

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

## Cell City Analogy

**Floating around in the cytoplasm are small structures called organelles. Like the organs in your own body, each one carries out a specific function necessary for the cell to survive. Imagine the cell as a miniature city. The organelles might represent companies, places or parts of the city because they each have similar jobs. Below are the descriptions of important parts of the Cell City:**

- A. City Limits/Police Department - control what goes in and out of the city
- B. Road System - Allows for movement throughout the city.
- C. City Hall - Controls all the activities of the city.
- D. City Auditor/Clerk - Stores all the records of the city and passes them on as the city grows.
- E. City Planning Office - A place in the city hall where plans are made for the construction of the city.
- F. Construction Company - Builds structures for the city.
- G. Delivery Van - delivers products made at the construction company to other locations in the city.
- H. Food Processing Plant - Processes large quantities of food entering the city into smaller packages that can be used more easily.
- I. Warehouse - Stores materials needed by the city.
- J. Power Company - Produces energy for the city.
- K. Solar Power Plant - Uses the sun's energy to produce power for the city.

***Directions*** As you move through this worksheet, see if you can match the important parts of the city listed above to the specific organelles found in cells. Be sure to write neatly, and in complete sentences.

**1. The nucleus is a large, round/oval structure usually located near the center of the cell. It is the control center for all the activities of the cell.**

- a. What company or place does the nucleus resemble in a Cell City?
- b. Why do you think so?

**2. The cell membrane is a thin, flexible envelope that surrounds the cell. It allows the cell to change shape and controls what goes into and out of the cell.**

- a. What company or place does the cell membrane resemble in a Cell City?
- b. Why do you think so?

**3. The endoplasmic reticulum consists of a network of tube-like passageways that proteins from the ribosomes are transported through.**

- a. What company or place does the endoplasmic reticulum resemble in a Cell City?
- b. Why do you think so?

**4. The ribosomes are small grain-like bodies made mostly of RNA and produced in the nucleolus. Proteins are constructed at the ribosomes.**

- a. What company or place do the ribosomes resemble in a Cell City?
- b. Why do you think so?

**5. The nucleolus is a small, dense object found in the middle of the nucleus. It makes the RNA for the cell.**

- a. What company or place does the nucleolus resemble in a Cell City?
- b. Why do you think so?

**6. The jelly-like area between the nucleus and the cell membrane is called the cytoplasm. It helps organelles move throughout the cell.**

- a. What company or place does the cytoplasm resemble in a Cell City?
- b. Why do you think so?

**7. The mitochondria are tiny bean-shaped structures in the cytoplasm with a smooth outer membrane, and a greatly folded inner membrane. They supply the energy for the cell by transforming sugars into energy.**

- a. What company or place does the mitochondria resemble in a Cell City?
- b. Why do you think so?

**8. The chromosomes are rod-shaped bodies found in the nucleus. They are made of DNA and protein. They contain all the information to run the cell. They also pass on the hereditary traits of the cell to new cells.**

- a. What company or place do the chromosomes resemble in a Cell City?
- b. Why do you think so?

**9. The chloroplast is an oval, green structure found in the cytoplasm. It contains chlorophyll. It captures the sun's energy and uses it to produce sugars in a process called photosynthesis.**

- a. What company or place do the chloroplasts resemble in a Cell City?
- b. Why do you think so?

**10. The lysosomes are small round structures found in the cytoplasm. They contain digestive enzymes that break down large food particles into sugars and other simple substances.**

- a. What company or place do the lysosomes resemble in a Cell City?
- b. Why do you think so?

**11. The vacuole is a large, round sac found in the cytoplasm. It stores water, food, wastes, or other materials needed by the cell.**

- a. What company or place does the vacuole resemble in a Cell City?
- a. Why do you think so?

## Part I: Cell

On a plain piece of paper, you will sketch, color, and label a plant or animal cell. Include all the cell parts we have discussed in class. Use your science book, any notes you have, and any cell worksheets you've done for help.

<b>Cell Sketch Rubric Criteria</b>	<b>Poor</b>	<b>Average</b>	<b>Excellent</b>
1 Sketched on plain paper	1	2	3
2 Colored with colored pencils	1	2	3
3 Sketch is correctly shaped and labeled as a certain type of cell	1	2	3
4 Includes a cell membrane (and if plant a cell wall)	1	2	3
5 Includes cytoplasm	1	2	3
6 Includes nucleus	1	2	3
7 Includes Nuclear membrane	1	2	3
8 Includes Chromosomes	1	2	3
9 Includes nucleolus	1	2	3
10 Includes endoplasmic reticulum	1	2	3
11 Includes ribosomes	1	2	3
12 includes mitochondria	1	2	3
13 Includes vacuoles	1	2	3
14 Includes lysosomes (if animal cell) or chloroplasts if plant cell	1	2	3

**Total Points: (42)** \_\_\_\_\_

## Part II: City

On a plain piece of paper, you will sketch, color, and label a city. Each part of the city will be labeled with its name and the name of the cell organelle that has a similar function.

<b>Criteria</b>	<b>Poor</b>	<b>Average</b>	<b>Excellent</b>
1 Sketched on plain paper	1	2	3
2 Colored with colored pencils	1	2	3
3 Sketch is of city	1	2	3
4 Includes analogy of cell membrane (and cell wall if plant).	1	2	3
5 Includes analogy of cytoplasm	1	2	3
6 Includes analogy of nucleus	1	2	3
7 Includes analogy of nuclear membrane	1	2	3
8 Includes analogy of chromosomes	1	2	3
9 Includes analogy of nucleolus	1	2	3
10 Includes analogy of endoplasmic reticulum	1	2	3
11 Includes analogy of ribosomes	1	2	3
12 Includes analogy of mitochondria	1	2	3
13 Includes analogy of vacuole	1	2	3
14 Includes analogy of lysosomes (if animal cell) or chloroplasts (if plant cell)	1	2	3

**City Points: (42)** \_\_\_\_\_

### Part III: Mobile Construction

On a plain piece of paper, you will sketch, color, and label a city. Each part of the city will be labeled with its name and the name of the cell organelle that has a similar function. Use your cell city worksheet as a resource for help.

Criteria	Poor	Average	Excellent
1 Glues cell and city to opposite sides of construction paper	1	2	3
2 Punched at top and a 20 cm piece string inserted to hang	1	2	3
3 Completes yes/no column of the rubric	1	2	3
4 Puts name and period on mobile and attaches rubric with paper clip	1	2	3
5. Neatness	1	2	4

**Construction Points: (16) \_\_\_\_\_**

**Total Project Points: (100) \_\_\_\_\_**

#### **Web Cell Resources:**

<http://www.biopic.co.uk/cellcity/index.htm>

[http://biology.unm.edu/ccouncil/Biology\\_124/Summaries/Cell.html](http://biology.unm.edu/ccouncil/Biology_124/Summaries/Cell.html)

[http://www.cellsalive.com/cells/cell\\_model.htm](http://www.cellsalive.com/cells/cell_model.htm)

<http://www.ibiblio.org/virtualcell/tour/cell/cell.htm>