**Problem:** What are the functions of different organelles in a cell?

**Background:**  The cell is the basic unit and building block of all living things. Organisms rely on their cells to perform all necessary functions of life. Certain functions are carried out within different structures of the cell. These structures are called **organelles**. [**NGSS** HS-LS1- 2, HS-LS1-5, HS-LS1-7]

***Directions:*** *Use Model 1 to answer the following question. Use complete sentences where applicable.*

1. Using the letters from the table in Model 1, label the cell diagram with the organelle names.

2. According to the table, what substance is analogous to a factory manager? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In what organelle would this substance be found? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Using the information in Question 2, which cell organelle controls the activities of the entire cell?

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Which organelle generates energy to power cellular activities? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Which organelle is responsible for assembling proteins? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. Once proteins have been assembled, to which organelle would they go next? \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_

7. Into what organelle might the cellular products be placed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

![C:\Users\Jason\AppData\Local\Microsoft\Windows\INetCache\IE\QQCX25O5\gold_key_2_png_clipart_by_clipartcotttage-d7bvydo[1].png]()8. Fill in the missing functions of cellular organelles in the table in Model 1.

![C:\Users\Jason\AppData\Local\Microsoft\Windows\INetCache\IE\QQCX25O5\gold_key_2_png_clipart_by_clipartcotttage-d7bvydo[1].png]()9. Starting with instructions from the factory manager (DNA/chromosomes), create a flow chart (or use one of your graphic organizers) to show how a protein is produced and shipped from a cell.

***Directions:*** *Use Model 2 to answer the following questions. Use complete sentences where applicable.*

10. Which cell is not missing any organelles compared to Model 1? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. Look carefully at Cell 2. Compared to Model 1, what kind of organelle is missing? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. Using grammatically correct sentence**s**, describe why Cell 2 would not function normally. \_\_\_\_\_\_\_\_\_

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13. Which two cells will have difficulty containing and getting rid of wastes within the cell? Why?

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14. Cell 1 is missing one organelle. List as many reasons as possible why Cell 1 will not survive.

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15. Cell 4 and Cell 7 will not be able to synthesize a major biological molecule. What molecule is this?

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***Directions:*** *Use Model 3 to answer the following questions. Use complete sentences where applicable.*

16. Do both cells in Model 3 have a nucleus? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Color it (them) in red.

17. Do both cells in Model 3 have mitochondria? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Color it (them) in blue.

18. Describe at least three differences between the animal and plant cells shown in Model 3. \_\_\_\_\_\_\_\_\_

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**![C:\Users\lbreithaupt\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\HARJIR7N\traffic-157617_640[1].png]()**  Plant cells have three organelles not found in animal cells. They include the cell wall, large central vacuole, and plastids (including chloroplasts).

**Read This Aloud!**

![C:\Users\Jason\AppData\Local\Microsoft\Windows\INetCache\IE\QQCX25O5\gold_key_2_png_clipart_by_clipartcotttage-d7bvydo[1].png]()19. Complete the table below using the three plant organelles mentioned in the *Read This!* box.

|  |  |
| --- | --- |
| **Organelle** | **Function** |
|  | Fluid-filled organelle; stores water, enzymes, and waste products. Size of this organelle can change |
|  | Supports and protects the cell |
|  | Some store food or pigments; some convert light energy to chemical energy in the form of organic compounds |

20. ***Label*** each of these three organelles on the plant cell diagram in Model 3.

21. *Individually*, in one grammatically correct sentence, describe why it is necessary for plants to have

 chloroplasts. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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22. *As a group*, reach a consensus on the answer to Question 21. Record the answer below. \_\_\_\_\_\_\_\_\_\_

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23. The central vacuole stores water. What would happen to the size of the central vacuole if a plant

 does not have enough water? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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24. Describe the appearance of the vacuole in a well-watered plant. What effect would this have on the

 cell wall of the plant? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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25. Using your response to Question 24, construct an explanation for why a plant has both a rigid cell

 wall and a cellular membrane. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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** Read This Aloud!**

**Extension Questions**

 All cells undergo cellular respiration for the production of energy. Energy is necessary for all metabolic activity within the cell.

The formula for ***cellular respiration*** is: C6H12O6 + 6O2 ⎯⎯→ 6CO2 + 6H2O + energy/ 36 ATP

Plants carry out photosynthesis for the production of glucose. The glucose then becomes the energy source for cellular respiration.

Sun’s energy

The formula for ***photosynthesis*** is: 6CO2 + 6H2O ⎯⎯---------------⎯⎯⎯→ C6H12O6 + 6O2

***Directions:*** Study the information given in the *Read This!* box. *Use complete sentences where applicable.*

26. In what organelle does cellular respiration occur? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Do plant and

 animal cells both have this structure? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

27. In what organelle does photosynthesis occur? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Do plant and

 animal cells both have this structure?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

28. Using the equations above, explain the relationship between mitochondria and chloroplasts. \_\_\_\_\_\_

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29. Plants have both mitochondria and chloroplasts; they can produce their own glucose to fuel cellular respiration. Animal cells, on the other hand, have only mitochondria. If an animal eats only meat

 what would be its source of glucose? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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30. Where in the human body would you find cells with a large number of mitochondria? Why? \_\_\_\_\_\_\_

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