Name

Use the “Cytology” Notes to complete the worksheet.

##### Modern Tools & Techniques

A cytologist is concerned with both structures and function of cells. Since cells are too small to be seen with the naked eye, a cytologist needs many tools and techniques to aid his study. In order to study the structure of cells, the cytologist uses an instrument to magnify the cell. The following are types of microscopes in common use. For each of the microscopes listed, give the limit of magnification and the source of illumination, resolution and any other miscellaneous information that is relevant and helpful.

Fill in the following chart using your notes or textbook:

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of Microscope** | **Limit of Magnification** | **Source of Illumination** | **Miscellaneous Info & Resolution** |
| Light Microscopes |
| Compound |  |  |  |
| Phase Contrast |  |  |  |
| Stereo/binocular |  |  |  |
| Oil Immersion | 1200 – 1500 X | Light through oil | Research |
| Ultraviolet |  |  |  |
| Electron Microscopes |
| Standard |  |  | Focuses with magnets |
| Scanning |  |  |  |

1. What advantages does the phase contrast microscope have over the standard compound microscope?
2. What major disadvantages (2) are there with the use of the electron microscope?

1.

2.

1. What advantage does the scanning electron microscope have over any of the other microscopes?

Specimen to be observed under the microscope may be either too colorless and transparent OR too thick to let light pass through in order to see sufficient internal detail. Answer the following questions regarding this:

1. What technique will increase the visibility of the specimen under a microscope, but usually kills the specimen?
2. Briefly list the steps used in order to prepare a specimen to be stained and mounted on a slide.

1.

2.

3.

4.

5.

6.

1. How would you obtain a slide with red cell walls and green cytoplasm?
2. Three techniques and/or instruments are used to separate various substances or parts of a substance. Explain how each one works.

1. Micro-dissection tools

2. Ultracentrifuge

3. Chromatography paper

1. In general, as magnification INCREASES, resolution ( INCREASES / DECREASES ) - cross out the wrong choice and circle the correct choice.
2. What tool is used to slice or cut prepared specimen into extremely thin sections for view under the microscope? \_\_\_\_\_

C

1. When a mixture containing many cell organelles is centrifuged in a special tube as sketched at the right, the heaviest organelles will be found in what layer?

B

A

1. To separate the chemical substances in solution which cannot be separated by centrifugation, a cytologist can use the technique of: \_\_\_\_\_.

**Part I Matching** Use “A” through “O” to answer # 1 - 10

\_\_\_1. Diffusion of water through a A. Autolysis

 semi-permeable membrane B. Centrioles

\_\_\_2. Taking in of dissolved particles into the cell C. Chloroplasts

\_\_\_3. Breaks down fatty acids, glucose and amino D. Cilia

 acids into ATP E. Cytoplasm

\_\_\_4. Photosynthetic organelles F. Golgi Bodies

\_\_\_5. The functioning part of the cell G. Mitochondria

\_\_\_6. Structures used to propel substances across H. Nucleus

 a surface or for movement I. Osmosis

\_\_\_7. A space in the cytoplasm filled with water J. Pinocytosis

 and solutes (and has a membrane) K. Plasmolysis

\_\_\_8. Contains chromosomes and a site for L. Protoplasm

 ribosome construction M. Ribosomes

\_\_\_9. Involved in spindle formation and cell division N. Vacuoles

\_\_\_10. Breakdown of worn-out cells O. Xanthophils

**Part II Place in Order** Place the following items in order as specified …

19. From lowest maximum magnification potential to highest maximum magnification potential

### A) standard compound microscope B) electron microscope \_\_\_\_\_\_\_

 C) stereo dissection microscope D) magnifying lens

20. From highest resolution potential (*1 cm*) to lowest resolution potential (*10 angstroms*)

### A) electron microscope B) magnifying lens \_\_\_\_\_\_\_

C) stereo dissection microscope D) standard compound microscope

## Part II Fill in the Blanks

21. \_\_\_\_\_ is the scientific name for the study of cells.

22. \_\_\_\_\_ is a special type of osmosis where water goes out of the cell.

23. An instrument that can slice tissue into extremely thin slices is called a \_\_\_\_\_\_.

24. When considering cell size, as volume decreases, surface area \_\_\_\_\_\_.

25. “\_\_\_\_\_\_ transport” occurs when energy is used to move materials in and out of a cell.

26. What cell organelle transports substances throughout the cell, and is connected to the nuclear membrane? \_\_\_\_\_

27. \_\_\_\_\_\_ are membranous structures found only in plants and algae. They contain DNA (e.g. “leukoplasts”)

28. What part of the protoplasm controls cell activity, cell reproduction and cell differentiation? \_\_\_\_\_

active cytology decreases endoplasmic reticulum golgi bodies hypertonic increases microtome nucleus passive plasmolysis plastids (chloroplast)