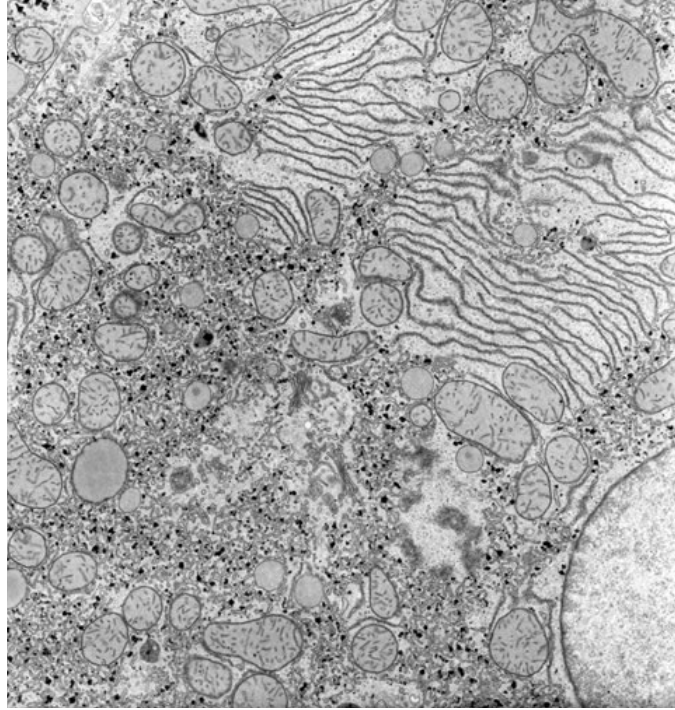


## STATION 1

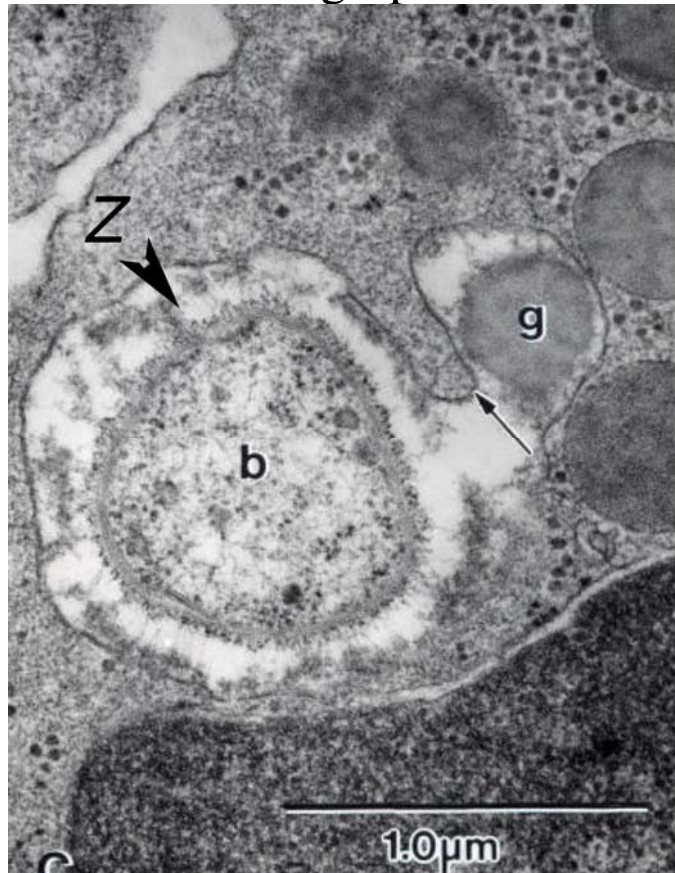
Photographs A and B are transmission electron micrographs of two types of cells. Answer the following questions based on your analysis of the organelles present in each photograph:

1. Which two organelles are more abundant in Photograph A compared to Photograph B?
2. Based on this observation, what possible function does the cell shown in Photograph A perform?
3. Identify the organelle (Z) shown in the center of Photograph B.
4. Based on the presence of this organelle, what possible function can be attributed to the cell shown in Photograph B?
5. Using the scale bar shown in Photograph B, determine the size of the structure labeled 'b' at its widest diameter. Please include relevant units.

Photograph A



Photograph B



## STATION 2

Two cells in the process of cell division are shown in Figures A and B. Answer the questions below based on your knowledge of the cell cycle in eukaryotic cells.



Figure A

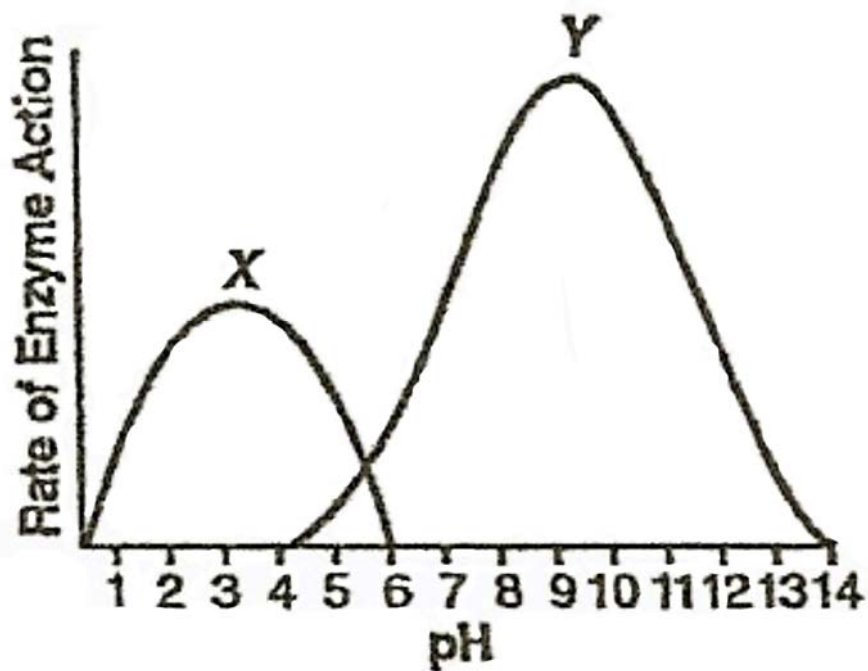


Figure B

1. Name the stage of cell division shown in Figure A.
2. Name the stage of cell division shown in Figure B.
3. Which of the two cells is in the earlier stage of cell cycle?
4. What is the name for the fibrous strand-like structures visible in these figures?
5. In which phase of cell cycle does DNA synthesis occur?

## STATION 3

This graph shows the change in activity of two enzymes, 'X' and 'Y' with pH. Analyze the information provided and answer the following questions.



1. What is the optimal pH of Enzyme 'X'?
2. What is the optimal pH of Enzyme 'Y'?
3. Name an organ in the body where you would expect to find enzyme 'X'?
4. Which enzyme works better in an alkaline environment?
5. Name one method to determine the pH of a solution.

## STATION 4

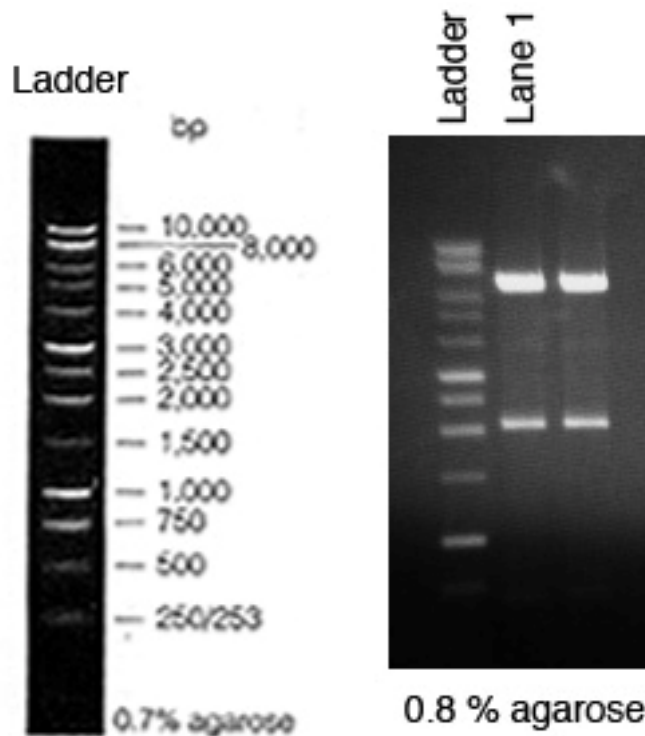
Using your knowledge of Cell Biology, fill in each blank with one word that best describes the information provided:

1. Peptide bonds link amino acids to form polymers called \_\_\_\_\_.
2. Animals store energy in their muscles in the form of this carbohydrate: \_\_\_\_\_.
3. Name the pathway where glucose is metabolized to pyruvic acid.  
\_\_\_\_\_
4. The two major components of cell membranes are:
  - a) \_\_\_\_\_
  - b) \_\_\_\_\_
5. DNA is present in these three organelles of a plant cell:
  - a) \_\_\_\_\_
  - b) \_\_\_\_\_
  - c) \_\_\_\_\_
6. Yeast cells produce alcohol and carbon dioxide by this form of respiration: \_\_\_\_\_.
7. The dark cycle takes place in this part of a chloroplast:  
\_\_\_\_\_.
8. This organic base is present in RNA but not in DNA: \_\_\_\_\_.
9. This food molecule provides the most calories per gram: \_\_\_\_\_.
10. This transport is involved in the influx of sodium inside the cell:  
\_\_\_\_\_.

## STATION 5

Cloning involves restricting plasmid DNA with enzymes. The DNA is then run on agarose gels to determine the sizes of fragments obtained. The figure below is representative of one such run.

Using the image of the DNA standards (Ladder) shown on the left, determine the approximate sizes of the two bands in Lane 1 of the agarose gel (right panel).



# Response Sheet

## Station 1:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

## Station 2:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

## Station 3:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

## Station 4:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. a) \_\_\_\_\_  
b) \_\_\_\_\_
5. a) \_\_\_\_\_  
b) \_\_\_\_\_  
c) \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_

## Station 5:

Top band: \_\_\_\_\_  
Bottom band: \_\_\_\_\_

# Answers

## Station 1:

1. Mitochondria, Endoplasmic reticulum, secretory vesicles (any two)
2. Secretory cell
3. Phagosome (vacuole or endocytic vesicle would also be correct)
4. Phagocytic cell (leukocyte)
5. 0.84 microns/micrometer (any value in the range of 0.81 to 0.86  $\mu\text{m}$  would be accepted)

## Station 2:

1. Metaphase
2. Anaphase
3. Cell in Figure A
4. Spindle fibers
5. S phase

## Station 3:

1. pH 3.0 (any value in the range of 3 to 4 would be correct)
2. pH 9.2 (any value in the range of 9 to 10 would be correct)
3. Stomach – it is the only place in the body with a highly acidic pH
4. Enzyme Y
5. pH meter/pH probe or pH paper

## Station 4:

1. Proteins
2. Glycogen
3. Glycolysis
4. a) Phospholipids  
b) Proteins
5. a) Nucleus  
b) Mitochondria  
c) Chloroplast
6. Anaerobic
7. Stroma
8. Uracil
9. Fat
10. Active

## Station 5:

- Top band: 7,500 bp (any number between 6,000 and 8,000 bp would be accepted)  
Bottom band: 2,100 bp (any number between 2,000 and 2,500 bp would be accepted)