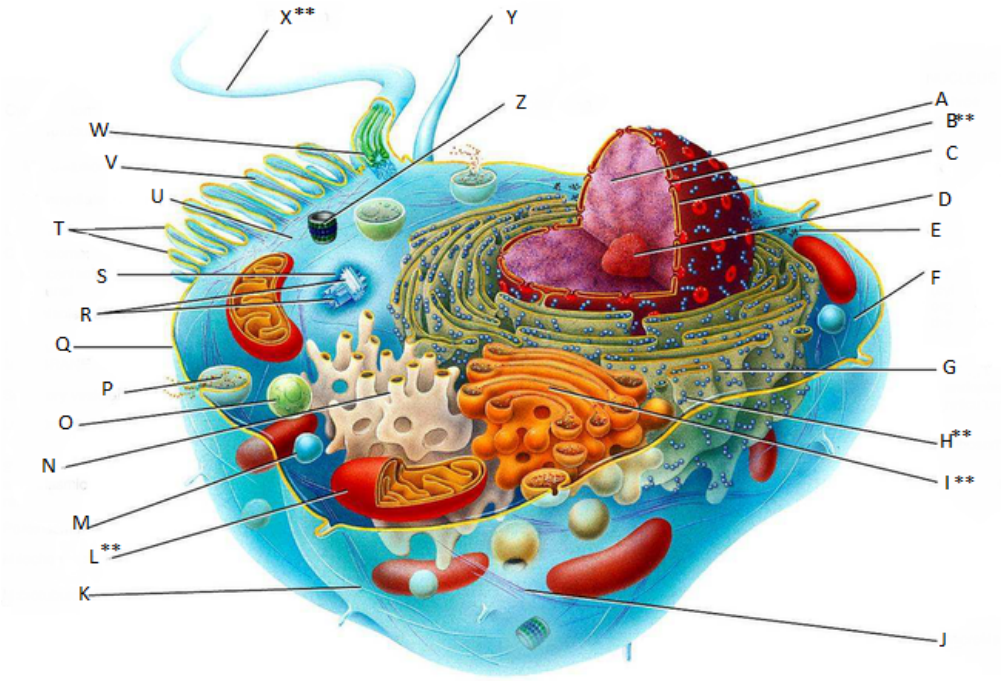
Cell Biology 2016 (C)
Practice Exam

Spartan Science Olympiad Club

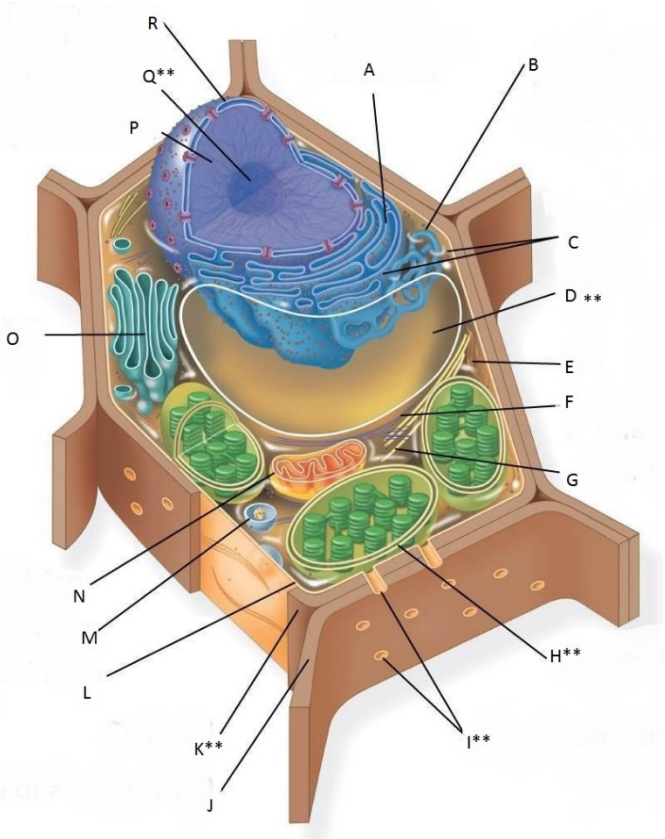
Station 1

- Label the following diagrams of cells and briefly describe the function of the cell structures labeled with an asterisk (**)
- Indicate what type of the cell is depicted in each of the diagrams (Animal, Plant, Eukaryotic, Prokaryotic)

Cell A



Cell B



Station 1

Cell A diagram represents what type of cell: _____

A) _____

B) _____ **_____

C) _____

D) _____

E) _____

F) _____

G) _____

H) _____ **_____

I) _____ **_____

J) _____

K) _____

L) _____ **_____

M) _____

N) _____

P) _____

Q) _____

R) _____

S) _____

T) _____

U) _____

V) _____

W) _____

X) _____ **_____

Y) _____

Z) _____

Station 1 continued

Cell B diagram represents what type of cell: _____

A) _____

B) _____

C) _____

D) _____ **_____

E) _____

F) _____

G) _____

H) _____ **_____

I) _____ **_____

J) _____

K) _____ **_____

L) _____

M) _____

N) _____

P) _____

Q) _____ **_____

R) _____

Station 2

1. Can these molecules cross the cell membrane without a carrier or channel? Yes or No?
    a. Na+
    b. O_2
    c. Glucose
    d. CO_2
    e. Water

2. Why is the inner membrane of the mitochondria and the thylakoid membrane of the chloroplast deeply folded? Short Answer

3. The reactions of the mitochondria that generate ATP by breaking down sugars are the reverse of the reactions that occur in the chloroplast to generate sugars. True or False?

4. Which condition yields more ATP to a eukaryotic cell during respiration?
    a. Presence of oxygen
    b. Absence of oxygen

5. Which phrase accurately describes the type of transport process required to move a molecule against its concentration gradient?
    a. Passive transport
    b. Active transport
    c. Diffusion

6. List 3 differences between prokaryotes and eukaryotes:

7. Yeast are considered prokaryotes. True or False

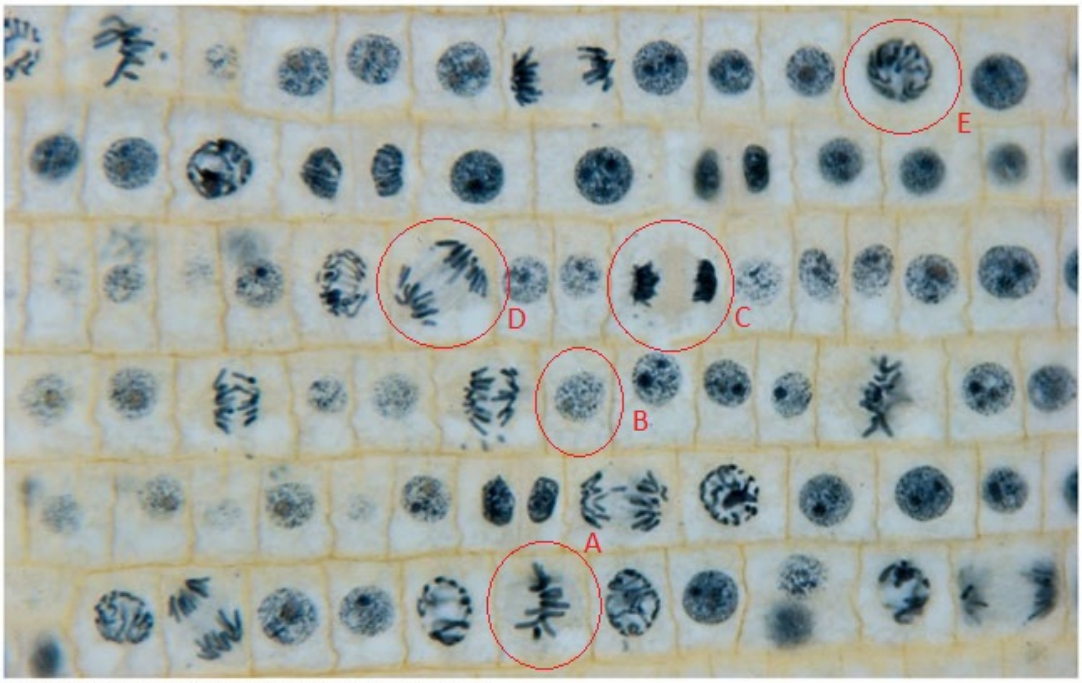
8. Simple sugars are referred to as _____, whereas their polymers are known as _____

9. Starch and cellulose are polymers of which simple sugar?
    a. Glucose
    b. Fructose

c. Sucrose

Station 3

1. Identify the following labeled mitotic stages.



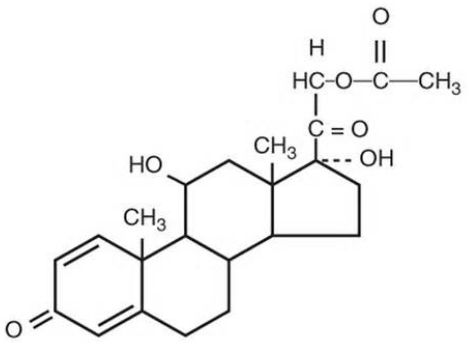
2. List the letters that correspond to the above mitotic phases in the order of occurrence during mitosis:

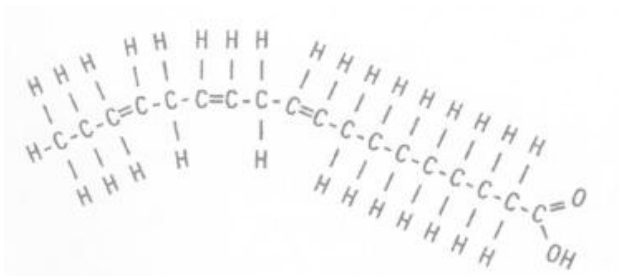
3. How do daughter cells at the end of mitosis and cytokinesis compare with their parent cell when it was in G1 of the cell cycle?
   a. Daughter cells have the same number of chromosomes and the same amount of DNA
   b. Daughter cells have half the amount of cytoplasm and half the amount of DNA
   c. Daughter cells have the same number of chromosomes and twice the amount of DNA
   d. Daughter cells have half the number of chromosomes and half the amount of DNA
   e. Daughter cells have the same number of chromosomes and half the amount of DNA

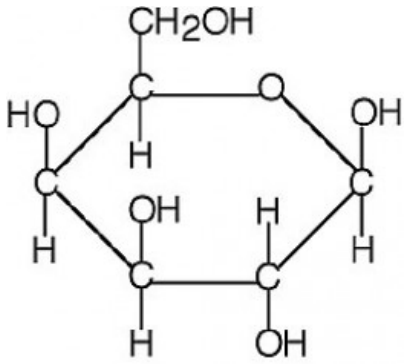
4. Cytokinesis usually, but not always, follows mitosis. If a cell completes mitosis, but fails to complete cytokinesis the result would be a cell with:
   a. Two nuclei, but with half the amount of DNA
   b. Two nuclei
   c. Two abnormally small nuclei
   d. A single large nucleus

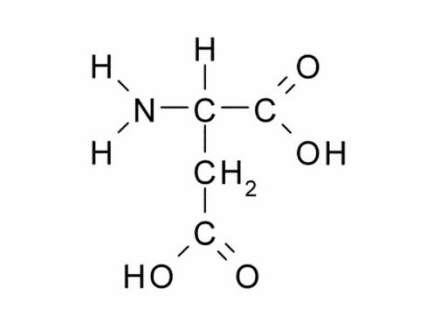
Station 4

1. Label the following structures as one of the following molecule choices: steroid, carbohydrate, fatty acid, or amino acid









2. Two of the above molecules will dissolve easily in water. Which ones?
   a. _____
   b. _____

3. Fermentation is performed under what conditions?
   a. Aerobic
   b. Anaerobic

4. The organisms responsible for yogurt and pickle fermentation are _____, whereas the organisms that are responsible for fermentation used in bread making are _____

Station 5

1. Which of the following statements regarding enzymes is true:
    a. They act as catalysts
    b. They are made of protein and non-protein parts
    c. They are not changed during the reaction
    d. All of the above are true

2. Using a diagram, explain how enzymes act as catalysts in a reaction.

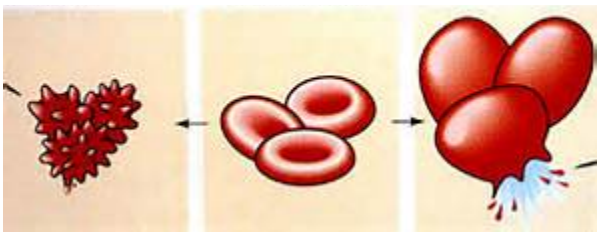
3. True or False. An acid is a substance that can take up an electron pair to form a covalent bond and a base is a substance that can donate an electron pair to form a covalent bond?

4. The pH scale is logarithmic. How many time more acidic is an acid of pH=5 in comparison to water (pH=7)?

5. If the magnification of the eye piece on a microscope is 10X and the magnification of the objective lens is 40X, what is the total magnification viewed using this set up?

6. Identify the type of environment the red blood cell must be placed into to achieve the effects depicted in the diagram?

A B C



A) _____

B) _____

C) _____

Station 6

1. Match the following techniques with a possible use.
    a. Electrophoresis
    b. Centrifugation
    c. Light microscope
    d. Spectrophotometry
    e. Paper chromatography

___ Determining how much of a colored product is made

___ Separating proteins based on charge

___ Separating pigments

___ Watching living cells with flagella move

___ Partitioning components of a mixture by density

2. Phagocytosis is an example of _____, whereas the release of products of digestion from inside the cell to the environment is known as _____

3. When two molecules are combined into one molecule with the release of water the reaction is referred to as a:
    a. Condensation reaction
    b. Hydrolysis reaction

4. Enzyme inhibition can occur in multiple ways, _____ inhibition occurs when the inhibitor binds at the active site of the enzyme and _____ inhibition occurs when the inhibitor binds at an enzymatic site other than the active site.

5. Which of the following statements regarding enzymes is false?
    a. Enzymes bring the reacting molecules into close proximity
    b. Enzymes orient reactants into positions to induce favorable interactions

c. Enzymes alter the chemical environment of the reactants to promote interactions
d. None of the above

Station 7

1. Where do the 'light reactions' of photosynthesis take place?
    a. Granum
    b. Thylakoid membranes
    c. Stroma
    d. Both a and b

2. True or False. The electron transport chain is also known as oxidative phosphorylation.

3. Identify the four stages of the cell cycle and briefly describe what occurs at each step:
    a. _____/_____
    b. _____/_____
    c. _____/_____
    d. _____/_____

4. Which of the following statement regarding lipid rafts is true?
    a. They contain combinations of glycosphingolipids and protein receptors
    b. They are more tightly packed than the surrounding bilayer, but float freely in the membrane bilayer
    c. Serve to compartmentalize cellular processes
    d. All of the above are true

5. Identify the three principle molecules that are essential to the fluid mosaic model of the plasma membrane
    a. _____
    b. _____
    c. _____

6. Briefly describe molecular chromosome structure as is relevant to the compaction of genetic material into cells