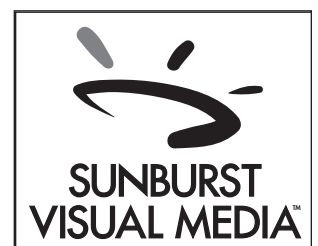


# **Inside A Cell**

**Grades 5-10**

energy  
weather  
planets  
light  
stars  
magnetism  
explore  
motion  
classification  
elements  
genes  
cells

ICTV



# CREDITS

---

Program Production

Sunburst Visual Media

Teacher's Guide

Rose Bulau, M.Ed.  
National Board Certification

Print Material Design

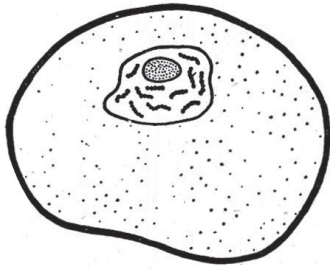
Desktop Productions

© 1999 Sunburst Visual Media, a division of Global Video, LLC  
Hawthorne, NY 10532

Approximate running time: 44 minutes

*Inside A Cell*

---



# TABLE OF CONTENTS

Guide Information .....	<b>05</b>
Fast Facts .....	<b>07</b>
Before Viewing Activities .....	<b>08</b>
During Viewing Activities .....	<b>13</b>
After Viewing Activities .....	<b>20</b>
After Viewing Quizzes .....	<b>24</b>
Additional Resources .....	<b>26</b>
Answer Keys.....	<b>30</b>
Script .....	<b>42</b>



# ABOUT THIS GUIDE

Providing students with visual media is an excellent way to take them out of the classroom and into the real world. Our programs offer real-world footage, dynamic graphics, engaging dramatizations, and first-person testimonials that keep students interested and help them visualize difficult concepts. More importantly, they reinforce critical learning objectives shaped by state and national educational standards. However, the learning doesn't begin and end when the program does. You can make the learning experience even more effective by using the materials provided in this Teacher's Guide.

This guide is divided into the following sections:

- **Fast Facts** are designed to give your students a quick overview of the information presented within the video.
- **Before Viewing Activities** help identify what students already know about the subject, what they are curious about, and what they hope to learn.
- **During Viewing Activities** may be used during viewing to enhance students' understanding of the video.
- **After Viewing Activities** help students summarize and draw conclusions from the information that was presented.
- **After Viewing Quizzes** test students' retention of the information presented in the program and activity sheets.
- **Additional Resources** are designed to help you extend the information presented in the program into other areas of your curriculum.
- **Answer Keys** are provided for relevant activities or reproducible pages.
- **Script** content is provided in an unabridged version for future reference.

# PROGRAM OVERVIEW

---

Guide  
Information

*Inside a Cell* provides a comprehensive look at this topic. Students will discover the various components of cells. They will view cell organelles and learn about their functions.

## VIEWING OBJECTIVES

---

By viewing the video/DVD and engaging in the activities provided, students will be able to:

- Identify the main organelles in a cell
- List the major parts of a cell
- Describe the functions of the different parts of a cell
- Explain how organelles work together in a cell
- Explain the importance of cell functions

### **Objectives from the National Science Foundation Correlations:**

All students should develop an understanding of the characteristics of organisms.

Each plant or animal has different structures that serve different functions in growth, survival, and reproduction

# CELL FAST FACTS

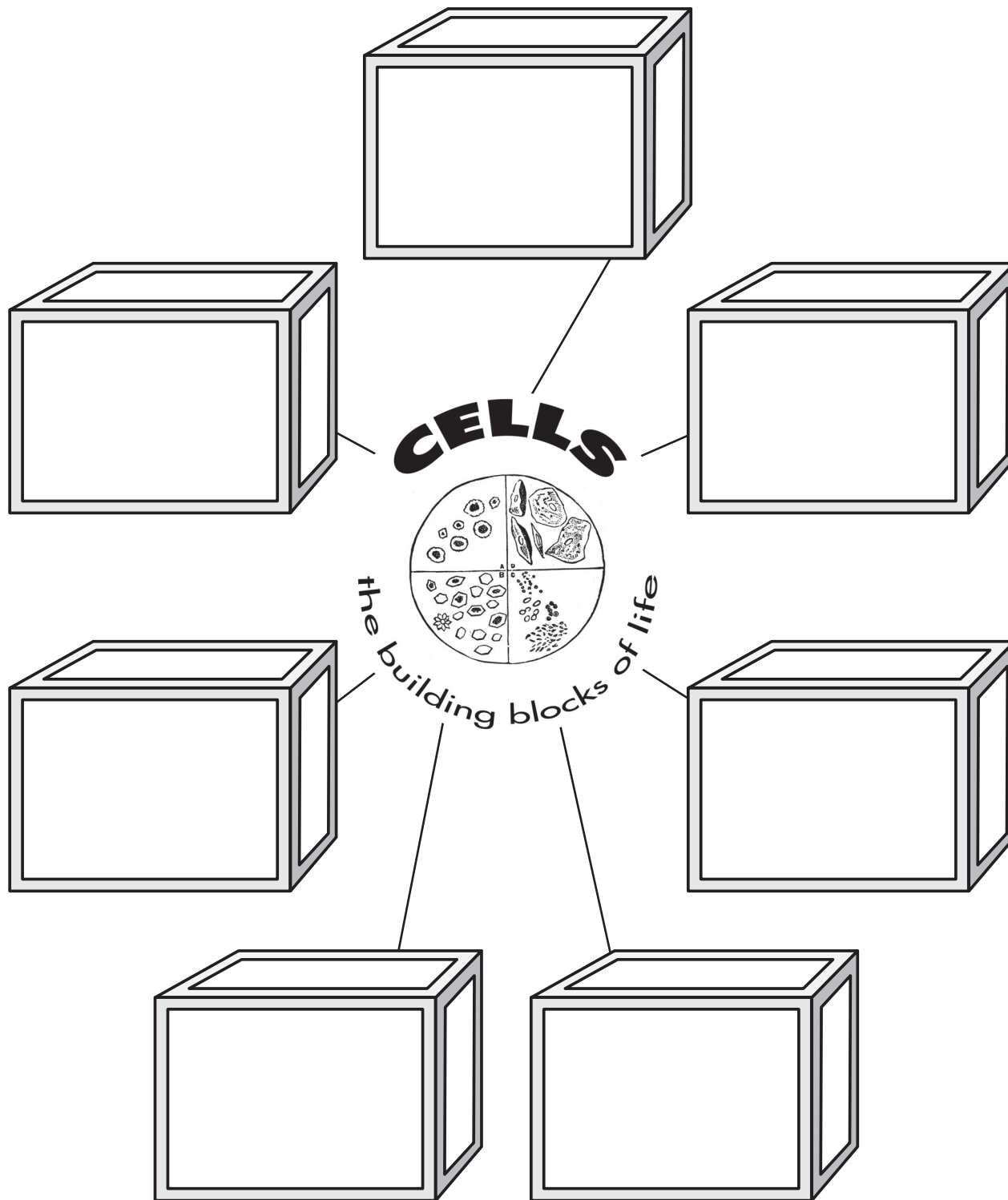
---

Fast Facts

- Every living thing on Earth is composed of cells.
- Cytoplasm is the jelly-like substance that breaks down molecules to produce energy and builds up other molecules.
- The cell membrane is the thin layer around the cell that holds organelles in place.
- Cell membranes are semi-permeable, meaning that only certain particles are allowed to pass through them.
- The cell membrane is the gatekeeper of the cell.
- Lipids are organic compounds like fats and waxes that can pass easily through the cell membrane. They are required for the growth of cell membranes and organelles.
- The cell membrane exports and imports nutrients and passes waste and unwanted particles outside of the cell.
- A cell is matter in one of its smallest forms.
- The cytoskeleton moves through the cytoplasm, providing support, strength, and shape for the cell. It is made of long, thin pieces of protein.
- The endoplasmic reticulum synthesizes macromolecules, separates molecules, and transports proteins. Some contain ribosomes (rough) and some don't (smooth).
- Ribosomes synthesize protein. They are found on rough endoplasmic reticulum and in the cytoplasm.
- The Golgi apparatus consists of interconnecting membranes. It connects, modifies, and packages substances manufactured by the cell (proteins, synthesized substances.)
- The vesicle stores and transports substances from Golgi apparatus to other parts of the cell.
- The lysosome uses digestive enzymes to break down worn-out organelles and particles.
- If a lysosome breaks, the digestive enzymes would leak into the cell and digest it.
- The mitochondria are considered the powerhouses of the cell. They have a double membrane. The inner layer is layered with complex folds called cristae. Mitochondria use sugars and fatty acids to generate energy. Mitochondria are self-replicating (they grow and divide). Mitochondria have their own DNA.
- Cristae contain special enzymes that trap energy from broken down sugars.
- The centriole is located next to the nucleus and helps organize the cytoskeleton. They also help with cell division.
- The nucleus is the control center of the cell. It directs the organelles in the cell and monitors activities in the nucleolus. It controls protein synthesis.
- DNA carries genetic messages.
- Chromatin is a mass of DNA and protein. It condenses into chromosomes when the cell divides. The chromosomes carry the DNA to the new cell during division.
- Mitosis is cell division. Body cells divide and replicate. Phases of mitosis are prophase, metaphase, anaphase, and telophase.

# Inside a Cell

Complete the thinking map below using what you already know about cells.





# Word Splash

Here you will find important vocabulary words related to this topic. On a separate piece of paper, write a paragraph, telling what you know about cells. Use as many of the words listed here as possible. Use a dictionary if necessary.

nucleus

cells

membrane

mitosis

organism

organelle

chromosome

DNA

energy

# Yes or No

Read each statement below. Decide whether you agree or disagree with the statement. Check the appropriate box in the Before Viewing column. After you've viewed the video/DVD, go through each statement again. Decide if you still agree or disagree with each statement. Check the appropriate box in the After Viewing column.

## Before Viewing

agree/disagree

Every living thing on Earth is composed of cells.

The cell membrane holds the cytoplasm and organelles in place.

A semi-permeable membrane does not allow anything to pass through it.

The cytoskeleton determines the size of the cell.

There are two kinds of endoplasmic reticulum.

Ribosomes are found only in cytoplasm.

Vesicles are attached to the Golgi apparatus.

The mitochondria are the powerhouses of a cell.

Mitochondria contain their own DNA.

Centrioles help in cell division.

The nucleus digests organelles.

The nucleolus makes ribosomes.

Cell division is called DNA.

The jelly-like stuff in a cell is called an organelle.

Lipids pass easily through the cell membrane.

## After Viewing

agree/disagree

# Circling Cells

Listed below are several vocabulary words that are related to cells. Find the words in the puzzle and circle them.

CELL MEMBRANE  
CENTRIOLE  
CYTOPLASM  
MITOCHONDRIA  
ENDOPLASMIC RETICULUM  
GOLGI APPARATUS

LYSOSOME  
NUCLEOLUS  
NUCLEUS  
RIBOSOME

Y C Y W P C Z G L O H Y X G X E A Q D O  
J E J N U E V R Z O M G X O Y F I Q J Y  
E C C T T N L N U C L E O L U S R C W R  
F L Z U R T W P U N V M L G K P D K P M  
S W G M X R S S G C M K S I P K N E T H  
M U L U C I T E R C I M S A L P O D N E  
D P E U H O L V F L X U G P L S H N E W  
B A D L A L T J E K B I S P K P C E Y J  
Z B S V C E L L M E M B R A N E O H X U  
B U M K M U E M O S O B I R X Y T T R D  
V U M Q S I N T S Q R X U A K X I X Y C  
V W Q G K Z R E O W L I M T L F M J I C  
F M E E V D G F S Q Z S Z U A Y P L L J  
Q V M G K K C K Y Z L T J S N W R G E M  
M C H L X J A R L Z U W B K G R H X D W

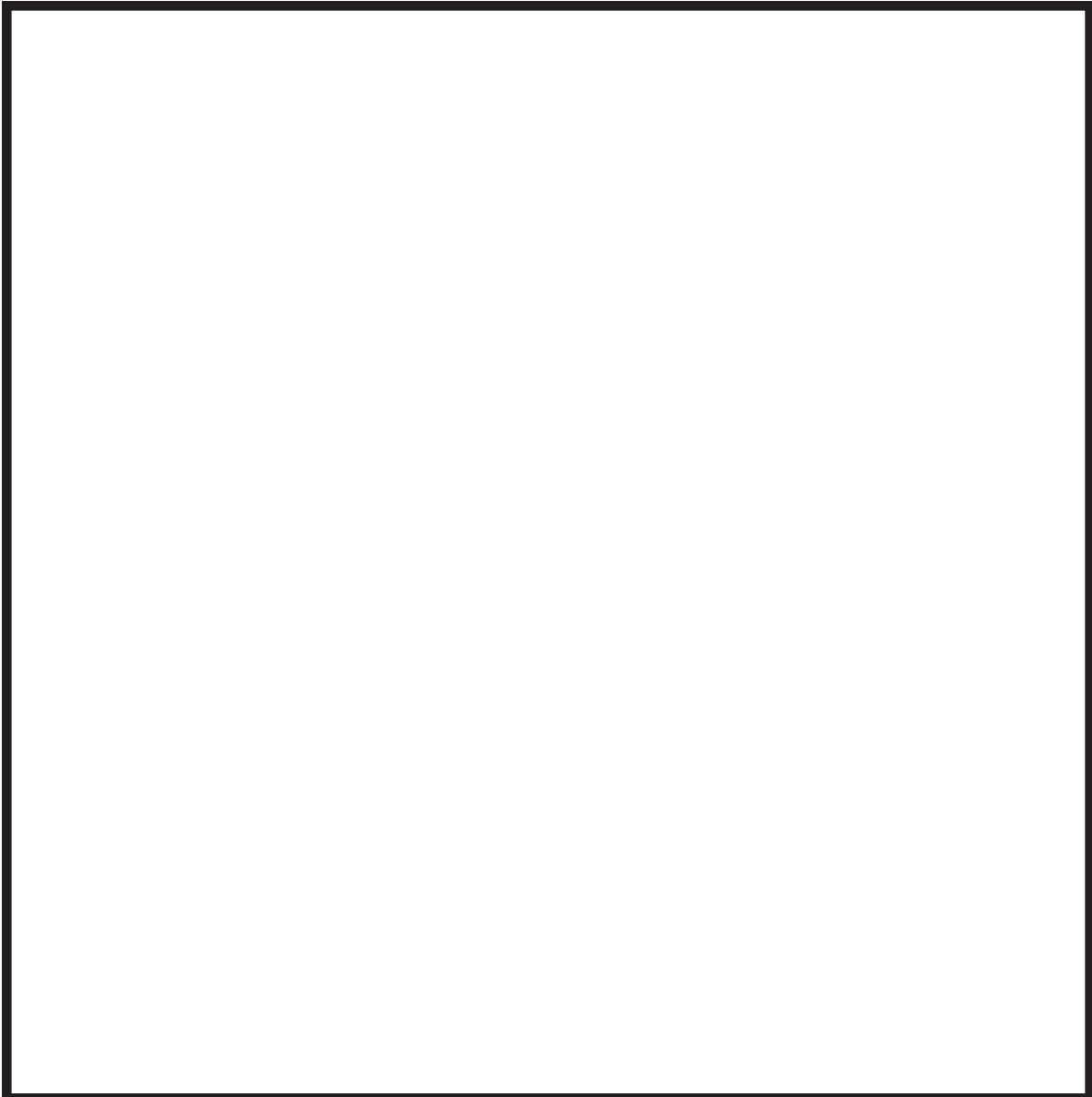


# Cell Diagram

Using the space below, draw a basic cell and label its parts. Use the words below to label your cell.

cell membrane  
cytoplasm  
centrioles  
nucleus  
endoplasmic reticulum (smooth)  
endoplasmic reticulum (rough)

lysosome  
mitochondria  
nucleolus  
vacuole  
ribosomes  
Golgi apparatus



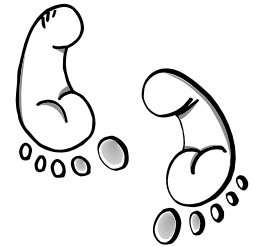
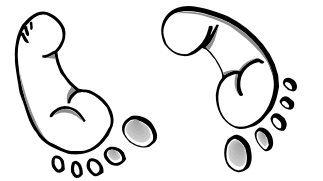
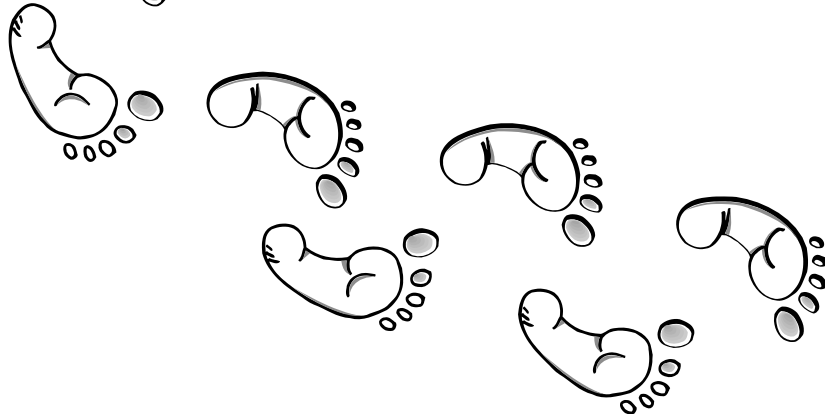
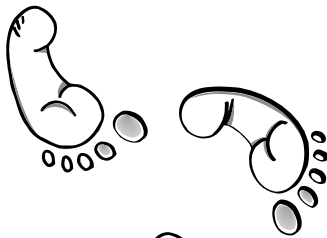
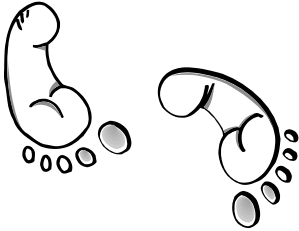
# Word Match

Match each definition with its term.

- |   |                          |
|---|--------------------------|
| _____ 1. the thin layer around the cell that holds the cytoplasm and organelles in place        | A. semi-permeable        |
| _____ 2. the jelly like substance where molecules are broken down to produce energy             | B. endoplasmic reticulum |
| _____ 3. a membrane that only allows certain particles to pass through it                       | C. chromatin             |
| _____ 4. organic compounds like fats and waxes that easily pass through the cell membrane       | D. cytoskeleton          |
| _____ 5. the control center of the cell   | E. vesicle               |
| _____ 6. provides support, strength, and shape to the cell                                      | F. lysosome              |
| _____ 7. gives strength to the cytoskeleton   | G. DNA                   |
| _____ 8. synthesizes macromolecules in the cell   | H. nucleus               |
| _____ 9. synthesizes protein in the cell  | I. cristae               |
| _____ 10. forms on the ends of the top layer of the Golgi apparatus                             | J. nucleolus             |
| _____ 11. collects, modifies, and pockets substances manufactured by the cell                   | K. mitosis               |
| _____ 12. breaks down worn out organelles, debris, and large ingested particles within the cell | L. centrioles            |
| _____ 13. the powerhouse of the cell  | M. cell membrane         |
| _____ 14. the folds on the mitochondria   | N. protein               |
| _____ 15. migrate to the poles of the cell to assist in division                                | O. mitochondria          |
| _____ 16. produces ribosomes in the nucleus   | P. cytoplasm             |
| _____ 17. cell division   | Q. Golgi apparatus       |
| _____ 18. carries genetic messages  | R. ribosome              |
| _____ 19. a mass of DNA and protein   | S. lipid                 |

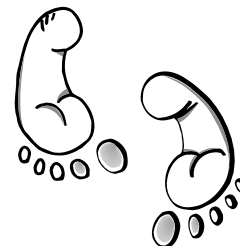
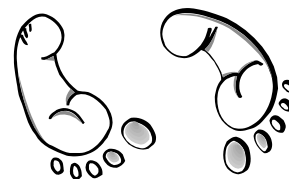
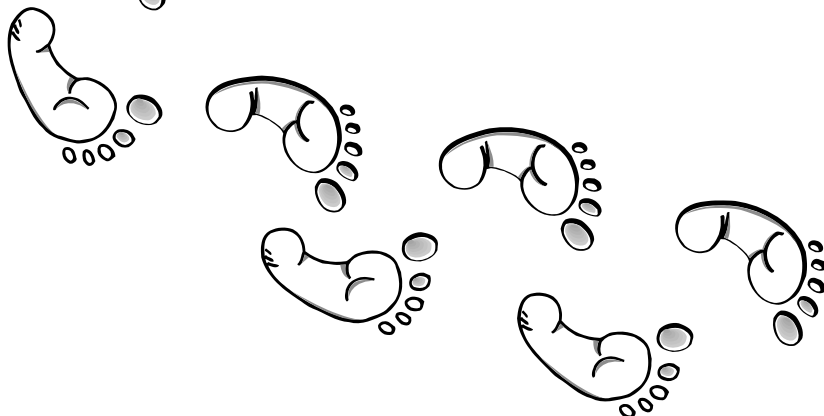
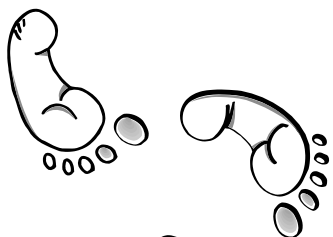
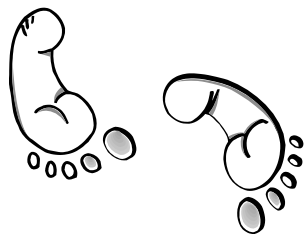
# Walking With Ryan

During the video/DVD, Ryan takes several steps to find his way out of the cell.  
As you watch and listen to the characters he meets, record their jobs below.



# Walking With Ryan (cont.)

During the video/DVD, Ryan takes several steps to find his way out of the cell.  
As you watch and listen to the characters he meets, record their jobs below.





# Take a Note

Listed below are some of the topics related to the video. Take notes about these topics as you watch and listen to the video/DVD. Write questions you still have about each topic so that you can discuss them.

Organelle

Golgi apparatus

Cytoplasm

Lysosome

Endoplasmic Reticulum

Centriole

Mitochondria

Nucleus

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

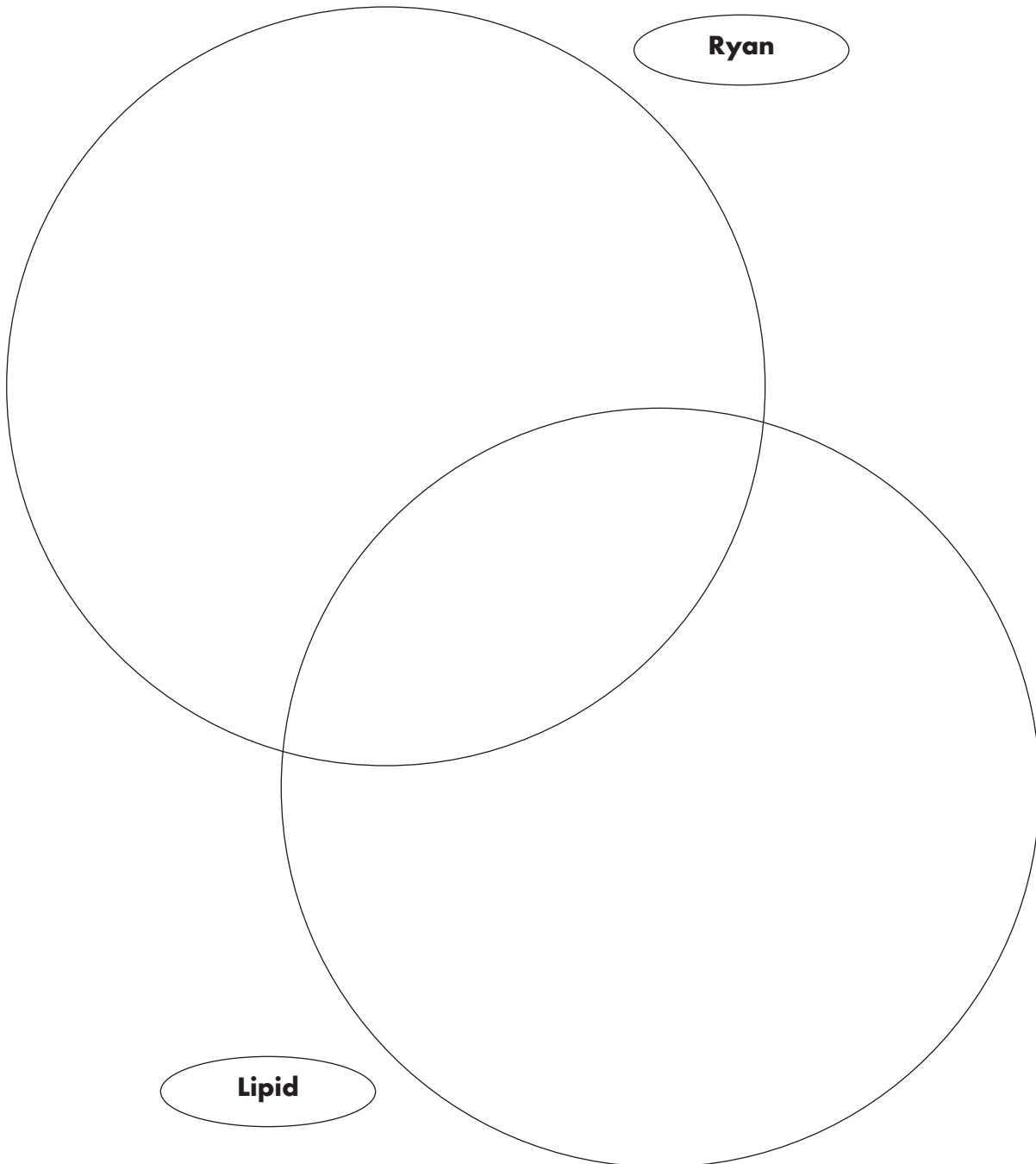
---

---

---

# Lipid or Not?

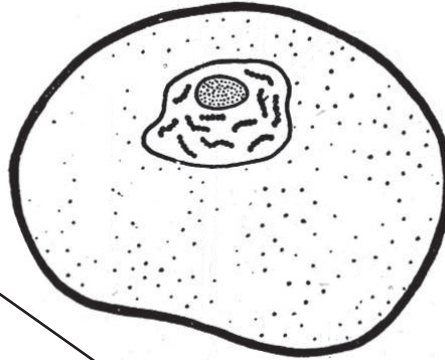
The organelles keep thinking that Ryan is a lipid. Compare Ryan with a lipid by using the Venn diagram below.



# The Big Guy

As Ryan makes his way through the cell, the organelles keep telling him that he needs to see the nucleus. They keep referring to the nucleus as an extremely important figure. As you listen to the video/DVD, write down the reasons why.

## The Nucleus

Five large, empty diamond-shaped boxes arranged in a staggered pattern below the cell diagram. These boxes are intended for students to write down reasons why the nucleus is important, as instructed in the text above.

# What Am I?

Use the clues to determine which cell organelle is being described.  
Write the name of the organelle after the question.

1. I feel like jelly, but my job is important. I am the place where molecules are broken down to produce energy and where other molecules are built up.  
What am I? \_\_\_\_\_
2. I am a thin layer that surrounds the cell. I hold all of the organelles in place. I let some things into the cell and keep others out. What am I? \_\_\_\_\_
3. I am strong like a bone. I provide support, strength and shape to the cell.  
My long thin structures are made of protein. What am I? \_\_\_\_\_
4. I can be rough or smooth, but my job is to make macromolecules like proteins, lipids, and complex carbohydrates. I also separate molecules that go to the cytoplasm from those that go to other sites. What am I? \_\_\_\_\_
5. I am made in the nucleolus and found on rough endoplasmic reticulum.  
I synthesize protein and send it to different parts of the cell. What am I?  
\_\_\_\_\_
6. I hang out with vesicles and I collect, modify, and package substances manufactured by the cell. What am I? \_\_\_\_\_
7. I eat and eat debris, old organelles and large ingested particles within the cell.  
If I get too full and burst, my digestive enzymes will destroy the whole cell.  
What am I? \_\_\_\_\_
8. I am called the powerhouse of the cell. I have two membranes where I break down sugars and fatty acids to trap energy. I am self-replicating and have my own DNA. What am I?  
\_\_\_\_\_
9. I hang out near the nucleus. My job is to organize microtubules and migrate to the ends of the cell to assist in mitosis. What am I? \_\_\_\_\_
10. I am the brains of the operation. I direct all of the organelles and keep track of the DNA in my membrane. What am I? \_\_\_\_\_

# Think It Over

Discuss each question with your team before writing your own answer.

1. You now know more about what happens in a cell. Can you compare the functions of organelles to the functions of your school or a city? What roles might be similar? What might be different?

---

---

---

2. Why do you think the organelles thought that Ryan was a lipid? \_\_\_\_\_

---

---

---

3. In your opinion, which organelle has the most important job? The toughest job? The easiest job? Explain your answer. \_\_\_\_\_

---

---

---

4. What kind of relationship does the vesicle have with the Golgi apparatus? \_\_\_\_\_

---

---

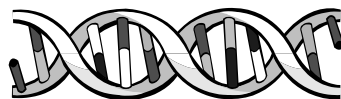
---

5. What do you know about DNA? \_\_\_\_\_

---

---

---



# Fun With Microscopes

Follow the steps below to explore cells further with microscopes.  
Show your findings in words and in pictures.

1. Look at several prepared slides. This will help you to develop skill in using the microscope. Does your microscope reverse the image so that moving the slide one direction makes the image in the microscope move the opposite direction? If so, it takes a little more practice to become skilled at moving objects under the lens.
2. Practice drawing what you see in the microscope. Use a compass or a round object to make a circle on a piece of paper. Use this as the round area that you see in the microscope. Draw the object you are looking at so it fills as much of the circle as the object fills of the area you see in the microscope (called the field of view or field).
3. Most microscopes use a mirror or electric light underneath an object to light it up. The object must be thin enough that light can pass through it. Other microscopes, usually having lower magnification, use light from the top to shine down on objects viewed. These are called dissecting microscopes and are often used to look at larger objects such as flowers which are then taken apart or dissected. Remember to use a very small piece of any object you are looking at if the light source is below the object.
4. Scrape a wooden toothpick along the inside of your cheek and smear it on a slide. Look at the slide to see if you can find any cells from the inside of your cheek.
5. Get some water from a pond, a puddle or an aquarium. Can you find anything swimming in a drop of water when you look at it under the microscope? Put a handful of dead grass in a small jar of this water and leave it with the top off for a week. A peanut butter jar is good for this. Look at it again in a week to 10 days when it is starting to smell bad. Do you find things swimming in it now? This is called a hay infusion. See if you can identify some of the things you find in the hay infusion or make up your own names that describe them.
6. Get a piece of onion. Break it apart where one layer peels away from another. Use tweezers or your fingernails to pull a thin layer off the inside or outside surface of this onion layer. Look at it under the microscope. Can you see the cells that make up this onionskin layer? If you can, put a drop of iodine on it. Can you see the cells better now? Look at pieces of thread from different clothes. Compare the small fibers that make up the threads.
7. Dissolve different household powders in water (get permission first so you know it is safe) and leave them until the water evaporates away. You may find interesting crystals left behind. Try salt and sugar for example. Put some iodine on a slide, let it evaporate and look at what is left behind.

# Cell Tour

Follow these steps to create a class tour of the cell.

1. With your team, choose two organelles that you will investigate.
2. Develop a list of questions with your team that you will answer through your research and presentation. List your questions here:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_


\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



3. Complete the research. You may need to change your questions as you work.  
Write your information on separate paper.
4. Create a poster or model showing each of the organelles and giving all of the information you have located.
5. Together, write a script that guides visitors through your organelles.
6. Have all teammates practice with the script so that they can say it clearly and loudly.
7. Arrange your organelle posters with others in the class and be prepared to participate in a class cell tour.

# Cell Knowledge Quiz

Choose the best answer for each question.

1. The nucleus is sometimes called the \_\_\_\_\_ of the cell.
  - a. powerhouse
  - b. gatekeeper
  - c. control center
  - d. transporter
2. Mitochondria are self-replicating which means they \_\_\_\_\_.
  - a. divide and make copies of themselves
  - b. provide support, strength, and shape to cells
  - c. hold organelles in place
  - d. transport digestive enzymes
3. Ribosomes can be found \_\_\_\_\_.
  - a. in the cytoplasm
  - b. on the endoplasmic reticulum
  - c. in the centrioles
  - d. A and B
4. Which of the following are organelles?
  - a. Mitochondria
  - b. Vesicle
  - c. Golgi apparatus
  - d. All of the above
5. Which of the following contains its own DNA?
  - a. Golgi apparatus
  - b. Mitochondria
  - c. Endoplasmic reticulum
  - d. Cytoplasm
6. Cell division is known as
  - a. Mitosis
  - b. Prophase
  - c. Telophase
  - d. Reproduction



# Cell Knowledge Quiz (cont.)

Choose the best answer for each question.

7. Every living thing is composed of \_\_\_\_\_.
  - a. cells
  - b. organelles
  - c. cytoskeleton
  - d. DNA
  
8. The \_\_\_\_\_ has the job of exporting and importing nutrients as well as passing waste and unwanted particles outside the cell.
  - a. mitochondria
  - b. cell membrane
  - c. cytoplasm
  - d. All of the above
  
9. If a lysosome breaks, the \_\_\_\_\_ would leak into the cell and digest it.
  - a. cytoskeleton
  - b. digestive enzymes
  - c. nuclear membrane
  - d. cytoplasm
  
10. DNA carries \_\_\_\_\_ information.
  - a. speed of cell division
  - b. the stages of mitosis
  - c. genetic
  - d. centriole movement

## Language Arts

**Flash Cards** – Hand out index cards to students, provide enough so there is one card for each vocabulary word you want your students to make into a flashcard. On the front of each card have them draw a picture of an organelle and write the name of the organelle. On the back of the card, tell them to describe the function of that organelle. Then, ask them to use these flashcards with another classmate to practice their knowledge of cell functions.

**Comic strip** – Write a comic strip or comic book about one or more organelles in a cell. Be creative but make sure to include factual information about the functions of the organelle you are writing about.

**Creative writing** – Write a story from the point of view of one of the organelles. Describe what your job is and how it affects you and the other organelles in your cell.

**Analogy** – Compare the functions of a cell to that of your town or school. How are the organelles and their functions similar to or different from the people and structures of your school or town?

## Social Studies

**Make a map** – Draw a map of a cell. Make a key and label your map so that anyone who looks at it knows what the organelles are and where they are found.

**Timeline** – Use your library or the Internet to discover how cell research began and how it has evolved over time. Prepare a timeline showing how far we have come in this area of science.

**Travel Brochure** – Pretend you are a travel agent trying to get people to visit a cell. Create a travel brochure encouraging people to visit each of the organelles. Be sure to include all of the positive attributes of each destination.

**Research project** – Using the library or Internet, research and present to the class information about cell disease and cell research.

## Health/P.E.

Invite a specialist to talk to your class about cell disease and stem cell research.

Invite the school nurse to talk to your class about the importance of maintaining good health to keep your body's cells healthy.

# Interdisciplinary Ideas

---

## Fine Arts

**Game Show** – With a group of students, create a game quiz show to practice your knowledge of cell parts and their functions. Fashion the game after your favorite TV game show or be creative and make up your own format.

**Board game** – Create a board game for other students. The game should include factual information about cells and organelles. Test it out on your classmates to see if it is fun and educational.

**Drama** – Create a play with your classmates. Each role represents an organelle in a cell. Write the parts so that they interact the way the parts of a cell do.

**3-D Cell** – Using clay, create a three-dimensional model of a cell.

**Cell Museum** – A challenging project for older students would be to research and design a traveling Cell Museum. After conducting research on a particular type of cell, students can use self-hardening modeling clay to create 3-D models for specific cell structures. A museum guide should be developed to support the display.

**Name that Slide** – If you have access to compound microscopes in your school, set up a lab and let students sort several prepared slides similar to those in the Virtual Electron Microscope activity. Cover the labels on the prepared slides and have students identify each slide as a plant or animal cell or have them identify the object they observe from a list provided for them. Students could also diagram one of the specimens they observed. Be sure they draw only what they see under the microscope.

# Suggested Reading List

Additional  
Resources

- Jeffris, David. *Cloning: Frontiers of Genetic Engineering*. Crabtree Publishing, 1999. Astonishing new findings about cells, DNA, and genetics are leading to rapid advances in the treatment of disease, the success of organ transplants, and the efficiency of agriculture. Succinct text, photographs, and illustrations explain the history of genetic research and the potential of cloning to our future.
- Kramer, Stephen. *Hidden Worlds: Looking Through a Scientist's Microscope*. Houghton Mifflin. Stunning photos of microscopic images invite the reader to investigate the amazing hidden world that comes to life under a microscope. This captivating book discusses how a scientist becomes interested in microscopes, how scientists use them in their work, and what has been discovered through research.
- Ruiz, Andres Llamas. *The Life of a Cell*. Sterling, 1997. From single-celled organisms to the complexity of the human body, the cell is the basic unit of life. This beautifully illustrated book takes a look at the various parts that make up a cell, how a cell functions, and how cells adopt a specialty as they gather together to form tissues.
- Young, John K. *Cells: Amazing Forms and Functions*. Franklin Watts, 1990. Along with basic information about the structure and function of cells, this book provides details about the variety of strange and wonderful types of cells that make up the human body. It also includes a brief history of our understanding of DNA, the "code of life."
- Yount, Lisa. *Antoni Van Leeuwenhoek: First To See Microscopic Life*. Enslow. Not a scientist but a fabric seller, Antoni van Leeuwenhoek's life teaches us much about the scientific processes of observation, record keeping, and formulating a hypothesis. He improved upon a tool of his trade, the magnifying glass, to create quality microscopes. For his entire 91 years, he was curious, meticulous, and thrilled with his discoveries and successes. He is an inspiration to all budding scientists. Includes activities using a microscope or magnifying glass.



# Internet Sites

---

**<http://micro.magnet.fsu.edu/primer/index.html>**

Teachers and older students might enjoy visiting Molecular Expression's Primer on microscope use. Anyone interested in microscopes will enjoy a visit to their images page.

**<http://www.howe.k12.ok.us/~jimaskew/bcell1.htm>**

This site explores cell theory. Historical information and related terminology are given. There are also links to other sources.

**[www.cell.com](http://www.cell.com)**

Diagrams and illustrations clarify the components of cells. Functions of cell parts are also investigated.

**<http://www.jcb.org/>**

This site, from the Journal of Cell Biology, provides up to date information about cell research. Information about cell processes is provided. There are also many links to additional information.

**<http://www.plantcell.org/>**

This site is from the American Society of Plant Biologists. There is a good deal of information here about plant cells. Effective illustrations add to the clarity of the information provided.

**<http://www.cellsalive.com/>**

This site is called Cells Alive! It provides an interactive look at cells and the functions of cell organelles. This site includes a few QuickTime movies and animations of microscopic organisms.

**<http://www.life.uiuc.edu/plantbio/cell/>**

This is a site for a virtual tour of a cell. Students will gain a solid understanding of cells and the functions of the organelles as they travel through the cell.

**[www.ascb.org](http://www.ascb.org)**

The American Society for Cell Biology provides this site. While some of the information included is geared toward older students, it provides a valuable source of diagrams and definitions that might be useful at all levels.

**[www.biology4kids.com](http://www.biology4kids.com)**

This site provides detailed and factual information in a format that is easy to understand and can be used by even young students. It is a good source of information and is very comprehensive.

# Yes or No

Read each statement below. Decide whether you agree or disagree with the statement. Check the appropriate box in the Before Viewing column. After you've viewed the video/DVD, go through each statement again. Decide if you still agree or disagree with each statement. Check the appropriate box in the After Viewing column.

## Before Viewing

agree/disagree

Every living thing on Earth is composed of cells.

The cell membrane holds the cytoplasm and organelles in place.

A semi-permeable membrane does not allow anything to pass through it.

The cytoskeleton determines the size of the cell.

There are two kinds of endoplasmic reticulum.

Ribosomes are found only in cytoplasm.

Vesicles are attached to the Golgi apparatus.

The mitochondria are the powerhouses of a cell.

Mitochondria contain their own DNA.

Centrioles help in cell division.

The nucleus digests organelles.

The nucleolus makes ribosomes.

Cell division is called DNA.

The jelly-like stuff in a cell is called an organelle.

Lipids pass easily through the cell membrane.

## After Viewing

agree/disagree

ANSWER KEY

# Circling Cells

Listed below are several vocabulary words that are related to cells.  
Find the words in the puzzle and circle them.

CELL MEMBRANE  
CENTRIOLE  
CYTOPLASM  
ENDOPLASMIC

RETICULUM  
GOLGI APPARATUS  
LYSOSOME  
MITOCHONDRIA  
NUCLEOLUS

NUCLEUS  
RIBOSOME

Y	C	Y	W	P	C	Z	G	L	O	H	Y	X	G	X	E	A	Q	D	O
J	E	J	N	U	E	V	R	Z	O	M	G	X	O	Y	F	I	Q	J	Y
E	C	C	T	T	N	L	N	U	C	L	E	O	L	U	S	R	C	W	R
F	L	Z	U	R	T	W	P	U	N	V	M	L	G	K	P	D	K	P	M
S	W	G	M	X	R	S	S	G	C	M	K	S	I	P	K	N	E	T	H
M	U	L	U	C	I	T	E	R	C	I	M	S	A	L	P	O	D	N	E
D	P	E	U	H	O	L	V	F	L	X	U	G	P	L	S	H	N	E	W
B	A	D	L	A	L	T	J	E	K	B	I	S	P	K	P	C	E	Y	J
Z	B	S	V	C	E	L	L	M	E	M	B	R	A	N	E	O	H	X	U
B	U	M	K	M	U	E	M	O	S	O	B	I	R	X	Y	T	T	R	D
V	U	M	Q	S	I	N	T	S	Q	R	X	U	A	K	X	I	X	Y	C
V	W	Q	G	K	Z	R	E	O	W	L	I	M	T	L	F	M	J	I	C
F	M	E	E	V	D	G	F	S	Q	Z	S	Z	U	A	Y	P	L	L	J
Q	V	M	G	K	K	C	K	Y	Z	L	T	J	S	N	W	R	G	E	M
M	C	H	L	X	J	A	R	L	Z	U	W	B	K	G	R	H	X	D	W

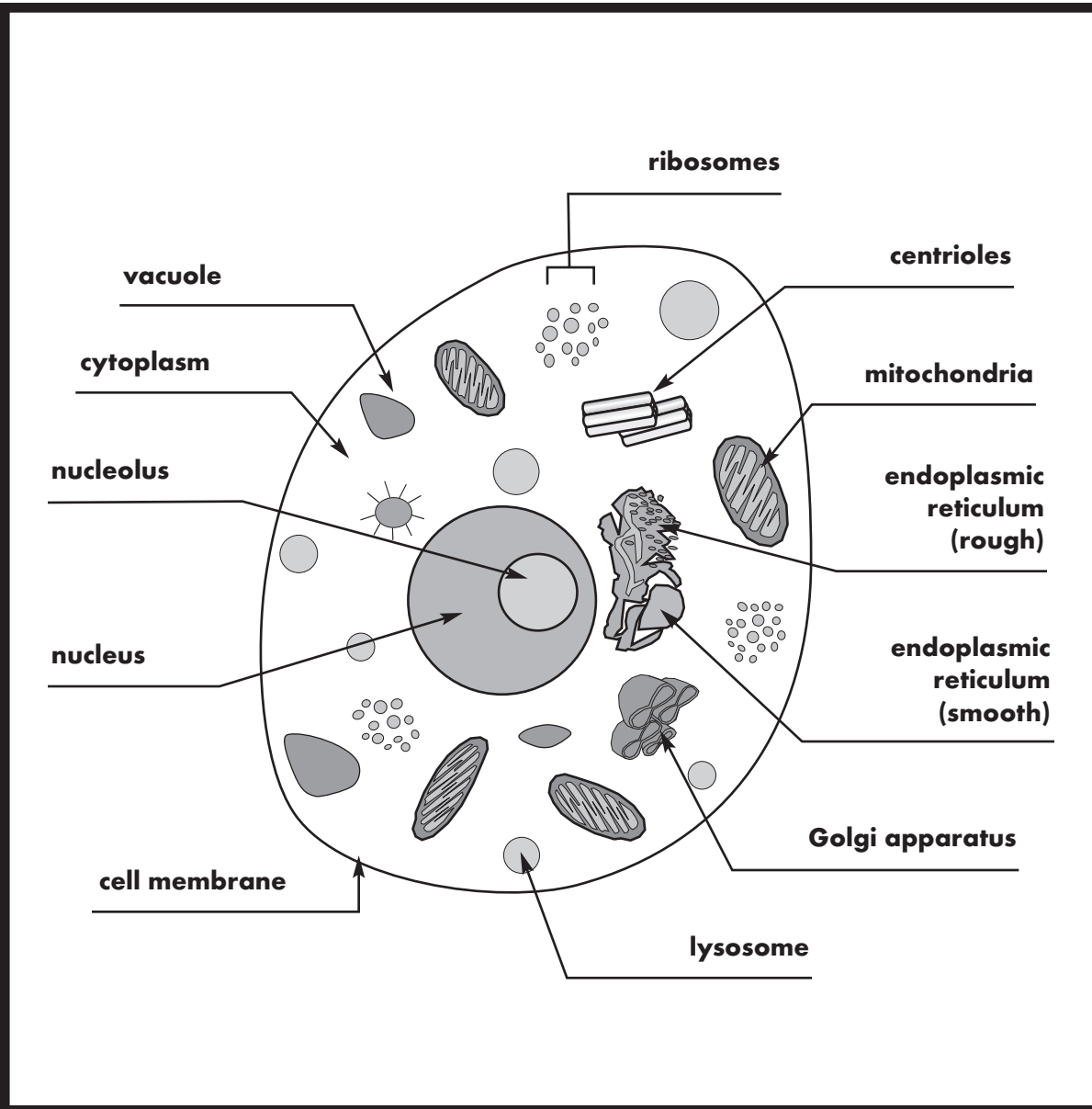
ANSWER KEY

# Cell Diagram

Using the space below, draw a basic cell and label its parts. Use the words below to label your cell.

cell membrane  
cytoplasm  
centrioles  
nucleus  
endoplasmic reticulum (smooth)  
endoplasmic reticulum (rough)

lysosome  
mitochondria  
nucleolus  
vacuole  
ribosomes  
Golgi apparatus



ANSWER KEY



# Word Match

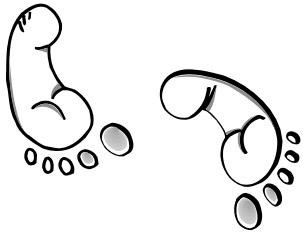
Match each definition with its term.

- |   |   |
|---|---|
| <p><u>M</u> 1. the thin layer around the cell that holds the cytoplasm and organelles in place</p> <p><u>P</u> 2. the jelly like substance where molecules are broken down to produce energy</p> <p><u>A</u> 3. a membrane that only allows certain particles to pass through it</p> <p><u>S</u> 4. organic compounds like fats and waxes that easily pass through the cell membrane</p> <p><u>H</u> 5. the control center of the cell</p> <p><u>D</u> 6. provides support, strength, and shape to the cell</p> <p><u>N</u> 7. gives strength to the cytoskeleton</p> <p><u>B</u> 8. synthesizes macromolecules in the cell</p> <p><u>R</u> 9. synthesizes protein in the cell</p> <p><u>E</u> 10. forms on the ends of the top layer of the Golgi apparatus</p> <p><u>Q</u> 11. collects, modifies, and pockets substances manufactured by the cell</p> <p><u>F</u> 12. breaks down worn out organelles, debris, and large ingested particles within the cell</p> <p><u>O</u> 13. the powerhouse of the cell</p> <p><u>I</u> 14. the folds on the mitochondria</p> <p><u>L</u> 15. migrate to the poles of the cell to assist in division</p> <p><u>J</u> 16. produces ribosomes in the nucleus</p> <p><u>K</u> 17. cell division</p> <p><u>G</u> 18. carries genetic messages</p> <p><u>C</u> 19. a mass of DNA and protein</p> | <p>A. semi-permeable</p> <p>B. endoplasmic reticulum</p> <p>C. chromatin</p> <p>D. cytoskeleton</p> <p>E. vesicle</p> <p>F. lysosome</p> <p>G. DNA</p> <p>H. nucleus</p> <p>I. cristae</p> <p>J. nucleolus</p> <p>K. mitosis</p> <p>L. centrioles</p> <p>M. cell membrane</p> <p>N. protein</p> <p>O. mitochondria</p> <p>P. cytoplasm</p> <p>Q. Golgi apparatus</p> <p>R. ribosome</p> <p>S. lipid</p> |
|---|---|

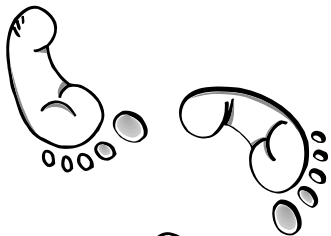
ANSWER KEY

# Walking With Ryan

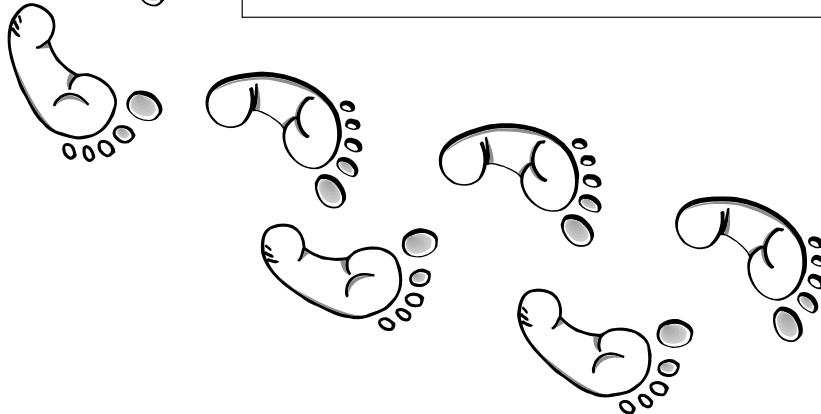
During the video/DVD, Ryan takes several steps to find his way out of the cell. As you watch and listen to the characters he meets, record their jobs below.



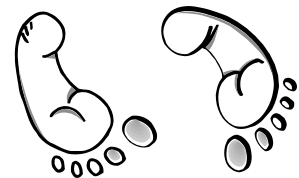
*cell membrane – Ryan passes through it to get into the cell, semi-permeable, holds cytoplasm and organelles in place (gate keeper,) exports nutrients, lets waste pass through*



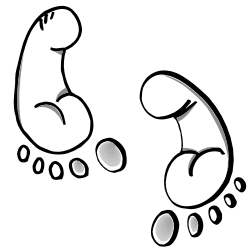
*cytoskeleton – long, thin tubes, helps the cell, moves through the cytoplasm, provides support, strength, and shape to the cell, made of protein*



*endoplasmic reticulum – smooth or rough (with ribosomes), synthesizes macromolecules, separates molecules, and transports proteins*



*Golgi apparatus – flattened, curved sac, collects, modifies, and packages proteins and synthesized substances, works with vesicle to transport substances elsewhere*

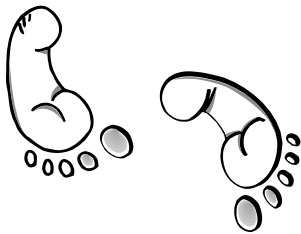


*vesicle – stores and transports substances from Golgi apparatus to other parts of the cell*

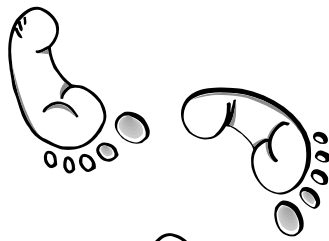
ANSWER KEY

## Walking With Ryan (cont.)

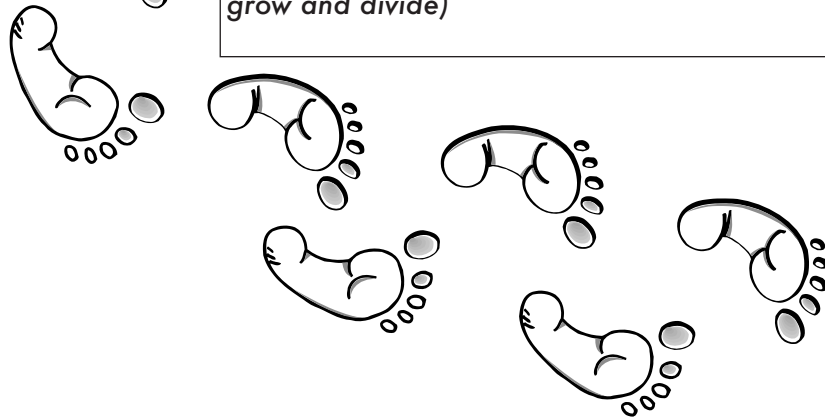
During the video/DVD, Ryan takes several steps to find his way out of the cell. As you watch and listen to the characters he meets, record their jobs below.



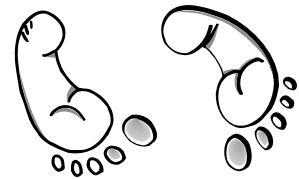
*lysosome – breaks down worn-out organelles and debris, digests with enzymes, keeps cell clean*



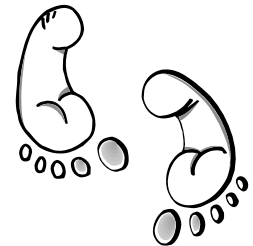
*mitochondria – called the powerhouse of the cell, it has two membranes - inner layer is layered with complex folds called cristae, uses sugars and fatty acids to generate energy, mitochondria are self-replicating (they grow and divide)*



*centriole – located next to the nucleus and helps organize the cytoskeleton, also helps with cell division*



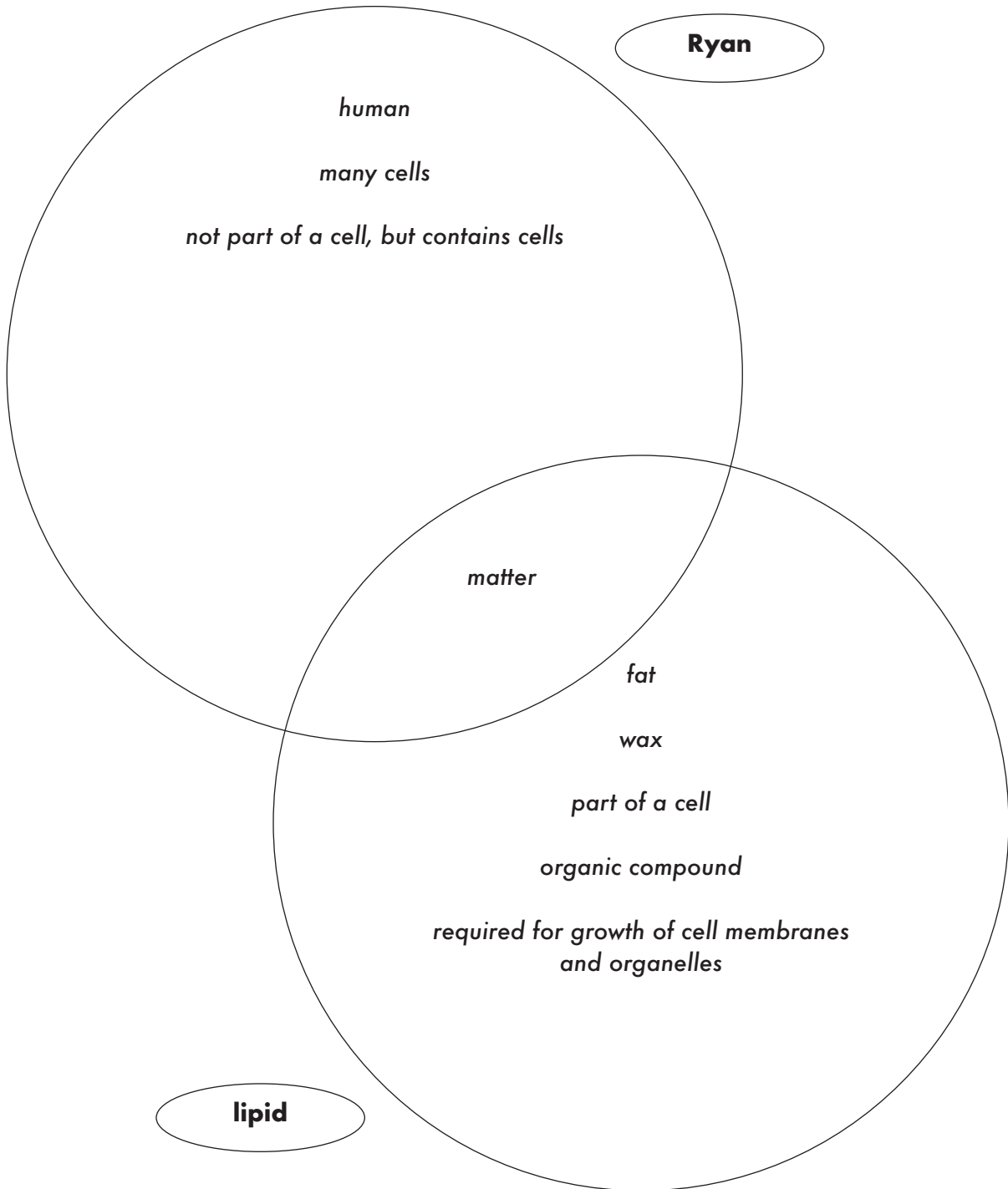
*nucleus – the control center of the cell, directs the organelles and monitors activities in the nucleolus, controls protein synthesis*



ANSWER KEY

# Lipid or Not?

The organelles keep thinking that Ryan is a lipid. Compare Ryan with a lipid by using the Venn diagram below.

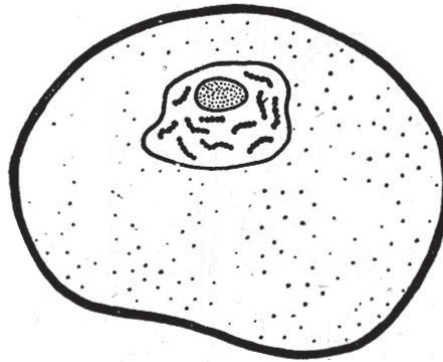


ANSWER KEY

# The Big Guy

As Ryan makes his way through the cell, the organelles keep telling him that he needs to see the nucleus. They keep referring to the nucleus as an extremely important figure. As you listen to the video/DVD, write down the reasons why.

The Nucleus



*the big man – the boss, tells what can come and go*

*control freak of the cell – controls all cell activities*

*the big boss – tells gatekeeper what can come in and go out*

*very busy – manages cell division*

OTHER IDEAS?????

ANSWER KEY

# What Am I?

Use the clues to determine which cell organelle is being described. Write the name of the organelle after the question.

1. I feel like jelly, but my job is important. I am the place where molecules are broken down to produce energy and where other molecules are built up.  
What am I? Cytoplasm
2. I am a thin layer that surrounds the cell. I hold all of the organelles in place. I let some things into the cell and keep others out. What am I? Cell Membrane
3. I am strong like a bone. I provide support, strength and shape to the cell.  
My long thin structures are made of protein. What am I? Cytoskeleton
4. I can be rough or smooth, but my job is to make macromolecules like proteins, lipids, and complex carbohydrates. I also separate molecules that go to the cytoplasm from those that go to other sites. What am I? Endoplasmic Reticulum
5. I am made in the nucleolus and found on rough endoplasmic reticulum.  
I synthesize protein and send it to different parts of the cell. What am I?  
Ribosome
6. I hang out with vesicles and I collect, modify, and package substances manufactured by the cell. What am I? Golgi Apparatus
7. I eat and eat debris, old organelles and large ingested particles within the cell.  
If I get too full and burst, my digestive enzymes will destroy the whole cell.  
What am I? Lysosome
8. I am called the powerhouse of the cell. I have two membranes where I break down sugars and fatty acids to trap energy. I am self-replicating and have my own DNA. What am I?  
Mitochondria
9. I hang out near the nucleus. My job is to organize microtubules and migrate to the ends of the cell to assist in mitosis. What am I? Centriole
10. I am the brains of the operation. I direct all of the organelles and keep track of the DNA in my membrane. What am I? Nucleus

ANSWER KEY

# Think It Over

Discuss each question with your team before writing your own answer.

1. You now know more about what happens in a cell. Can you compare the functions of organelles to the functions of your school or a city? What roles might be similar? What might be different? Answers may vary. Some ideas may include the mayor or principal is the nucleus. The teacher is the powerhouse (mitochondria). The bricks holding up the buildings are the cytoskeleton, etc. Encourage students to be creative but to back up their arguments.
2. Why do you think the organelles thought that Ryan was a lipid? Answers may vary. They may assume that Ryan was not waste because he was able to permeate into the cell. Perhaps his body fat accounts for the mistake. Again, encourage students to be creative.
3. In your opinion, which organelle has the most important job? The toughest job? The easiest job? Explain your answer. Answers may vary. They should be supported by evidence from the video.
4. What kind of relationship does the vesicle have with the Golgi apparatus? Answers may vary. Students should recognize that these two organelles work together in storing and transporting substances.
5. What do you know about DNA? Answers may vary. Students should be encouraged to listen to news programs, or read the newspaper to learn about cloning, medical research, and other issues related to DNA.



ANSWER KEY

# Cell Knowledge Quiz

Choose the best answer for each question.

1. The nucleus is sometimes called the \_\_\_\_\_ of the cell.
  - a. powerhouse
  - b. gatekeeper
  - c. control center
  - d. transporter
2. Mitochondria are self-replicating which means they \_\_\_\_\_.
  - a. divide and make copies of themselves
  - b. provide support, strength, and shape to cells
  - c. hold organelles in place
  - d. transport digestive enzymes
3. Ribosomes can be found \_\_\_\_\_.
  - a. in the cytoplasm
  - b. on the endoplasmic reticulum
  - c. in the centrioles
  - d. A and B
4. Which of the following are organelles?
  - a. Mitochondria
  - b. Vesicle
  - c. Golgi apparatus
  - d. All of the above
5. Which of the following contains its own DNA?
  - a. Golgi apparatus
  - b. Mitochondria
  - c. Endoplasmic reticulum
  - d. Cytoplasm

ANSWER KEY



# Cell Knowledge Quiz (cont.)

Choose the best answer for each question.

6. Cell division is known as
- a. Mitosis
  - b. Prophase
  - c. Telophase
  - d. Reproduction
7. Every living thing is composed of \_\_\_\_\_.
- a. cells
  - b. organelles
  - c. cytoskeleton
  - d. DNA
8. The \_\_\_\_\_ has the job of exporting and importing nutrients as well as passing waste and unwanted particles outside the cell.
- a. mitochondria
  - b. cell membrane
  - c. cytoplasm
  - d. All of the above
9. If a lysosome breaks, the \_\_\_\_\_ would leak into the cell and digest it.
- a. cytoskeleton
  - b. digestive enzymes
  - c. nuclear membrane
  - d. cytoplasm
10. DNA carries \_\_\_\_\_ information.
- a. speed of cell division
  - b. the stages of mitosis
  - c. genetic
  - d. centriole movement

ANSWER KEY

# Script

## CAST

<b>Mrs. Curry</b> .....	biology teacher
<b>Ryan</b> .....	biology students
<b>Jenny</b> .....	biology students
<b>Steven</b> .....	biology students
<b>Cell Membrane</b> .....	organelle
<b>Cytoskeleton</b> .....	organelle
<b>Quick Quiz</b> .....	Quick Quiz reader
<b>Endoplasmic Reticulum</b> .....	organelle
<b>Golgi Apparatus</b> .....	organelle
<b>Vesicle</b> .....	organelle
<b>Lysosome</b> .....	organelle
<b>Mitochondria</b> .....	organelle
<b>New Mitochondria</b> .....	organelle
<b>Centriole</b> .....	organelle
<b>Nucleus</b> .....	organelle
<b>Nurse</b> .....	school nurse

### SCENE ONE — IN THE CLASSROOM

#### MRS. CURRY

Good morning class. Today we are going to look at eukaryote cells but before we begin let me explain the assignment and the directions.

#### RYAN

Eureka cells. What are those?

#### JENNY

Not eureka, eukaryotes. They're cells that have a nucleus and organelles and are surrounded by a membrane.

#### RYAN

Do you mean like plant and animal cells? Oh, I get it.

#### MRS. CURRY

Very good. Now look through your microscopes at the slides of the animal cells.

After you have studied each cell, draw a picture of the cell as you see it.

#### JENNY

Do we have to label our pictures too?

#### MRS. CURRY

Excellent question Jenny. Yes, after you have drawn the picture of your cell please label each part of the cell and describe the functions of each part. Are there any questions? Then you may begin.

#### RYAN

Man this is going to be a lot of work. Draw this, label that, write this. Next thing you know we're going to be doing full-blown dissections next week.

#### MRS. CURRY

Oh and by the way next week we will be dissecting frogs. So be prepared.

# Script

**RYAN**

Frogs. I don't think I understand much of this cell stuff at all.

**JENNY**

Oh give me a break. This stuff isn't that bad. Actually cells are pretty cool.

**STEVEN**

Yeah, if it weren't for cells you wouldn't be here.

**RYAN**

How do you figure?

**STEVEN**

Because every living thing on Earth is composed of cells.

**MRS. CURRY**

Ryan, Jenny, Steven... are we making progress?

**STUDENTS**

Yes.

**MRS. CURRY**

Good. Then you'd better get busy or you're going to run out of time.

**JENNY**

Come on you guys, let's get to work.

**RYAN**

I've got to get my book; I'll be right back.

**JENNY**

Wow, you've got to see this cell. It looks so cool!

**RYAN**

I want to see, I want to see.

*(Ryan falls)*

## SCENE TWO — GOING INSIDE!

**RYAN**

I've got to get to the cell. See the cell. Be the cell. Help somebody! Help me please!

**STEVEN**

Did you hear something?

**JENNY**

Yeah, or I thought I did.

**STEVEN**

Wait. Shh...

**RYAN**

Help! Somebody help me! Please!

**STEVEN**

Did you hear that?

**JENNY**

Yeah, but where's it coming from?

**STEVEN**

I don't know

**RYAN**

Jenny, Steven, I'm in here. Look in the microscope.

**JENNY**

Ryan, what are you doing in there?

**RYAN**

Somebody help me please.

**STEVEN**

Hey Ryan, that's really neat! How did you get in there, man?

# Script

**RYAN**

I don't know, but all I want to do is get out of here before one of these meat eaters knock me over.

**JENNY**

Yeah, what are those things?

**RYAN**

I don't know and I don't want to find out. Get me out of here.

**STEVEN**

Here let me see. Oh, wait, I know what those are. Those are cells.

**RYAN**

You mean to say I've got cells flying at me.

**STEVEN**

Yeah actually you do. I can't believe this. This is so cool. Maybe I should go and get Mrs. Curry.

**JENNY**

No we might get into trouble. Let's just keep this among us.

**RYAN**

Yeah, yeah, don't tell anyone. I know I'm not going to be able to live this down.

**JENNY**

You may not live through this at all if you don't watch out for those cells. Ryan look out! It's coming straight at you. Move! Move!

## SCENE THREE — CELL MEMBRANE

**STEVEN**

Can you see him?

**JENNY**

Where'd he go?

**RYAN**

I'm in here guys. How did I get in here? The cell just kind of sucked me in.

**STEVEN**

Well, I think you just passed through the cell membrane.

**RYAN**

Cell membrane? Is that the stuff I'm stepping in?

**JENNY**

No, no, that sticky stuff is the cytoplasm. The cytoplasm is the jelly like substance where molecules are broken down to produce energy and other molecules are built up.

**STEVEN**

Yeah the cell membrane is a thin layer around the cell, which holds the cytoplasm and all the organelles in place.

**RYAN**

Well I'm obviously not an organelle. How did I pass through the membrane without ripping it?

**JENNY**

Well according to my book it's because cell membranes are semi-permeable.

**RYAN**

Semi-permanent? Oh great I'm going to be in here forever.

**JENNY**

No, semi-permeable.

# Script

**RYAN**

Perm? No I don't need a perm, my hair's just fine thanks.

**JENNY**

Not a perm. A semi-permeable membrane. It's a membrane that only allows certain particles to pass through it.

**RYAN**

Good, because if I got in with no problems then I should be able to get back out.

**CELL MEMBRANE**

Yo watch it there buddy.

**RYAN**

Who's that?

**CELL MEMBRANE**

It's me, the cell membrane. But you can call me The Gatekeeper.

**RYAN**

The Gatekeeper? Ok. If you're the gatekeeper, then tell me why I'm in here?

**CELL MEMBRANE**

I thought you were a lipid.

**RYAN**

Lip? I didn't give you any lip.

**CELL MEMBRANE**

Lip? Not lip. Lipid. Lipids are organic compounds like fats and waxes that can pass easily through me.

**RYAN**

So all you do is let nutrients pass through you to get into the cell?

**CELL MEMBRANE**

No I export nutrients to other parts of the body and let waste and unwanted particles pass through me to leave the cell as well.

**RYAN**

Well then in that case, don't call me Ryan, call me Mr. Waste so I can get out of here.

**CELL MEMBRANE**

Not so fast. The big man says that you're not going anywhere yet.

**RYAN**

The big man? Who's that?

**CELL MEMBRANE**

The nucleus. He's the boss... well, of our world.

**RYAN**

The nucleus? Well I don't care who he is.

**CELL MEMBRANE**

You better care kid because he's the big man.

**RYAN**

Sort of like mind over matter.

**CELL MEMBRANE**

In a sense. Hey speaking of matter, you are matter at the moment.

**RYAN**

Matter?

**CELL MEMBRANE**

Yep, in one of it's smallest forms.

# Script

**RYAN**

Well you see that's my problem, outside this cell I've got a life. I hang out with friends, play sports, you know just basically live.

**CELL MEMBRANE**

Good, good. You can live with us a little then.

**RYAN**

Un huh no, no, no, no, no way. I've got to find this nucleus guy so I can leave. Show me the way to him.

**CELL MEMBRANE**

Well that's easy, just pass by the cytoskeleton, hang a left at the endoplasmic reticulum and ribosomes, continue straight past the Golgi apparatus and vesicle, turn right at the lysosome, and when you see the mitochondria and the centriole, it will be straight ahead. It's the largest organelle in the cell. You can't miss it.

**RYAN**

Yeah, right. That was "a lot of help".

**JENNY**

Don't worry Ryan. We'll help you get there.

**STEVEN**

Yeah, we'll get you out of there. Don't worry.

## SCENE FOUR — CYTOSKELETON

**RYAN**

Well I hope so. I have to get to the nucleus. Where am I headed? I can't see where I'm going very well.

**JENNY**

Watch out... You're going to run into those long thin tubes.

**RYAN**

Where? Where?

**STEVEN**

Straight ahead, don't get tangled up in them.

**RYAN**

What are they?

**JENNY**

I don't know. I'm looking. I'm looking.

**RYAN**

Well hurry up. They're all around me now.

**CYTOSKELETON**

Relax, do you think I'm going to bite you or something? Give me a break.

**RYAN**

What? I mean you can talk too? What's your name again?

**CYTOSKELETON**

My full name is cytoskeleton, it rhymes with sight of skeleton. But since the sight of a skeleton can sometimes be scary, well, I usually go by the name of Cy.

**RYAN**

Okay Cy, can you help me get to the nucleus?

**CYTOSKELETON**

You want my help?

**RYAN**

Umm, yeah.

**CYTOSKELETON**

All I ever do is help, help you, help the cell and no one appreciates me.

# Script

**RYAN**

Okay, okay, sorry. I'd really appreciate it if you'd help me get out of here.

**CYTOSKELETON**

I was. How many organelles do you know that would move through the cytoplasm and not complain like I did? Huh, tell me? Well, I'll tell you. None!

**JENNY**

I guess you really upset her, Ryan.

**RYAN**

Oh, you finally noticed! What should I do? I don't want to upset her even more?

**STEVEN**

Ask her what her job in the cell is. Try and make her feel important.

**RYAN**

Oh okay. So Cy, I realize that you help out the cell. What exactly do you do?

**CYTOSKELETON**

Finally, someone who cares. As a cytoskeleton I provide support, strength and shape to the cell.

**RYAN**

Wow, you must be pretty strong then, huh?

**CYTOSKELETON**

Yes, very strong. My long thin structures are made out of a special substance. Do you want to guess what it is?

**RYAN**

Is this some kind of a joke?

**CYTOSKELETON**

Of course! What else would you expect from a girl known as a cytoskeleton. Here's a clue, I believe in young people.

**RYAN**

Huh?

**CYTOSKELETON**

That makes me pro-teen, protein. Get it?

**RYAN**

Oh very funny. As you were saying?

**CYTOSKELETON**

Ah, yes. As I was saying, our long thin structures are made of protein. Protein gives us the strength that we need to support and maintain the shape of the cell.

**RYAN**

Protein? Well, how about using some of that protein to help me get to the nucleus?

**CYTOSKELETON**

You're going where?

**RYAN**

I told you, the nucleus. The cell membrane won't let me out until the big guy says so.

**CYTOSKELETON**

Oh! That could be a problem.

**RYAN**

What do you mean?

**CYTOSKELETON**

Sometimes he's not so friendly. He has this reputation for being the control freak of the cell. Not a pleasant organelle, if I must say so. But, being the helpful organelle that I am, I guess I'll help you.

**JENNY**

That's okay Ryan, we'll deal with the nucleus when we get there.

**STEVEN**

Yeah don't sweat it. Let's just see what's coming up next.

# Script

## SCENE FIVE — QUICK QUIZ

### QUICK QUIZ

Here's Quick Quiz. It looks like Ryan has quite a journey ahead of him, but before we continue let's take a quick breather. Okay now let's see if you understand everything that we've covered so far. I'm going to ask you a question and give you 3 choices for answers. You pick the one that you feel best answers the question. Are you ready? All right here it goes.

*The cytoskeleton aids the cell in the following areas except \_\_\_\_\_.*

- a) size
- b) support
- c) shape

Take a second to think about. Do you think you've got an answer? Well, we know that the cytoskeleton provides support, shape and strength to the cell. Therefore the answer is **A**, the cytoskeleton does not determine the size of the cell. Okay guys, let's go back and see how Ryan's doing.

## SCENE SIX — ENDOPLASMIC RETICULUM

### STEVEN

Okay Ryan, you're almost there.

### RYAN

Almost where? Do you mean those big blob things ahead?

### JENNY

Well, they're not exactly blob things. I think it's the endoplasmic reticulum.

### RYAN

The endoplastic ridiculous?

### ENDOPLASMIC RETICULUM

No, no, no, the endoplasmic reticulum. Please don't insult me. There's nothing plastic or ridiculous about me.

### RYAN

Wow, this is too cool. Listen, I'm sorry. I'm not trying to offend anyone or anything in your case. I'm just trying to get out of here.

### ENDOPLASMIC RETICULUM

Well, I'm sorry, I can't help you there.

### RYAN

Figures. Good for nothing.

### ENDOPLASMIC RETICULUM

Hey, hey, hey. Good for nothing, is that what you said? I'll have you know that I'm good for a lot of things. Actually I'm pretty important.

### RYAN

How do you?

### JENNY

Hang on Ryan, let her finish.

### STEVEN

Yeah.

### ENDOPLASMIC RETICULUM

Well, at least your friends have some manners.

### RYAN

Sorry. I guess this whole trip is just stressing me out a bit.

### ENDOPLASMIC RETICULUM

Stress? You think you have stress? You don't know stress. Let me tell you about stress.

### RYAN

So do you think she's a little stressed? So your job's pretty tough, huh?



# Script

**ENDOPLASMIC RETICULUM**

Tough? You don't know the half of it. I'm responsible for synthesizing macromolecules in the cell like proteins, lipids and complex carbohydrates. I also have to separate molecules destined for the cytoplasm from those intended for transport to other sites. And, I have to transport proteins to various places in the cell. You know, all this work can really wear an endoplasmic reticulum out.

**RYAN**

I'm sorry. Ouch, what are all those bumps on you?

**ENDOPLASMIC RETICULUM**

Oh, those things? Guess.

**RYAN**

I haven't got a clue.

**JENNY**

I know, I found it in the book. They're called ribosomes.

**RYAN**

Oh, okay ribosomes. What do they do?

**ENDOPLASMIC RETICULUM**

The ribosomes synthesize protein in the cell.

**RYAN**

So what do they do with it after it's been synthesized?

**ENDOPLASMIC RETICULUM**

Well, after the ribosomes synthesize the protein, the protein enters my channels and goes to various locations in the cell that need it. Or, it's exported to other parts of the body.

**RYAN**

So do all endoplasmic reticula have ribosomes that cover them?

**ENDOPLASMIC RETICULUM**

No. Do you see my cousin over there?

**RYAN**

Yeah, but I don't see any ribosomes on her.

**ENDOPLASMIC RETICULUM**

Exactly! We call her smoothie because her skin's so smooth. So you see there are two types of endoplasmic reticula. There are rough endoplasmic reticula, like me, and smooth endoplasmic reticula, like my cousin. Smooth endoplasmic reticula do not have ribosomes on their surface.

**RYAN**

So what do they do then?

**ENDOPLASMIC RETICULUM**

The smooth endoplasmic reticula synthesize lipids, which are organic compounds like fats and waxes while ribosomes break down proteins. Speaking of which, I'm surprised she's not over here trying to synthesize you. You kind of look like a lipid.

**RYAN**

That's what the cell membrane said too. Why do you all think I'm a lipid?

**ENDOPLASMIC RETICULUM**

Don't be upset. It's actually a compliment in our world. Lipids are required for the growth of cell membranes and for the membranes of organelles in the cell.

# Script

**RYAN**

In that case, I guess it's okay. So ribosomes are only located on rough endoplasmic reticula right?

**ENDOPLASMIC RETICULUM**

Not quite. While ribosomes are found on rough endoplasmic reticula, they can also be found in the cytoplasm.

**RYAN**

Oh cool, there are ribosomes in the cytoplasm. But what good are they?

**ENDOPLASMIC RETICULUM**

They synthesize protein and pass the protein directly into the cytoplasm.

**RYAN**

Okay, so let me see if I've got this right. Ribosomes synthesize proteins, which are then transported to various parts of the cell. They are found in the cytoplasm or on the outside of the rough endoplasmic reticula right?

**ENDOPLASMIC RETICULUM**

Yeah, very good.

**RYAN**

And the smooth endoplasmic reticula do not have ribosomes on them and their job is to synthesize lipids?

**ENDOPLASMIC RETICULUM**

Excellent Ryan. But really I must get back to work. Good luck on your voyage to see Mr. Nucleus, and by the way, when or if you get to meet him, be very very humble. He can be quite irritable at times. But anyway, I have to go now. So many molecules to process and so little time. Bye.

**RYAN**

But wait, where do I go? What do I do? Great, now which way do I go?

## SCENE SEVEN — GOLGI APPARATUS

**JENNY**

Hold on a second it looks like you're heading towards another endoplasmic reticulum.

**RYAN**

Not another one.

**STEVEN**

Here let me see. No it's not an endoplasmic reticulum. It's a... here, I'll spell it, G-O-L-G-I A-P-P-A-R-A-T-U-S.

**RYAN**

A gold guy apparatus. Awesome, I'm going to get rich in this cell.

**JENNY**

Not a gold guy apparatus, a Golgi apparatus.

**RYAN**

What's that?

**JENNY**

Well, it says that they're sets of flattened slightly curved sacs that look similar to endoplasmic reticulum.

**RYAN**

Yep, this must be it.

**GOLGI APPARATUS**

Who are you calling a flattened, slightly curved sac?

**VESICLE**

What are you doing here? We don't get much company in this neck of the cell.

**GOLGI APPARATUS**

Are you a lipid? Because, if you're a lipid, you don't belong here. You belong...

# Script

**RYAN**

I am not a lipid. Does everybody in this cell hear me? I am not a lipid!

**VESICLE**

Easy there, she was just kidding. See what you did? We hardly ever get any company and you almost scared him off.

**RYAN**

Oh, that's okay. Besides, who are you? You're not the Golgi apparatus. Jenny, Steven, I thought you said that this was a Golgi apparatus?

**JENNY**

That's what the book said.

**GOLGI APPARATUS**

I'm a Golgi apparatus, he's a vesicle.

**RYAN**

But, why are you guys together, if you're separate organelles?

**VESICLE**

I guess that you could say that we kind of hang out together. We're buddies.

**RYAN**

What do you mean?

**GOLGI APPARATUS**

Do you see all these layers?

**RYAN**

Yeah.

**GOLGI APPARATUS**

Well, these layers are a complex stack of interconnecting membranes that make up the whole Golgi apparatus.

**VESICLE**

And I form on the ends of the top layer of the Golgi apparatus.

**GOLGI APPARATUS**

Yeah, he just kind of pops out and does his own thing.

**RYAN**

Hold on. I don't get it. What do you guys do exactly?

**VESICLE**

Here, you go ahead.

**GOLGI APPARATUS**

No, no, no, you tell the child.

**VESICLE**

No really, I insist, you.

**RYAN**

Will one of you just explain it to me?

**GOLGI APPARATUS**

Oh, oh, oh, sorry. As the Golgi apparatus in the cell it is my responsibility to collect, modify and pocket substances manufactured by the cell.

**RYAN**

What kind of substances?  
Don't say lipids.

**GOLGI APPARATUS**

No. I mostly deal with proteins and other newly synthesized substances in the cell.

**VESICLE**

And that's where I come in.

**RYAN**

What do you mean?

# Script

**VESICLE**

It's my job to store and transport these substances from the Golgi apparatus to various locations within the cell including the cell membrane, where the nutrients are exported to other cells. It seems like I'm always on the move. Hey, want to hear a poem I wrote?

**RYAN**

Okay sure.

**VESICLE**

Okay ready?

*We're vesicles, we're vehicles. We serve our Golgi, she's a great Golgi. We're movers and shakers. We're truly not fakers. We're here, we're there, we're everywhere. Got lots of nerve and we're here to serve. Ain't no bore, just got to store. More and more and more and more. I'm not mystical, just a plain old vesicle.*

**RYAN**

Cool poem. Maybe I can hitch a ride with you to the membrane and you can get me out of here.

**VESICLE**

Sorry, I'd like to help you out. But as you can see, I don't have any room. I'm full of synthesized proteins.

**RYAN**

Oh come on. You can fit me in there somewhere and then you can sneak me out of the cell.

**VESICLE**

Not past "The Gatekeeper", I can't. He may be semi-permeable, but he's strict.

**GOLGI APPARATUS**

Oh lad, you don't mess with

The Gatekeeper...

He does whatever the big boss wants.

**VESICLE**

Yeah, you know, the...

**RYAN**

Oh, I know the nucleus. Yeah I already heard about him. Let me see if I understand all this. You collect, modify and package substances that are manufactured by the cell.

**GOLGI APPARATUS**

You are correct.

**RYAN**

And you form at the ends of the top layer of the Golgi apparatus and you transport substances to the cell membrane and other parts of the cell.

**VESICLE**

You got it! By the way though, I'm late. I must get going or I'm not going to make it to the gate in time to drop off these synthesized proteins and The Gatekeeper hates it when I'm late. He can get mean. He might mess me up if you know what I mean and then I'd be a "messicle" instead of a vesicle.

**RYAN**

You guys are all jokers around here, huh?

**VESICLE**

After all the work we do, we deserve to have some fun.

**GOLGI APPARATUS**

Speaking of that, I've got some substances waiting to be packaged so I must leave you now, Ryan. Good luck and cheers. I hope for your sake that the

# Script

nucleus is in a good mood today. He can be awfully scary when he's in a bad mood.

## **VESICLE**

See ya Ryan.

## **RYAN**

Gosh these organelles are really busy today.

## **JENNY**

Yeah, could you imagine if they just stopped doing their work? It would affect our whole body, I can't even think about it.

## **RYAN**

Hey you two, I've got other things on my mind like getting out of here, and besides, I think I'm almost to the nucleus. What do you guys see coming up next?

molecules are built up. Endoplasmic reticulum synthesizes macromolecules and transports proteins to various places in the cell.

So therefore the answer is **B**, the Golgi apparatus. The Golgi apparatus is responsible for collecting, modifying, and packaging substances manufactured by the cell. So did you get it right? Great! So, let's get back to Ryan, Jenny, and Steven and see what's coming up next.

## **SCENE EIGHT — QUICK QUIZ**

### **QUICK QUIZ**

Quick Quiz is back. Hi guys it's me, Quick Quiz. Let's take a quick brain break. You know how it works, here comes the question and you pick the best answer. Here it goes.

*Which of the following organelles is responsible for collecting, modifying, and packaging substances manufactured by the cell?*

- a) the cytoplasm*
- b) the Golgi apparatus*
- c) the endoplasmic reticulum*

Take a second to think about it. You think you've got an answer? Let's see. The cytoplasm is the jelly-like substance where molecules are broken down to produce energy and where other

# Script

## SCENE NINE — LYSOSOMES

### RYAN

You guys see anything?

### JENNY

Yeah... oh yuck.

### STEVEN

What? What? Let me take a look.

Wow, whatever it is, it's eating one of the other organelles.

### RYAN

What? Oh great! An eating organelle, that's just what I need. I hope it's not a man-eating organelle!

### LYSOSOME

What are you? If you need to be digested you're going to have to wait until I finish this worn out mitochondria.

### RYAN

No, no, no, no, I'm not waiting to be digested! I'm just trying to get to the nucleus.

### LYSOSOME

Good, because for a minute there, I thought you were a lipid that didn't get synthesized by the smooth endoplasmic reticulum.

### RYAN

Not quite. Besides, what are you?

### LYSOSOME

I'm a lysosome.

### RYAN

Lysosome?

### LYSOSOME

I digest things.

### RYAN

Like what, and how?

### LYSOSOME

Well, inside of my membrane are digestive enzymes. I use these digestive enzymes to break down worn out organelles, debris, and large ingested particles from within the cell.

### RYAN

You digest old organelles? Gross!

### LYSOSOME

Oh contraire. Organelles are a delectable treat, sort of like caviar. Hey, if it wasn't for me, the organelles; debris; and particles would just float around in the cell and take up space. The cell would be a mess.

### RYAN

Well I can understand that, but it's still kind of weird.

### LYSOSOME

Yes, it can be. When the worn out organelles see me coming, they know it's the end of the line for them and that can be unpleasant. Some of them don't want to go without a fight.

### RYAN

I can't say that I blame them.

### LYSOSOME

Well, sometimes it's not a very good job, but some organelle's got to do it. Just imagine if someone didn't collect your garbage. Well, I'm nothing more than a garbage person; difference is, I eat the stuff. Yum, yum.

### RYAN

So, all you do, is travel around the cell and digest worn out organelles; debris; and ingested particles. Hmm, you must get full eventually though.

# Script

**LYSOSOME**

Yeah, I do get very full. Sometimes I feel like I'm going to burst. It's okay, you can all calm down, I'm not going to burst it was a false alarm.

**RYAN**

Whoa, what happened?  
Why'd they all freak out?

**LYSOSOME**

Because I said the magic word.

**RYAN**

What word?

**LYSOSOME**

Burst. See what I mean? It's okay, please go back to work. I'm fine, nothing's going to happen, really.  
They get into such an uproar whenever I say that.

**RYAN**

Why?

**LYSOSOME**

You remember when I said I have digestive enzymes in my membrane?

**RYAN**

Yeah, but what does that have to do with anything?

**LYSOSOME**

It has everything to do with it. You see if my membrane were to break, all of the digestive enzymes would leak out into the cell.

**RYAN**

Hmm and that would be pretty bad, huh?

**LYSOSOME**

Yeah. Really bad. The digestive enzymes could destroy the whole cell.

**RYAN**

Destroy the whole cell?

**LYSOSOME**

Yep, that's right! Destroy it all and life in the cell as we know it. Kaboom, the show's over, the end of..

**RYAN**

Okay I get it. So if your membrane were to burst?

**LYSOSOME**

False alarm again folks, sorry.  
He did it this time, not me.

**RYAN**

Sorry, let me rephrase that. If your membrane were to break then all the digestive enzymes would leak out and digest the whole cell.

**LYSOSOME**

Yes, exactly! Hey what is that over there? Is that a worn out organelle  
I see, trying to sneak past me?

He's toast, that is, toast with caviar. Sorry, Ryan I've got to go.

**RYAN**

Wait, wait, wait, wait!  
What am I supposed to do?  
Where am I supposed to go?

**STEVEN**

Relax Ryan. You're on the right track, you're almost there.

**JENNY**

Yeah, just hang a right and keep going.

**RYAN**

I'm going. I wonder what kind of weirdo I'm going to meet next?

# Script

## SCENE TEN — QUICK QUIZ

### QUICK QUIZ

Quick quiz. Hello there let's take a quick break. Okay I'll give the question and you give the answer. Here't goes:

*Sacs filled with digestive enzymes that travel around the cell and eliminate worn out organelles are called?*

- a) vesicles
- b) ribosomes
- or c) lysosomes.

Take a second to think about it. You think you've got the answer? Well let's see. Vesicles transport and store substances like proteins. Ribosomes synthesize protein. The answer is **C**, lysosomes contain digestive enzymes and eliminate worn out organelles, debris, and ingested particles. Did you get it right? Well great!

## SCENE ELEVEN — MITOCHONDRIA

### STEVEN

Is that a red flashing sign, I see?

### RYAN

Oh, you see it too? I thought I was imagining things.

### JENNY

Let me see. What does it say Ryan?

### RYAN

Powerhouse. Oh no, not another organelle that thinks he's all that.

### JENNY

Well, wait a second, I think I saw something in my book about that.

Here it is, it says that the mitochondria is also called the powerhouse of the cell.

### RYAN

Hypochondria? What does this guy think he's sick all the time or something?

### JENNY

No mito, mitochondria.

### RYAN

It kind of looks like a big sausage. It doesn't feel like a sausage though. It actually feels pretty strong.

### MITOCHONDRIA

Well, that's because I have two membranes.

### RYAN

Whoa, you startled me.

### MITOCHONDRIA

Oops, sorry.

### RYAN

You have two membranes?

### MITOCHONDRIA

Yes I have a double-layered membrane. The inner layer, as you can see, is arranged into complex folds called crista. These folds increase my surface area.

### RYAN

Are those folds used for something special?

### MITOCHONDRIA

Special? Yeah, actually they're special. You see, inside of these folds are specialized enzymes that trap energies from sugars that are broken down.



# Script

**RYAN**

Sugars? Man, you're my kind of organelle. I love candy bars, especially ones with the caramel and the peanuts.

**MITOCHONDRIA**

Hang on now. Before you get carried away, let me explain. You know, I don't sit around all day eating candy bars.

**RYAN**

You said that you use sugars, right?

**MITOCHONDRIA**

Oh I do, but I use fatty acids also.

**RYAN**

Fatty acids? For what?

**MITOCHONDRIA**

I use sugar and fatty acids to generate energy for the cell. Because I generate energy they call me the powerhouse of the cell, just think of me as the mighty chondria. Get it?

**RYAN**

Got it.

**MITOCHONDRIA**

I'm beginning to feel a little bit strange, as if, I'm about to become another me.

**RYAN**

What? Another you? Jenny, Steven what's going on?

**STEVEN**

I don't know. Oh wait it's splitting apart.

**JENNY**

Yeah, it is splitting apart. Let me see if I can find something in the book about this.

**RYAN**

Well hurry up. It may look really interesting from up there, but from down here, it's not.

**JENNY**

Okay, okay.

**STEVEN**

Wait, here it is.

**JENNY**

What did you find?

**RYAN**

Hello there people, let's pick up the speed.

**STEVEN**

It says that the mitochondria are self-replicating.

**RYAN**

Self-replicating? What do you mean?

**STEVEN**

Well according to this, the mitochondria grow and divide to increase their members to meet the needs in the cells.

**JENNY**

Yeah and it says, they divide by simply splitting in two.

**RYAN**

Whoa, it's true, then you really do self-replicate.

**MITOCHONDRIA**

Yes it's true, I mean why not? I get a little lonely now and then. It's no big deal to generate another me, it's great to have more company.

**RYAN**

Weird. How come you split in two but the whole cell didn't?

# Script

**MITOCHONDRIA**

Yeah, because we use our own DNA. Because we have our own DNA, we do not rely on the cell for division, we can divide ourself.

**RYAN**

Man I wish I could do that. I'd go out and hang out with friends; while I left the other me at home to do homework and maybe some chores.

**NEW MITOCHONDRIA**

Hey there, don't get carried away. We really have serious work to do, energy to make, organelles to see and places to go.

**RYAN**

Okay, okay, you organelles can be so touchy sometimes. So let me see

if I got all this. As the mitochondria, it's your job to generate energy for the cell from sugars and fatty acids.

**BOTH MITOCHONDRIA**

Oh yes, very good.

**RYAN**

And, you can also self-replicate because you have your own DNA.

**MITOCHONDRIA**

Excellent. See, that wasn't hard to remember.

**RYAN**

Yeah. I guess, I have learned a lot throughout my trip in the cell so far. Who's that over there?

**NEW MITOCHONDRIA**

Oh, that organelle? That's the centriole.

**RYAN**

Centriole?

**MITOCHONDRIA**

Yes, the centriole. We don't really care for the centriole; she's pretty close to the nucleus if you know what I mean.

**NEW MITOCHONDRIA**

Yeah, all she does, is hang out next to him all day long.

**RYAN**

She hangs out with nucleus? Oh man, I have to go see her. Maybe she can help me talk to the nucleus, so I can get out of here. I'll see you guys later.

**MITOCHONDRIA**

See you Ryan. I guess we've got to split too, huh?

**JENNY**

It's straight ahead, Ryan. You can't miss it.

# Script

## SCENE TWELVE — CENTRIOLES

### RYAN

Excuse me, Miss Centriole.  
Are you there?

### CENTRIOLE

Of course, I'm here.  
Where am I going to go to?

### RYAN

Yeah, I guess you guys don't  
get out of the cell much.

### CENTRIOLE

No, we don't. Was that you over there  
talking to the mitochondrion?

### RYAN

Yeah, that was me.

### CENTRIOLE

Oh, I thought you were a lost lipid. Hey, now  
what were you doing over there talking to  
them? They're always picking on me and  
my sister. They don't like us because we hang  
out here with the nucleus.

### RYAN

Hey, hey don't cry. It's okay, don't let them  
bother you.

### CENTRIOLE

I'm just tired of you all picking on us. They  
think that we get special treatment because  
we're located next to the nucleus.

### RYAN

I can barely understand you.  
Its okay, just calm down.

### CENTRIOLE

They don't understand that we're here

because this is where we do our job.

### RYAN

What job is that?

### CENTRIOLE

It's our job to organize specific cytoskeleton,  
called microtubules,  
in the cell.

### RYAN

You organize the cytoskeleton?  
Hmm, that doesn't sound too hard.

### CENTRIOLE

Well, that isn't all, that we do. We also play  
an important part in cell division.

### RYAN

Cell division? Oh, don't tell me,  
you're going to split apart like  
the mitochondria did.

### CENTRIOLE

No, I don't split apart. You see,  
when the cell divides, it's our job  
to migrate to the poles of the cell  
to assist in division.

### RYAN

So you don't split apart then, you just move  
to opposite ends of the cell right?

### CENTRIOLE

You got it!

### NUCLEUS

Organelles prepare for division.

### CENTRIOLE

Oh Ryan, I've got to start migrating  
so I really must go. If you all need  
to see the nucleus, you better get  
on it like mud on a pig because  
he's going to be very busy.

# Script

**RYAN**

Busy, why?

**CENTRIOLE**

Ask the nucleus.

**RYAN**

Ask the nucleus what?

**CENTRIOLE**

Ask him about the big “M” word.

**RYAN**

The big “M” word? Oh thanks. Great, that’s perfect. That’s all I need, more complications in my life right now. Okay guys, the nucleus is just up ahead. I’m kind of nervous.

**JENNY**

It will be okay, think positive.

**STEVEN**

Yeah, he can’t be that bad.

**RYAN**

We’ll see, soon enough.

## SCENE THIRTEEN — QUICK QUIZ

**QUICK QUIZ**

Here’s Quick Quiz. Before we meet the nucleus let’s do one last quick question. Okay, the final question is...

*Centrioles:*

*a) are located next to the nucleus in the cell,  
b) organize cytoskeleton called microtubules  
or c) migrate to opposite ends of the cell  
during division.*

Take a second to think about it. You think you got an answer? In this case, all 3 answers are correct. How’d you guys do? Excellent, well that’s all for me. So, now let’s go back to see how Ryan’s going to get out of this cell.

## SCENE FOURTEEN — NUCLEUS

**RYAN**

This, must be it.

**NUCLEUS**

Who goes there?

**RYAN**

It’s me. It’s Ryan. I just want to get out of here, if it’s no bother to you.

**NUCLEUS**

You don’t leave here until I say so.

**RYAN**

But sir, I really couldn’t.

**NUCLEUS**

Come a bit closer; let me have a good look at you. Are you a lipid?

**RYAN**

I am not a lipid.

# Script

**NUCLEUS**

Hey, I know who you are. You're the one that's been wandering around this cell, getting all the organelles in an uproar. Before long, the organelles will be rebelling. Just what do you think you are, getting my organelles so worked up like that?

**RYAN**

Uh, no one, sir. As I said, I'm just trying to get out of here. Hey, how'd you know I was talking to all the other organelles?

**NUCLEUS**

Well, you have a lot to learn about me. I know everything that goes on in this cell. I'm the boss, that's why they call me the control center of the cell.

**RYAN**

Control center? I heard you were the control freak.

**NUCLEUS**

Control freak? Which organelle said that? If I find out, I'll send a lysosome over to digest them. I am not a control freak.

**RYAN**

Easy there, I was just kidding. None of the other organelles said that about you.

**NUCLEUS**

What did they say, then?

**RYAN**

Oh, they just told me what they do and they told me a few jokes.

**NUCLEUS**

Jokes? I hate jokes. Life in this cell is a serious matter you know. Ooh matter, matter, matter, get it? As in, what's the matter.

**RYAN**

He's nuts, too.

**NUCLEUS**

I heard that. Buddy, do you know who I am or not?

**RYAN**

You're the nucleus; you're the control center of the cell, what else is there to know.

**NUCLEUS**

Well, it's much more complex than that. Not only do I have to direct the organelles in the cell. I'm also responsible for the activities that take place inside of my nucleolus.

**RYAN**

Nucleolus, what's that?

**NUCLEUS**

Do you see that smaller structure on the side of me?

**RYAN**

Yeah. What is it?

**NUCLEUS**

That's the nucleolus.

**RYAN**

Nucleolus? That produces ribosomes. Is that all you do?

**NUCLEUS**

I wish. I also have to control protein synthesis in the cytoplasm and keep track of the DNA inside of my membrane. Those DNA, little rascals, they've gotten swelled heads lately. They think they're so special. They're in the news all the time you know, all this hoopla about cloning and duplication. What's the big deal, one sheep, two sheep, three sheep, baaa.

# Script

**RYAN**

It is a big deal. What if they clone people?

**NUCLEUS**

They better not. If I have more than one of you to deal with, I'll go out of my nucleus head. Hey, here's a clone joke. How come two of you would make a yummy sandwich?

**RYAN**

I don't know.

**NUCLEUS**

Because two Ryan's, would be a Rye on Rye, a rye bread sandwich.

**RYAN**

Very funny.

**NUCLEUS**

Anyway, what do you know about DNA?

**RYAN**

Uh, a little bit. It's the stuff that carries genetic messages right?

**NUCLEUS**

Yes exactly. I see that you've learned a lot. The DNA, inside of my membrane, is organized along with proteins into a mass called chromatin.

**RYAN**

Chromatin? So, chromatin is a mass of DNA and protein.

**NUCLEUS**

Yes. However, when the cell divides, the chromatin condenses and forms thick structures that are called chromosomes. These chromosomes carry the genetic code to the new cells during division. Speaking of which, hold on a second, Ryan. Attention organelles, mitosis will begin in 1, I repeat, 1 minute.

**RYAN**

Mitosis, what's that?

**NUCLEUS**

Mitosis. Cell division. The big M.

**RYAN**

Oh, one of the organelles told me to ask you about that.

**NUCLEUS**

Good. Mitosis is when body cells divide and replicate. In mitosis, there are many different phases.

**RYAN**

Different phases uh like what?

**NUCLEUS**

Let's see, there's prophase, metaphase, anaphase, and telophase. I'm so excited.

**RYAN**

Prophase, anaphase, telephone what?

**NUCLEUS**

Not telephone, telophase! 45 seconds, I repeat, 45 seconds.

**RYAN**

45 seconds till mitosis, cell division right?

**NUCLEUS**

40 seconds.

**RYAN**

What exactly happens when you split?

**NUCLEUS**

Well it's a bit complex, but basically everything in the cell splits in two. Me, you.

# Script

**RYAN**

Me split?

**NUCLEUS**

Yes sounds exciting, huh?

**RYAN**

Exciting. Jenny, Steven, get me out of here now, I'm about to split.

**NUCLEUS**

20 seconds.

**RYAN**

Wait!

**NUCLEUS**

I'd love to Ryan, but mitosis waits for no one. I mean no cell. But hey, I'm really not such a bad guy. I've just got this reputation for being mean.

**RYAN**

You're not mean. You're kind and you're generous and you're caring and you're sweet and and...

**NUCLEUS**

Gee really? No one's told me that before. So I guess if you want to split not in two, then you can split, now.

**RYAN**

Are you serious, I can leave?

**NUCLEUS**

Yes, of course. What did you think? I was going to keep you here? Now if you were a lipid, maybe.

**RYAN**

Okay, okay, okay. Don't get on this lipid thing. How do I get out of here?

**NUCLEUS**

Just go back the way you came. Oh, here, take this pass. Without it, you'll never get out.

**RYAN**

Hey, thanks a lot man. You know, you're really not that bad of a guy.

**NUCLEUS**

Thanks, but I already knew that. Besides you better leave quickly, we're going to be very busy here in just a few moments. 10, 9, 8...

**RYAN**

See ya.

**STEVEN**

Go, Ryan. Run faster.

**JENNY**

You're almost to the cell membrane, straight ahead. Jump, now.

# Script

## SCENE FIFTEEN — THE RETURN TO CLASS

### STEVEN

Mrs. Curry, the nurse is on her way.

### MRS. CURRY

Thank you. Let's just try to keep him calm.

### STEVEN

Ryan, wake up.

### JENNY

Come on Ryan, say something and stop trying to kick me.

### RYAN

Jenny, Steven, you're here. Thank you guys for your help. I wouldn't have been able to get out of the cell if it wasn't for you guys.

### STEVEN

Out from where?  
What are you talking about?

### RYAN

Jenny, you remember the organelle-eating lysosome and the centriole that was crying.

### JENNY

Ryan, I don't know what you're talking about.

### MRS. CURRY

Ryan, the nurse is here.  
She'll take care of you.

### NURSE

Well it appears as though you've hit your head pretty hard.

### RYAN

But I was there, I promise I was.  
You guys believe me, right?

### JENNY

Sure you were, in the cell, right? Where else would you have gone? Ryan, what's that in your hand?

### RYAN

You see, I was in the cell.

### MRS. CURRY

Ryan, I'm so glad you're okay.  
I'll take that pass if you don't mind,  
as far as I know we have only one  
hall pass around here.

### RYAN

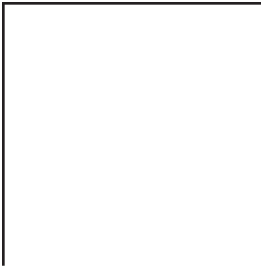
It was a cell pass, a cell pass.

### NURSE

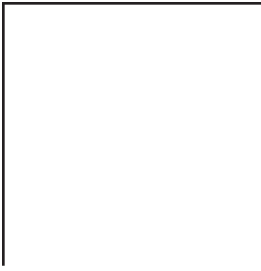
Good work out there, Ryan. Have fun with your science studies. By the way next time you visit us, be sure to bring two of you, for the mitosis adventure. See ya.



# Notes



# Notes



# Notes

