

**Goal** • Use this summary to review the concepts in Unit 4—Cells, Tissues, Organs, and Systems.

### **Chapter 10 The cell is the basic unit of life.**

- All living things have characteristics that demonstrate that they are alive. These include the ability to grow, to move, to reproduce, and to respond to stimuli. (10.1)
- Some living things are very small and can be observed only with a microscope. (10.1)
- A compound light microscope is an important tool in the study of cells and microscopic living things. (10.1)
- All cells have similar structures and organelles. Each structure and organelle carries out a specific task to help support the life functions of a cell. (10.2)
- Cellular respiration is the process that produces energy for the cell. (10.2)
- Cell theory states that the cell is the basic unit of life; all living things are composed of one or more cells; all cells come from other living cells. (10.2)

### **Chapter 11 Human body cells are organized as tissues, organs, and systems.**

- A system is made up of parts that work together as a whole. (11.1)
- Each system of the human body consists of organs that are made up of different kinds of tissue. (11.1)
- Tissues are made up of many similar cells working together to carry out a specific function. (11.1)
- The human body is made up of 11 systems that, working independently and together, support and maintain the function of the whole body. (11.2)

### **Chapter 12 The health of the human body depends on the health of its interdependent systems.**

- All the cells of the body have the same basic need for energy, nutrients, and oxygen to carry out their functions. All cells also have the same basic needs for removing wastes. (12.1)
- Body systems work together to provide cells with what they need. Thus, they support themselves, one another, and the whole human body. (12.1)
- All body systems work together with other body systems. (12.2)
- If one system does not function properly, the whole network of systems is disrupted, and the whole body is affected. In the same way, maintaining the health of each body system keeps the network of systems, and the whole body, healthy. (12.2)
- Factors such as diet, exercise, and stress affect the health of the body systems. (12.2)

**UNIT 4****Unit 4 Key Terms****BLM 4-2**

**Goal** • Use this page to review the Unit 4 Key Terms.

<b>Chapter 10 Key Terms</b>	<b>Chapter 11 Key Terms</b>	<b>Chapter 12 Key Terms</b>
arm base cell cell membrane cell theory cell wall chloroplast coarse adjustment knob compound light microscope cytoplasm eyepiece fine adjustment knob diaphragm light source magnification power mitochondria nucleus objective lenses organelle resolving power revolving nosepiece stage tube vacuole	circulatory system digestive system excretory system muscular system nervous system organ organ system respiratory system system tissue	genetic factors homeostasis lifestyle factors

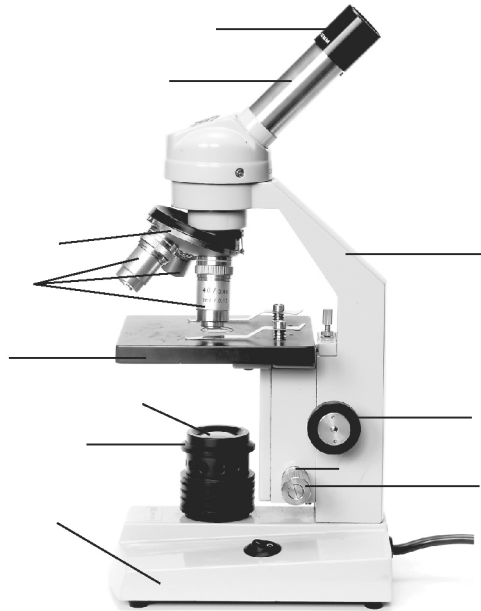
**UNIT 4**

# Chapter 10 Key Terms

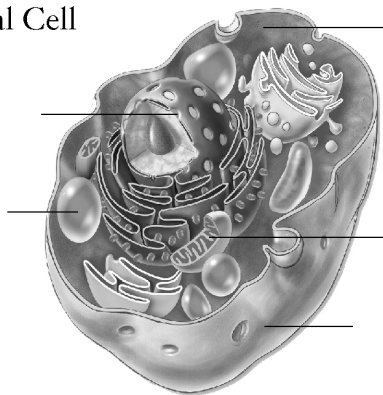
**BLM 4-3**

**Goal** • Use this page to review the Key Terms in Chapter 10.

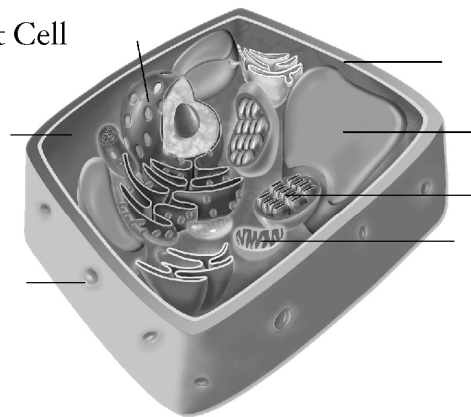
1. Use Key Terms in Chapter 10 to label each diagram.



Animal Cell



Plant Cell



2. Which three Key Terms did you not use? Write a definition in your own words for each one.

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**Goal** • Use this page to help you review the Key Terms in Chapter 11.

Create a list of 10 words or phrases from the descriptions below. Then find the words and phrases in the puzzle.

1. A group of tissues that work together (5 letters)	
2. A group of organs that work together (5 letters, 6 letters)	
3. Any set of different components that work together (6 letters)	
4. A group of cells that work together (6 letters)	
5. The system that carries blood around your body (11 letters, 6 letters)	
6. The system that obtains nutrients for your body (9 letters, 6 letters)	
7. The system that eliminates body wastes (9 letters, 6 letters)	
8. The system that helps your body to move (8 letters, 6 letters)	
9. The system that sends messages about your environment around your body (7 letters, 6 letters)	
10. The system that exchanges oxygen and carbon dioxide (11 letters, 6 letters)	

DATE:

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**BLM 4-4**  
**continued**

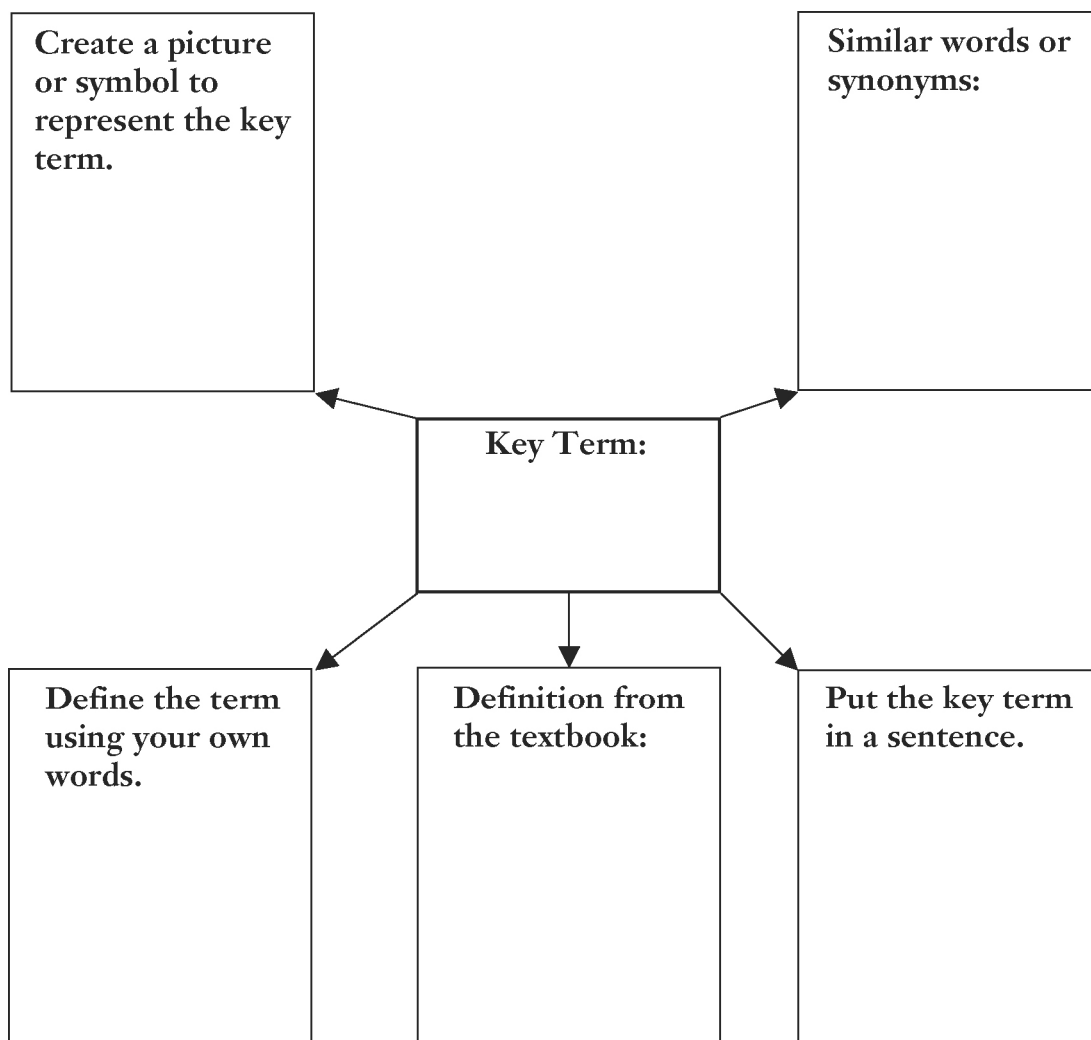
B A R E S P I R A T O R Y S Y S T E M  
H Y I X P U S O R S I O O E E T R N U  
C I R C U L A T O R Y S Y S T E M D S  
A S E R Q O D A R S P I S T R P O O C  
R M E E S I O I G Y I R Y U D S P C U  
D K K T K F B R A I N C S R E O W R L  
I T S O R G A N N G K T M A R E I L A  
A N E R V O U S S Y S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

**Goal** • Use the graphic organizer below to help you review the Key Terms in Chapter 12.

Work with two other students. Each student should complete this page for one Key Term. Then add anything you can to help complete your group members' pages. Be sure all three team members are satisfied with all three pages.

### Key Terms

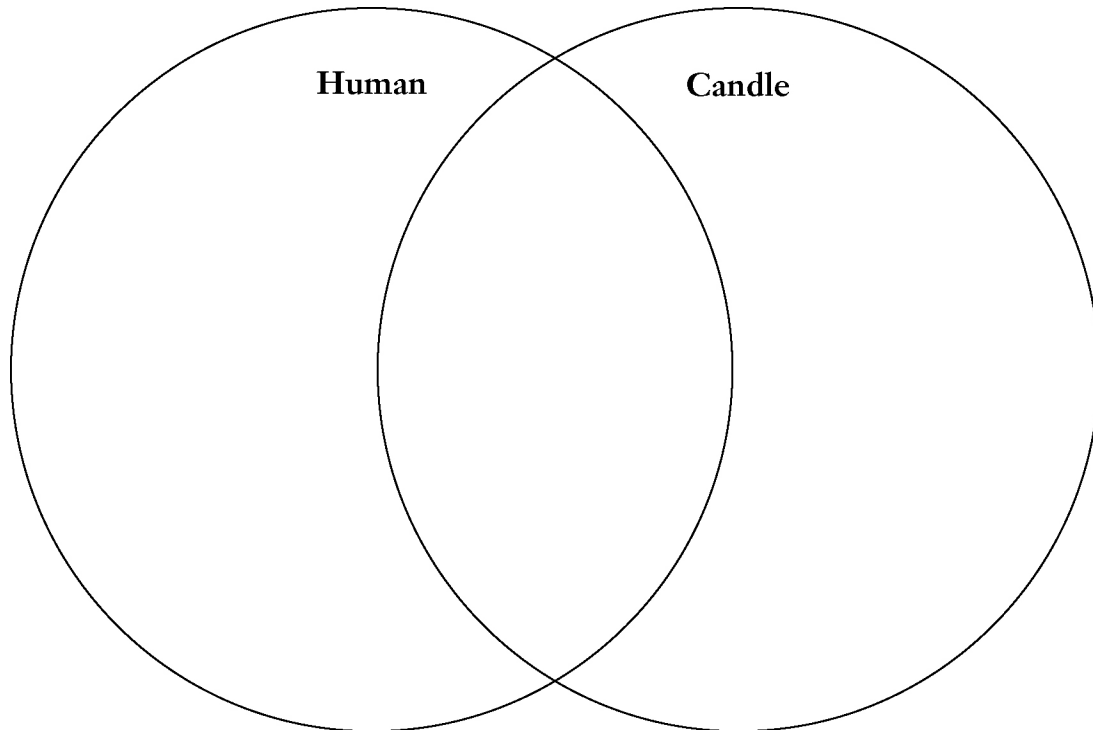
- genetic factors
- homeostasis
- lifestyle factors



**Goal** • Use the characteristics of living things to compare a human with a candle.

**Think About It**

Consider the characteristics of living things. Can you apply these characteristics to a candle? For example, does a candle grow? Does a candle produce wastes? Is a candle alive?

**What to Do**

1. Write characteristics that are exclusive to humans in the “human” circle. Write characteristics that are exclusive to the candle in the “candle” circle. Write characteristics that apply to both humans and candles in the overlapping region of both circles.
2. Explain each characteristic you wrote in the overlapping region.

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3. Is a candle alive? Write a concluding statement to explain your answer.

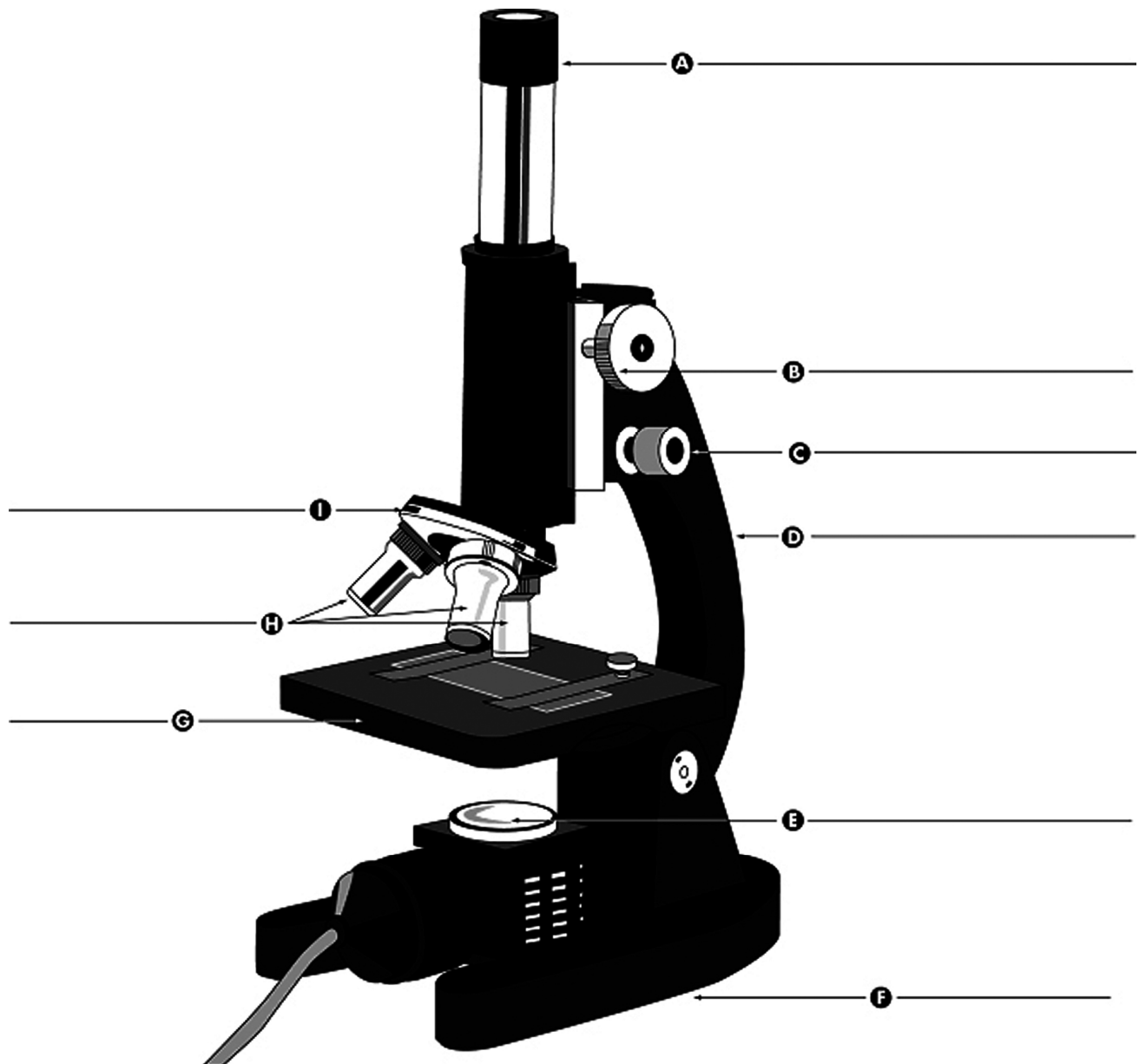
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# Compound Light Microscope

**Goal** • Use this page to review the parts of a compound light microscope.

## What to Do

Label the following parts of a compound light microscope.





**UNIT 4****Parts of a Compound Light  
Microscope****BLM 4-8**

**Goal** • Use this page to review the function of each part of the compound light microscope

**What to Do**

Each part of the compound light microscope is listed in the left column of the table below. In the right column, describe the function of each microscope part. For assistance, refer to page 392 of your textbook.

Microscope Part	Function
Eyepiece	
Arm	
Revolving nosepiece	
Objective lenses	
Fine adjustment knob	
Coarse adjustment knob	
Stage	
Base	
Light source	

**Goal** • Use this page to practise calculating magnifications.

### Think About It

A magnifying lens that magnifies the size of an image by 10 times has a magnification of  $10\times$ . A compound microscope uses two lenses to create higher magnifications.

### What to Do

To calculate the total magnification of a compound microscope, multiply the magnification of the eyepiece by the magnification of the objective lens.

1. What is the magnification of a microscope with two lenses that each enlarges an image by  $10\times$ ?

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2. An eyepiece on a microscope has a magnification of  $10\times$ . The objective lenses on the microscope have magnifications of  $4\times$  at low power,  $10\times$  at medium power, and  $40\times$  at high power.

- (a) How would you combine lenses on the microscope described above if you wanted to magnify an object  $40\times$ ?

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- (b) How would you combine lenses if you wanted to magnify an object  $100\times$ ?

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- (c) How would you combine lenses if you wanted to magnify an object  $400\times$ ?

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3. A compound microscope has an eyepiece of  $15\times$  magnification. You select an objective lens with a power of  $40\times$ . What is the total magnification of the object?

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4. Fill in the blanks within the brackets to express total magnification as a word equation.

TOTAL MAGNIFICATION = ( \_\_\_\_\_ )  $\times$  ( \_\_\_\_\_ )

# Estimating the Size of Microscopic Objects

**Goal** • Use this page to help you develop your skill of estimating the size of objects under the microscope.

## Think About It

How do you estimate the size of the object you are viewing?

## What to Do

Read the information below and answer the questions.

### Part A: Estimating Object Size

1. Look at the four circles below. Assume that each circle below has a diameter of 2.5 cm. (Diameter is the distance across a circle.) Use the following formula to calculate the exact diameter of each happy face in each of the circles:

Diameter of one happy face = Diameter of circle  $\div$  Number of happy faces



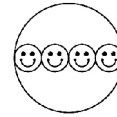
\_\_\_\_\_ cm



\_\_\_\_\_ cm



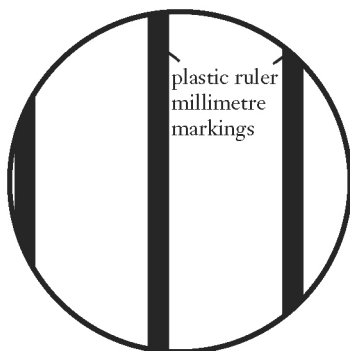
\_\_\_\_\_ cm



\_\_\_\_\_ cm

### Part B: Estimating Size Under the Microscope

- Once you know the diameter of a microscope's field of view, you can estimate the size of the object you are viewing. The field of view is what you see when you look through the microscope. To find the diameter of the field of view, place a clear plastic ruler across its centre. The diagram below represents a field of view when looking at millimetre markings on a ruler.



The diameter of this field of view is 2.5 mm.

- Most objects under the microscope are much smaller than a millimetre. You can measure them using a smaller unit, the micrometre ( $\mu\text{m}$ ).  $1 \text{ mm} = 1000 \mu\text{m}$ . To convert a field of view from millimetres (mm) to micrometres ( $\mu\text{m}$ ), multiply its diameter by 1000.

Convert the field of view above (2.5 mm) to micrometres:

The diameter of the field of view is \_\_\_\_\_  $\mu\text{m}$ .

**Goal** • Use this page to practise estimating the size of cells in a field of view.

### What to Do

Read the information given for each question. Answer the questions in the space provided.

1. As scientists, we must determine how small cells really are. To do this, we need to measure the diameter of the field of view.

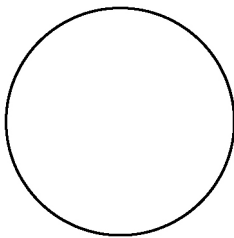
(a) What is a field of view?

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(b) What is a diameter?

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2. When Molly looks under a microscope, before placing her specimen on the stage, she observes an empty field of view.



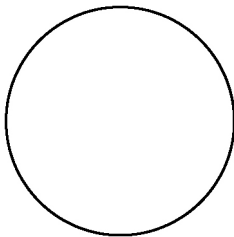
(a) Use your ruler to draw in the diameter of the field of view; that is, draw a line that cuts the circle exactly in half.

(b) What is the measurement of the circle's diameter?

in centimetres \_\_\_\_\_

in millimetres \_\_\_\_\_

3. Imagine that 10 circular cells of equal size fit across the diameter of this circle.



(a) Measure the diameter of the circle. \_\_\_\_\_

(b) What is the length of the row of 10 cells?

\_\_\_\_\_

(c) What is the diameter of one cell? \_\_\_\_\_

(d) Explain how you arrived at your answer for part (c).

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4. If 10 equally sized cells fit across a field diameter of 40 mm, what is the diameter of one cell? Show your work. You can use the back of this sheet of paper.

**Goal** • Use this chart to help organize your solutions for the Newo colony's problems.

**What to Do**

Record your ideas for solutions to the Newo colony's problems.

Management Group	Problem	Solution
Control Central (CC)		
Protection Dome (PD)		
Food and Nutrient Fluid Transportation (FNFT)		
Energy Production (EP)		
Waste Control (WC)		

**Goal** • Review your understanding of the functions of cell organelles.

**What to Do**

Fill in the following table to describe each organelle. An example is done for you.

Organelle	Function	Diagram/Description
Cell membrane	Surrounds and protects the cell's contents	Thin layer

**UNIT 4****Discovering Organelles:  
Concept Map****BLM 4-14**

**Goal** • Use this page to review your knowledge of organelles.

**What to Do**

1. Look at the partially completed concept map below. The ovals contain the concept words. Beside each arrow is a linking phrase.
2. Use words from the Word List to fill in the concepts and linking phrases that are missing from the concept map.

**Word List**

the cell

organelles

that stores

photosynthesis occurs

of the

control centre

that produces

the cell

the contents of the cell

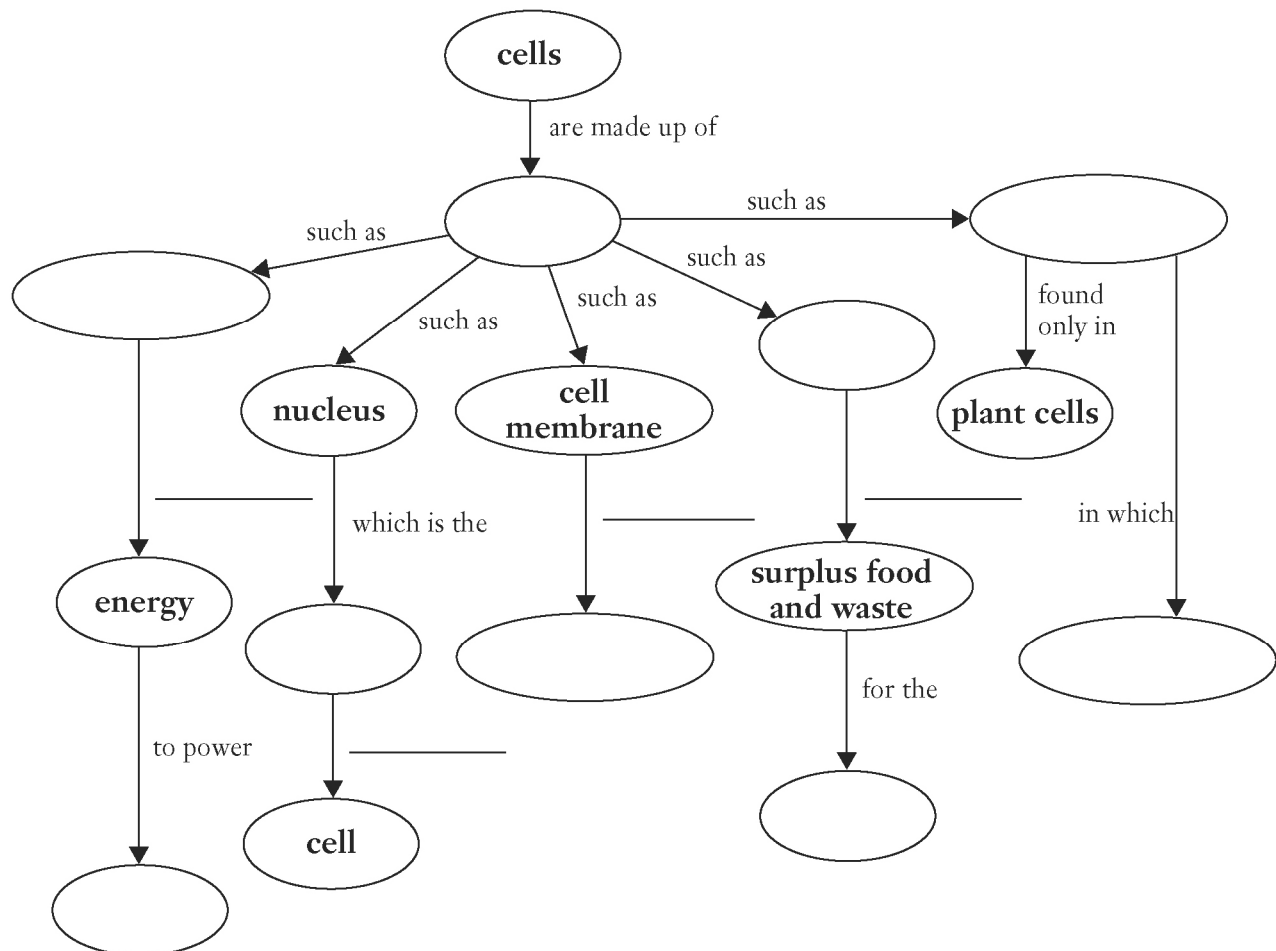
mitochondrion

chloroplast

that protects

the cell

Vacuole



**UNIT 4****A “Cell” Job****BLM 4-15**

**Goal** • Communicate the importance of a cell organelle.

**Introduction**

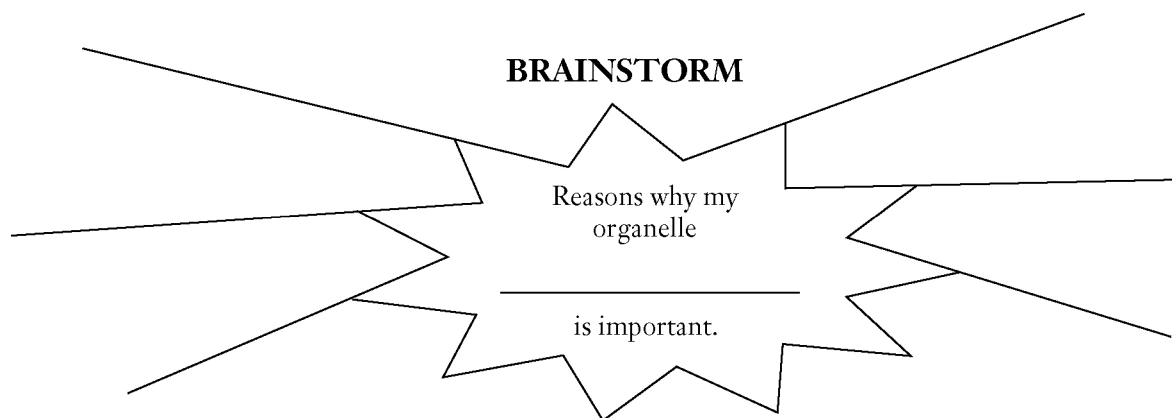
The scientific community has just learned that a prize has been established for the “most valuable organelle.” The list of potential winners has been narrowed down to three organelles. Each of these three organelles needs scientific representatives to make a strong case in its favour. You must represent one of these organelles to help it win the “most valuable organelle” prize.

**What You Need**

- poster paper
- coloured pencils

**What to Do**

1. Choose one of these three organelles: mitochondrion, nucleus, or cell membrane.
2. In the space below, brainstorm the reasons why your chosen organelle is important to a cell.
3. Using poster paper, create an accurate poster of a cell. Include various organelles you would expect to find in either an animal or a plant cell. Be sure to highlight the organelle you are representing. Design your poster before making your final copy.
4. On your poster, write the specific function your organelle performs in the cell.
5. On your poster, write a list of things that might go wrong in the cell without your organelle’s help.
6. Write a paragraph to convince your audience that your organelle should win the prize. Remember, for your organelle to win you must be convincing and do the best “cell” job!

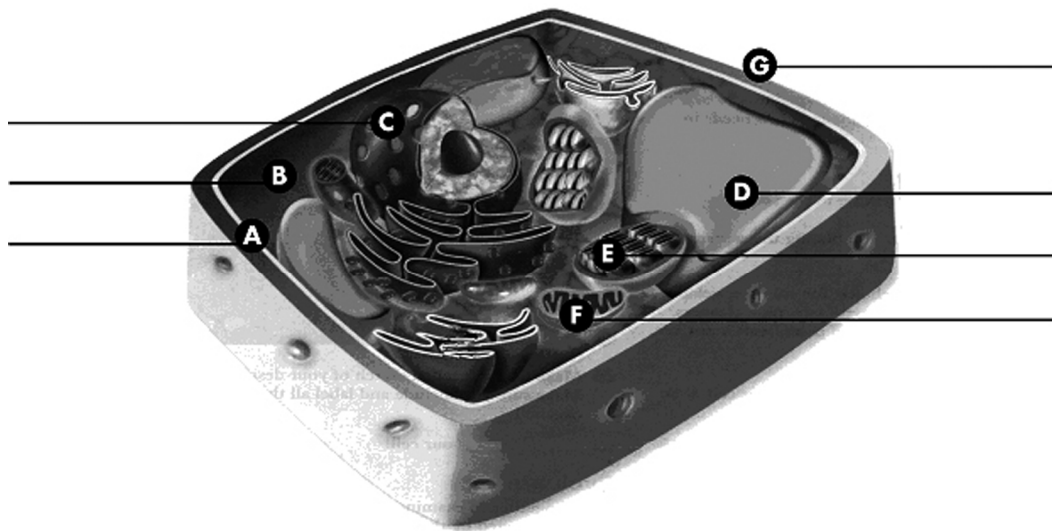




**Goal** • Use this page to review the vocabulary of plant cells by labelling a diagram.

### What to Do

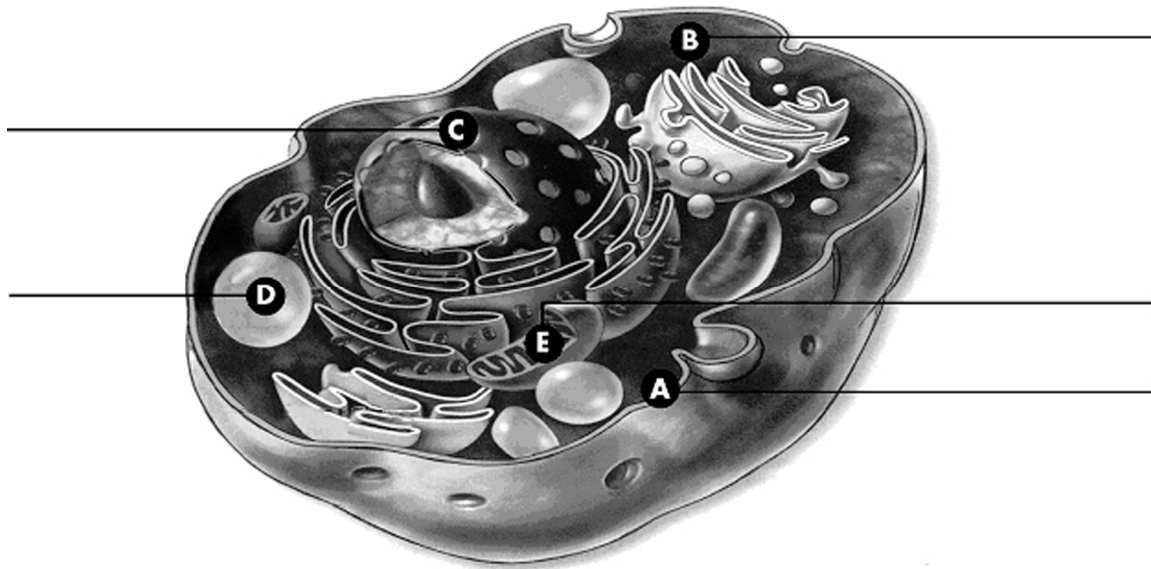
Below is a diagram of a plant cell. Label the parts of the cell indicated by each letter. For assistance, turn to page 405 of your textbook.



**Goal** • Use this page to review the vocabulary of animal cells by labelling a diagram.

### What to Do

Below is a diagram of an animal cell. Label the parts of the cell indicated by each letter. For assistance, turn to page 405 of your textbook.



# Comparing a Plant and an Animal Cell

**Goal** • Compare the organelles in plant and animal cells.

## What to Do

Complete the table below. The first row has been completed for you.

Cell Part	Description	Present in Animal Cell?	Present in Plant Cell?
Cell membrane	The structure that protects the cell and controls the movement of particles into and out of the cell	Yes	Yes
Cell wall			
Cytoplasm			
Nucleus			
Mitochondrion			
Chloroplast			
Vacuole			

**Goal** • Use this page to help you design a new type of cell.

### **Think About It**

Different types of cells perform different functions. For example, in your body, there are many types of cells, like muscle cells and red blood cells. They are all cells, but they perform different functions. You have seen that cells have many different organelles within them. Just as different types of cells perform different functions, each type of organelle has a specific function within the cell.

### **What to Do**

1. Imagine that you are a scientist who has the power to create a new type of cell. It can be any type of cell, in any environment that you want. On a separate piece of paper, plan the design for your new cell. Ask yourself the following questions to help design your cell. What is your cell's function? What types of organelles work inside your cell? What are the organelles' jobs inside the cell? Can your cell move? What does it eat? What name will you give your cell?
2. In the space below, draw a good copy of your new cell using coloured pencils. Be sure to label your cell and its organelles.

# Observing Plant and Animal Cells Comparison Chart

**Goal** • Use this chart to compare the similarities and differences between onion skin cells and human skin cells in Conduct an Investigation 10-1C, Observing Plant and Animal Cells.

Onion Skin Cells	Human Skin Cells

DATE:

NAME:

CLASS:

**UNIT 4**

# Observing Evidence of Cellular Respiration

**BLM 4-21**

**Goal** • Use this page to record your observations for Find Out Activity 10-2E, Observing Evidence of Cellular Respiration.

Time (minutes)	Bottle 1	Bottle 2
15		
30		
45		
60		
75		
90		
105		
120		
135		
150		
165		
180		

**Goal** • Check your understanding of Chapter 10.

### What to Do

Circle the letter of the best answer.

1. Which of the following lists includes something that is non-living?
  - A. rabbit, grass, bacteria, whale
  - B. rabbit, insect, tree, whale
  - C. rabbit, stone, bacteria, whale
  - D. rabbit, yeast, tree, whale
2. Which is the function of the fine adjustment knob of a compound light microscope?
  - A. brings an object into focus at high power
  - B. brings an object into focus at low or medium power
  - C. controls the amount of light reaching the specimen
  - D. supports the eyepiece
3. What part of a compound light microscope holds the eyepiece and objective lenses at a proper distance from each other?
  - A. arm
  - B. base
  - C. iris diaphragm
  - D. stage
4. What is the total magnification of a microscope that has a medium-power objective lens and an eyepiece lens with a magnification power of 10X?
  - A. 4X
  - B. 10X
  - C. 100X
  - D. 400X
5. Which of the following describes resolving power?
  - A. the ability to distinguish between two dots or objects that are very close together
  - B. the number of objects you can count across the field of view
  - C. the number of times larger an image looks under a lens
  - D. the number of times smaller an image looks under a lens
6. Which of the following is not found in animal cells?
  - A. cell membrane
  - B. chloroplast
  - C. cytoplasm
  - D. mitochondria

7. Which of the following statements describes a selectively permeable cell membrane?
- A. All substances can cross it.
  - B. No substances can cross it.
  - C. Some substances can cross it.
  - D. Some substances cross it more quickly than others.
8. Which of the following is part of cell theory?
- A. All cells are surrounded by cell walls.
  - B. All cells come from other living cells.
  - C. All cells have a nucleus.
  - D. All living things are made up of two or more cells.
9. Which of the following describes chromosomes?
- A. contain a cell's genetic material
  - B. help control the movement of food, wastes, and other substances into the cell and out of the cell
  - C. help distribute materials such as food and oxygen to different parts of the cell
  - D. store extra food

### Short Answer Questions

10. Is an icicle a living thing? Explain why or why not.

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11. (a) What do plant cells and animal cells have in common?

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- (b) What are the differences between plant and animal cells?

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12. (a) Describe cellular respiration.

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- (b) Where does cellular respiration take place?

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**Goal** • Use this page to create the flowchart for Think About It Activity 11-1A, Represent the Relationship.

Represent the relationships among the components of the human organism in your flowchart.

- Include cells, tissues, organs, and organ systems.
- Use these words or phrases in your flowchart: individual, group, many interacting groups, and a system of interacting groups.



**Goal** • Use this page to review the characteristics of five human body systems.

	<b>Main Tissues and Organs</b>	<b>Main Functions</b>
<b>Digestive System</b>		
<b>Circulatory System</b>		
<b>Nervous System</b>		
<b>Respiratory System</b>		
<b>Excretory System</b>		

**Goal** • Use this page to review different body systems and their importance.

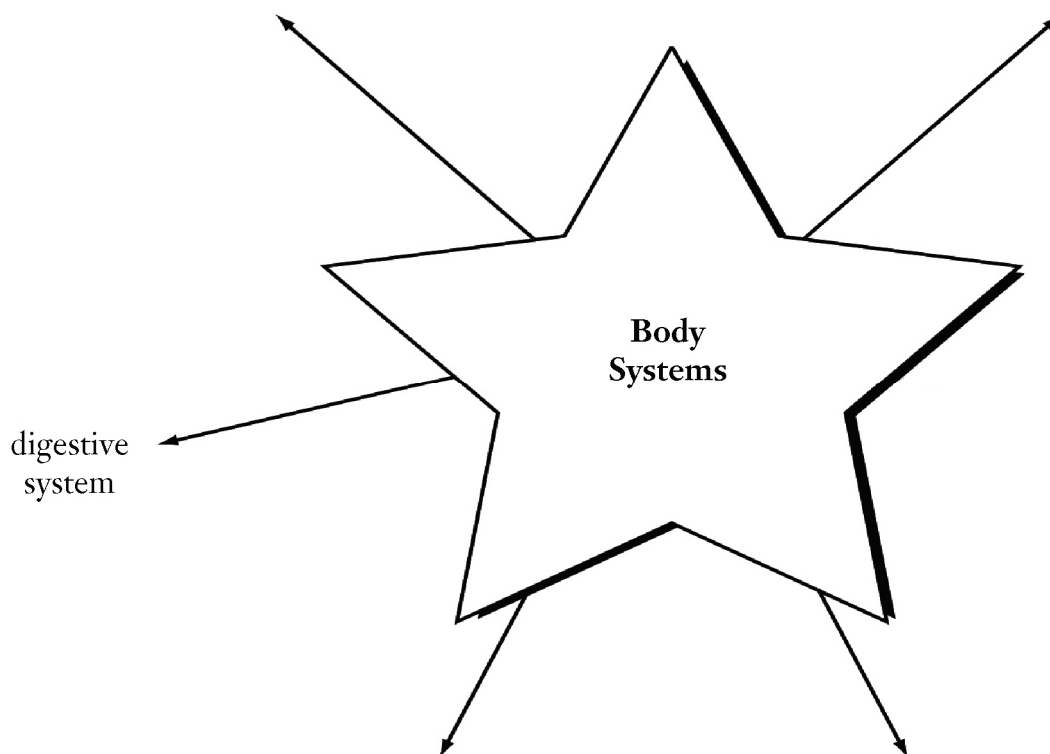
### Think About It

In our bodies, there are many systems that take on specialized tasks. For example, our digestive system extracts nutrients from the foods we eat.

### What to Do

#### Part A

Write one specialized body system beside each arrow. Beside or underneath the name of each system, outline why it is essential to our bodies.



**Part B**

Answer the following questions in the space provided.

1. Which three body systems do you think are the most important?

(a) \_\_\_\_\_ (b) \_\_\_\_\_ (c) \_\_\_\_\_

2. Explain why you chose these three systems.

(a) \_\_\_\_\_

\_\_\_\_\_

(b) \_\_\_\_\_

\_\_\_\_\_

(c) \_\_\_\_\_

\_\_\_\_\_

3. What would your body do to adapt if these three systems did not exist?

(a) \_\_\_\_\_

\_\_\_\_\_

(b) \_\_\_\_\_

\_\_\_\_\_

(c) \_\_\_\_\_

\_\_\_\_\_

4. Are the adaptations that you listed in your answer to question 3 realistic? In other words, would you be able to survive? Explain.

(a) \_\_\_\_\_

(b) \_\_\_\_\_

(c) \_\_\_\_\_

**Goal** • Use this page to review your knowledge of organization in biology.

### Think About It

An organism that is too large to function as a unicellular entity must be multicellular. This ensures that all of its cells receive the substances required and have their waste products removed. These functions are accomplished through specialization of cells and their organization into tissues, organs, and systems.

### What to Do

Read pages 422 and 423 of your textbook. Answer questions 1 to 4 below using complete sentences. Then fill in as many organs as you can think of that are part of the digestive system in question 5.

Define the following terms:

1. tissue: \_\_\_\_\_

\_\_\_\_\_

2. organ: \_\_\_\_\_

\_\_\_\_\_

3. organ system: \_\_\_\_\_

\_\_\_\_\_

4. organism: \_\_\_\_\_

\_\_\_\_\_

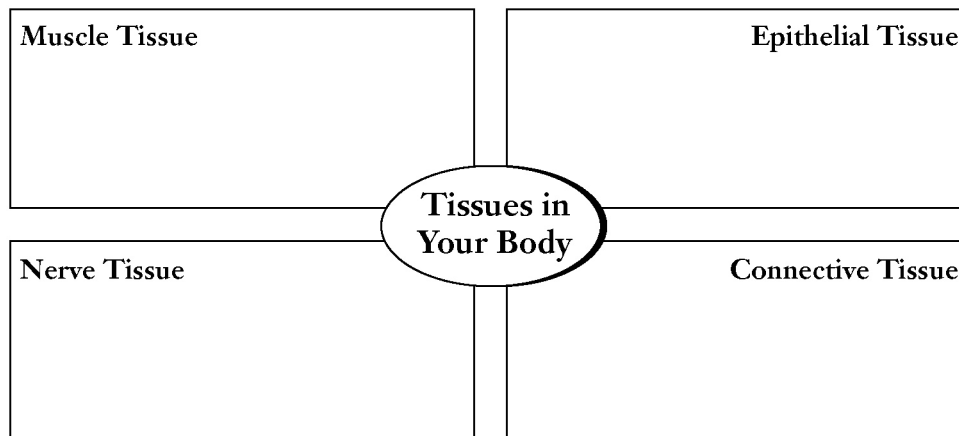
5. The digestive system is an example of a system. List organs that are part of this system in the space below.

**Goal** • Use this page to help you review the four main types of body tissue.

### What to Do

Refer to page 422 of your book to help you complete this activity.

1. In the graphic organizer below, explain where in your body these tissues are found and why they are important.



2. Give an example of tissues in an organ and explain how these tissues can participate in the function of that organ in the body.

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3. Why is it helpful for an organism to have different types of tissues? Use an example to support your answer.

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**Goal** • Check your understanding of Chapter 11.

### What to Do

Circle the letter of the best answer.

1. Which tissue is responsible for transferring signals in the body?
  - A. connective tissue
  - B. epithelial tissue
  - C. muscle tissue
  - D. nerve tissue
2. Which tissue protects the outside of the body and also covers the internal structures, such as the intestines?
  - A. connective tissue
  - B. epithelial tissue
  - C. muscle tissue
  - D. nerve tissue
3. Which system's main function is the transport of blood, nutrients, oxygen, and liquid and gaseous wastes?
  - A. circulatory system
  - B. digestive system
  - C. excretory system
  - D. nervous system
4. Which system's main function is removing liquid and gaseous wastes from the body, and maintaining the volume and composition of bodily fluids?
  - A. excretory system
  - B. muscular system
  - C. respiratory system
  - D. skeletal system
5. Which system includes the gall bladder?
  - A. digestive system
  - B. excretory system
  - C. respiratory system
  - D. skeletal system
6. Which of the following is part of the human respiratory system?
  - A. bladder
  - B. skin
  - C. trachea
  - D. urethra

7. Which system works with the skeletal system to move parts of the body?
- A. immune system
  - B. lungs
  - C. muscular system
  - D. respiratory system

**Match the Term on the left with the best Descriptor on the right.**  
**Each Descriptor may be used only once.**

Term	Descriptor
_____ 8. capillaries	A. connects and supports different parts of the body
_____ 9. connective tissue	B. lines stomach
_____ 10. epithelial tissue	C. moves parts of the body
_____ 11. muscle tissue	D. part of the circulatory system
_____ 12. nose	E. part of the respiratory system

### Short Answer Questions

13. In your own words, explain how a human being is similar to a bicycle.

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14. (a) What are the main types of tissue in the human body?

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- (b) Describe the role each of these tissues plays as part of your stomach.

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**Cellular Respiration**

**Goal** • Use this page to review cellular respiration.

Four systems in the human body play important roles in the process of cellular respiration.

System	Role Played in Cellular Respiration
Respiratory system	Nose (takes in oxygen-rich air) Windpipe (directs oxygen-rich air to lungs) Lungs (exchange oxygen and carbon dioxide, and remove carbon dioxide through the nose)
Circulatory system	Heart (pumps blood) Veins (transport blood from body cells) Arteries (transport blood to body cells)
Digestive system	Mouth (grinds up food) Esophagus (moves food to stomach) Stomach (breaks down and churns food) Small intestine (breaks food down into nutrients so they can be absorbed) Large intestine (processes solid waste material) Anus (removes solid waste material)
Excretory system	Kidneys (filter blood to produce urine) Ureters (transport urine) Bladder (stores urine) Urethra (excretes urine)

**Goal** • This activity helps you to review how nutrients and oxygen enter your bloodstream.

### What to Do

Refer to pages 438 and 439 of your textbook to help you complete this worksheet.

1. Where does the transfer of food from the digestive system to the circulatory system take place?

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2. Digestion is one of the main functions of the digestive system. What does digestion mean? (You may need to look up the word in a dictionary.)

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3. What are villi?

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4. In what way are the villi in your intestines and the alveoli in your lungs similar?

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5. Why do you think there so many villi and air sacs?

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6. Complete the following table to show how nutrients, oxygen, and carbon dioxide move into and out of your bloodstream.

	Where Does it Start?	What Does it Pass Through?	Where Does it Go?
Nutrient	intestines		
Oxygen			capillaries
Carbon dioxide		alveoli	

# Connections Between Circulation and Respiration

**Goal** • Review your understanding of how different body systems work together.

## What to Do

Using the information on pages 438 to 440 of your textbook, complete this worksheet to help review your understanding of how different systems in the body work together.

1. Which system connects all the other systems in your body?

\_\_\_\_\_

2. Give two examples of systems that must work together with the circulatory system.

(a) \_\_\_\_\_ (b) \_\_\_\_\_

3. Explain how each of these systems works together with the circulatory system.

(a) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(b) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Goal** • Use this page to review your understanding of the organ systems of the human body.

### What to Do

1. With a partner, read through the following list of tissues, structures, and organs. Sort them into their appropriate organ systems. The boxes below the list represent organ systems, and you can place the names of organs inside them.

#### Tissues, Structures, and Organs

brain	liver	nerves	pancreas	small intestine
spinal cord	tongue	heart	blood	stomach
arteries	lungs	trachea	nasal passage	esophagus
veins	capillaries	bronchus	alveoli	villi
gall bladder	diaphragm			

Organ system: \_\_\_\_\_

Organ system: \_\_\_\_\_

Organ system: \_\_\_\_\_

Organ system: \_\_\_\_\_

Organ system: \_\_\_\_\_

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**BLM 4-32**  
**continued**

2. With your partner, discuss the following statement:

“Organ systems do not function independently—they fit together like pieces of a puzzle.”

Record your ideas. Use a diagram if it is helpful.

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# Harmful Chemicals in Tobacco Products

## The Six Most Harmful Chemicals in Tobacco Products and Their Effects on the Human Body

Chemical	Effect
Nicotine	Nicotine occurs naturally in tobacco plants and is the chemical that causes the addiction to tobacco products. Nicotine harms your cardiovascular and endocrine systems.
Tar	Tar is a sticky, black residue in tobacco smoke containing hundreds of chemicals, many of which are considered carcinogenic or classified as hazardous waste.
Carbon monoxide	Carbon monoxide is in tobacco smoke as a result of burning tobacco. It reduces the ability of your red blood cells to deliver oxygen to tissues, causing the greatest potential damage to the heart, brain, and skeletal muscles—tissues that have the most demand for oxygen.
Formaldehyde	Formaldehyde is a colourless, smelly gas used as a disinfectant and preservative. It causes cancer and damages your lungs, skin, and digestive system. Embalmers use it to preserve dead bodies.
Hydrogen cyanide	Hydrogen cyanide is considered one of the most extremely harmful agents found in tobacco smoke. Many short- and long-term harmful effects of cigarette smoke have been associated with hydrogen cyanide. Frequent exposure to lower concentrations will cause weakness, headache, nausea, vomiting, rapid breathing, and eye and skin irritation.
Benzene	Benzene is a flammable liquid obtained from coal tar and used as a solvent. This cancer-causing chemical is used to make everything from pesticides to detergent to gasoline.

Source: Health Canada

DATE:

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**UNIT 4**

# Evaluating Energy Drinks— Investigate an Energy Drink

**BLM 4-34**

**Goal** • Use this page to help you complete Find Out Activity 12-2B, Evaluating Energy Drinks.

Name of Energy Drink: \_\_\_\_\_

Ingredients in Energy Drink: \_\_\_\_\_

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Safety Warnings: \_\_\_\_\_

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Advertising Claims: \_\_\_\_\_

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DATE:

NAME:

CLASS:

**UNIT 4**

# Evaluating Energy Drinks— Investigate a Sports Drink

**BLM 4-35**

**Goal** • Use this page to help you complete Find Out Activity 12-2B, Evaluating Energy Drinks.

Name of Sports Drink: \_\_\_\_\_

Ingredients in Sports Drink: \_\_\_\_\_

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Safety Warnings: \_\_\_\_\_

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Advertising Claims: \_\_\_\_\_

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# Evaluating Energy Drinks— Energy Drink PMI Chart

**Goal** • Use this page to help you complete Find Out Activity 12-2B, Evaluating Energy Drinks.

Energy Drinks		
Plus (P)	Minus (M)	Interesting (I)

# Evaluating Energy Drinks— Sports Drink PMI Chart

**Goal** • Use this page to help you complete Find Out Activity 12-2B, Evaluating Energy Drinks.

Sports Drinks		
Plus (P)	Minus (M)	Interesting (I)

**Goal** • Review and use the process of a formal debate.

### Think About It

A formal debate has an orderly step-by-step procedure that is followed by people who take opposing or contradictory views on issues presented as resolutions. There can be four speakers, two for the resolution and two against. A debate chair introduces the resolution, the rules, the speakers, and the order in which the speakers will present their views. The debate chair also announces the winner after taking a vote to determine which side supported the points it made more effectively.

### What to Do

The debate process is outlined in the chart on the next page. After the first four speakers, there is a break of up to 3 min. Then each side presents its summary. Think about the resolution suggested here and, in the final column of the chart, jot some notes that you think each speaker might present in the debate on this resolution.

### Resolution

Be it resolved that methods used in alternative medicine are unproven as effective ways of treating an illness.

Order	Speaker	Speaking Time	Job	Your Notes
1	Speaker #1 for the resolution	3 min	<ul style="list-style-type: none"> <li>clarifies the resolution or issue</li> <li>supports the resolution</li> <li>often introduces a plan showing how the resolution could be implemented</li> </ul>	
2	Speaker #1 against the resolution	3 min	<ul style="list-style-type: none"> <li>challenges the definitions, points, and evidence given by Speaker #1 for the resolution</li> <li>offers points against the resolution</li> <li>sums up why Speaker #1 was wrong or misguided, and why the negative position is preferred</li> </ul>	

DATE:

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**BLM 4-38**  
**continued**

3	Speaker #2 for the resolution	3 min	<ul style="list-style-type: none"><li>• counters the points given by Speaker #1 against the resolution</li><li>• supports the good points made by Speaker #1 for the resolution</li><li>• may add some new points supporting the resolution</li></ul>	
4	Speaker #2 against the resolution	3 min	<ul style="list-style-type: none"><li>• makes any new points</li><li>• counters specific points supporting the resolution</li><li>• clarifies the position against the resolution</li></ul>	
5	Speaker against the resolution	2 min	<ul style="list-style-type: none"><li>• points out where speakers for the resolution have failed to prove their points</li><li>• sums up the points made by the other team</li></ul>	
6	Speaker for the resolution	2 min	<ul style="list-style-type: none"><li>• points out why the resolution must succeed</li><li>• makes a final review of the position for the resolution</li></ul>	

**Goal** • Check your understanding of Chapter 12.

### What to Do

Circle the letter of the best answer.

1. Which of the following describes the process of cellular respiration?
  - A. produces glucose and energy
  - B. requires carbon dioxide and water
  - C. requires oxygen and glucose
  - D. uses carbon dioxide to release energy stored in glucose
2. Which of the following organ systems is directly involved with cellular respiration?
  - A. digestive system
  - B. muscular system
  - C. nervous system
  - D. skeletal system
3. Which of the following is the main function of the small intestine?
  - A. break food down into nutrients for absorption
  - B. move food to the stomach
  - C. process solid waste material
  - D. remove solid waste material
4. Which of the following is the main function of the kidneys?
  - A. excrete urine
  - B. filter blood to produce urine
  - C. store urine
  - D. transport urine
5. Which of the following statements about the connections between the circulatory and respiratory systems is correct?
  - A. Capillaries are surrounded by a mesh-like network of small blood vessels called alveoli.
  - B. The blood picks up oxygen from the cells and delivers it to the lungs to be exhaled from the body.
  - C. The carbon dioxide passes through (diffuses through) the membrane of the alveolus and the membrane of the capillary into the blood.
  - D. The oxygen passes through (diffuses through) the membrane of the alveolus and the membrane of the capillary into the blood.

6. Which of the following devices are used to measure blood pressure?
- sphygmomanometer and stethoscope
  - sphygmomanometer and thermometer
  - stethoscope and insulin pump
  - stethoscope and thermometer
7. Which of the following can be indicated by high blood pressure?
- blood loss from an injury
  - flexible, elastic arteries
  - large, open arteries
  - small, narrow arteries
8. Which of the following factors can increase blood pressure?
- high-fat diet
  - low-fat diet
  - low-salt diet
  - regular exercise
9. Which of the following is true about smoking?
- Carbon dioxide in smoke changes to oxygen in the lungs.
  - Cigarette smoking damages the digestive system more than the circulatory system.
  - Nicotine in cigarette smoke causes blood vessels to constrict.
  - Nicotine in cigarette smoke causes blood vessels to dilate.
10. After you eat a meal, the concentration of glucose in your blood increases. In response, the pancreas releases insulin, to move glucose from the blood to body tissues. This response is an example of your body doing something to maintain which of the following?
- circulation
  - homeostasis
  - minerals
  - water balance

**Match the Term on the left with the best Descriptor on the right.**  
**Each Descriptor may be used only once.**

Term	Descriptor
_____ 11. arteries	A. carry deoxygenated blood back to the heart
_____ 12. capillaries	B. carry oxygenated blood away from the heart
_____ 13. cilia	C. oxygen, nutrients, and glucose diffuse through the walls of these
_____ 14. veins	D. tiny hairs that filter air and push particles

**Short Answer Questions**

15. How can a diet high in saturated fats affect the health of your circulatory system?

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16. Emphysema is a lung disease that can be caused by smoking. In emphysema, the alveoli in the lungs lose their elasticity. As a result, the alveoli are no longer effective at moving air in and out. In effect, “dead air” pockets form in the lungs where air does not move in or out.

(a) What effect do you think emphysema has on gas exchange?

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(b) What do you think the symptoms would be in someone who had a severe case of emphysema?

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(c) Considering that lung transplants are almost always unsuccessful, what might you suggest as a treatment for someone who is suffering from emphysema?

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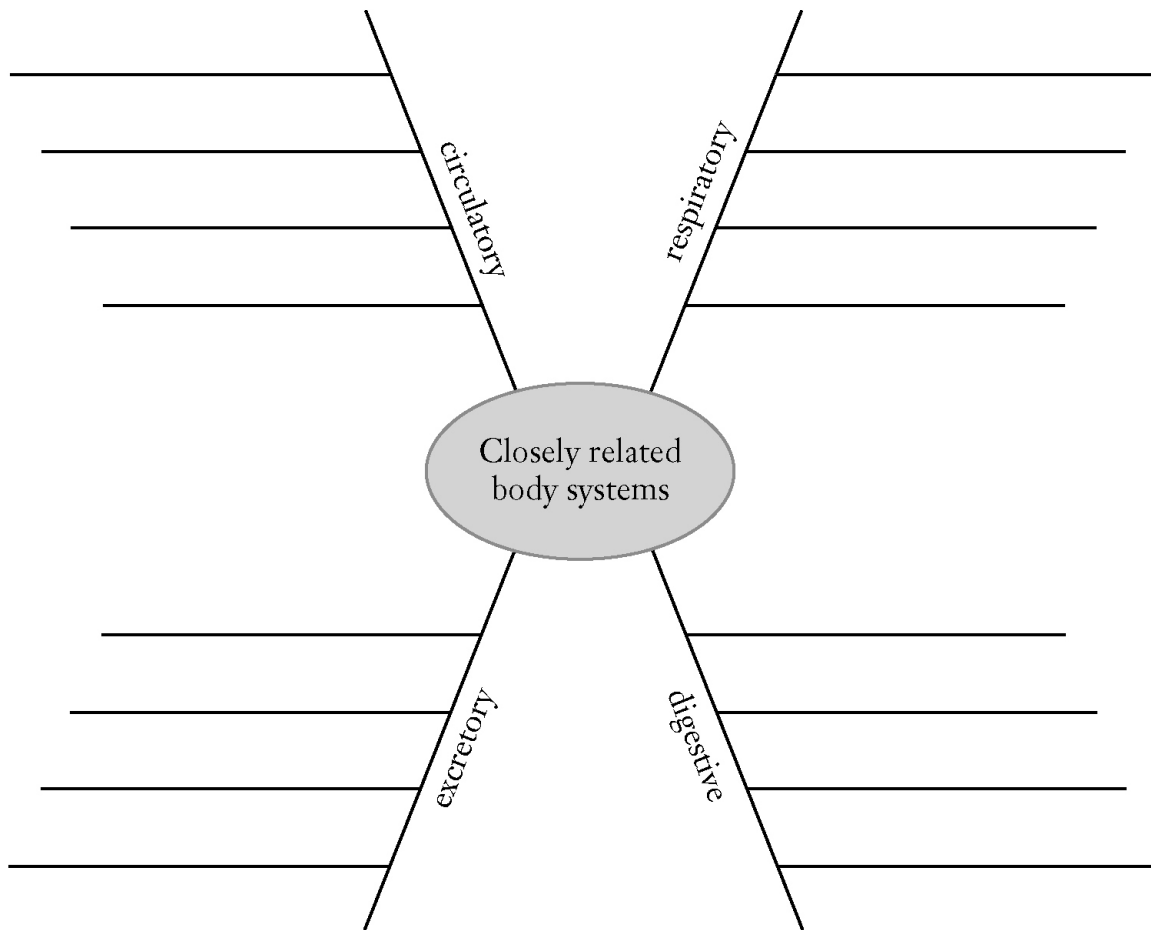
**UNIT 4**

# Unit 4 Review—Spider Map

**BLM 4-40**

**Goal** • Use this page to review Unit 4.

Write key points about each body system in the appropriate part of the spider map.





**UNIT 4****Unit 4 Review****BLM 4-41**

**Goal** • Test your understanding of Unit 4.

**What to Do**

Circle the letter of the best answer.

1. What are the structures inside a living cell that have specific functions?
  - A. membranes
  - B. organelles
  - C. organs
  - D. systems
2. If you were comparing a cell to a home, what part of the home would best describe the mitochondria?
  - A. furnace room
  - B. garage
  - C. hallway
  - D. kitchen
3. Which of the following structures does a plant cell have that an animal cell does not?
  - A. chloroplast
  - B. cytoplasm
  - C. endoplasmic reticulum
  - D. ribosome
4. Which of the following best describes cellular respiration?
  - A. carbon dioxide + water  $\rightarrow$  glucose + oxygen + energy
  - B. glucose + carbon dioxide  $\rightarrow$  oxygen + water + energy
  - C. glucose + oxygen  $\rightarrow$  carbon dioxide + water + energy
  - D. glucose + oxygen + energy  $\rightarrow$  carbon dioxide + water
5. Which of the following descriptions of the cell wall is true?
  - A. helps give an animal cell its shape
  - B. protects the cell
  - C. replaces a cell membrane in plant cells
  - D. tough, rigid structure found inside the cell membrane
6. Which system is responsible for transporting oxygen and nutrients around the body?
  - A. circulatory system
  - B. endocrine system
  - C. nervous system
  - D. respiratory system

7. If your bronchi became blocked, which body system would be most directly affected?
- circulatory system
  - excretory system
  - nervous system
  - respiratory system

**Match the Term on the left with the best Descriptor on the right.**  
**Each Descriptor may be used only once.**

Term	Descriptor
_____ 8. base	A. brings an object into focus at high power
_____ 9. coarse adjustment knob	B. brings an object into focus at low or medium power
_____ 10. eyepiece	C. holds the three objective lenses
_____ 11. fine adjustment knob	D. is used for viewing and contains a lens that magnifies
_____ 12. revolving nosepiece	E. supports the entire microscope
_____ 13. stage	F. supports the slide

14. (a) What is the difference between an organelle and an organ system?

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- (b) Give an example of each one.

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15. If a person has mixed connective tissue disease, their immune system attacks and destroys its own connective tissue.

- (a) What is the role of connective tissue in the body?

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- (b) What do you think the consequences would be if the connective tissue in the body were damaged by this disease?

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DATE:

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**BLM 4-41**  
**continued**

16. In your own words, describe how the circulatory and excretory systems work together.

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17. Blood pressure can indicate several things about the health of the circulatory system. Describe three of these things.

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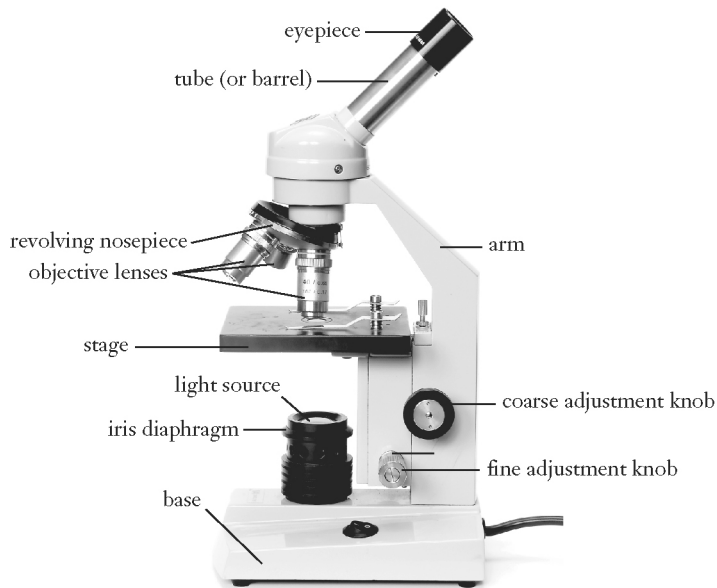
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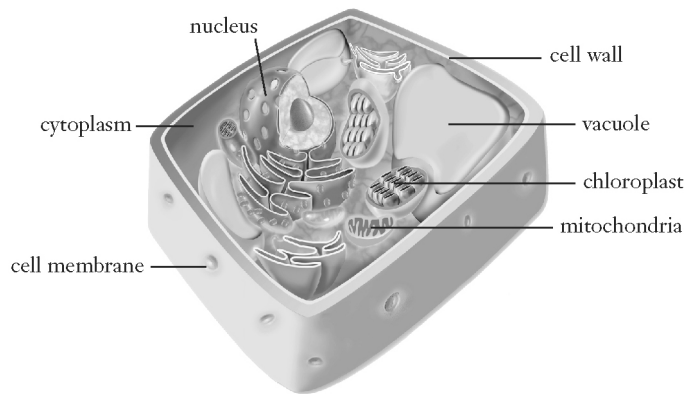
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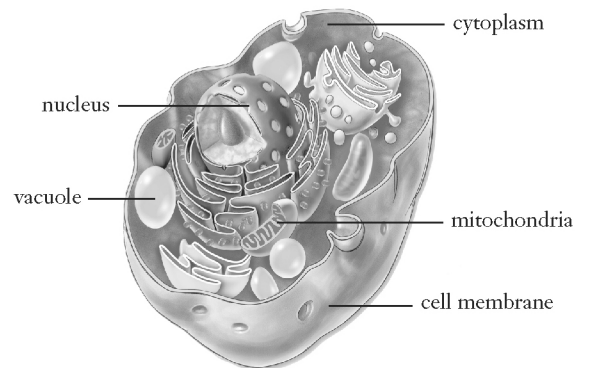
BLM 4-3, Chapter 10 Key Terms



Plant Cell



Animal Cell



2. cell theory: theory that states that the cell is the basic unit of life; all living things are made up of one or more cells; and all cells come from other living cells

magnification power: the number of times bigger an image looks under a lens

total magnification: the overall magnification power of a microscope for each objective lens, found by multiplying the power of the objective lens by the power of the eyepiece.

BLM 4-4, Chapter 11 Key Terms

1. organ
2. organ system
3. system
4. tissue
5. circulatory system
6. digestive system
7. excretory system

- 8. muscular system
- 9. nervous system
- 10. respiratory system

**BLM 4-6, Is a Candle Alive?**

1–2. Be open to a variety of student responses as long as students can support their assertions with reasonable explanations. For instance, a candle cannot reproduce itself. However, the flame that comes from a lit candle can “reproduce” if a piece of paper or another candle is held to the flame. There is no need to emphasize whether students’ answers are right or wrong. Rather, engage them in discussion to make it clear that there may be more than one viewpoint.

3. No, a candle is not alive, although it may be possible to apply many of the characteristics of living things to candles. The main reason candles are not alive is that they are not made of cells.

**BLM 4-7, Compound Light Microscope**

- A. eyepiece
- B. coarse adjustment knob
- C. fine adjustment knob
- D. arm
- E. light source
- F. base
- G. stage
- H. objective lenses
- I. revolving nosepiece

**BLM 4-8, Parts of a Compound Light Microscope**

<b>Microscope Part</b>	<b>Function</b>
Eyepiece	The part you look through. It has a lens that magnifies the object, usually by 10×.
Arm	Holds the eyepiece and the objective lenses at the proper working distance from each other.
Revolving nosepiece	Rotating disk that holds two or more objective lenses. Turn it to change lenses. Each lens clicks into place.
Objective lenses	Magnify the object. Different lenses provide different levels of magnification.
Fine adjustment knob	Use with medium- and high-power magnification to bring the object into sharper focus.
Coarse adjustment knob	Moves the tube or stage up or down to bring the object into focus. Use it only with the low-power objective lens.
Stage	Supports the microscope slide. Clips hold the slide in position. A hole in the centre of the stage allows the light from the light source to pass through the slide.
Base	Directs light to the object being viewed.
Light source	Lights the object being viewed.

BLM 4-9, Calculate Magnification

- The magnification would be  $10 \times 10 = 100\times$ .
- (a) Combine the eyepiece lens (10×) with the low-power lens (4×) for a magnification of 40×.  
(b) Combine the eyepiece lens (10×) with the medium-power lens (10×) for a magnification of 100×.  
(c) Combine the eyepiece lens (10×) with the high-power lens (40×) for a magnification of 400×.
- The total magnification would be  $15 \times 40 = 600\times$ .
- TOTAL MAGNIFICATION = (eyepiece lens magnification) × (objective lens magnification)

BLM 4-10, Estimating the Size of Microscopic Objects

Part A

1. The size of the happy face in first circle is 2.5 cm. The size of one happy face in the second circle is 1.25 cm. The size of one happy face in the third circle is 0.83 cm. The size of one happy face in the fourth circle is 0.625 cm.

Part B

The diameter of the field of view is 2500 μm.

BLM 4-11, Cell Size

- (a) A field of view is the area seen through the eyepiece.  
(b) A diameter is the distance across a circle.
- (b) The circle is 3 cm or 30 mm in diameter.
- (a) 3 cm or 30 mm  
(b) 3 cm or 30 mm  
(c) 0.3 cm or 3 mm  
(d) Divide the diameter of the circle (3 cm) by the number of cells.

$$\begin{aligned}
 \text{4. Span of 1 cell} &= \frac{\text{diameter of circle}}{\text{number of cells}} \\
 &= \frac{40 \text{ mm}}{10} = 4 \text{ mm}
 \end{aligned}$$

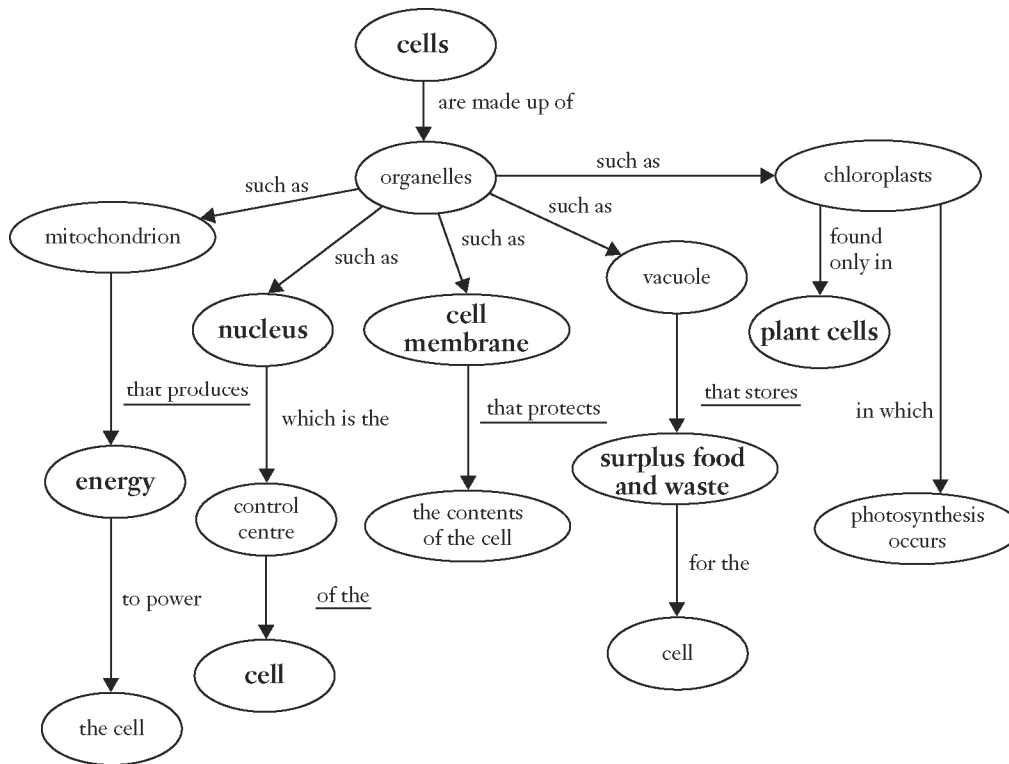
BLM 4-13, Functions of Cell Organelles

Students' charts may vary slightly and organelles may be listed in any order. Sample answer:

Organelle	Function	Diagram/Description
Cell membrane	Surrounds and protects the cell's contents	A thin layer
Cell wall	Protects the cell and gives the cell a regular, box-like shape	A tough, rigid structure that surrounds the cell membrane
Cytoplasm	Contains organelles, water, and other life-supporting materials	Jelly-like substance
Nucleus	Controls all the activities within a cell	Contains DNA
Mitochondrion	Produces energy	Has an inner and outer membrane

Chloroplast	Traps energy from the Sun and changes it into chemical energy	May be a greenish colour
Vacuole	Temporarily stores substances and regulates water	Larger in plant cells

BLM 4-14, Discovering Organelles: Concept Map



BLM 4-16, Parts of a Plant Cell

- A. cell membrane
- B. cytoplasm
- C. nucleus
- D. vacuole
- E. chloroplast
- F. mitochondrion
- G. cell wall

BLM 4-17, Parts of an Animal Cell

- A. cell membrane
- B. cytoplasm
- C. nucleus
- D. vacuole
- E. mitochondrion

BLM 4-18, Comparing a Plant and an Animal Cell

Cell Part	Description	Present in Animal Cell?	Present in Plant Cell?
Cell membrane	The structure that protects the cell and controls the movement of particles into and out of the cell	Yes	Yes
Cell wall	Tough, rigid structure surrounding membrane that gives cell regular, box-like shape	No	Yes
Cytoplasm	Jelly-like, watery fluid in which internal organelles float	Yes	Yes
Nucleus	Large, round structure in cells that contains the chromosomes (which control cell growth, reproduction, and other vital activities)	Yes	Yes
Mitochondrion	Bean-shaped structure that produces energy for the cell by breaking down food particles to release stored energy	Yes	Yes
Chloroplast	Green structure that contains chlorophyll, which captures energy from the Sun to produce food	No	Yes
Vacuole	Structures in cytoplasm that provide space to store food, waste, and other substances the cell cannot use right away	Yes	Yes



BLM 4-22, Chapter 10 Review

1. C
  2. A
  3. A
  4. C
  5. A
  6. B
  7. C
  8. B
  9. A
10. An icicle is not a living thing. An icicle can grow larger and respond to the environment by melting, but it cannot reproduce, does not need energy, and has no need to get rid of wastes.
11. (a) Plant and animal cells are both basic units of living things. They share the following structures and organelles: cell membrane, cytoplasm, nucleus, vacuole, and mitochondria. Plant and animal cells both divide at some point during their life cycle, need energy, and carry out cellular respiration to release energy stored in glucose.
- (b) Plant cells are surrounded by a cell wall; animal cells are not. Animal cells have smaller and more numerous vacuoles than plant cells. Plant cells contain an organelle called a chloroplast that contains chlorophyll; animal cells do not. Many plant cells capture energy from the Sun and use it to produce food through the process of photosynthesis. Animal cells do not carry out photosynthesis.
12. (a) Cellular respiration is the process that produces energy for a cell. Energy stored in glucose is converted to other forms of energy used to carry out a cell's life functions.
- (b) Cellular respiration takes place in the mitochondria of cells.

BLM 4-24, Human Body Systems

	<b>Main Tissues and Organs</b>	<b>Main Functions</b>
Digestive system	Mouth, esophagus, stomach, gall bladder, liver, pancreas, small intestine, large intestine, anus	<ul style="list-style-type: none"> <li>– takes in food and breaks it down into nutrients</li> <li>– absorbs nutrients</li> <li>– eliminates solid wastes</li> </ul>
Circulatory system	Heart, arteries, veins, capillaries, blood (tissue)	<ul style="list-style-type: none"> <li>– transports blood, nutrients, oxygen, and liquid and gaseous wastes</li> </ul>
Nervous system	Brain, spinal cord, nerves (tissue)	<ul style="list-style-type: none"> <li>– controls and coordinates body activities</li> <li>– senses and responds to internal and external changes</li> </ul>
Respiratory system	Nose, trachea, lungs	<ul style="list-style-type: none"> <li>– controls breathing</li> <li>– exchanges gases in lungs and tissues</li> </ul>
Excretory system	Kidneys, ureters, bladder, urethra, skin	<ul style="list-style-type: none"> <li>– removes liquid and gaseous wastes from the body</li> <li>– maintains the volume and composition of body fluids</li> </ul>

**BLM 4-25, Specialization in the Body****Part A**

circulatory, nervous, respiratory, muscular, excretory

**Part B**

1–4. Students' responses will vary.

**BLM 4-26, Organization in Biology**

1. tissue: groups of similar cells having a common function
2. organ: a structure composed of at least two (and often more) types of tissue
3. organ system: a group of organs that work closely together to accomplish or perform a common purpose.
4. organism: a living independent individual
5. Students will probably know many of the organs from everyday experience or previous studies. Some of their answers may include the following: stomach, pancreas, liver, tongue, mouth, large intestine, small intestine, and salivary glands.

**BLM 4-27, Understanding Body Tissues**

1. • Muscle tissue is found in various places. Much of our body contains skeletal muscles—those that are attached to our bones and allow movement such as walking and running. Other important areas that students should know about include the heart and the blood vessels, the digestive system (muscles in the lining of the gut contract to help move food along the digestive tract and cause contractions of the stomach). Muscles are associated with many other parts of our bodies, such as our eyes and skin (which can cause, for example, hair to stand erect to produce goose flesh).
  - Epithelial tissue covers every body surface (so the skin is the common example students know), as well as the surface of every structure that faces an internal cavity. Thus, the cavities themselves (such as the chest and abdominal cavities) and the structures within the cavities (e.g., heart, lungs, stomach, liver, spleen, pancreas) are lined with epithelial tissue.
  - Nerve tissue is present in all areas of our bodies except for the epidermis. (Some students may then wonder how we can feel sensations. The nerve endings in the dermis have an association with special cells in the epidermis called Merkel cells that participate in sensory perceptions.) Nerve tissue can connect signals between the brain and any other part of the body.
  - Connective tissue examples that students may know about include bone, blood, tendons, and cartilage. Connective tissue, like bones, provides support. Blood transports substances throughout the body.
2. Accept any appropriate answer.
3. It is helpful for an organism to have different types of tissues because the different tissues have different roles or functions. Multicellular organisms require such specialization for proper functioning. Students may give many examples. (A limb involves connective tissue, muscles, and nerves; the stomach has muscles, epithelial tissues, and nerves.)

**BLM 4-28, Chapter 11 Review**

1. D
2. B
3. A
4. A
5. A
6. C
7. C
8. D
9. A

10. B
11. C
12. E
13. A human being is similar to a bicycle because both have specialized parts and systems that work together to make them function properly.
14. (a) The main types of tissue in the human body are muscle, epithelial, connective, and nerve.  
b) Muscle tissue moves to mix stomach contents. Epithelial tissue lines the stomach, and connective tissue holds the shape of the stomach. Nerve tissue co-ordinates the organ's activities.

**BLM 4-30, Getting Food to Body Cells**

1. The transfer occurs in the intestines.
2. To digest means to break down or reduce something to a convenient size.
3. The villi are small projections of the internal surface of the intestinal wall.
4. They are similar in that they are closely associated with capillaries for exchange of material, and they are adaptations to increase the surface area available for exchange.
5. Many villi and air sacs are required to maximize the surface area for exchange.

	<b>Where Does it Start?</b>	<b>What Does it Pass Through?</b>	<b>Where Does it Go?</b>
Nutrient	intestines	villi	capillaries
Oxygen	lungs	alveoli	capillaries
Carbon dioxide	capillaries	alveoli	lungs

**BLM 4-31, Connections Between Circulation and Respiration**

1. The circulatory system connects all the systems in your body.
2. (a) respiratory system (b) digestive system
3. (a) The respiratory system receives waste carbon dioxide from all of the cells and removes it from the body. The circulatory system unloads the carbon dioxide into the lungs. The lungs bring in oxygen, which passes into the circulatory system for distribution to all the cells (including those of the circulatory system).  
(b) The digestive system breaks down food particles into the proper size so that they can pass through the lining of the digestive system and into the bloodstream, allowing all the cells (including those of the circulatory system) to receive the nutrients they need.

**BLM 4-32, Organizing Organ Systems**

1. Nervous system: brain, nerves, spinal cord  
Digestive system: pancreas, stomach, esophagus, tongue, liver, small intestine, villi, gall bladder  
Respiratory system: lungs, trachea, nasal passage, bronchus, alveoli (students may also include diaphragm)  
Muscular system: biceps, tendon, hamstring, diaphragm (students may also include heart)  
Circulatory system: heart, blood, veins, arteries, capillaries.
2. All systems function together to provide the body with the requirements needed for survival. For example, the circulatory system circulates substances throughout the body, but it must work together with the digestive and respiratory systems to provide these substances. It requires the help of the nervous system to coordinate the timing of activities, as well as the excretory system to remove some substances. In return, the circulatory system (which is also made up of cells) receives oxygen and removes carbon dioxide through the respiratory system, and obtains its nutrients from the digestive system. Similar outlines may be given for the other systems.

**BLM 4-39, Chapter 12 Review**

1. C
2. A
3. A

- 4. B
- 5. D
- 6. A
- 7. D
- 8. A
- 9. D
- 10. B
- 11. B
- 12. C
- 13. D
- 14. A
- 15. A diet high in saturated fat promotes the build-up of a material called plaque in the blood vessels. This type of plaque is a fatty deposit that impedes the flow of blood and increases the risk of heart attack and stroke.
- 16. (a) Emphysema reduces gas exchange. The alveoli are where gas exchange takes place, so when alveoli are not working properly, gas exchange is negatively affected.
- (b) Someone who has severe emphysema is likely to be constantly short of breath, and therefore tired and short of energy, and perhaps dizzy. Without proper gas exchange, he or she is chronically short of oxygen.
- (c) Answers will vary, but any solution that promotes gas exchange and increases the amount of oxygen in the bloodstream should be accepted. For example, a person with emphysema may have to have a bottle of pure oxygen with them at all times so that the oxygen enters their lungs via a tube at the nostrils. This procedure will increase oxygen content in the bloodstream.

**BLM 4-41, Unit 4 Review**

- 1. B
- 2. A
- 3. A
- 4. C
- 5. B
- 6. A
- 7. D
- 8. E
- 9. B
- 10. D
- 11. A
- 12. C
- 13. F
- 14. (a) An organelle is a cell structure that has a specific function to help an individual cell survive. An organ system is one or more organs that perform specific functions for the entire human body.
- (b) Students' examples may vary. A mitochondrion is an example of an organelle. The circulatory system is an example of an organ system.
- 15. (a) Connective tissue holds together and supports other tissues. It also protects and insulates organs.
- (b) Damaged connective tissue would mean support for tissues and protection for organs would be weak and underdeveloped. This result could manifest itself through many symptoms, such as weak joints, breakdown of tissue, and more frequent infections.
- 16. Blood vessels of the circulatory system carry blood into and out of the kidneys. Filtering units in the kidneys remove substances from the blood that the body can reuse, and help to remove waste products that the body cannot use.
- 17. Blood pressure can indicate the following about the health of the circulatory system: heart rate, artery size, artery elasticity, blood viscosity, and blood volume.