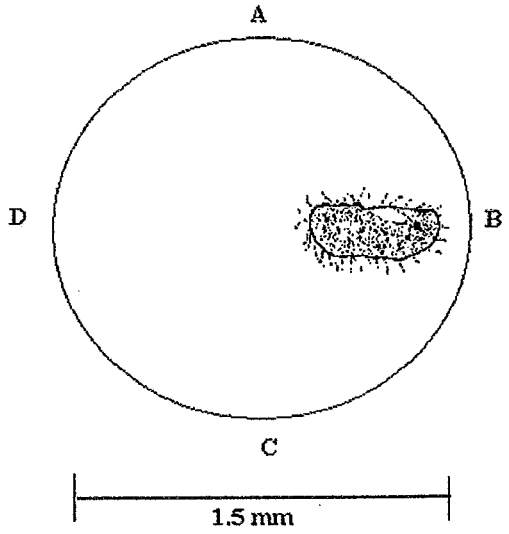
PRE AP BIOLOGY
Unit 1 Test (Cells)

Name: _____

Date: _____ **Period:** _____

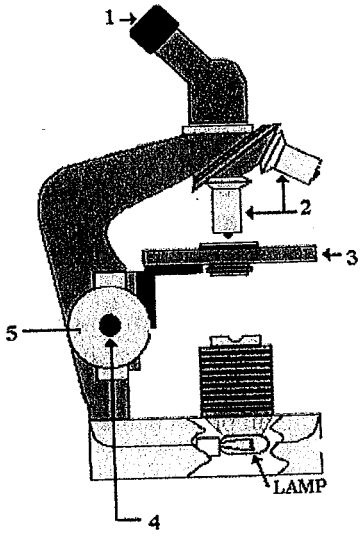
Directions: All MCQ questions are worth one (1) point each. Please read each question and all options carefully. Choose the one alternative that **best** completes the statement or answers the question. You are welcome to write on this sheet. *Pay attention to key words*, feel free to cross out wrong answers, flag, star, or otherwise indicate any good answers. Circle your choice for the best answer and bubble in the corresponding answer on your scantron sheet.

Multiple Choice Questions (1 pt. each)



1) The diagram above represents a paramecium viewed through a compound light microscope on low power. The diameter of the field of view is 1.5mm. The length of the organism is approximately?

A) 0.15mm
B) 0.5mm
C) 0.95 mm
D) 0.15cm



2) Marci was viewing a slide that contained streptococcus bacteria. She wanted to magnify the image as much as possible. She located and focused the image on low power. She then switched to the high power objective. Referring to the diagram above, which part of the microscope will she now use to bring the image into clear view?

A) 1
B) 3
C) 4
D) 5

3) The Cell Theory is one of the fundamental theories to Biology. All of the following statements below, except one, are true and would be supported by the contributions of these various scientists: Henri Dutrochet, Theodor Schwann, Matthias Schleiden, and Rudolf Virchow. Which statement from below is NOT a true statement from the Cell Theory?

A) The cell is the basic functional unit of life.
B) All cells come from pre-existing cells.
C) Cells may grow to an unlimited size.
D) All living organisms are made from cells.

4) Organelles play various roles within Eukaryotic cells, such as helping with protein production or structural integrity. Which organelle contains DNA and is responsible for producing ATP when Oxygen is present within the cell?

A) The mitochondria are the energy producing organelle associated with ATP synthesis.
B) The lysosomes are the energy producing organelle, as it is associated with ATP production.
C) The chloroplasts are the energy producing organelle that harnesses sunlight and is associated with ATP production.
D) Nucleus controls the activity of a cell and therefore is associated with the activity of ATP production.

5) Proteins can be produced by cells and then exported out of the cell to aid in cell communication. Some examples include hormones. Hormones are examples of ligands, communication molecules, between cells that can trigger a signal transduction response. Which structures and organelles would play a roll in protein synthesis of these hormone molecules?

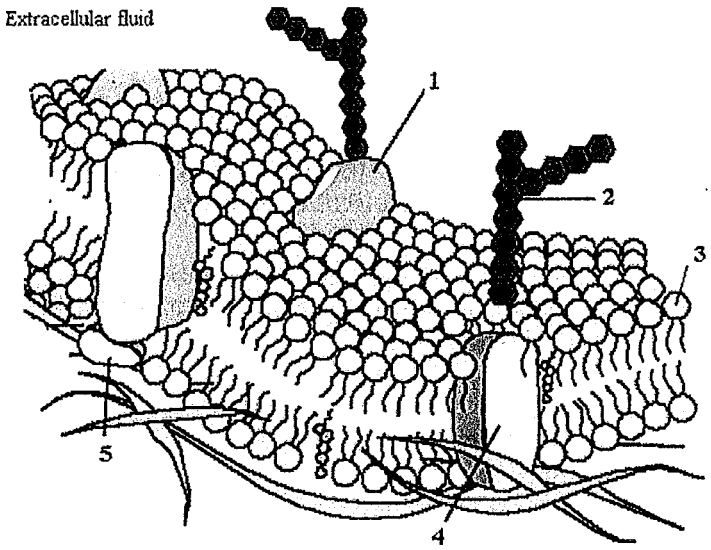
A) Ribosomes, Golgi Apparatus, and Lysosomes
B) Rough Endoplasmic Reticulum, Ribosomes, and Vacuoles
C) Smooth Endoplasmic reticulum, Chloroplasts, and Ribosomes
D) Ribosomes, Rough Endoplasmic Reticulum, and Golgi Apparatus

6) Animal cells do not have protective cell walls, like plant cells, as they need to be able to move or be flexible. They do have protective structures that help to protect them from environmental stresses. Which statement below **best** identifies and explains the structures that animal cells posses?

A) The cytoskeleton protects the outside of the cell and the Extra Cellular Matrix protects the internal structure from possible stresses that could damage the cell membrane.
B) The Extra Cellular Matrix protects the outer membrane surface; where as, the Cytoskeleton provides internal support and structure to the cell.
C) The cytoskeleton protects the outer and inner membrane from destructive forces. The Extra Cellular Matrix protects the internal cell organelles from damage on the inside.
D) Microtubules, microfilaments, and intermediate filaments are woven together to make an outer membrane protective coating. The Cytoskeleton protects the internal environment and provides supportive structure to the cell.

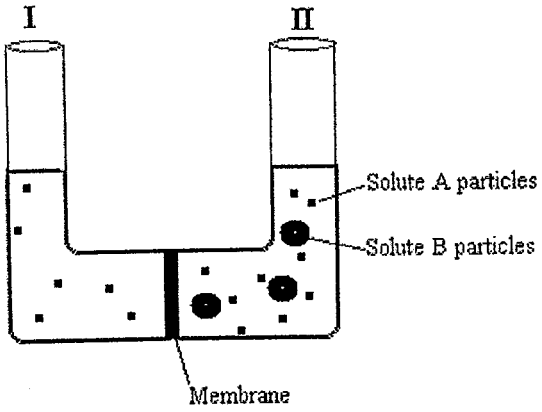
7) Place the following events in the **correct sequence** in which they would occur in a signal transduction response.
1. Conformational shape change occurs.
2. Ligand binds with a receptor protein.
3. A cascade of events amplifies and changes the signal.
4. The cellular process of transcription is carried out within the cell.
5. The activation, by phosphorylation, of a transcription enzyme.

A) 2, 1, 3, 5, 4
B) 2, 3, 1, 5, 4
C) 2, 4, 3, 5, 1
D) 5, 4, 3, 2, 1



8) The cell membrane is described as a fluid mosaic model of molecules. All the components of the membrane move laterally providing the visual of an ever-changing puzzle. The molecules serve as a barrier between the external environment and the life giving internal environment. In the diagram above, which number(s) represent structures that could act as enzymes, transport molecules, attachment sites for the ECM or cytoskeleton?

A) 1 and 2
B) 1 and 3
C) 3 and 4
D) 4 and 5



9) Most movement of molecules across membranes in cells involves little to no energy expenditure. It depends upon an established concentration gradient. Movement goes from high concentration to low concentration. Each of the following statements about the above diagram is correct. Which statement is NOT correct?

A) Side I is hypotonic to side II.
B) Side II contains more solute, so it is described as hypertonic to side I.
C) The volume of water on side I will increase as water moves there by osmosis.
D) The volume levels of both sides will change over time.

10) You enter the cafeteria for lunch. Today's offering is chicken nuggets. You eat your serving of chicken nuggets and begin to digest the food as it passes through your digestive tract. Those food molecules will then be absorbed into the blood stream and delivered to your cells for what purpose?

A) To catabolically breakdown the molecules releasing free energy to make ATP using mitochondria or reconfigure into new molecules for your cells to use building your new structures by anabolism.
B) The cell will undergo exocytosis of the food molecules so that catabolism will occur to release free energy for ATP production by the mitochondria.
C) The food particles will be packaged away and stored for future use lysosomes.
D) The food particles will undergo endocytosis of food molecules so that catabolism can occur to release free energy for ATP production by ribosomes.

11) A G protein receptor molecule receives a ligand. This ligand causes a conformational shape change to occur within the receptor protein. What will happen next?

A) A cascade of phosphorylation will amplify the signal within the cell.
B) A G protein will come in, attach to the receptor protein and become phosphorylated and set in motion transduction.
C) Six proteins will attach to the receptor protein. Each will be phosphorylated to thereby activate 6 different processes at once.
D) The cell will immediately respond to the intended message by turning "off" or "on" a process.

12) A high surface area to volume ratio in a cell favors:

A) immediate cell division to reduce volume.
B) adequate exchange of materials between the cell and its surrounding environment.
C) a struggle to obtain needed nutrients.
D) a build up of water and waste on the interior of the cell.

13) Referring to the transport mechanisms listed below, which of the transport mechanisms moves molecules against a concentration gradient?

I. Active Transport
II. Simple Diffusion
III. Facilitated Diffusion
IV. Osmosis

A. I only
B. III only
C. II and IV only
D. All the above

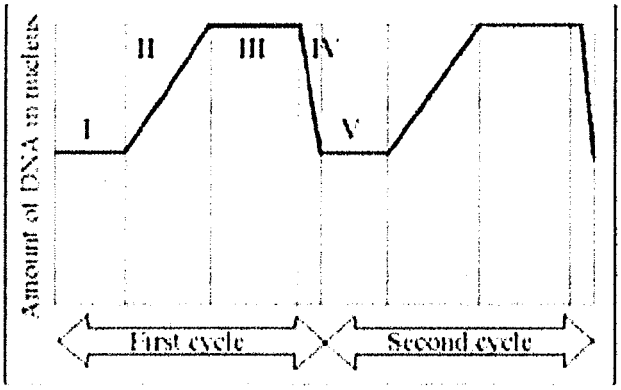
14) A cytologist counted 2,500 cells from an embryo on a microscope slide and recorded the following data:

Cell Stage	Number of cells present
Prophase	125
Metaphase	50
Anaphase	50
Telophase	25
Interphase	2,250

If these cells had been dividing randomly, it could be reasonably concluded that:

A) the duration of Anaphase is approximately, one-half that of Telophase.
B) Prophase is approximately three times as long as Telophase.
C) Metaphase is the shortest stage of the cell cycle.
D) Interphase is the longest stage of the cell cycle.

15) Refer to the following graphic using Roman numeration.



Mitosis is the division of the nucleus in eukaryotic cells. Which number on the diagram above indicates the process of Mitosis is occuring?

A) I
B) II
C) III
D) IV

Math Question (5 points possible)

The cell below has the following dimensions. What is the surface to volume ratio for the cell?

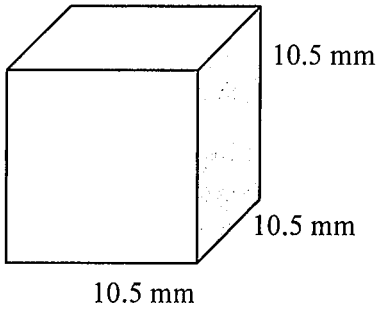
Surface area of a square cube: (Height X Width of one side) X 6

Volume of a square cube: Height X Width X Length

A) Show your calculations below: (1 pt. Calculation)

SA:

V:



SA_____mm^2 : V_____mm^3 (2 pts./line)

Please write your answers to the following free response questions on a sheet of loose-leaf paper. Be sure to write your name on it and staple it to your MCQ test document.

Short Free Response 1 (5 points possible)

In the 1960's Lynn Margulis proposed the Endosymbiont Hypothesis that tried to explain how Eukaryotic cells evolved From symbiotic relationships between large and small prokaryotic cells. **Explain** what is meant by the term symbiotic and **describe** evidence for *two* structures within Eukaryotic cells that may support this hypothesis.

Short Free Response 2 (5 points possible)

There are two collective types of cancers that can occur within humans. Cancerous cells are said to be "out of control" reproducing masses of cells. **Explain** why cancerous cells seem to be "out of control" in the growth pattern. **Describe** the two collective types of cancer.

Long Free Response (10 points possible)

The following question is worth a maximum of ten points. It is intended to be answered in about 12-15 minutes. The parts within a question may not have equal grading weight. Answers **must** be in essay sentence form. Outline form is **NOT** acceptable. Labeled diagrams may be used to help clarify discussion, but in **no** case will a diagram alone suffice.

Part A:
Describe the structure of the cell membrane surrounding an animal cell.

Part B:
Discuss where specifically on a cell membrane and which method of molecule transport is utilized for the following molecules: CO_2 (Carbon Dioxide), H_2O (water), and Na+ (Sodium ions).