

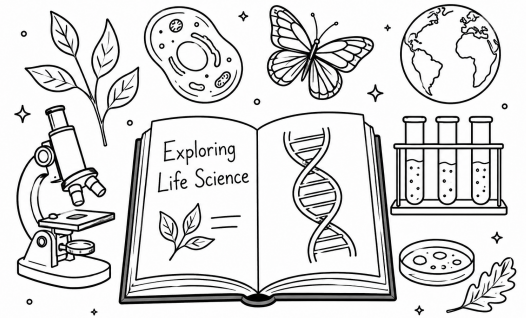
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Exploring Life Science: Your 8th Grade Honors Summer Packet

Congratulations on completing 7th grade and earning a place in 8th Grade Honors Science!

This summer packet is designed to help you strengthen the skills you will need to be successful in Biology and throughout your academic career. Next year, you will begin exploring the study of life, from cells and genetics to ecosystems and human body systems. You will also begin preparing for the New York State Biology Regents Exam.



Throughout this packet, you will think like a scientist by reading closely, analyzing information, interpreting data, and supporting your ideas with evidence. Take your time, challenge yourself, and remember that scientific discovery begins with curiosity.

Skills You Will Practice:

- Reading and analyzing scientific texts
- Finding and using evidence from a text
- Writing clear and organized CER (Claim, Evidence, Reasoning) responses
- Interpreting scientific information
- Answering reading comprehension questions
- Reading, creating, and analyzing graphs
- Explaining your thinking using facts, data, and scientific concepts

Before We Begin...

Take a moment to think about the year ahead!

- **1. What is something you are excited about as you enter 8th grade?**
- **2. What is one academic goal you would like to achieve during 8th grade?**
- **3. Biology is the study of life. What is one topic in life science that interests you the most, and why?**
- **4. The Biology Regents Exam is an important assessment that you will take at the end of the year. What is one question, concern, or challenge you have about taking the exam or succeeding in Honors Biology?**

What is CER?

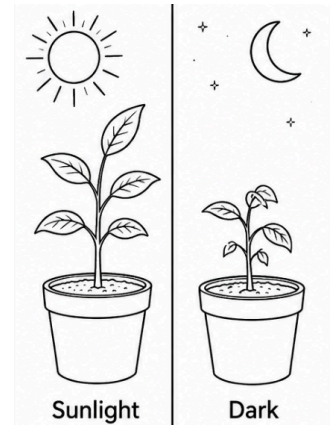
CER is a method used to organize your thinking and support your ideas with clear evidence in science. It helps you explain your answers in a logical and structured way.

CLAIM:**What is it?**

A statement or conclusion that answers a question or explains what you think is happening.

Example:

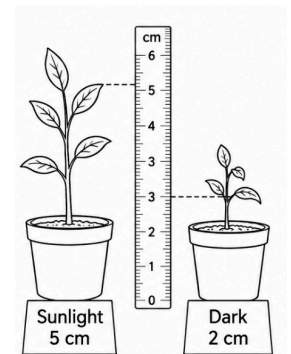
The plant grows faster in sunlight than in the dark.

**EVIDENCE:****What is it?**

Facts, data, or observations you have from experiments, research, or real-world experiences that support your claim.

Example:

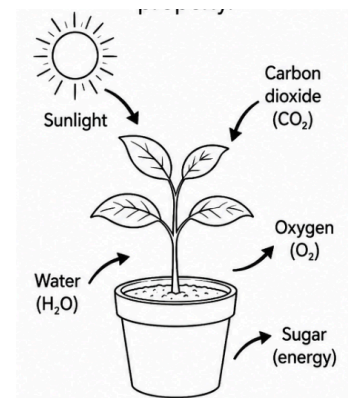
In an experiment, the plant exposed to sunlight grew 5 cm, while the plant in the dark grew only 2 cm.

**REASONING:****What is it?**

Explains why your evidence supports your claim. You make connections to scientific concepts or principles.

Example:

Plants need sunlight for photosynthesis, which helps them grow. Without sunlight, the plant cannot produce enough energy to grow properly.



Cells and Organelles: The Teamwork Inside Every Cell

Have you ever wondered how your body grows, repairs injuries, or has enough energy to get through the day? The answer begins with cells. Cells are the basic units of life, and every living organism is made of one or more cells. Although cells are microscopic, they contain many specialized structures called organelles that work together to keep the cell alive and functioning.

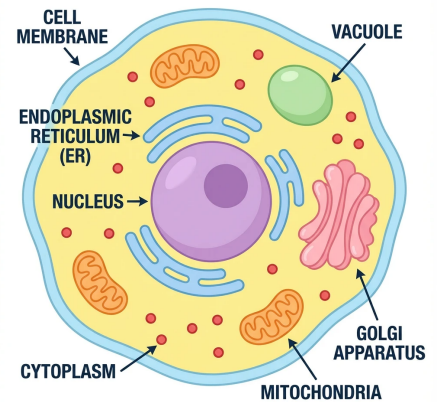
The nucleus is often called the "control center" of the cell because it contains DNA, the genetic information that directs cell activities. DNA provides instructions for making proteins, which are needed for growth, repair, and many cellular processes.

Proteins are produced by ribosomes. Some ribosomes float freely in the cytoplasm, while others are attached to the rough endoplasmic reticulum (rough ER). The rough ER helps transport proteins to other parts of the cell. Another organelle, the Golgi apparatus, modifies, packages, and distributes proteins to where they are needed.

Cells also need energy to perform their functions. Mitochondria are known as the "powerhouses" of the cell because they convert energy from food into ATP, a form of energy cells can use. Cells that require large amounts of energy, such as muscle cells, often contain many mitochondria.

Plant cells contain additional organelles not found in animal cells. Chloroplasts carry out photosynthesis, a process that uses sunlight, water, and carbon dioxide to produce glucose. Plant cells also have a large central vacuole that stores water and helps maintain the cell's shape. Both plant and animal cells contain a cell membrane, which controls what enters and leaves the cell.

The survival of a cell depends on all organelles working together. If one organelle cannot perform its function, the entire cell may be affected. Just as members of a team depend on one another to achieve a goal, organelles must cooperate to keep cells healthy and functioning properly.



CER Activity: Which Organelle Is Most Directly Responsible for a Cell's Energy Supply?

Scenario

A scientist is studying three different cell types and records the average number of mitochondria found in each cell.

Skin Cell	200
Liver Cell	1,000
Muscle Cell	2,500

The scientist also observes that muscle cells require large amounts of energy to contract and allow movement.

Question

Name: _____

Based on the information provided, which organelle is most directly responsible for supplying usable energy to the cell?

Directions

Write a CER response using complete sentences.

Claim

State which organelle is most directly responsible for supplying energy to the cell.

Evidence

Use at least two pieces of evidence from the passage and/or data table to support your claim.

Reasoning

Explain how your evidence supports your claim. Include scientific principles from the reading passage about the function of organelles and the role of ATP in cells.

Why Do Scientists Use Graphs?

Scientists collect large amounts of information, called **data**. Graphs help organize data so it is easier to understand, compare, and analyze. Astronomers use graphs to study planets, stars, weather patterns on other worlds, and much more.

Different types of graphs help us answer different questions.

★ Bar Graphs:

A **bar graph** is used to compare different categories or groups.

For example, if scientists want to compare the sizes of the planets, a bar graph can show which planets are larger or smaller than others.

A bar graph:

- Uses rectangular bars
- Compares categories
- Helps readers quickly see differences

Use a bar graph when comparing things.

★ Line Graphs:

A **line graph** is used to show change over time.

For example, scientists could track the number of exoplanets discovered each year. A line graph would show whether discoveries are increasing or decreasing.

A line graph:

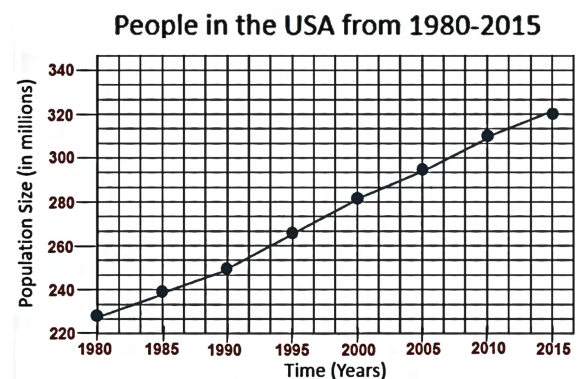
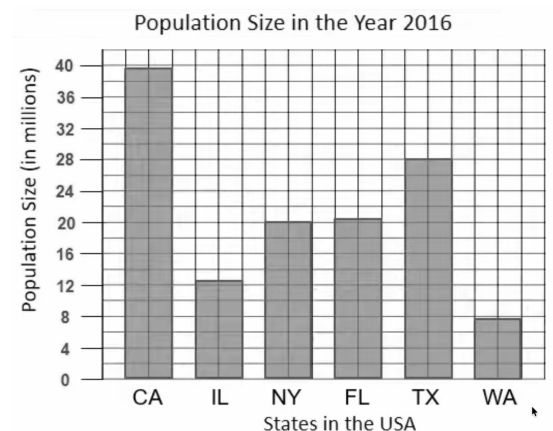
- Uses points connected by lines
- Shows trends and changes
- Helps readers identify patterns over time

Use a line graph when showing change over time.

Parts of Every Graph

Every graph should have:

✓ A title	✓ A labeled y-axis (vertical)	✓ Accurate data
✓ A labeled x-axis (horizontal)	✓ A scale that is easy to read	



Graphing Activity: Mitochondria and Energy Needs

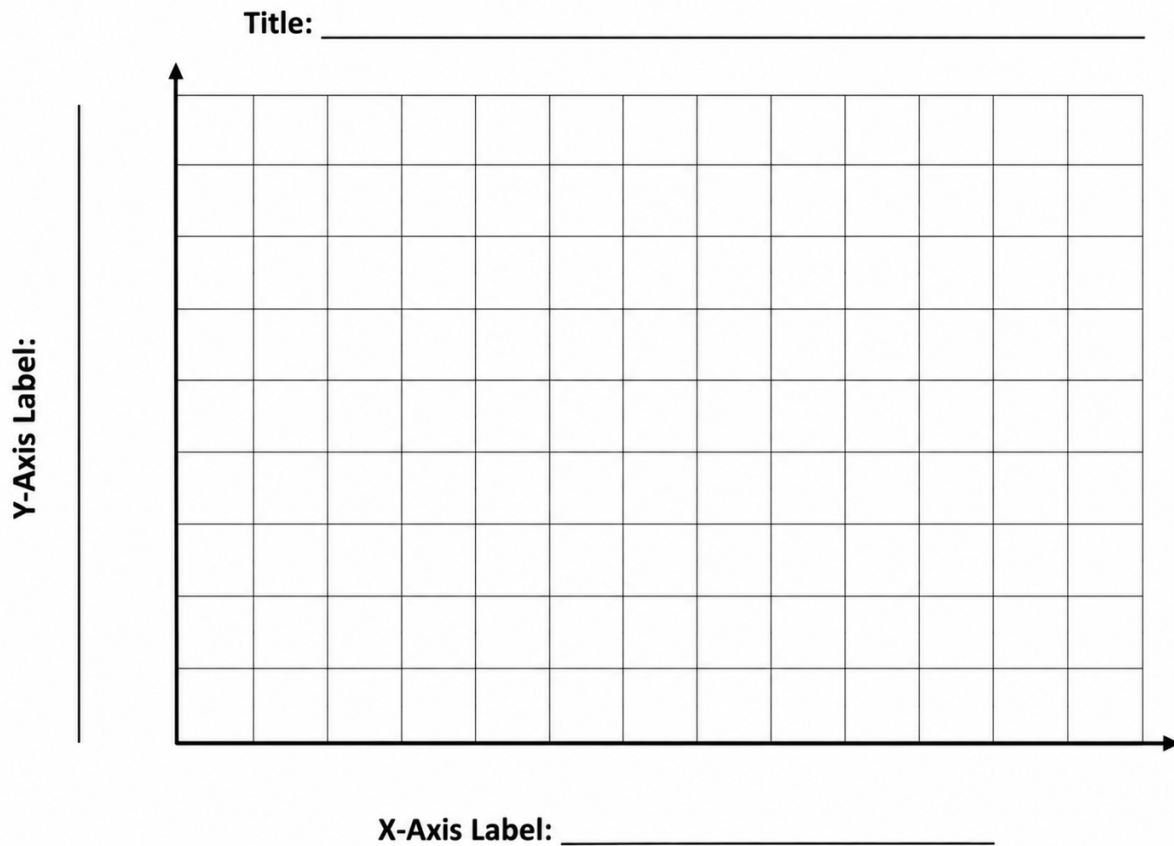
A biology student is investigating the relationship between a cell's energy needs and the number of mitochondria it contains. Remember that mitochondria are the organelles responsible for producing ATP, the usable energy that cells need to carry out their functions.

The student collected data from several types of human cells and recorded the average number of mitochondria found in each cell type.

Directions:

1. Create a **bar graph** using the data in the table below.
2. Title your graph: "**Average Number of Mitochondria in Different Cell Types**"
3. Label the **x-axis**: *Cell Type*
4. Label the **y-axis**: *Average Number of Mitochondria*
5. Use an appropriate scale on the y-axis.
6. Answer the analysis questions using complete sentences.

Data Table	
Cell Type	Average Number of Mitochondria
Skin Cell	200
Bone Cell	400
Liver Cell	1,000
Heart Muscle Cell	3,500
Skeletal Muscle Cell	2,500



Analysis Questions

1. Which cell type contains the greatest number of mitochondria?

2. Which cell type contains the fewest mitochondria?

3. Describe the overall relationship between a cell's function and the number of mitochondria it contains.

4. Why do heart muscle cells contain more mitochondria than skin cells?

5. Based on the data, predict whether a brain cell would likely contain more mitochondria than a skin cell. Explain your reasoning using evidence from the graph.

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Extension Question

Scientists discover a new cell type that requires a large amount of energy to perform its function continuously throughout the day. Predict whether this cell would have a high or low number of mitochondria and explain why.
