



# Teacher Directions

## How to Run a Station Lab

### What It Is

A [Kesler Science station lab](#) is a hands-on activity built around 9 stations that students rotate through during one or two class periods. Four input stations (Watch It!, Read It!, Explore It!, Research It!) introduce the topic from different angles. Four output stations (Organize It!, Illustrate It!, Write It!, Assess It!) give students a way to show what they learned. One bonus station (Challenge It!) requires teacher approval before a group can start it.

### Before Class

- Print and set up each station at a separate table or area of the room.
- Each station should be duplicated at least 2-3x depending on your class size.
- Group students into teams. Pairs work best, but students could do them solo also.
- Each station is designed to take about 10-12 mins long. The first time you run one, allow for more time.
- Read through the Challenge It! requirements ahead of time so you know what to check for before approving a group to start it.

### Running the Rotation

- Assign each group a starting station to avoid chaos. No one should start at an output station.
- Allow students to rotate at their own pace, but along the way add in verbal cues that they “should be at their 3rd station”, etc. by now.

### Common Setup Mistakes

- Skipping a quick preview and expectation of how each station works. Get this right the first time, and you’ll have classes that can run them by themselves for the next topic you teach.
- Not having enough stations or materials at each station for the class size.
- Students start at an output station rather than an input station. They will not be able to respond at the output stations without doing the input stations.
- Doing this after direct instruction on the topic. Station Labs are meant to introduce the topic so that when you’re ready to get into some direct instruction, they come with a foundation.

### Grading

The output stations produce the work you'll grade. Assess It! is built as the formal check for understanding. Input stations gather information and aren't typically graded for correctness.



# Watch It! Input Station Instructions

1. Each member of your group should go to the website listed on task card #1.
2. Answer the task card questions in the Watch It! section of your answer sheet.
3. Be sure to number your responses.



## Input: Watch It!

Card 1 of 4

Go to:

<https://www.youtube.com/watch?v=8IlzKri08kk>

Play from 3:12 to 8:15.



## Input: Watch It!

Card 2 of 4

1. Which organelle helps keep the cell stable by controlling what comes in and out?



## Input: Watch It!

Card 3 of 4

2. What do the mitochondria produce during the process of cellular respiration?



## Input: Watch It!

Card 4 of 4

3. Which organelle(s) are found only in plant cells?



## **Read It! Input Station Instructions**

1. Each member of your group should read the accompanying passage.
2. Answer the task card questions in the Read It! section of your answer sheet.
3. It is important to remember that the answers will come directly from the reading passage.





# The Cell Factory

Cells can be thought of as tiny factories, bustling with activity and specialized workers called **organelles**. Just like in a real factory, each organelle has its own job to do to keep the cell running smoothly.

At the heart of every factory cell lies the nucleus, acting like the control room of the cell. It houses the instructions, like a manual, for everything the factory needs to make and do. That manual is the genetic material that dictates the cell's activities and characteristics.

Surrounding the factory cell is the cell membrane, functioning as both a security gate and a shipping dock. It controls what comes in and out of the factory, ensuring materials are delivered where they're needed.

Inside the factory, **ribosomes** are the assembly lines. They read the instructions from the nucleus and turn out the proteins needed to build and repair the factory's structures. Powering the cell's activities are the **mitochondria**, often called the powerhouses of the cell. They convert nutrients into energy that the cell can use. Without mitochondria, cells wouldn't have the energy to carry out their functions.

**Vacuoles** are the storage warehouses of the factory cell. They store raw materials, finished products, and waste. It's their job to keep the factory organized and efficient.

The floor around the factory is similar to the cytoplasm. The cytoplasm is where all the cell's other structures can be found, and where all the cell's activities take place.

In plant factory cells, **chloroplasts** are the solar panels. They contain chlorophyll, which captures sunlight to convert into energy through photosynthesis, just like harvesting solar power. Photosynthesis allows plants to make their own food using sunlight, water, and carbon dioxide. This process not only nourishes the plant but also produces oxygen, which is vital for life on Earth.

Another unique feature of plant factory cells is the cell wall. It's like the sturdy cinderblock fencing around the factory. It provides structural support and protection, ensuring the factory can stand tall and endure.

In this busy cellular factory, each organelle plays a crucial role. The cell can't operate correctly without each organelle doing its job. Together, they form a complex and efficient system, ensuring the factory cell can carry out its functions and contribute to the larger organism's survival and growth.





## Input: Read It!

Card 1 of 4

1. What role does the nucleus play in a cell?
  - A. It provides structure and support.
  - B. It acts as a gatekeeper.
  - C. It stores raw materials, finished products, and waste.
  - D. It houses genetic material that tells the cell its characteristics and how to function.



## Input: Read It!

Card 2 of 4

2. Which organelle is responsible for providing the cell with energy?
  - A. mitochondria
  - B. chloroplast
  - C. ribosomes
  - D. vacuoles



## Input: Read It!

Card 3 of 4

3. Which organelle is found in plant cells, but not in animal cells?
  - A. mitochondria
  - B. chloroplast
  - C. ribosomes
  - D. vacuoles



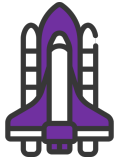
## Input: Read It!

Card 4 of 4

4–8. Vocabulary

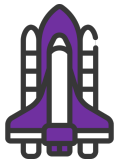
There are vocabulary words on your answer sheet. Use the space under them to jot down notes or drawings to help you remember their meanings from the reading.





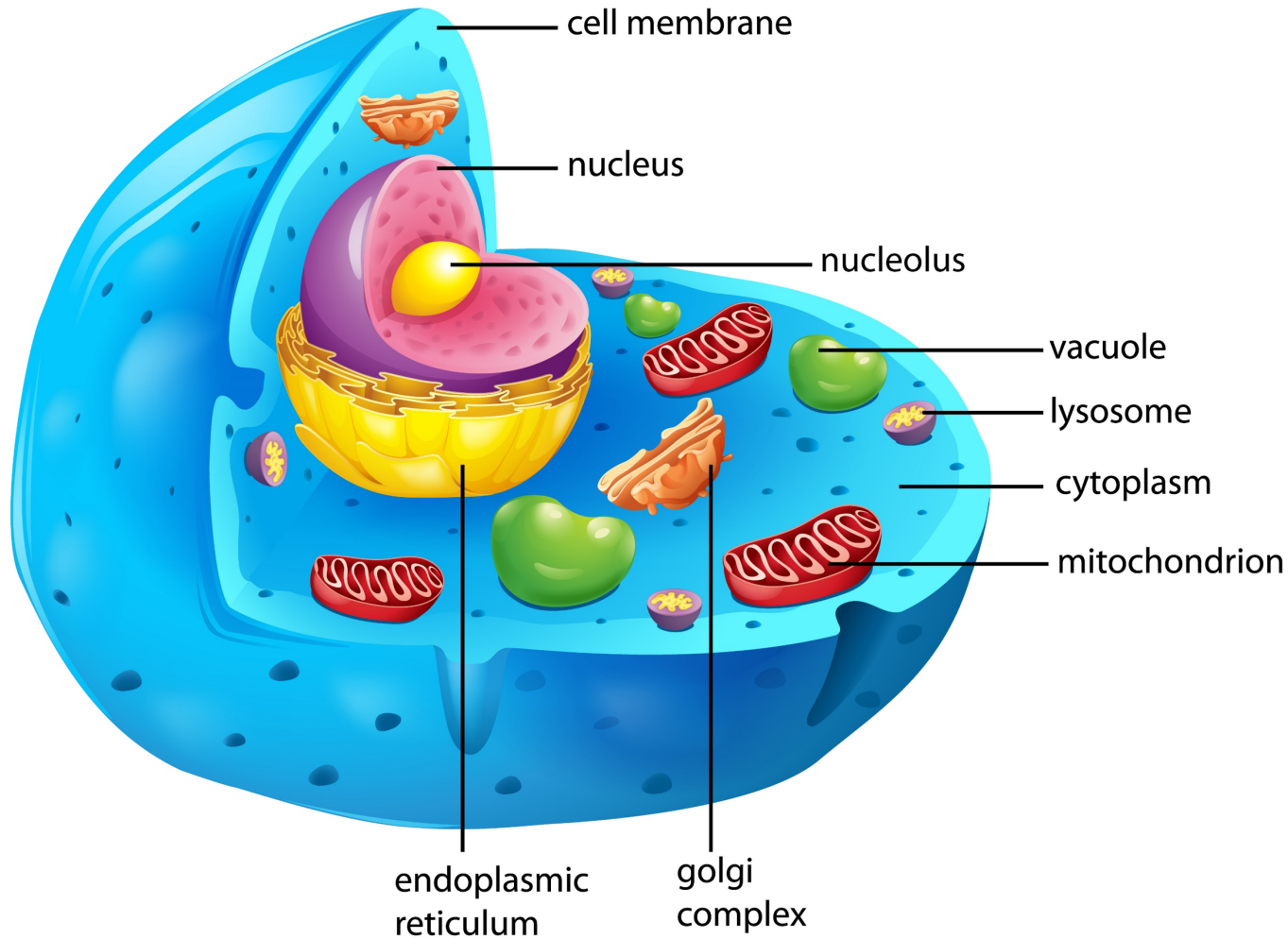
## Explore It! Input Station Instructions

1. One member of your group should read the task cards in order. The group is responsible for completing each of the tasks that are being read.
2. During each station, draw and label what you see. Use your colored pencils when necessary
3. Answer the task card questions in the Explore It! section of your answer sheet.
4. Be sure to number your responses.

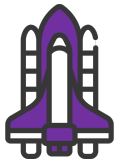


# Explore It! Animal Cell Model

## Anatomy of an Animal Cell

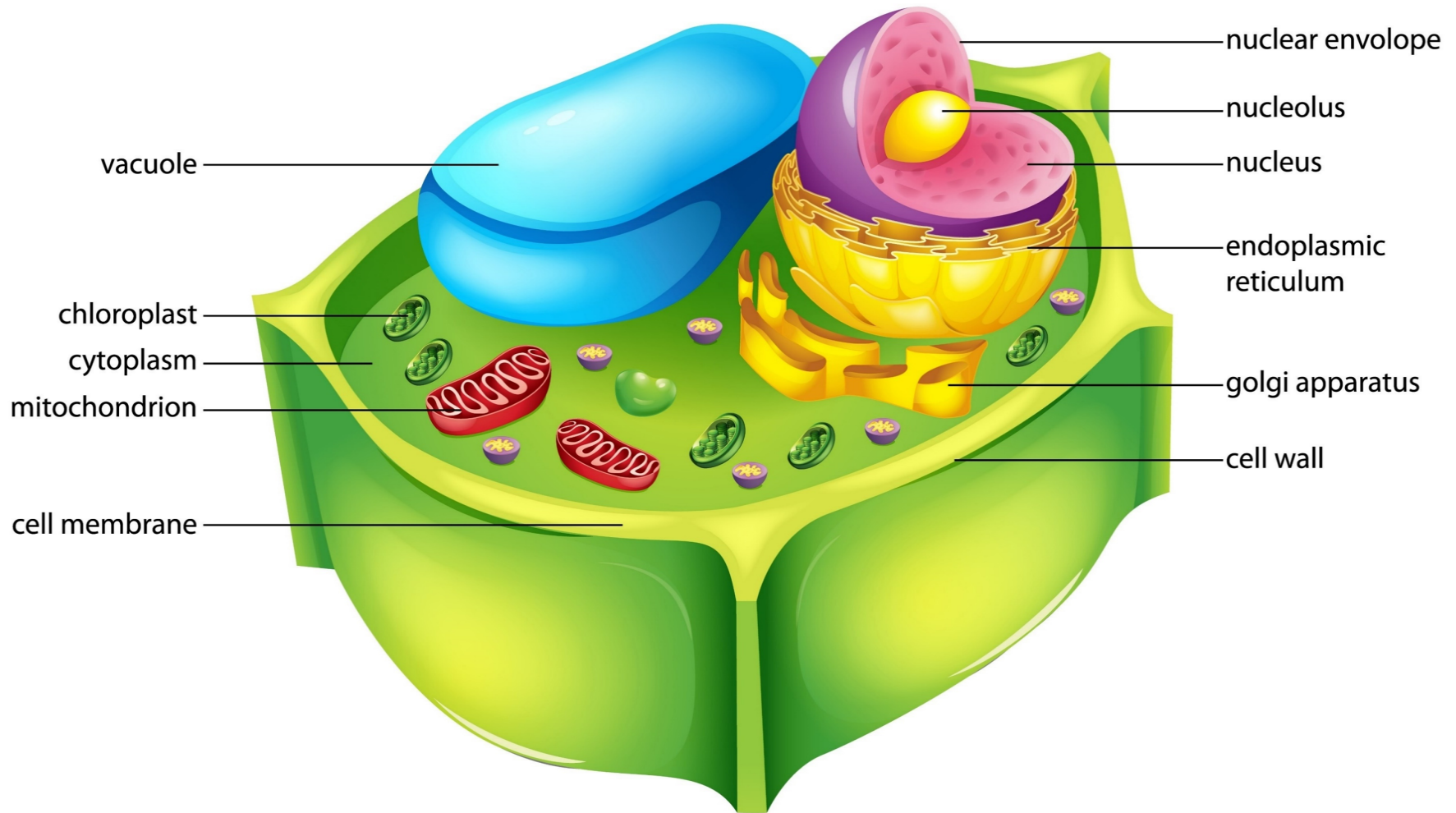


*Teacher Note: An actual 3D cell model can be used in place of the images.*



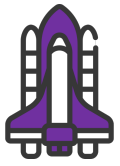
# Explore It! Plant Cell Model

## Plant Cell Anatomy

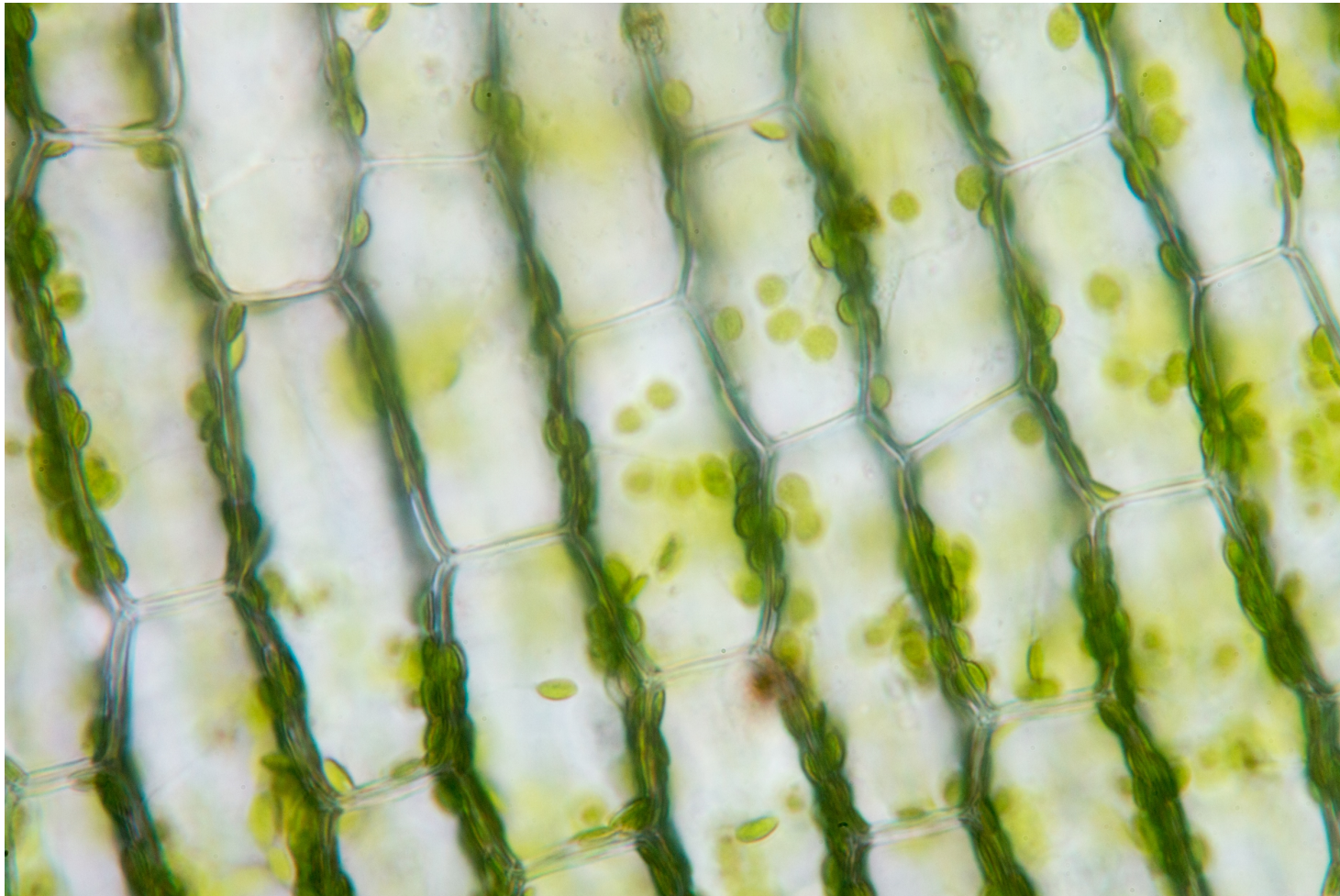


*Teacher Note: An actual 3D cell model can be used in place of the images.*

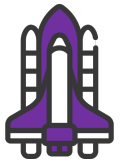




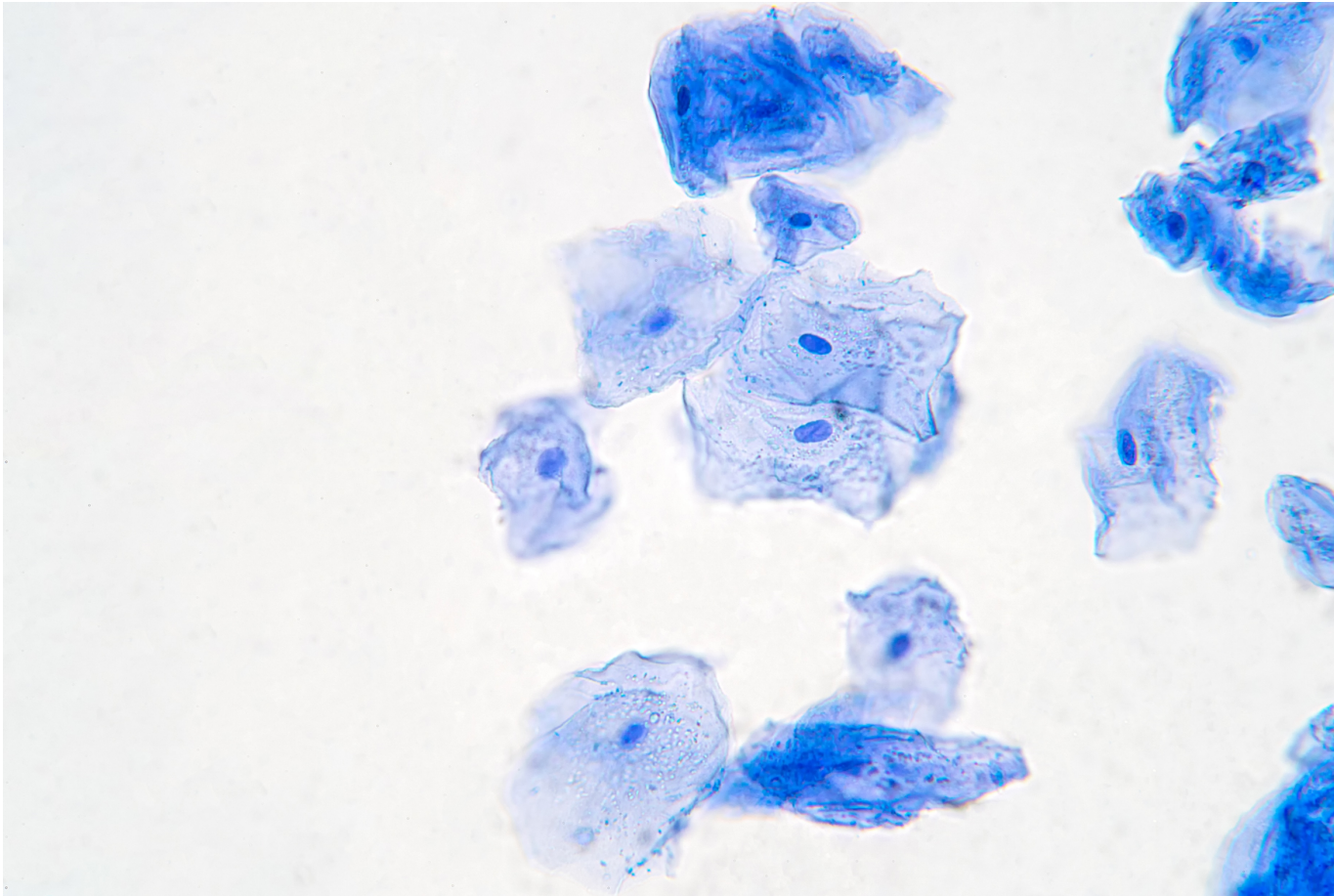
# Explore It! Cell 1



*Teacher Note: This is an image that can be used in place of the microscopes.*



## Explore It! Cell 2



*Teacher Note: This is an image that can be used in place of the microscopes.*



## Input: Explore It!

Card 1 of 5

Examine the plant cell and animal cell models on the table.

1. What's similar about both models?  
What's different about the models?



## Input: Explore It!

Card 2 of 5

There are three important differences between plant and animal cells.

- Plant cells have a **cell wall** for protection and structure.
- Plant cells have **chloroplasts** where photosynthesis happens, and energy is created.
- Plant cells have a **large central vacuole** for food and water storage.



## Input: Explore It!

Card 3 of 5

### Cell 1

Look through the eyepiece of the microscope labeled Cell 1. This is an example of a plant cell.

2. What organelles can you identify in Cell 1?



## Input: Explore It!

Card 4 of 5

### Cell 2

Look through the eyepiece of the microscope labeled Cell 2. This is an example of an animal cell.

3. What organelles can you identify in Cell 2?





## Input: Explore It!

Card 5 of 5

4. When looking at the microscope samples, what differences do you notice between the plant cell and animal cell structures?
5. How would you describe the shape of plant cells compared to animal cells? What organelle contributes to the shape of the plant cells?
6. What observations can you make about the overall organization of plant cells versus animal cells?



# Research It! Input Station Instructions

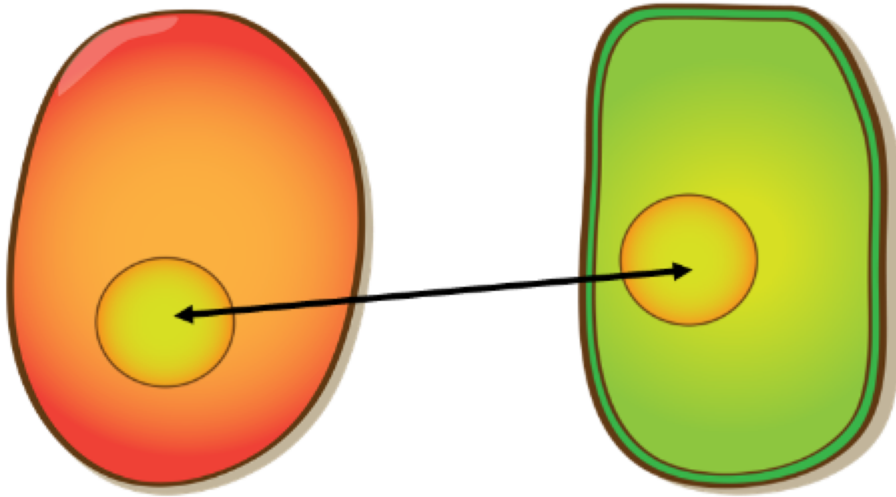
1. Each member of your group should read the reference cards.
2. Answer the task card questions in the Research It! section of your answer sheet.
3. Be sure to number your responses.



## Input: Research It!

Card 1 of 15

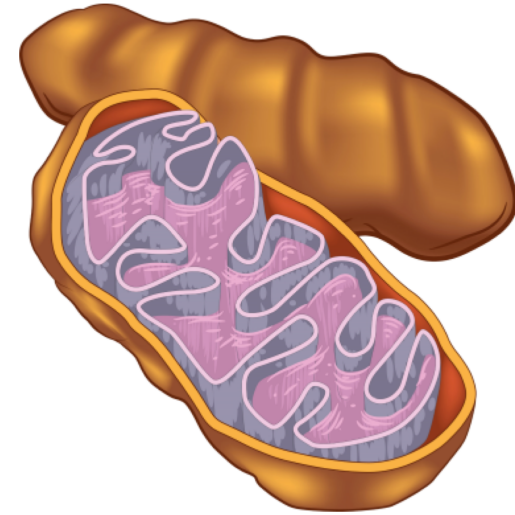
### Nucleus



## Input: Research It!

Card 2 of 15

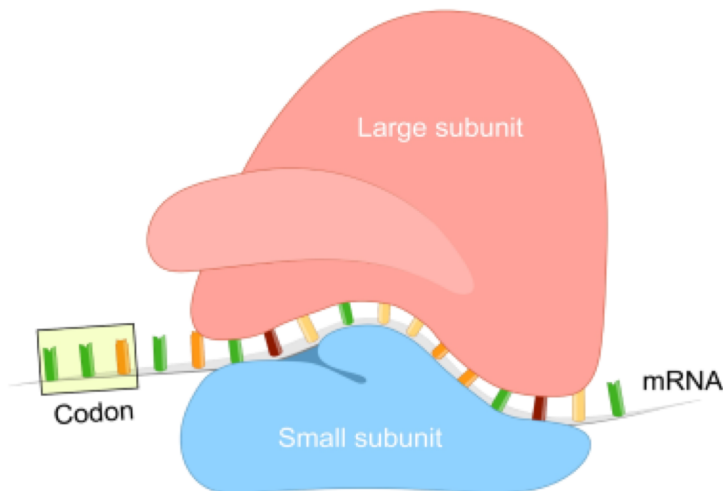
### Mitochondria



## Input: Research It!

Card 3 of 15

### Ribosomes



## Input: Research It!

Card 4 of 15

### Chloroplast

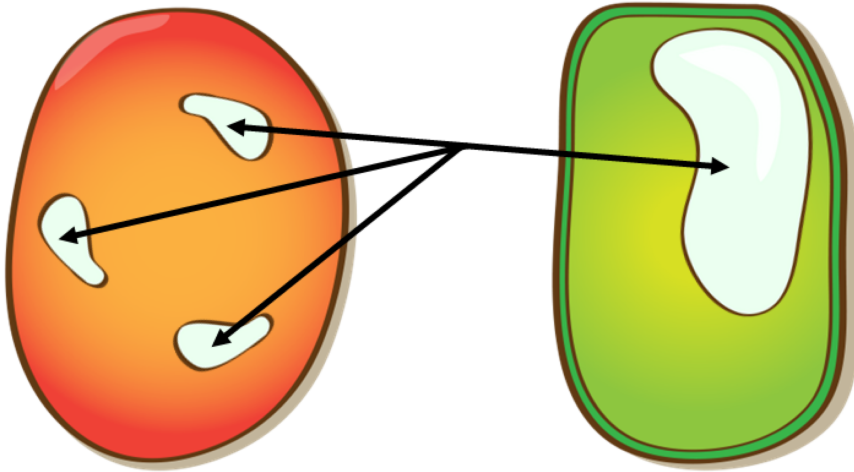




## Input: Research It!

Card 5 of 15

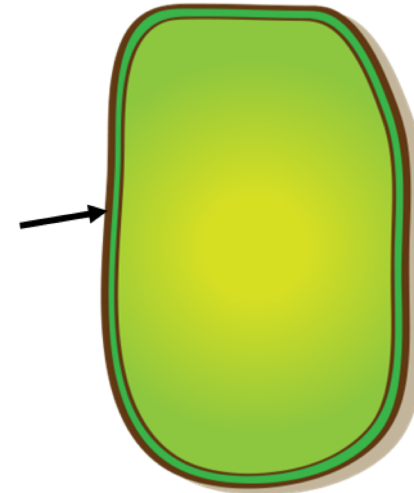
### Vacuole(s)



## Input: Research It!

Card 6 of 15

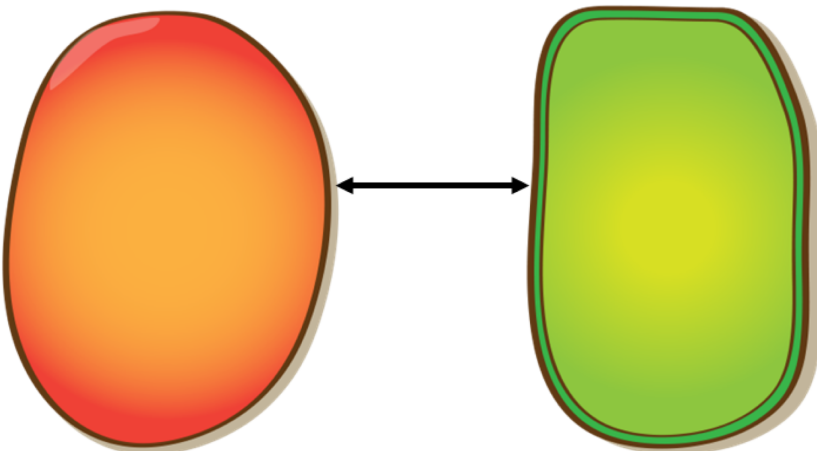
### Cell Wall



## Input: Research It!

Card 7 of 15

### Cell Membrane



## Input: Research It!

Card 8 of 15

### Organelle A

I am a double-membraned organelle with inner folds called cristae.

I am typically red in models, but I am orange-brownish in real life.

I am found in both plant and animal cells.

My job is to produce energy (ATP) for the cell.



## Input: Research It!

Card 9 of 15

### Organelle B

I am a thick, rigid structure made of cellulose in plants.

I am found only in plant cells.

My job is to provide structural support and protection.



## Input: Research It!

Card 10 of 15

### Organelle C

My structure varies depending on the type of cell I'm in.

In animal cells, there are many of me, and my job is to store water, nutrients, waste products, and other materials the cell needs.

I am one large structure in plant cells, and my primary job is to store water.



## Input: Research It!

Card 11 of 15

### Organelle D

I am a thin, flexible barrier around the cell.

I am found in both plant and animal cells.

My job is to protect the cell and control what goes in and out.



## Input: Research It!

Card 12 of 15

### Organelle E

I am the control center of the cell. Each cell only has one of me.

I am usually round.

I am found in both plant and animal cells.

My job is to store the cell's DNA and manage the cell's functions.



## Input: Research It!

Card 13 of 15

### Organelle F

I am a double-membraned organelle with stacks of thylakoids (looks like coins stacked on top of each other) inside.

I contain chlorophyll which makes me green.

I am found only in plant cells.

My job is to perform photosynthesis, making food (glucose) from sunlight.



## Input: Research It!

Card 14 of 15

### Organelle G

I am a round, tiny structure composed of RNA and proteins.

I can be free-floating or attached to the endoplasmic reticulum.

I am found in both plant and animal cells.

My job is to make proteins for the cell.

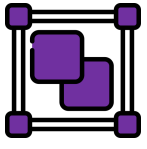


## Input: Research It!

Card 15 of 15

1. Identify each organelle.
2. What organelle can be found in plant and animal cells, but has a structure that varies based on the cell type?
3. Why do you think plant cells need both mitochondria and chloroplasts?
4. In what ways do you think the organelles within a cell work together to keep the cell alive?





# Organize It! Output Station Instructions

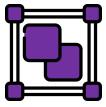
You should complete at least **two** of the following stations before working at this station.

- ☐ Watch It!
- ☐ Read It!
- ☐ Explore It!
- ☐ Research It!

## Procedure:

1. Your group should organize the cards. Use all of the cards.
2. Once the cards are correctly organized, your teacher will initial each student's answer sheet.
3. Please mix up the cards again before the next group arrives at this station.





*Print, laminate, and cut apart. Scramble before giving to students.*

| <b>Organelle</b> | <b>Function</b>                                                 | <b>Type of Cell</b>    |
|------------------|-----------------------------------------------------------------|------------------------|
| cell membrane    | surrounds the cell and allows materials in and out of the cell  | animal and plant cells |
| cell wall        | maintain rigid structure and protection                         | plant cells            |
| nucleus          | control room of the cell that holds genetic material            | animal and plant cells |
| ribosome         | make proteins out of amino acids                                | animal and plant cells |
| vacuoles         | organelles that hold substances like waste                      | animal and plant cells |
| cytoplasm        | gel-like substance that holds organelles in place               | animal and plant cells |
| mitochondria     | releases energy to the cell in the form of ATP                  | animal and plant cells |
| chloroplast      | contains chlorophyll and conducts the process of photosynthesis | plant cells            |





# Illustrate It! Output Station Instructions

1. You should complete at least **two** of the following stations before working at this station.
  - ☐ Watch It!
  - ☐ Read It!
  - ☐ Explore It!
  - ☐ Research It!
2. Draw a quick sketch in the Illustrate It! section of your answer sheet that shows an analogy for each of the following cell organelles. An analogy is a comparison between two things. For example, you might draw the school building to represent the cell wall since the walls of the building provide the shape and structure of the school.
  - a. cell wall
  - b. cell membrane
  - c. ribosomes
  - d. cytoplasm
  - e. nucleus
  - f. vacuole
  - g. chloroplasts
  - h. mitochondria
3. Use the colored pencils and/or markers that are provided.





# Write It! Output Station Instructions

1. You should complete at least **two** of the following stations before working at this station.
  - ☐ Watch It!
  - ☐ Read It!
  - ☐ Explore It!
  - ☐ Research It!
2. Answer each of the task card questions in the Write It! section of your answer sheet, using **complete sentences**.
3. Be sure to number your responses.



## Output: Write It!

Card 1 of 3

1. Why do you think ribosomes are important for a cell's survival?



## Output: Write It!

Card 2 of 3

2. Why do plants need additional organelles such as a cell wall and chloroplast?



## Output: Write It!

Card 3 of 3

3. What organelle do you think is most essential to the cell? Explain your reasoning.



# Assess It! Output Station Instructions

1. You should complete at least **two** of the following stations before working at this station.
  - ☐ Watch It!
  - ☐ Read It!
  - ☐ Explore It!
  - ☐ Research It!
2. Answer the task card questions in the Assess It! section of your answer sheet.







## Output: Assess It!

Card 1 of 4

1. Which cell organelle is responsible for storing water, nutrients, and waste products?
  - A. the nucleus
  - B. the cytoplasm
  - C. the vacuoles
  - D. the ribosomes



## Output: Assess It!

Card 2 of 4

2. What is the primary function of chloroplasts?
  - A. It produces proteins.
  - B. It captures sunlight to create food for the plant.
  - C. It breaks down waste.
  - D. It stores water.



## Output: Assess It!

Card 3 of 4

3. Which of the following best describes cytoplasm in the cell?
  - A. It's the control center of the cell.
  - B. A network of tubes that help transport material within the cell.
  - C. A substance throughout the cell that holds organelles in place.
  - D. The powerhouse of the cell that produces energy.



## Output: Assess It!

Card 4 of 4

4–8. *Complete the paragraph below using vocabulary words from Read It!*

Animal and plant cells contain important (4). Each has its own purpose. (5) help the cells store substances, while (6) make proteins. Although both types of cells have (7) producing energy, only plant cells also have (8), where photosynthesis occurs to create food using sunlight.





## **Challenge It! Bonus Station Instructions**

1. You should get your teacher's approval before attempting the Challenge It! station.
2. Choose one or more challenges to complete from the task cards.
3. When you have completed your challenge(s), ask your teacher to check your work. You may need to attach your work to your answer sheet.



## **Bonus: Challenge It!**

### **CREATE A WORKER**

Card 1 of 4

Create a social media profile for one of the cell factory workers. Include where the organelle works, their main abilities, and images.



## **Bonus: Challenge It!**

### **PARAGRAPH SUMMARY**

Card 2 of 4

Genetic material is stored within the nucleus. However, mitochondria also contain some DNA and can be used to identify certain relatives. Write a summary paragraph about how the DNA in mitochondria can be used in this way.



## **Bonus: Challenge It!**

### **DAILY DIARY**

Card 3 of 4

Imagine you're taking a tour of the cell. Write about a day in the cell as protein. Describe which organelles you visit and how you interact with these organelles.



## **Bonus: Challenge It!**

### **PAPER CHAIN**

Card 4 of 4

Create a paper chain with a different organelle and facts about the organelle on each link.

|                                                                                                     |                                                                                                       |                                                                                                     |                                      |
|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------|
| <b>Watch It!</b>    |                                                                                                       | <b>Read It!</b>  |                                      |
| 1.                                                                                                  |                                                                                                       | <b>Questions</b><br>1. _____<br>2. _____<br>3. _____                                                | <b>Vocabulary (4–8)</b><br>organelle |
|                                                                                                     |                                                                                                       |                                                                                                     | ribosome                             |
|                                                                                                     |                                                                                                       |                                                                                                     |                                      |
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| <b>Explore It!</b>  | <b>Research It!</b>  |                                                                                                     |                                      |
| 1.                                                                                                  | 1.                                                                                                    |                                                                                                     |                                      |
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|                                                                                                     |                                                                                                       |                                                                                                     | vacuoles                             |
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|                                                                                                     |                                                                                                       |                                                                                                     |                                      |
|                                                                                                     |                                                                                                       |                                                                                                     | chloroplast                          |
|                                                                                                     |                                                                                                       |                                                                                                     |                                      |
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Name \_\_\_\_\_ Date \_\_\_\_\_



### Organize It!

Show your station to your teacher and get a check or initial.



### Illustrate It!



### Write It!

1.



### Assess It!

- 1.
- 2.
- 3.
- 4.

- 5.
- 6.
- 7.
- 8.



### Challenge It!

Show your completed worksheets to your teacher and get a check or initial before continuing.



My Challenge It! choice: \_\_\_\_\_

I am submitting Challenge It! station work:

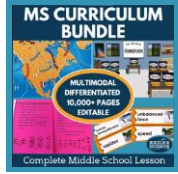
Y / N



# What Can Kesler Science Do for You?

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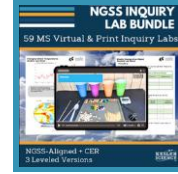
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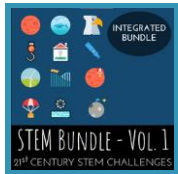
## INTERACTIVE NOTEBOOKS

Bring science journals  
to life.



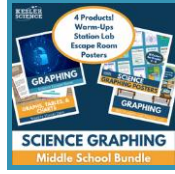
## WIKI TICKETS

Quick formative  
assessments



## STEM CHALLENGES

Real-world STEM  
problem-solving



## GRAPHING

Table and charts and  
graphs ... OH MY!



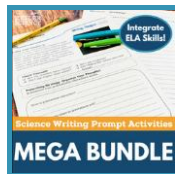
## SCIENCE READING COMPREHENSION

Leveled reading passages  
with mini-activities



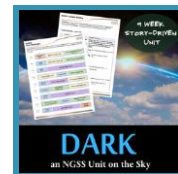
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