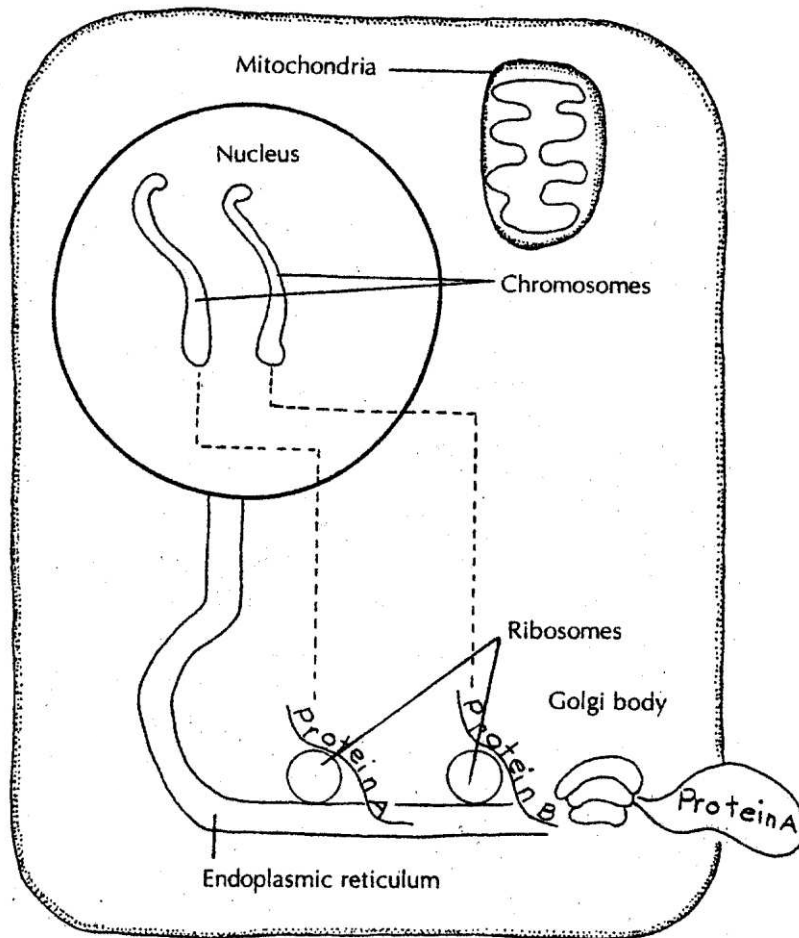


NAME \_\_\_\_\_ Period \_\_\_\_\_ Date \_\_\_\_\_

# How the Cell Operates

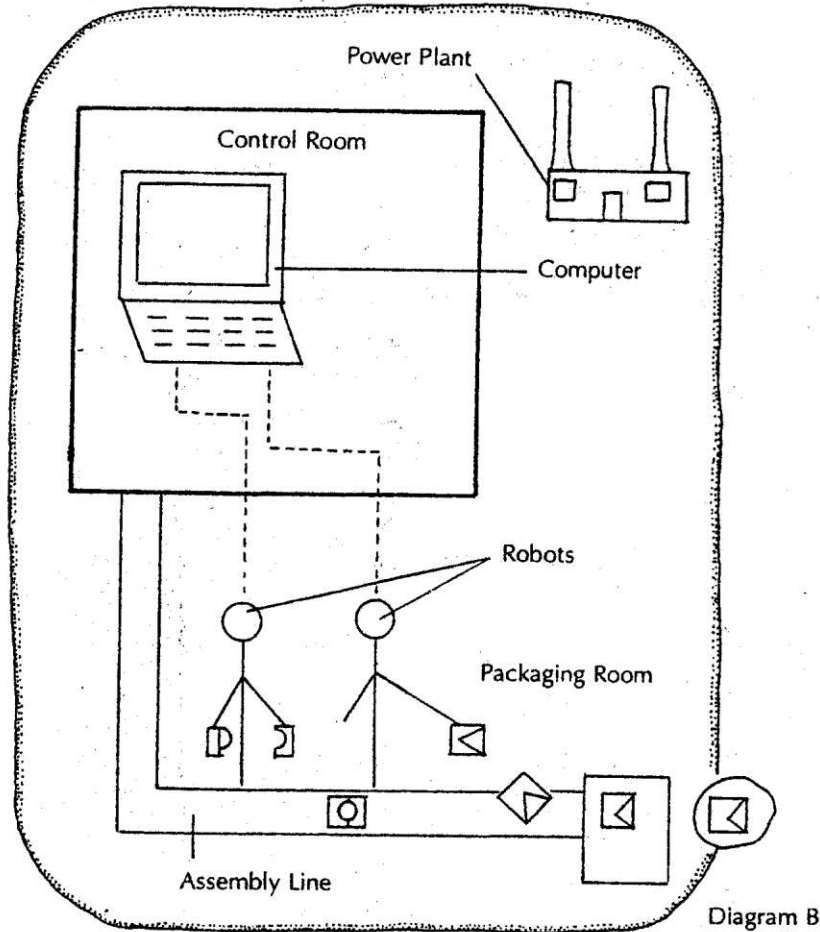
H Biology - 402

**Instructions:** (1.) Read text carefully. (2.) Complete the project. (3.) Use the text and the project to help you to answer the questions.



Many cells in your body act like factories, assembling molecules into various beneficial secretions. The cells that line your mouth, for example, assemble molecules into the slippery mucus that prevents bacteria and other germs from entering into your body.

**Diagram A** shows an actual cell that produces molecules for the body. **Diagram B** shows a factory – a make-believe cell – in which a computer, power plant, and robots are used to represent actual structures in a real cell. By comparing Diagram A with Diagram B, you will learn how the organelles of an actual cell work together to produce molecules for the body.



**Section 1:** To complete this project –

Obtain a set of colored pencils and use them to color-code **Diagrams A and B** as follows:

- In Diagram A, color the chromosomes orange.
- In Diagram B, color the computer orange.
- In Diagram A, color the nucleus brown.
- In Diagram B, color the control room brown.
- In Diagram A, color the mitochondria yellow.
- In Diagram B, color the power plant yellow.
- In Diagram A, color the endoplasmic reticulum blue.
- In Diagram B, color the assembly line blue.
- In Diagram A, color the ribosomes green.
- In Diagram B, color the robots green.
- In Diagram A, color the Golgi body red.
- In Diagram B, color the packaging room red.

**Section 2:**

1. How did you show that the organelles in Diagram A are similar to the structures in Diagram B?

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2. How are the functions of the mitochondria and the power plant similar? \_\_\_\_\_

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3. What is the form of the energy that the mitochondria produce for the cell? \_\_\_\_\_

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4. What structures in Diagram A are similar to the computer in Diagram B? How are the structures similar?

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5. Which organelles in Diagram A are similar to the robots in Diagram B? How are they similar?

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6. If the job of the computer is to control the robots, what do the chromosomes control?

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7. If the job of the robots is to make boxes, what do the ribosomes produce?

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8. Which organelle in Diagram A is similar to the packaging room in Diagram B?

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9. If the job of the packaging room is to wrap the boxes so that they can leave the factory, what is the job of the Golgi body? \_\_\_\_\_

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10. To reach the packaging room, the boxes travel on the assembly \_\_\_\_\_; to reach the Golgi body in the actual cell, the chemicals must travel through the \_\_\_\_\_.

11. Read in a biology textbook about cells in the stomach lining. How are certain cells in your stomach specialized? \_\_\_\_\_

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12. The \_\_\_\_\_ is the control center of the cell.

13. How many chromosomes are in each human cell? \_\_\_\_\_

14. What is the function of the chromosomes? \_\_\_\_\_

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15. Where are proteins assembled? \_\_\_\_\_  
\_\_\_\_\_

16. Where is RNA manufactured? \_\_\_\_\_  
\_\_\_\_\_

17. Describe the function of messenger RNA. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. What structure transports proteins? \_\_\_\_\_  
\_\_\_\_\_

19. What is the function of the Golgi body? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

20. Lysosomes contain chemical substances called \_\_\_\_\_ .

21. Lysosomes use their enzymes to break proteins into \_\_\_\_\_ .

22. The ribosomes use these amino acids to assemble new \_\_\_\_\_ .

23. Organelles that function as storage sacs are \_\_\_\_\_ .

24. Incoming nutrients are stored in vacuoles before they are broken down by \_\_\_\_\_ .

25. When assembling proteins and performing other functions, the cell uses a source of energy called \_\_\_\_\_  
\_\_\_\_\_

26. The organelle that produces the chemical used directly by the cell for energy is the \_\_\_\_\_  
\_\_\_\_\_

**Section 3.** Complete the following table to fully describe the various cell parts. Insert your responses in the spaces provided under each heading.

<b>Cell Structure</b>	<b>Location</b>	<b>Function</b>
	External boundary of the cell	Confines cell contents; regulates entry and exit of materials
Lysosomes		
	Scattered throughout the cell	Control release of energy from foods; forms ATP
	Projections from the plasma membrane	Increase the membrane surface area
Golgi Apparatus		
Nucleus		
	Two rod-shaped bodies near the nucleus	“Spin” or form the mitotic spindle
Nucleolus		
Smooth ER		
Rough ER		
	Attached to membrane systems or scattered in the cytoplasm	Synthesize proteins
Chromatin		
	Scattered in cytoplasm	Detoxify alcohol, hydrogen peroxide, <i>etc.</i>
Vacuoles		

**Section 4.** Answer the following questions by inserting your answers in the answer blanks.

1		1 – 4. Name the four elements that make up the bulk of living matter.
2		
3		
4		
5		5. Name the single most abundant material or substance in living matter.
6		6. Name the trace element most important for making bones hard.
7		7. Name the element that is needed to make hemoglobin for oxygen transport.
8		8 – 12. Although there are many specific “jobs” that certain cells are able to do, name five functions common to all cells.
9		
10		
11		
12		
13		13 – 15. List three different shapes of cells.
14		
15		
16		16. Name the fluid, similar to seawater, that surrounds and bathes all body cells.

**Section 5.** Using the following terms, correctly label all the cell parts indicated by the lines. Then select different colors for each structure and use them to color the coding circles and the corresponding structures in the illustration.

- Plasma membrane
- Centrioles
- Chromatin thread(s)
- Golgi apparatus
- Microvilli
- Mitochondrion
- Nuclear membrane
- Nucleolus
- Rough endoplasmic reticulum
- Smooth endoplasmic reticulum

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