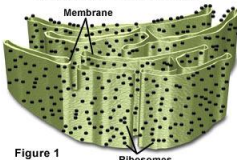
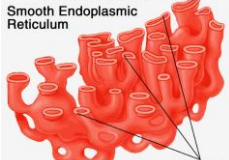
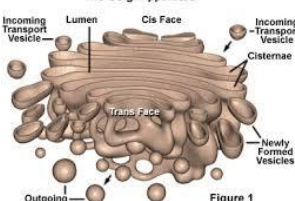
4) Temperature and pH are the two factors that influence the functioning of an enzyme. If they are not optimal they can cause the enzyme to stop working or work less effectively.

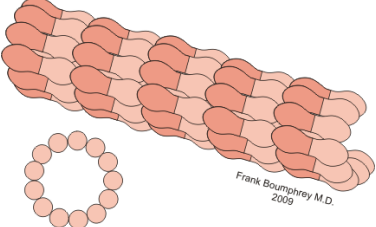
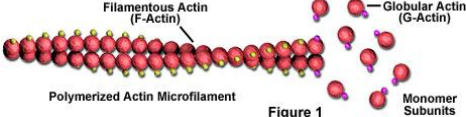
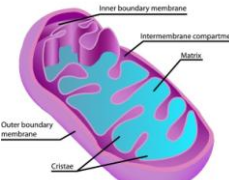
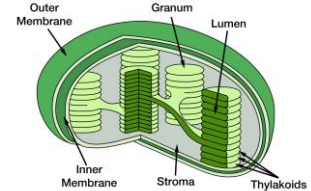
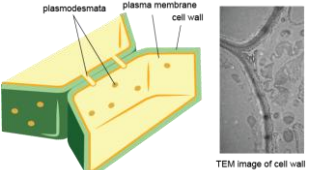
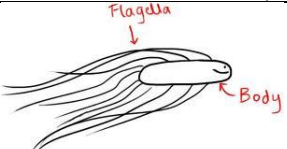
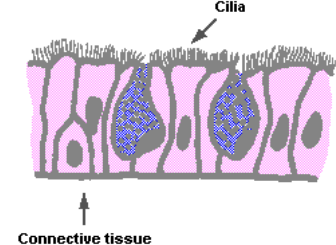
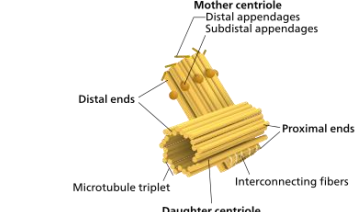
5) **Cellular Transport:** Complete the following Table

Transport	Diagram	Description of Process
Diffusion		Movement of molecules from area of high concentration to an area of low concentration. Molecules move WITH the concentration gradient.
Osmosis		Diffusion of water across a semi-permeable membrane
Passive Transport		Molecules move across the cell membrane WITH the concentration gradient. This requires no energy and can result from molecules travelling through protein channels.
Active Transport		Molecules move AGAINST the concentration gradient. The process requires energy and can require carrier proteins.
Bulk Transport		The movement of large quantities of substances as a result of the cell (plasma) membrane folding around and then releasing into or out of the cell.
Endocytosis		Bulk transport into the cell
Exocytosis		Bulk transport out of the cell
Pinocytosis		Bulk transport of fluids across cell membrane
Phagocytosis		Bulk transport of solids across cell membrane

6) **Cellular Structure:** Complete the following table

Organelle	Drawing or Description	Function
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Plasma Membrane		Maintain cell shape, control what enters and leaves the cell
Nucleus		Control center of the cell
Nucleolus		Synthesize (produce) ribosomes
Nuclear Membrane (envelope)		Protect the nucleus and regulate what enters and leaves.
Vacuole		Provide storage for the cell
Lysosome	<p>Lysosome Structure</p>  <p>Figure 1</p>	Contains digestive enzymes used for digestion and waste disposal in the cell
Rough Endoplasmic Reticulum (Rough ER)	 <p>Figure 1</p>	With ribosomes attached this organelle is responsible for transporting newly synthesized proteins throughout the cell.
Smooth Endoplasmic Reticulum (Smooth ER)	 <p>Figure 1</p>	With no ribosomes attached this organelle is responsible for transporting carbohydrates, lipids and sometimes waste products.
Golgi Body (Complex or apparatus)	 <p>Figure 1</p>	Responsible for packaging and secreting substances

Microtubule	 <p>Construction of Microtubules from α & β Tubulins</p> <p>Frank Bounthony M.D. 2009</p>	they serve as the "backbone" of the cell, and also have a role in cell locomotion, mitosis, and also in cell transport.
Microfilament	 <p>Microfilament Structure and Assembly</p> <p>Figure 1</p>	They work with microtubules to form the structure that allows a cell to hold its shape, move itself, and move its organelles.
Mitochondrion	 <p>Mitochondrion</p>	Site of cellular respiration in plants
Chloroplast	 <p>Chloroplast</p>	Site of photosynthesis in plants.
Cell Wall	 <p>Cell Wall</p>	Rigid outer structure found in plant, bacteria and fungal cells.
Flagella	 <p>Flagella</p> <p>Body</p>	Long whip-like projection that is used for motion.
Cilia	 <p>Cilia</p> <p>Connective tissue</p>	Short hair-like projections that are used for movement.
Centriole (centrosome)	 <p>Centriole (centrosome)</p>	either of two rodlike bodies in most animal cells that form the poles of the spindle during mitosis

7) Cell Cycle: Complete the following table

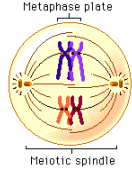

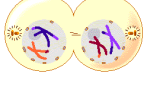
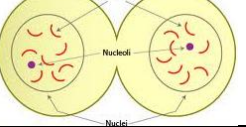




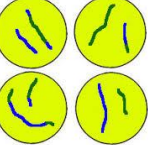
Stage	Diagram	Description
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G1 (Interphase)		Growth, all regular cell activities, centrioles replicate
S (Interphase)		DNA Replication
G2 (Interphase)		All other organelles, except the nucleus replicate, final growth and activity before mitosis
Prophase (Mitosis)		Nuclear envelope disappears, DNA shortens and thickens, centrioles move to the poles
Metaphase (Mitosis)	<p style="text-align: center;">Metaphase</p>	Chromosomes line up at the center
Anaphase (Mitosis)		Chromosomes separate and move to opposite poles of the cell.
Telophase (Mitosis)		Nuclear envelope reappears, spindle fibers disappear
Cytokinesis	<p style="text-align: center;">Cytokinesis</p>	Cytoplasmic division, cells divide into two identical daughter cells

8) What is the end result of Mitosis? 2 diploid (2n) daughter cells

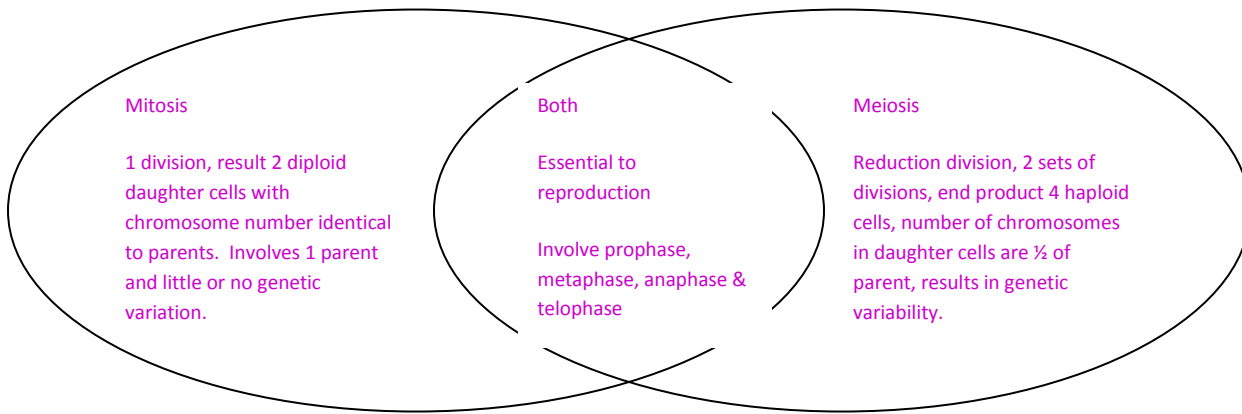
9) Meiosis: Complete the following table

Stage	Diagram/Drawing	Description
Prophase I		Nuclear envelope disappears, spindle fibers appear, centrioles move to the poles, crossing over occurs.

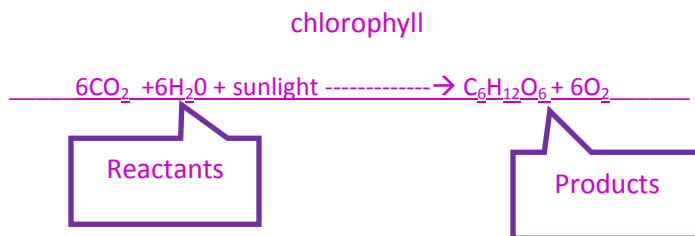
Metaphase I		Tetrads line up along center of cell.
Anaphase I		Tetrad chromosomes begin to move to the poles with half moving to each side.
Telophase I		Nuclear envelope reappears, centrioles move back to position near nucleus.
Interkinesis		First cytoplasmic division in meiosis. This can be unequal for females in the process of oogenesis where the egg gets all of the cytoplasm and the first polar body gets none. In spermatogenesis, the division of the cytoplasm is equal.
Prophase II		In Prophase II the DNA that remains in the cell begins to condense and form short chromosomes. Each chromosome pair has a centromere . The <u>centrioles</u> also begin their journey to opposite sides of the cell.
Metaphase II		In Metaphase II all of the chromosomes line up along the center of the cell and the centrioles are in position for the duplication.
Anaphase II		the chromosomes split and move to opposite sides of the cell. Each one splits into two pieces. They don't divide up the DNA between the new cells; they split the DNA that exists
Telophase II		Telophase II shows the DNA completely pulled to the sides and the <u>cell membrane</u> begins to pinch.
Cytokinesis		The final cytoplasmic division in meiosis that results in 4 haploid cells.

- 10) Describe the process of crossing over. Two chromosomes pair up and exchange segments of their genetic material
- 11) During which phase of Meiosis does crossing over occur? prophase 1 of meiosis 1
- 12) What is the significance of the process of crossing over? Provides increased genetic variation which ensures that no two organisms are ever identical.
- 13) What is the end result of Meiosis? 4 haploid cells
- 14) What is spermatogenesis, what is the end result of this process? Meiosis that occurs in male organisms. The end result is 4 haploid sperm cells (pollen in plants)
- 15) What is oogenesis, what is the end result of this process? Meiosis that occurs in female organisms. The end result is 4 haploid cells which are 3 polar bodies (which end up disintegrating) and 1 egg that contains all of the cytoplasm.
- 16) Why is Meiosis important for the survival of species? Meiosis is reduction division, so chromosome number is reduced (n or haploid) to ensure that appropriate chromosome number (2n or diploid) be restored at fertilization.

17) Compare and Contrast Meiosis and Mitosis by completing the following Venn Diagram.

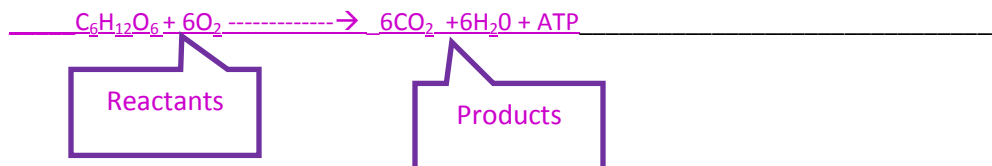


18) What is the chemical equation for photosynthesis? _____



19) Label the reactants and the products in the above equation.

20) What is the chemical equation for cellular respiration (metabolism) _____



21) Label the reactants and the products in the above equation.

22) What gas would be the end result of the process of photosynthesis? oxygen

23) What gas would be the end result of cellular respiration? carbon dioxide