Map Magnification Activity

Name:_____

Conceptually, a map works nearly opposite of a microscope. A map gives you a small picture of a very large object, whereas a microscope gives you a larger image of a very tiny object. During this activity you will be deriving an equation that can be used to determine the true size of magnified objects.

1.) Using ONLY the scale 1 inch = 13 miles, a ruler, and a map, determine how far from Milwaukee the city of Madison is (as the crow flies). Please write the equation you used below. Be certain to include all units.

2.) If you were to travel by airplane from Milwaukee to the city of Green Bay, how far would you be traveling? Write the equation you used to determine your answer below. Be sure to include all units.

3.) Which city in Wisconsin is exactly 156 miles away from the city of Milwaukee? Write the equation below that helped you determine which city this was. Explain your answer.

4.) What is a conversion factor? (Give a definition.)

5.) What is the conversion factor you have been using to determine your answers for this map?

6.) Assume you find a very old map. This map is so old there is no scale on it. Being the bright student you are, you take out a ruler and measure the distance between Milwaukee and Menomonie. The distance you measure is 24 inches. What is the scale on your map?

7.) Which map will be bigger (yours or the "old map")? Why (please do not give the "easy" answer)?

8.) Using your background knowledge, deduce and write an equation for Magnification.

Magnification = _____

9.) Determine the magnification of your map.

10.) Assume you are using a microscope. You put a small water bug under the microscope that is 2 mm in length. When you look under the microscope you find that the bug appears to be 40 cm long. What is the magnification of the microscope you are using? Please show all work. Are you likely using a light microscope or an electron microscope? Explain your answer.

11.) Explain why your answer for #9 is less than ~~zero~~ one, while your answer for #10 is greater than ~~zero~~ one. What is the significance of this occurrence?

Please determine the magnification for these two images.

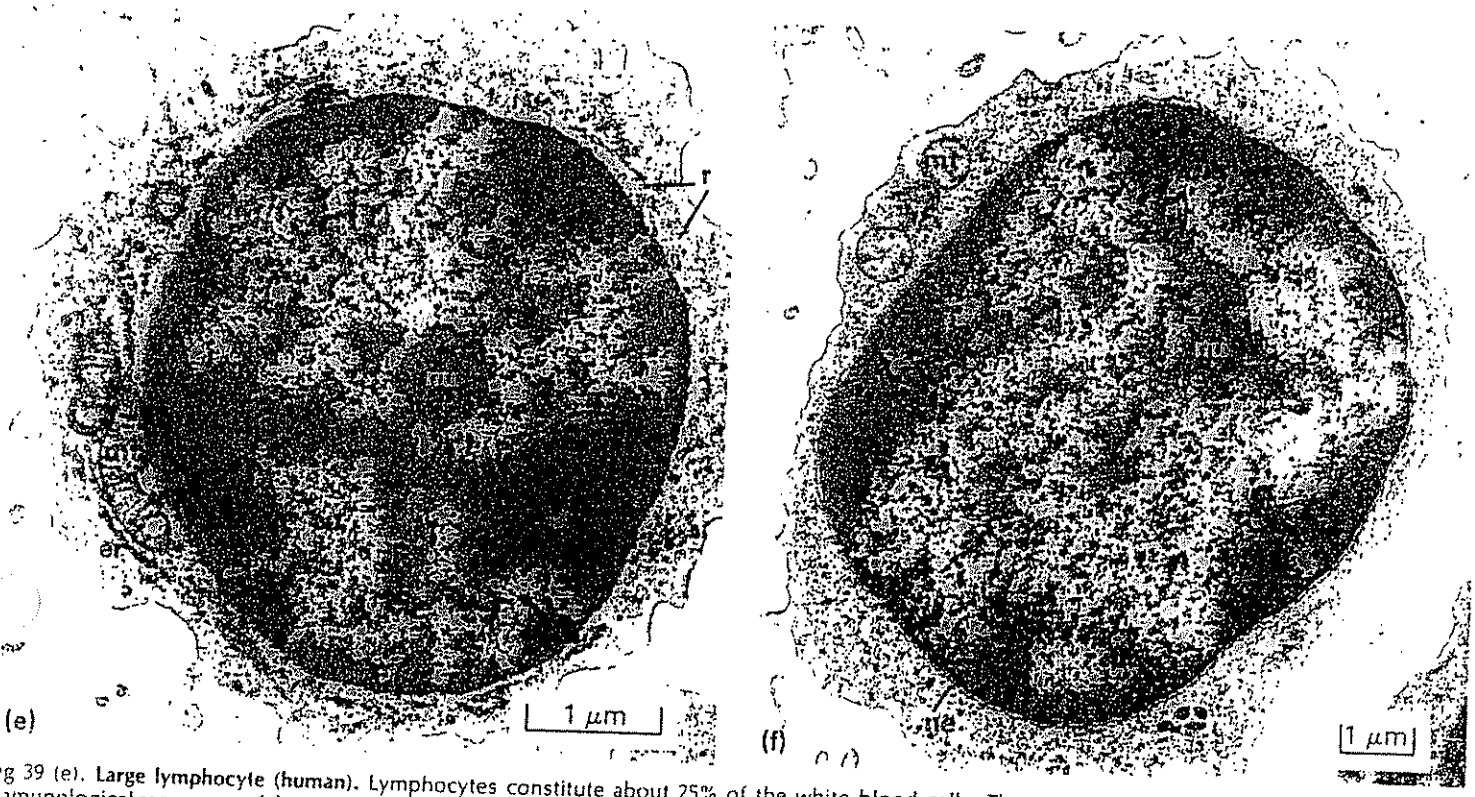


Fig 39 (e). **Large lymphocyte (human).** Lymphocytes constitute about 25% of the white blood cells. They recognise foreign antigens and initiate the immunological responses of the animal. Most are small lymphocytes which may circulate without dividing for many months. When small lymphocytes are stimulated by antigen they divide and increase the total lymphocyte pool. First they enlarge and become large lymphocytes. Lymphocytes have the largest nucleus for their size of any cell in the body. There is a prominent nucleolus (nu). er; rough endoplasmic reticulum; eu, euchromatin; mt, mitochondrion; r, single ribosomes. (Courtesy J. Dorling.) (f) **Small lymphocyte (human).** Small lymphocytes are of two kinds, B and T. B lymphocytes are the precursors of the antibody-producing *plasma cells* (Fig. 40). They are often incapable of being this if T lymphocytes are not present. There are various theories of B/T cell collaboration, all at present speculative. The scanty cytoplasm contains none of the well-developed apparatus for protein synthesis seen in the plasma cell. ne, nuclear envelope. (Courtesy J. Dorling.)

Read the caption below this electron micrograph. Your task is to draw a scale bar appropriate for this image.

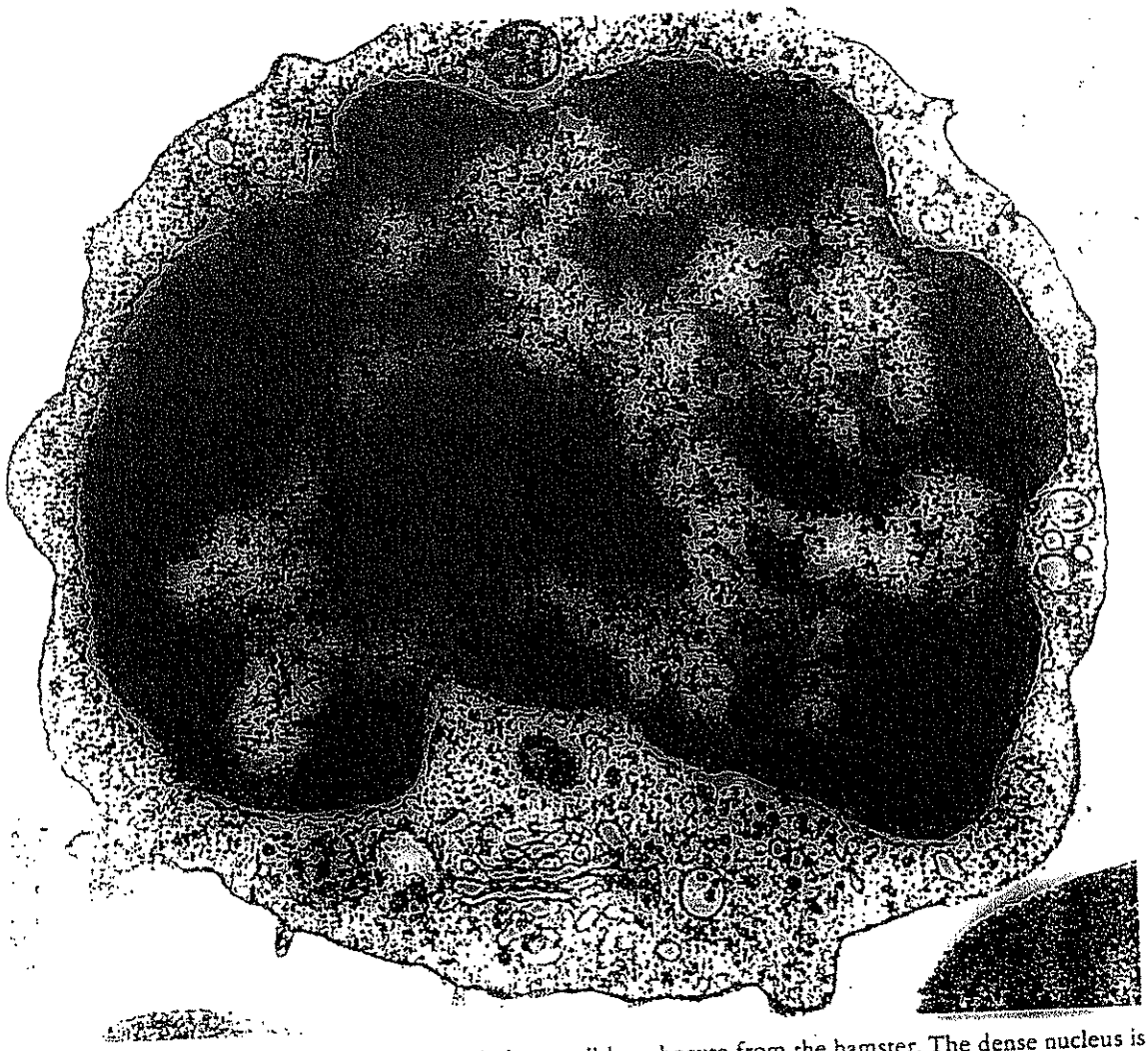
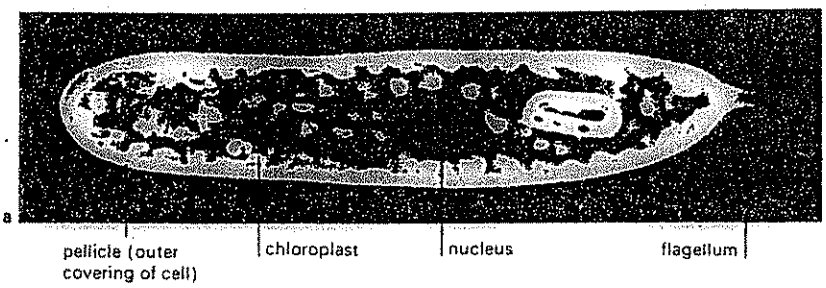
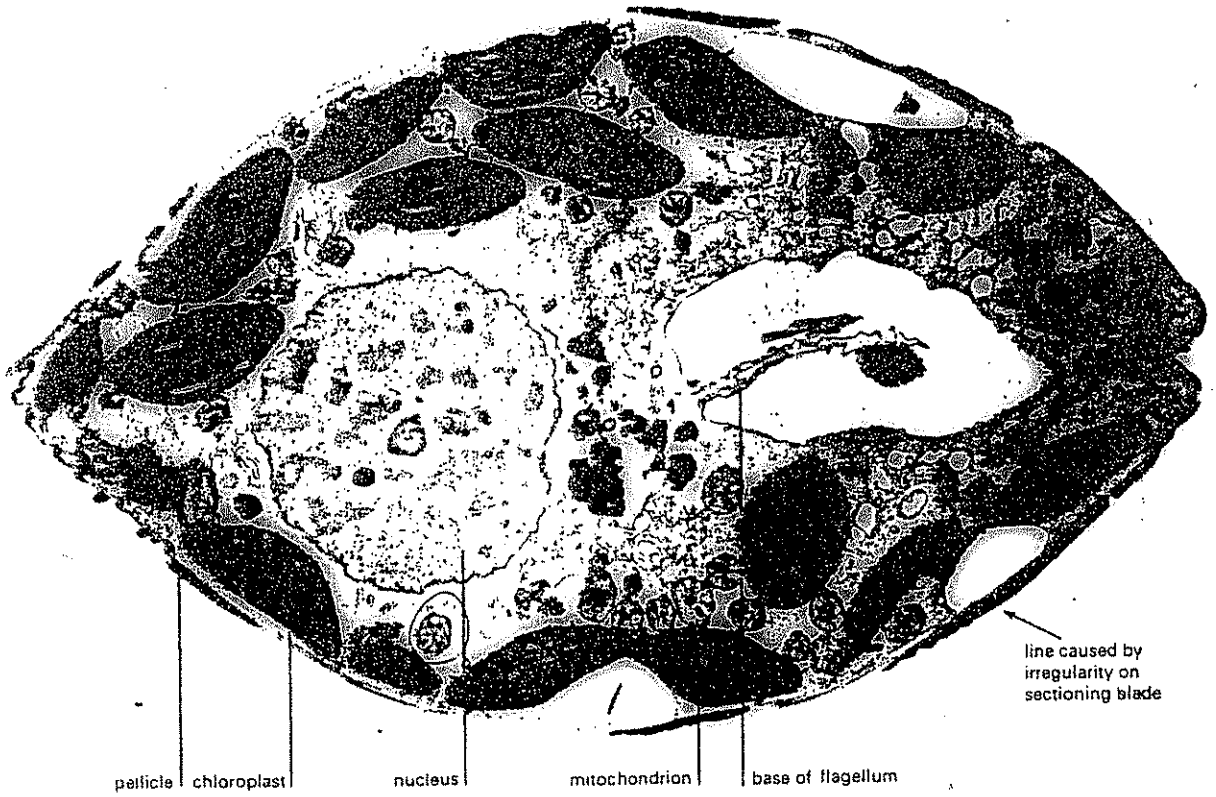


Figure 14–3 Electron micrograph of a circulating small lymphocyte from the hamster. The dense nucleus is surrounded by a thin rim of cytoplasm. A centriole and a small Golgi apparatus are located at a nuclear indentation. Free ribosomes in moderate numbers are scattered as single units throughout the cytoplasm. One mitochondrion (top) and multivesicular bodies complete the list of cytoplasmic organelles. Notice the absence of cisternae of the granular endoplasmic reticulum. ×23,000. (Micrograph by David Phillips.)

Read the caption below these electron micrographs. Your task is to draw a scale bar appropriate for these three images.





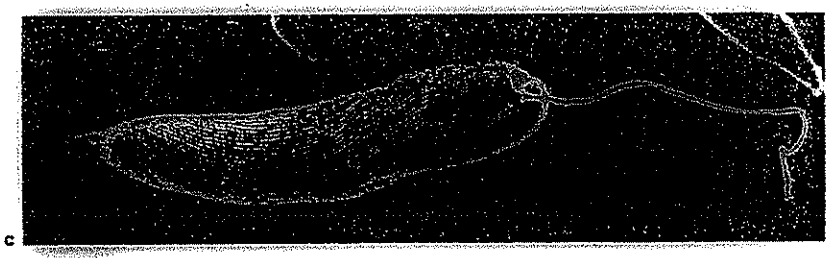


Figure 86
Similar eukaryotic cells of *Euglena*.
a A photomicrograph, taken using a conventional light microscope (× 1690).
b A transmission electronmicrograph (× 10 250).
c A scanning electronmicrograph (× 1380).
Photographs, Biophoto Associates.

Calculating Magnification

On your "Cell Sizes" worksheet calculate the magnification of each of the six cells / animal / viruses as they appears on the paper. Reminder: Do NOT forget to convert your units before calculating magnification.

Amoeba:

Leptospira Pomona:

Daphnia:

Foraminiferan:

Epidermal cells:

Papillomavirus:

Scientific Notation and SI Unit Conversions

Name:_____

Please write the following in scientific notation:

10000000=_____

10000=_____

230000=_____

65000=_____

7900=_____

.0000098=_____

.000072=_____

Convert the following to um:

1000nm=_____

4500nm=_____

.0098mm=_____

.000056mm=_____

Convert the following to nm:

.12mm=_____

400um=_____

.00350um=_____

.0046mm=_____