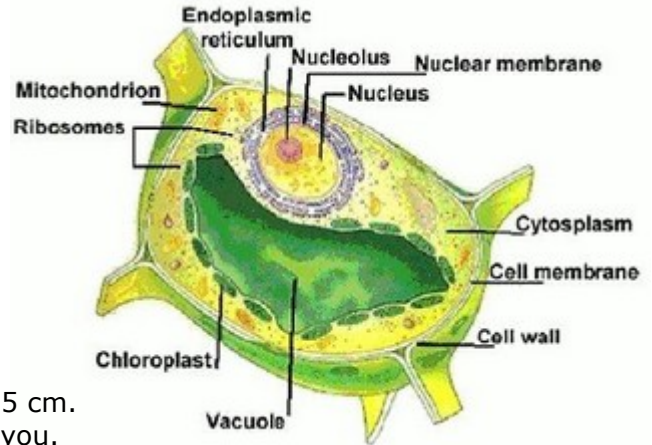


## Drawing a Scale Model of a Cell

Cells appear in all shapes and sizes. Cells are so small they are measured in micrometers (aka micron). The symbol for a micrometer is  $\mu\text{m}$  and it is equal to one millionth of a meter or one thousandth of a millimeter. Often it is not clear how the size of the cell is related to the size of the organelles. In this activity, you will explore the relationship of cell size to organelle size by drawing a scale model of a cell.



### Materials

- Calculator (optional)
- Colored Pencils
- Centimeter ruler

### Calculations

- a. Complete the table. Use a scale factor of 1 micrometer = 0.5 cm.  
The calculation for the diameter of the cell is completed for you.

Organelle	Average Size ( $\mu\text{m}$ )	Scaling Factor (1 $\mu\text{m}$ = 0.5 cm)	Model Size (cm)
<b>Average Plant Cell Diameter</b>	<b>30</b>	<b><math>35 \mu\text{m} \times 0.5 \text{ cm}/\mu\text{m}</math></b>	<b>15</b>
<b>Nucleus (Nucleolus)</b>	<b>5 -10 <math>\mu\text{m}</math> (2.5 <math>\mu\text{m}</math>)</b>	1.	2.
<b>Mitochondria</b>	<b>6 <math>\mu\text{m}</math> x 1 <math>\mu\text{m}</math></b>	3.	4.
<b>Lysosome</b> (in some plant cells)	<b>2 <math>\mu\text{m}</math></b>	5.	6.
<b>Endoplasmic Reticulum</b> (in most plant cells)	<b>0.5 <math>\mu\text{m}</math> thick</b> (each layer)	7.	8.
<b>Golgi Complex</b>	<b>1 x 1 <math>\mu\text{m}</math></b> (membranes have thickness of ER)	9.	10.
<b>Vacuole (central)</b> sometimes serves as lysosome	<b>Varies: 15 x 20 <math>\mu\text{m}</math></b>	11.	12.
<b>Ribosome</b>	<b>0.025 <math>\mu\text{m}</math></b>	13.	14.
<b>Chloroplast</b>	<b>5 <math>\mu\text{m}</math> long x 2 <math>\mu\text{m}</math> wide</b>	15.	16.

### Model Procedure

- a. On a separate sheet of paper, measure the diameter of the cell (17centimeters) and draw a cell-like rectangular shape on your paper. This will be the outline of your plant cell.
- b. Using your calculations, make a nucleus to scale using the colored pencils.
- c. Following the procedure for the nucleus, draw the rest of the organelles each in a different color. Be sure to use the plant cell diagram in your textbook as a guide in drawing your organelles.
- d. Once your drawing is complete, make a table and neatly print or type a key for the organelles.
- e. Include a small colored drawing of the organelle in the key (this does not need to be to scale).
- f. Include the organelle's function in the key.
- g. Staple your drawing to this sheet.

### Applying your knowledge

17. What is the smallest organelle in a typical plant cell? \_\_\_\_\_
18. What is the largest organelle in a typical plant cell? \_\_\_\_\_
19. If you were drawing an animal cell, which you include these same organelles in your drawing? If not, what organelles would you not include?  
\_\_\_\_\_
20. This method does not apply only to cells. List two other examples where scale models are used.
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_

### Model – 30 points

#### Grading Criteria

- This handout stapled or paper clipped to drawing
- Full heading in right-hand corner of model
- Title centered (*Drawing of a Plant Cell*)
- Lettering even and very readable
- Accurate depiction of the cell and organelles
- Accurate model size of cell and organelles
- Different colors used to represent the various organelles
- No white showing in areas colored
- Coloring stays within the organelle
- Extra marks or mistakes completely erased
- Model overall is very neat
- Key is written as a table with organelle shape colored and drawn, name of organelle and function of organelle given (You may type the key and paste it on the model).
- Organelles drawn and colored in key
- Organelle name listed in key
- Accurate function of organelles listed in key