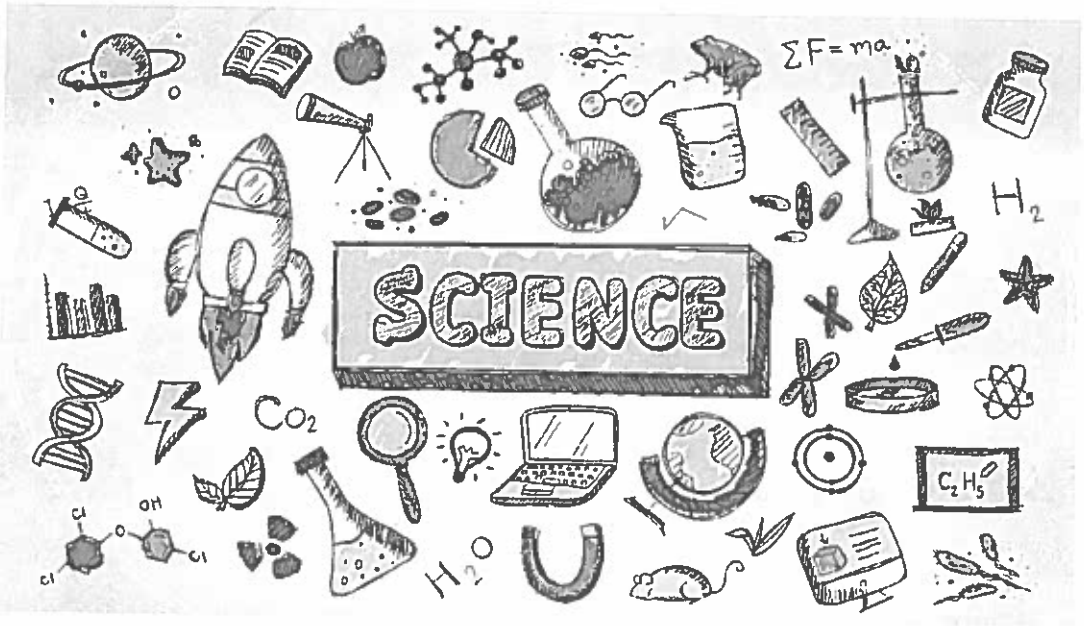
Lathrop Intermediate

6th grade Science

2nd Semester



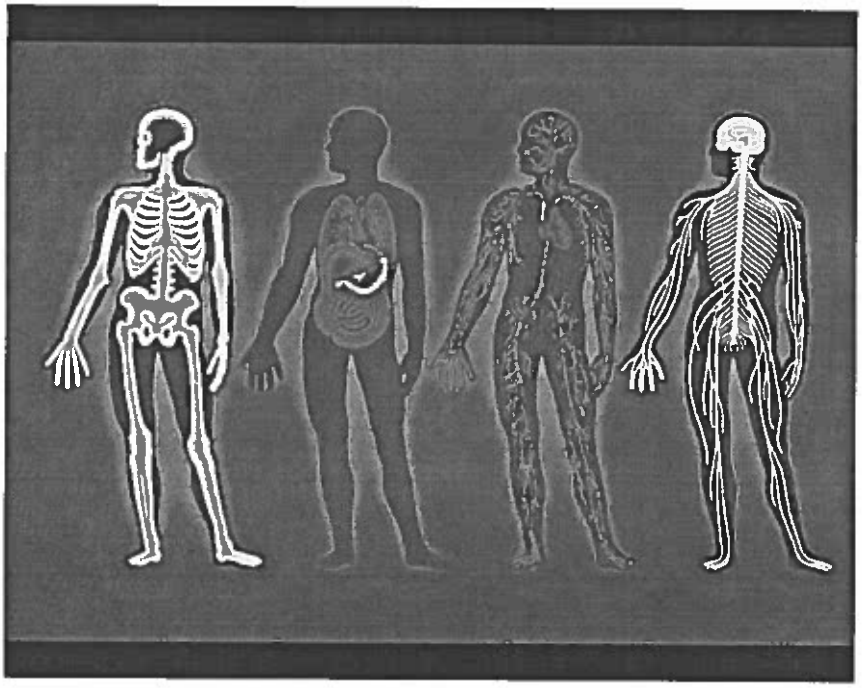
Name: _____

Teacher: _____

Period: _____

Lathrop Intermediate

6th grade Science
Body Systems Unit



Focus: What does it mean for the body to work/function normally?

experiencing symptoms	function normally

6.3.1 Task: Body Systems (Print 2 copies and place in plastic sleeves)

Guiding Question: *How does each body system keep our body functioning normally?*

Our bodies are arranged into several different systems, each with its own specific function. We will explore a few of these systems. Your team will be an expert in one body system.

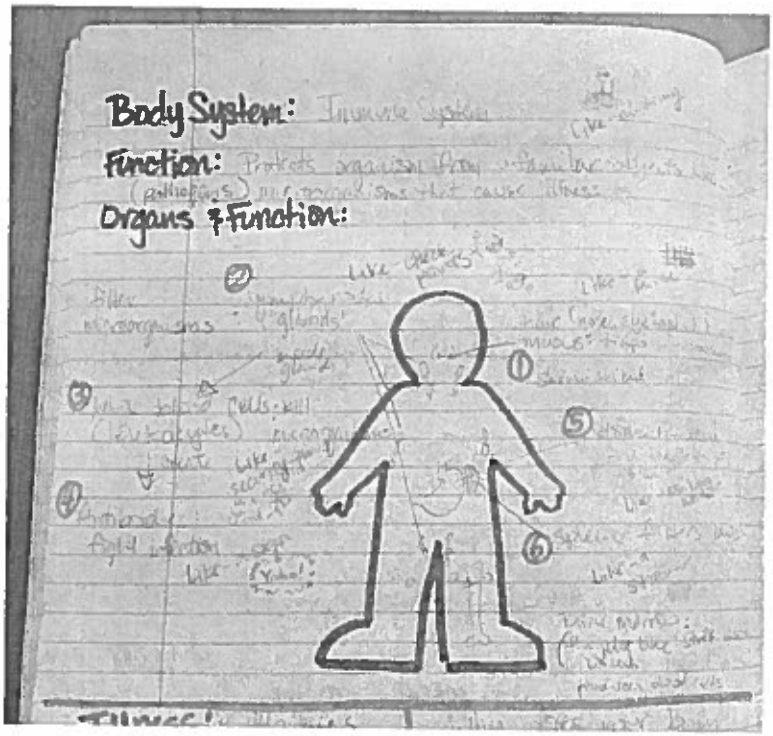
Materials:

- Computer
- Body Outline
- Interactive Notebook
- Color pencils/crayons/ markers

Procedure:

1. Make an outline of a body in your Interactive Notebook using the Body Outlines. Put the outline under your paper and trace.

2. Your team will visit the KidsHealth website - kidshealth.org . Click on the organ that is associated with your body system. Then click on the "Article" icon. There are 6 body systems to research as a class:
   a. Digestive System
   b. Excretory (Urinary) System
   c. Respiratory System
   d. Circulatory System
   e. Nervous System
   f. Muscular System



3. In your Interactive Notebooks, each team member will write down information about that body system.
   a. Name of the Body System
   b. The function of the Body System
   c. The organs in the Body System and their functions. How do they contribute to the overall function of the system?
      i. pick the 6 most important organs/parts of your system into include. See example.
   d. Include any fun facts.
   e. Save two pages for each body system. We will be adding to this section later.

4. Your expert group will also plan on how to present this body system to someone who has not researched that system using analogies.

For example:

a. *The immune system is like army. Both fight invaders.*

b. *Your skin, mucus and hair (nose, eyelashes) are like a fence. They are your first line of defense against an unfamiliar object coming in.*

c. *Lymph nodes (glands) act like a series of checkpoints at a sporting event. They filter objects at different points.*

d. *Antibodies are like a neon sign telling what something is.*

5. When your teacher says go, your team will split up and form mixed groups of experts i.e. one person who researched the Digestive System, one person who researched the Circulatory System, one person who researched the Excretory (Urinary) System, and one person who researched the Nervous System.

6. When you get into your mixed group, you will take turns presenting your body systems.

7. Actively listen to the person presenting. Ask clarifying questions when they are done presenting.

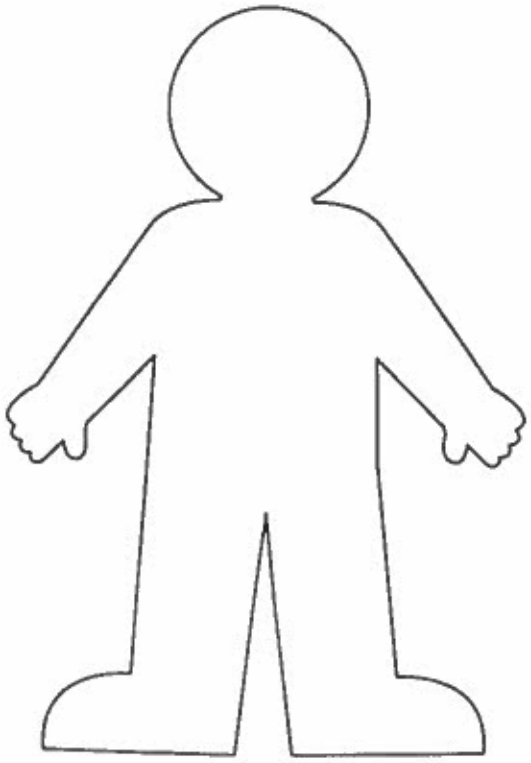
8. At the end of each presentation, fill out a page in your Interactive Notebook for that body system. Each page should have the:
   a. Name of the Body System
   b. Function of the Body System
   c. 6-Organs in the Body System and their functions.
   d. 7-Analogies using words and/or pictures for each organ and the Body System's function.
   e. Don't forget to leave space at the bottom.

9. When the teacher says go again, mix groups so you can meet with experts of different systems.

Body System:

Function:

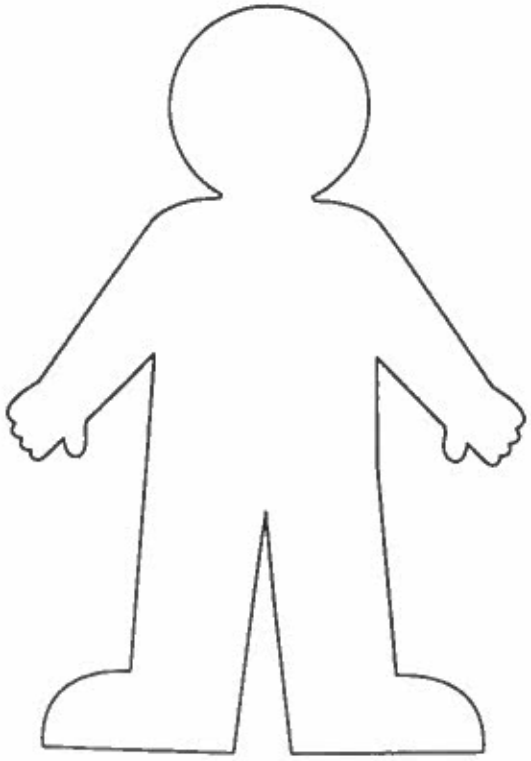
Organs and Functions:



Body System:

Function:

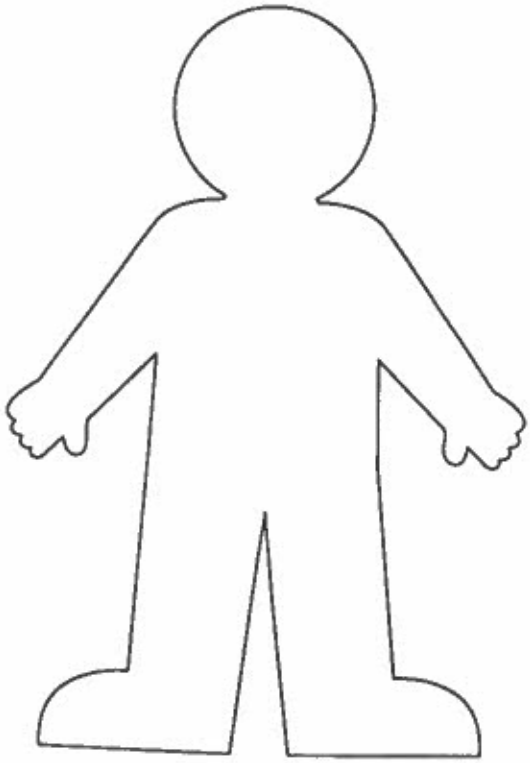
Organs and Functions:



Body System:

Function:

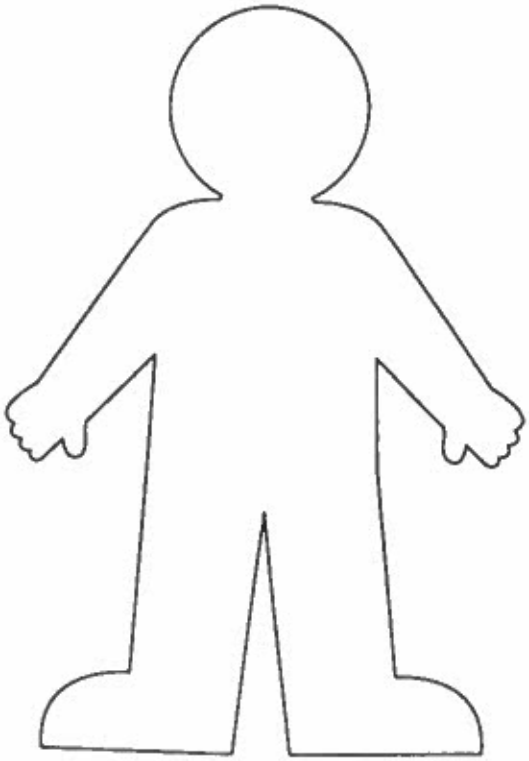
Organs and Functions:



Body System:

Function:

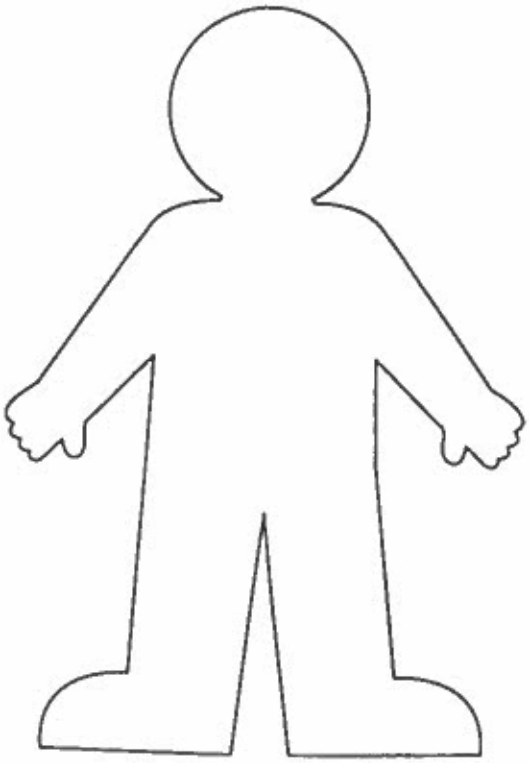
Organs and Functions:



Body System:

Function:

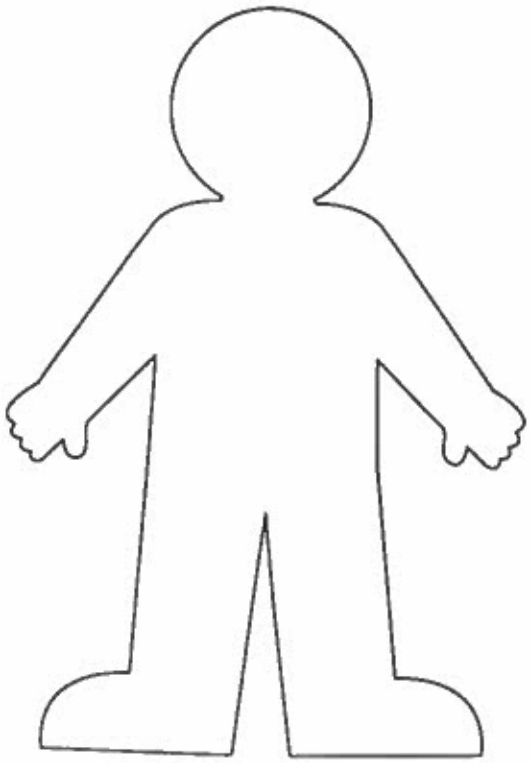
Organs and Functions:



Body System:

Function:

Organs and Functions:



6.3.1 Task Card - Common Illness (Print 2 copies and place in plastic sleeves)

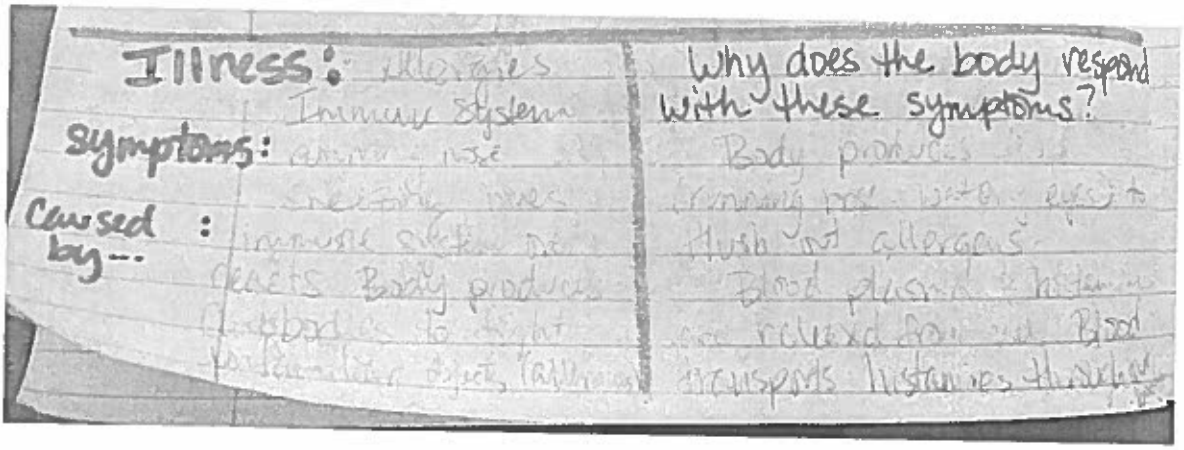
Guiding Question: *Why does our body respond to illness in a particular way?*

1. Your team will visit the KidsHealth website - kidshealth.org . Under the menu for Diseases and Condition, click your body system. A drop list of diseases and conditions will appear. Click on the illness your group has been assigned.
   a. Digestive System - Lactose Intolerance
   b. Excretory (Urinary) System - Urinary Tract Infection
   c. Respiratory System - Tuberculosis
   d. Circulatory System - Hypertension (High Blood Pressure)
   e. Nervous System - Headaches
   f. Muscular System - Strains and Sprains

2. As your team researches the illness, write down information about your illness in your Interactive Notebooks.

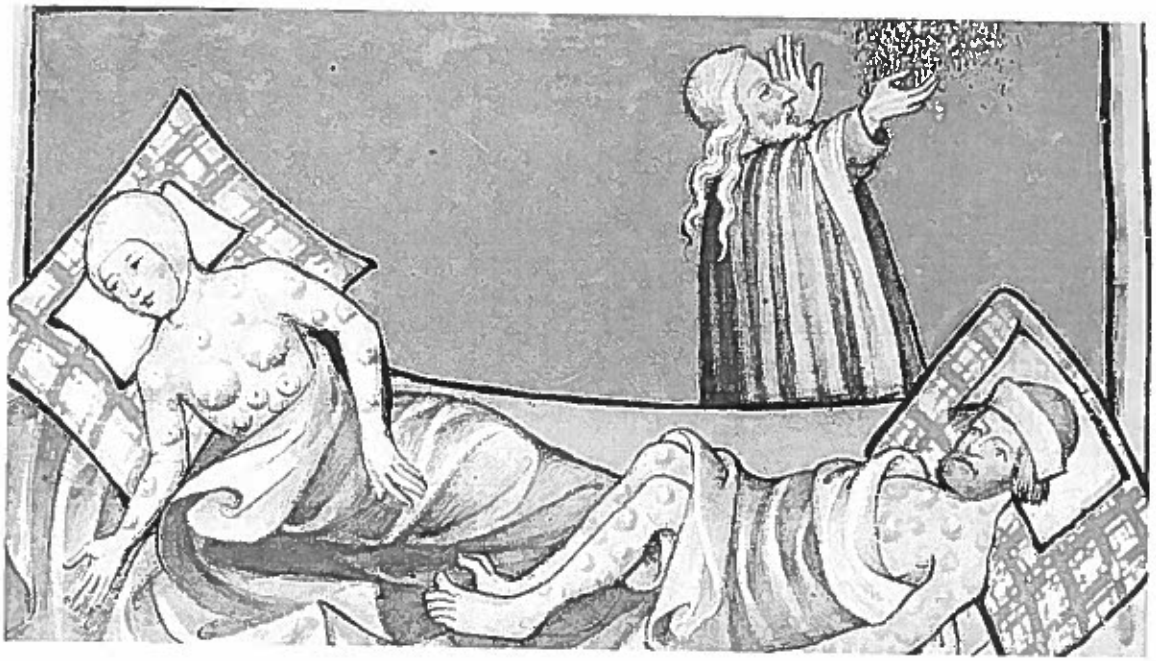
3. Once your teacher says go, your team will create an informational poster about your illness. The poster must include the following information:
   a. Name of the illness
   b. Name of primary body system affected
   c. Symptoms of that illness
   d. Cause of the illness
   e. Prevention
   f. Treatment
   g. Relevant diagrams/pictures

4. Once your teacher says go, teams will do a gallery walk of the illnesses. While at each poster, your team will have to explain **why the body responds to this illness in this particular way?** Each person will respond to this question in their Interactive Notebook.
   a. The only information you need to copy from the poster is the name of the illness and symptoms.



Scientists solve one mystery about two plagues

By Los Angeles Times, adapted by Newsela Staff on 02.11.14
Word Count **498**



Miniature out of the Toggenburg Bible (Switzerland) of 1411. The disease is widely believed to be the plague. The location of bumps or blisters, however, is more consistent with smallpox (as the bubonic plague normally causes them only in the groin and in the armpits). Photo: Wikimedia Commons

About 1,500 years ago, a disease called the Justinian Plague killed up to 50 million people from Asia to Africa to Europe. Experts say the type, or strain, of bacteria that caused the disease can no longer be found.

We will likely never see it again, say the authors of a new study on the missing strain. The study was published in a medical journal called Lancet Infectious Diseases. Its authors say the missing strain teaches us a lesson.

Plague can jump from rodents to humans. A strain can kill millions of people, and then mysteriously disappear. New and equally deadly strains could appear just as mysteriously, they wrote.

"Fortunately, we now have antibiotics that could effectively be used to treat plague," said study co-author Dave Wagner, a professor at Northern Arizona University. That, he says, lessens the chances of another worldwide outbreak.

The symptoms that overtook victims of the Justinian Plague were similar to those of the Black Plague, which struck 800 years later and killed up to 200 million people.

Did the same strain cause both diseases?

Doing Detective Work

That's the question an international team of researchers set out to answer. They first extracted DNA fragments from the teeth of two plague victims who were buried in Bavaria, Germany, around the time of the Justinian Plague outbreak. DNA is the material that holds information about how a person will look and how his or her body will work.

Next, they reconstructed the genetic material of the strain that killed both victims. Finally, they compared it with more than 100 strains of bacteria from the same family. Those bacteria strains are currently found worldwide in animals and humans.

What did the research team discover? The strain that caused the Justinian Plague is a member of the bacterial family Yersinia pestis. The Black Plague, also called the Black Death, sprang from the same family 800 years later. But the genetic fingerprint of the Black Plague is different from the Justinian Plague. Researchers concluded it is highly unlikely that they are related. It is also unlikely that the Justinian strains evolved into the strains that caused the Black Death.

Among the most significant differences between the strains: their ability to spread, replicate and kill their hosts. The Justinian Plague strains appeared to have been even deadlier than the Y. pestis strains that re-emerged during the Black Plague outbreak.

The authors believe the strain of Y. pestis that caused the Justinian Plague is gone for good. If it does still exist, scientists have yet to discover it.

What became of the strain after it killed so many? The study's authors can only guess. Humans may have built a resistance to the strain. Climate changes occurring at the time may have killed the strain.

There is evidence for the climate-change theory. Both the Justinian Plague, the Black Plague, and a plague that occurred in the late 1800s and early 1900s followed periods of exceptional rainfall and ended periods of normal climate patterns.

Quiz

1 Which selection from the introduction [paragraphs 1-6] is MOST connected to its main idea?

(A) A strain can kill millions of people, and then mysteriously disappear.

(B) "Fortunately, we now have antibiotics that could effectively be used to treat plague," said study co-author Dave Wagner, a professor at Northern Arizona University.

(C) That, he says, lessens the chances of another worldwide outbreak.

(D) The symptoms that overtook victims of the Justinian Plague were similar to those of the Black Plague, which struck 800 years later and killed up to 200 million people.

2 Which of the following sentences would you include in a summary of the article?

(A) It is very important for the scientists to study what causes plagues, so they can prevent the bacteria from coming back.

(B) Rodents are most responsible for spreading the plague to humans, which is one of the reasons why it's never a good idea to have an unclean living space that may invite rodents into your house.

(C) People who think the Black Death was the worst plague in history need to learn more about the past, because the Justinian Plague was much deadlier and makes the Black Death look like the common cold.

(D) Scientists do not know why the bacteria that caused the Justinian Plague disappeared, but they believe it is important to know that other deadly bacteria can appear or disappear at any time.

3 According to this article, how were the plagues connected?

(A) The bacteria that caused both plagues are unrelated, except for having similar symptoms and killing many people.

(B) The bacteria that caused both plagues are part of the same family of bacteria, but they are different types of bacteria.

(C) It is likely that the bacteria that caused the Justinian Plague changed and developed into the bacteria that caused the Black Plague.

(D) The bacteria that caused the Justinian Plague is different from the bacteria that caused the Black Plague, but probably very similar to the bacteria that caused the Black Death.

4 Which answer below BEST explains how the article presents its ideas?

(A) The article first explains the research question, then how the study was conducted, and finally explains its results, ending with things that are still unclear.

(B) The article explains why the study was important, and then goes into the details of how the study was conducted and what they found, ending with the research question.

(C) The article begins with a general overview of the subject matter, introduces the research question, and then goes into details about the process and results of the study.

(D) The article begins with explaining the research question, then a summary of the conclusions of the study, and then goes into details about how the scientists discovered what they found.

6.4.2 Task Card - Bacteria, Virus, Fungi and Parasites (Print 2 copies and place in plastic sleeves)

Guiding Question: *What are microorganisms? How small are they?*

Background Information

Life on Earth consist of millions of different living things we call organisms. For example, there are 4,500 different kinds of mammals, 1 million different types of insects and 5 to 10 million different bacteria. We can tell the difference between organisms by their characteristics or traits. We identify some traits using our senses but other traits we cannot. For example, the type of vitamins or other nutrients a plant might contain cannot be easily observed. We cannot simply look, taste or feel an organism to determine how they are related to other organisms.

Almost all large organisms have many cells. Smaller organisms called microorganisms or microbes, are made up of a single cell and can only be seen with a microscope. If you made a grain of salt the size of a baseball bat, a microorganism would be as tiny as a grain of sand.

In this activity, we focus on four different kinds of microorganisms; bacteria, viruses, fungi, and parasites. These microorganisms come in different sizes. For example, if a virus was the size of a pea (0.2inches), bacteria would be the length of a full size car (17 feet) and a parasite could be as big as twenty times the size of the Transamerica building in San Francisco (16,000 feet). Each microorganism has characteristics you can see and some you cannot. Your team will look at magnified pictures of these microorganisms and decide if you can tell them apart based on how they look.

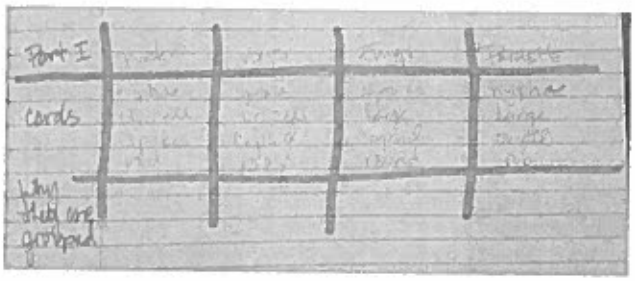
Materials:

- 16 microorganism cards
- 4 microorganism description cards
- 1 envelope

Directions:

Part I

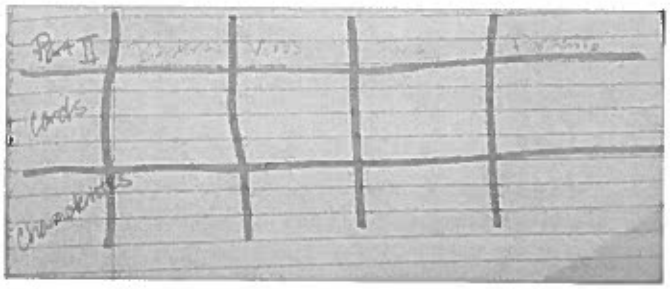
1. Your team will be given 16 cards. At this time, only look at the picture side.
2. Of the 16 cards, 4 cards are bacteria, 4 cards are viruses, 4 cards are fungi and the last 4 are parasites.
3. As a team decide which 4 cards are bacteria, which 4 cards are viruses, which 4 cards are fungi and which 4 cards are parasites. You have ____ minutes to group your cards into 4 groups of 4.
4. In your Interactive Notebook, write down why your team has grouped the cards this way.
5. Share out



Adapted from Backyard Mystery, UC Berkeley

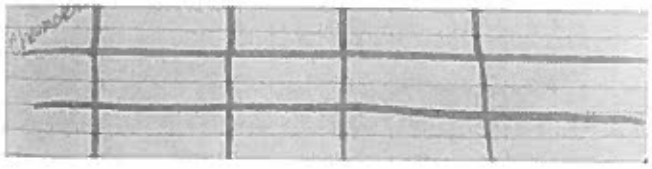
Part II

6. When your teacher says go, flip over the cards to see if the letters on the back spell out their microorganism's name. If the cards do not spell out the names, switch them around so they do spell out the name.
7. Look at the picture side of the cards again and write down common visible characteristics and some different characteristics of these microorganisms.
8. Share out.



Part III

9. Obtain the 4 microorganism description cards.
10. Add additional rows to your data table. As a team decide what information needs to go in those additional rows.



Conclusion

There are some microorganisms that are harmful because they cause disease and sickness, these are called pathogens. Pathogens thrive in warm, moist environments like the crevices of our hands, our noses and mouths, in food and around moist places like the kitchen, bathroom and toilet. Pathogens are easily transferred.

11. Which microorganism are pathogens and how do you know?

12. Synthesize what you have learned using pictures and words (graphic notes or concept web).

Adapted from Backyard Mystery, UC Berkeley

Part one	Bacteria	Virus	Fungi	Parasite
Cards				
Why they are grouped				

Part Two	Bacteria	Virus	Fungi	Parasite
Cards				
Characteristics				

Living (Biotic)	Non-Living (Abiotic)

Identify the characteristics that Living (biotic) things have in common.

Identify the characteristics that Non-Living (Abiotic) things have in common.

2.1 Is It Alive?

Do you know how bread is made? One of the most important ingredients is yeast. Open a packet of yeast and you'll see a bunch of tiny, dried specks. If you drop those specks into a cup of warm water with a little sugar, they'll start to bubble and froth. If you look at the mixture under a microscope (Figure 2.1), you will see individual clumps of yeast growing and even multiplying! Is yeast a living organism? In this section, you'll learn what it means to be alive.

What does it mean to be alive?

What is an organism?

An **organism** is an individual form of life. A tree is an organism and so is yeast. So are you. What makes something alive? As with many questions in science, the answer is not easy and is still argued among scientists. If you've ever had a cold or the flu, you're familiar with the effects of viruses. Viruses are very tiny things that have some of the characteristics of living things, but are not considered alive by many scientists.

The characteristics of living things

So what makes something alive? Having a set of rules is a good way to get closer to the answer. Biologists often use five basic rules to classify something as living or nonliving.

Five Characteristics of Living Things

1. Living things **respond** to their surroundings.
2. Living things **grow** and **develop**.
3. Living things are able to **reproduce**.
4. Living things **use energy**.
5. Living things are made of smaller building blocks called **cells**.

STUDY SKILLS

Make a list of all of the vocabulary terms in this section. For each term:

1. Write its definition, in your own words.
2. Use the term in a sentence.

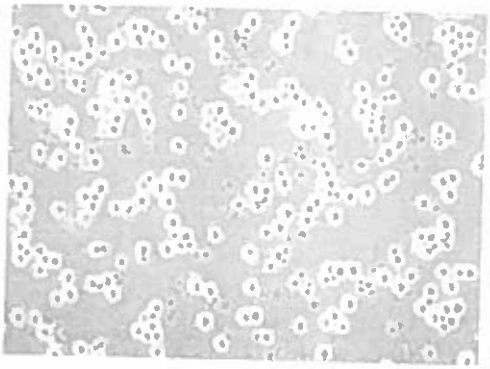


Figure 2.1: *Yeast magnified 100 times. Yeast is a living organism. Each tiny sphere is an individual organism.*

VOCABULARY

organism - an individual form of life.

Response and stimulus Have you ever gone from a dark room out into the sunshine? You respond by squinting your eyes. The brightness of the sun is called a **stimulus** and your reaction to it is called a **response**. All living things respond to a stimulus.

Growth You may think of growth as an increase in size. You have increased in size since you were born. **Growth** also refers to an increase in mass and to an increase in number of cells.

Reproduction The process of making more of the same kind of organism is called reproduction. Because all living things eventually die, reproduction allows life to continue.

Energy All living things take materials from their surroundings such as food, water, and gases. They use these materials to get energy. This energy is needed to carry out all of the life functions.

Cells A **cell** the smallest unit of a living thing. It is the simplest structure that can carry out all of the functions described above. You'll learn more about cells in Unit 2.

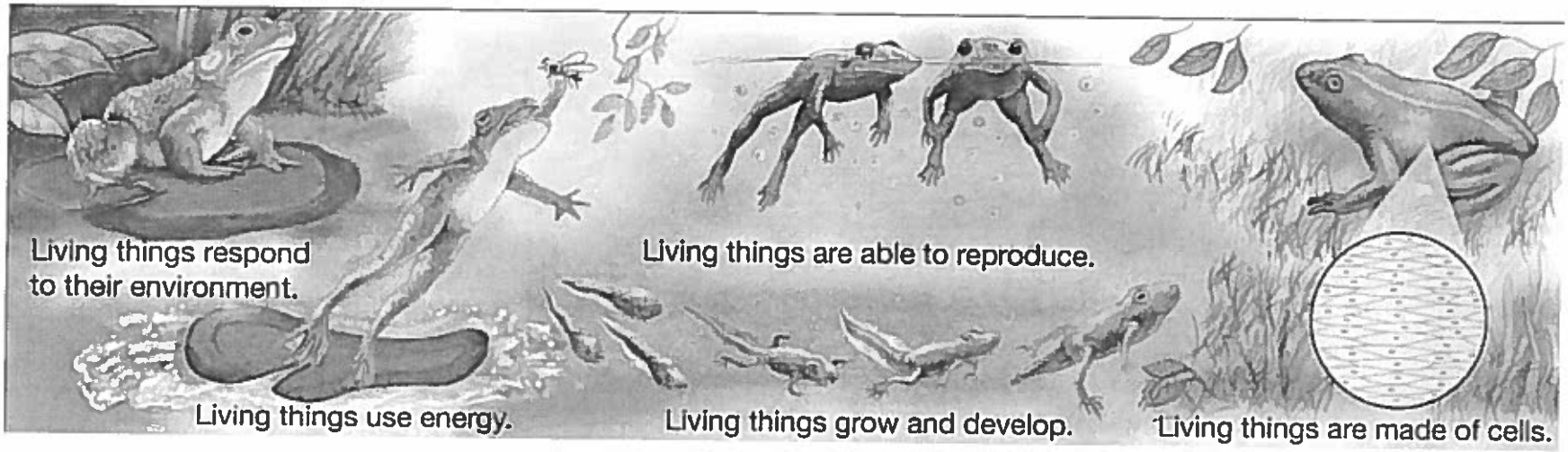
VOCABULARY

stimulus - something that causes a response.

response - how an organism reacts to a stimulus.

growth - an increase in mass.

cell - the smallest unit of a living thing.



6.3.2 Task Card - Organization of "Living Things (Print 2 copies and place in plastic sleeves)

***Guiding Question**: How does size affect whether something is living?*

Materials:

- Envelope with magnified pictures of things
- computer
- interactive website: Cell Size and Scale & Cells Alive

Directions:

Part I

1. Your team will be given a set of magnified pictures of things. Use what your team already knows about these things to put them in order of **big to small**.
2. Work together as a team to put the cards in order.
3. Use evidence to explain why you think cards should go in a certain order.
4. Be sure all team members share evidence.
5. Be ready to change your ideas when there is convincing evidence.
6. Discuss your team's final decision thoroughly and be sure everyone in the team agrees.
7. Be prepared to share information and evidence (reasoning) with the class about your team's decision.

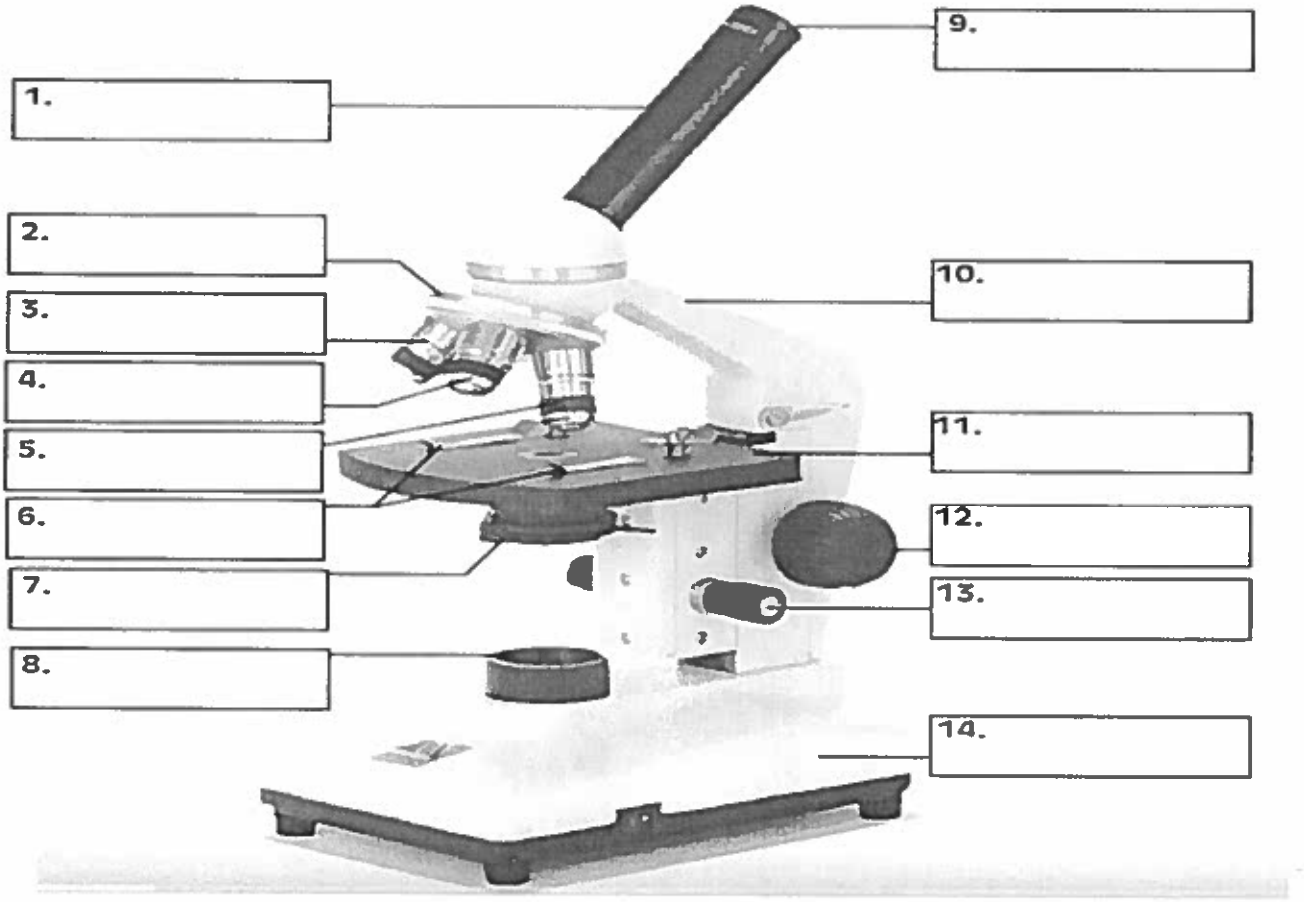
Part II

8. After you have shared your reasoning with the class, visit the interactive websites.
9. Some pictures represent living organisms while others do not. Determine which things are living and non-living. Provide your reasoning. How does size affect whether something is living?

How does size affect whether something is living?

6.4.2 Resource Sheet: Microscope Diagram

As you interact with Virtual Lab: Using a Microscope, fill in the diagram below and and any notes that will help you use the microscope later.



A#

Using a Microscope

How do you use a compound microscope to see objects?

Name:

Per: **Date:**

Have you ever used a magnifying glass? Objects under the magnifying glass look larger than real life. A compound microscope is like a magnifying glass that uses more than one lens to magnify small objects. In this investigation, you will become familiar with the parts of the compound microscope. Then you will examine a specimen with the microscope and practice using different levels of magnification.

Materials
- Compound microscope
- Power supply
- Clean glass slides
- Prepared specimens on glass slides
- Lens paper

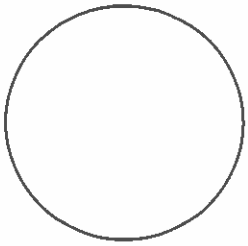
A. Focusing on the letter "e"

The microscope allows you to look in the eyepiece and see an image of the object on the stage. There are some differences between the image and the object. By following these directions, you will see **how the IMAGE is DIFFERENT from the ACTUAL OBJECT.**

DIRECTIONS:

		Got it?(√)
1.	Turn on the light.	
2.	**CENTER THE OBJECT** by moving the slide **in the center of the stage** with the letter **"e" facing you.** Secure the slide under the stage clips.	
3.	**ALWAYS START WITH THE LOWEST POWER OBJECTIVE (4X). Move the revolving nosepiece slowly until the 4x objective** is clicked into place and directly above the object.	
4.	**MOVE THE STAGE UP/DOWN using the focus knob** while LOOKING IN THE EYEPIECE. Focus until you see a clear image.	
5.	**ROTATE THE DIAPHRAGM under** the stage to get the RIGHT amount of light.	
6.	**Carefully move the slide until the image is centered.** Focus again if necessary.	
7.	*Challenge:* **CHANGE THE OBJECTIVE** to view a more detailed image. Rotate the nosepiece until a new objective **CLICKS** into place directly above the slide. Adjust the focus knob as needed.	

Draw a picture of how the IMAGE appears of the letter "e" below.



How is the IMAGE of the letter "e" DIFFERENT? Is it facing the same direction as how you put it in?

a. If you moved the slide **to the right**, then the IMAGE moves to the _____.

b. If you moved the slide **to the left**, then the IMAGE moves to the _____.

c. If you moved the slide **towards you**, then the IMAGE moves _____.

d. If you moved the slide **away from you**, then the IMAGE moves _____.

e. What is your advice to someone who does NOT know how to correct an **off-center image**? What should they try before asking for help from someone else?

B. Examining organisms underneath the microscope

By following these directions, you will see **how organisms look underneath the microscope.**

DIRECTIONS:	**Got it?(√)**
1. Use the directions on the front page to set the microscope and focus your specimen.	
2. There will be TWO rotations. Secure the slides with **stage clips.** *First,* **PARTNERS A AND B** will look at _____. **PARTNERS C and D** will look at _____. *Second,* **PARTNERS A AND B** will look at _____. **PARTNERS C AND D** will look at _____.	
3. **Make detailed drawings** of what you see. **Use color.**	
4. Record your **specimen name** and your **observations.**	

Observations and Data Collection – (*HIGH POWER = CHALLENGE for some specimens*)

First Rotation:

Specimen: _____ (Low power)

Observations:

Specimen: _____ (Medium power)

Observations:

Specimen: _____ (Highpower)

Observations:

Second Rotation:

Specimen: _____ (Low power)

Observations:

Specimen: _____ (Medium power)

Observations:

Specimen: _____ (Highpower)

Observations:

6.3.3. Resource Sheet: Reading

Organization of a System

Focus Question: How do cells fit into the organization of the living organisms?

Look closely at the skin on your arm. Can you see that it is made of cells? Of course not! Your skin cells are much too small to see with your eyes. Now look at one square centimeter of your arm. That square centimeter contains about 100,000 skin cells. Cells are so small that they weren't even discovered until the invention of the microscope. What are cells and how were they discovered?

You are made of cells

A cell is the smallest unit of a living thing

A cell is the basic unit of structure and function in a living thing. Your body is composed of billions of cells. You have skin cells, muscle cells, nerve cells, blood cells, and many other types as well. Each type of cell has a unique structure and function, but they all share similarities. Figure 5.1 shows pictures of different types of cells found in your body.

A cell is the basic unit of structure and function in a living thing.

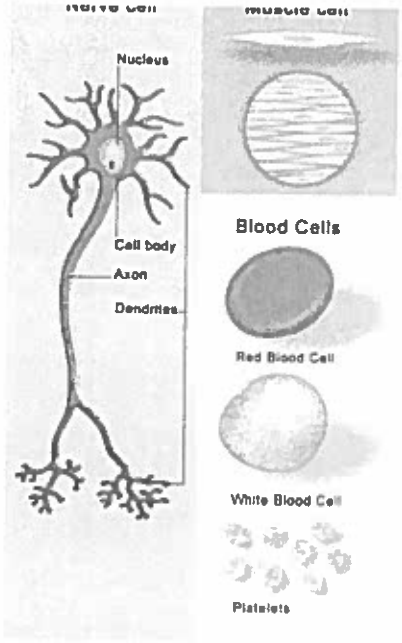


Figure 5.1: *Different types of cells found in your body. Platelets are found in your blood but are particles, not cells.*

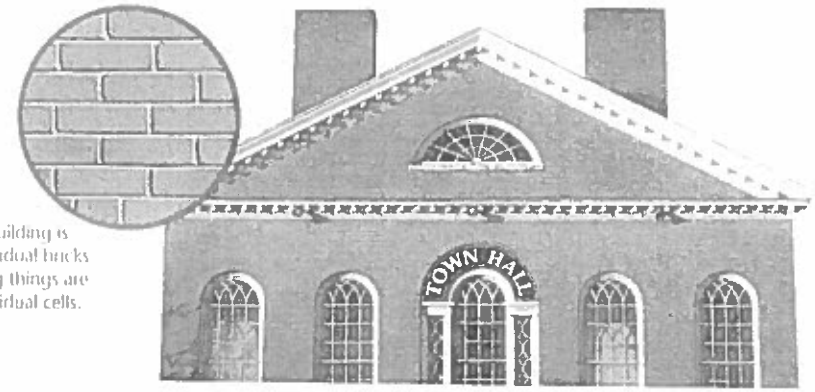


Figure 1 This building is made up of individual bricks. Similarly, all living things are made up of individual cells.

6

Tissues Your body is made up of many different types of cells. You have skin cells, muscle cells, liver cells, nerve cells, and blood cells, to name just a few. A group of specialized cells that performs a particular function is called a **tissue**. For example, muscle tissue is a tissue that is able to contract. Figure 2.7 shows what your muscle tissue looks like under a microscope.

Organs Tissues combine to form organs, the next level of organization. An **organ** is a group of tissues that works together to carry out a set of functions. For example, your stomach is an organ that contains several types of tissue. Muscle tissue in your stomach contracts to mix food. Another type of tissue makes a chemical that breaks down the food.

Organ systems A group of organs that works together to perform a set of functions is called an **organ system**. For example, your digestive system consists of many organs including the esophagus, stomach, small intestine, and large intestine. Each organ in the system performs a different function that is part of the digestive process.

Organism In multicellular organisms like you, different body parts and organ systems take on different functions. The network of organ systems works together to keep the organism alive. **An organism is an independently functioning living thing.**

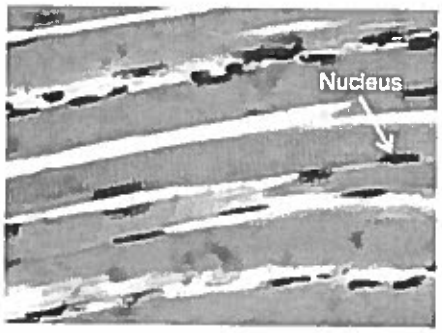
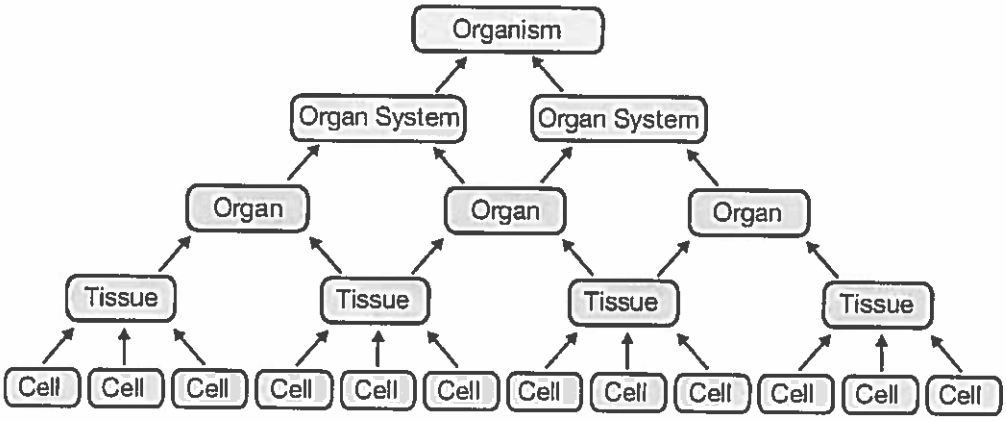


Figure 2.7: *Muscle tissue is made of individual muscle cells. Each individual cell has a dark spot called a nucleus.*

Levels of Organization



Name: _____ Period: ____ Date: _____ Page: 33

6.3.3 Resource Sheet: Comparison of Animal and Plant Cell

Cut out and paste on opposite pages facing each other in your notebook.

1

Diagram of an animal cell

The picture below is a schematic drawing of an animal cell. Under a microscope, you would not be able to see many of the organelles.

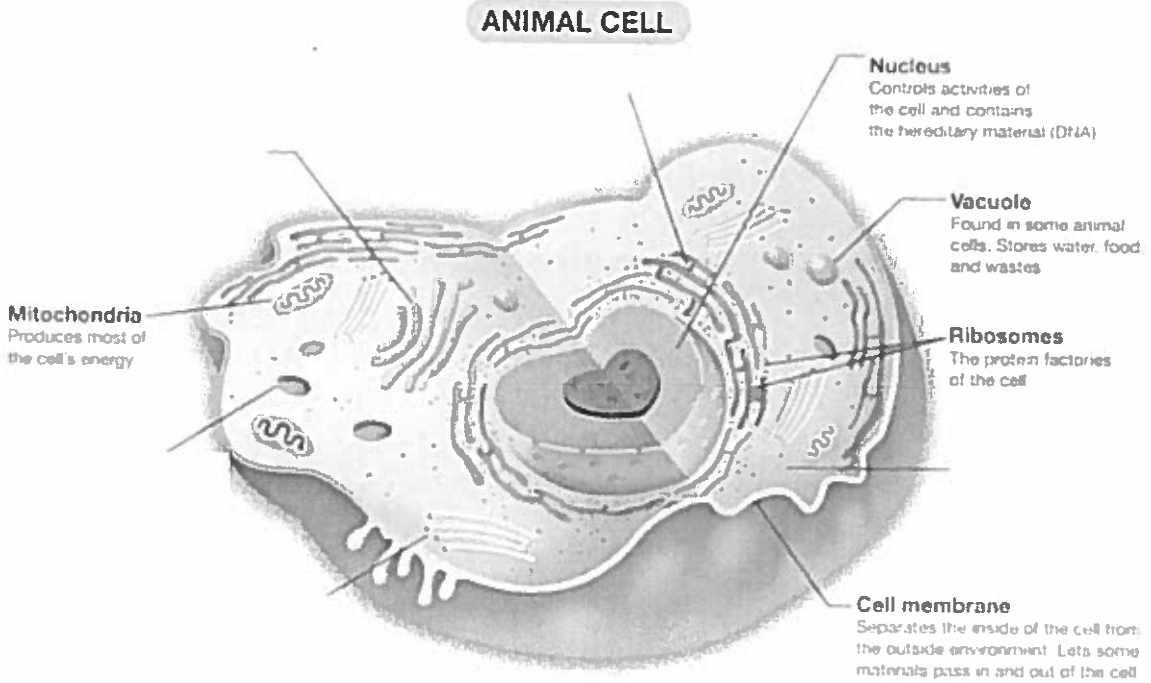
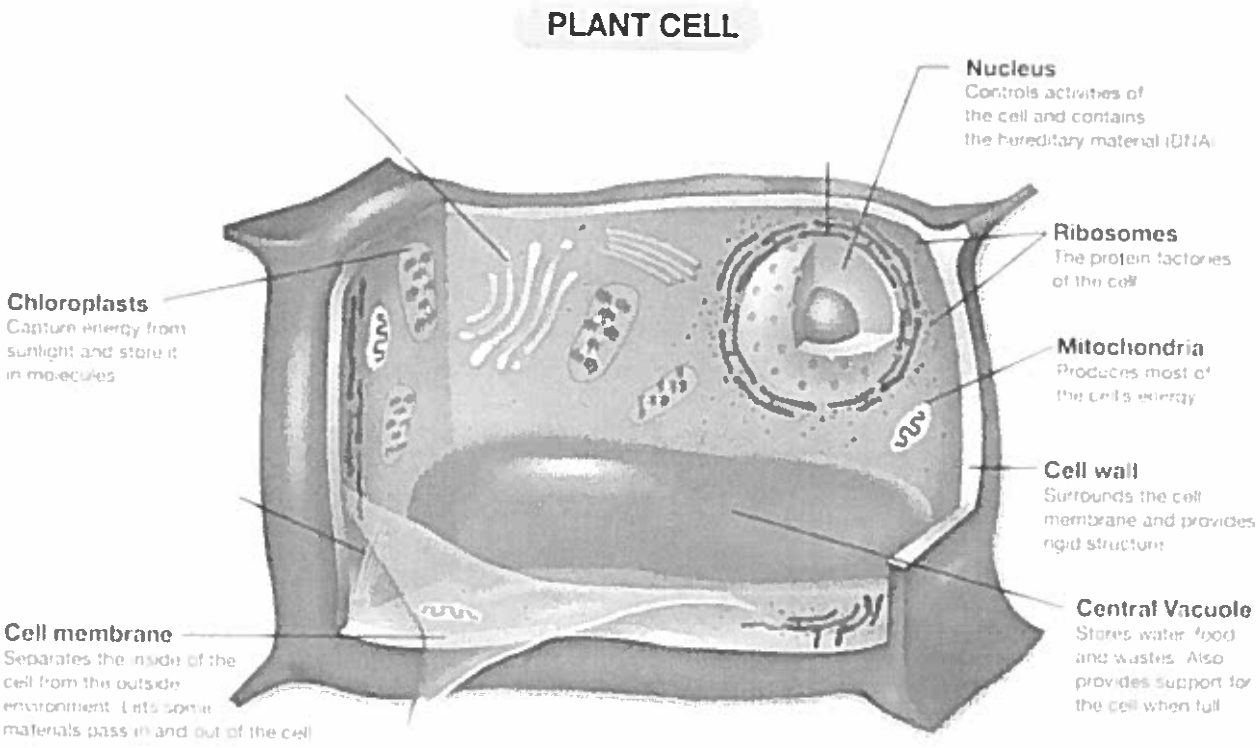
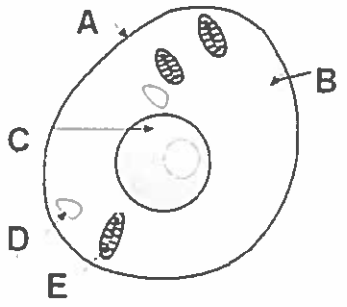


Diagram of a plant cell

Plant cells are different from animal cells. Here is a diagram of a typical plant cell.



Cell #	Identify: Which cell organelle is missing?	Label: Write the letter of the organelle that is missing.	Function: What is the function of the organelle?
			
Ex.			
1.			
2.			
3.			
4.			

Would cells be able to survive if one part was missing? Why or why not?

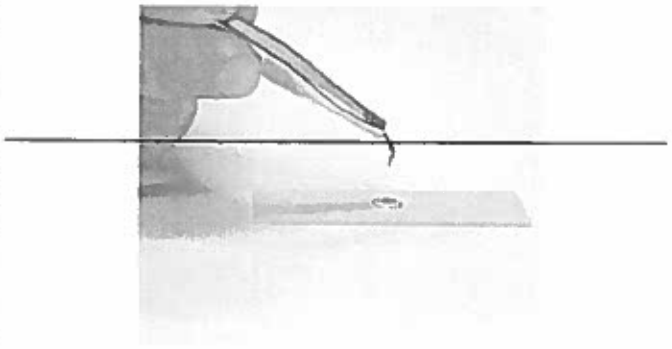
TASK CARD - Examining organisms underneath the microscope

By following these directions, you will see **how organisms look underneath the microscope.**

DIRECTIONS:

PLANT – Elodea Leaf specimen

DIRECTIONS:	Got it?
1. Place ONE drop of water onto a clean slide.	
2. Place an Elodea leaf into the drop of water.	
3. Using tweezers, gently place a coverslip onto the leaf.	
4. Examine the Elodea under low, medium, and high power.	
5. **Record the specimen name. Sketch what you see and record your observations ONLY in MEDIUM and HIGH power.**	
6. Separate the Elodea slide from the coverslip and place them both in the appropriate containers.	



ANIMAL – Human Cheek Cell specimen

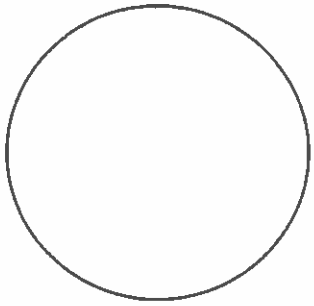
The cells that line the inside of your mouth are called *epithelial cells*. These cells are easy to collect and observe. Follow the procedures below.

DIRECTIONS:	Got it?
1. Place ONE small drop of **methylene blue stain** onto a clean slide.	
2. Get a clean flat toothpick. GENTLY scrape the inside of your cheek with the wide end.	
3. Place the toothpick into the stain on the slide and gently swirl to mix the cheek cells with the stain. Dispose of the toothpick as directed by your teacher. DO NOT REUSE THE TOOTHPICK.	
4. Using tweezers, GENTLY place a coverslip on top of the methylene blue solution as shown.	
5. Place the slide on the microscope stage and observe under low power, medium power, and high power. **Record the specimen name, sketch what you see, and record your observations ONLY in MEDIUM and HIGH power.**	
6. Separate the cheek cell slide from the coverslip and place them both in the appropriate containers.	

DRAW INTO NOTEBOOKS

First Rotation:

Specimen: _____
(Low power)

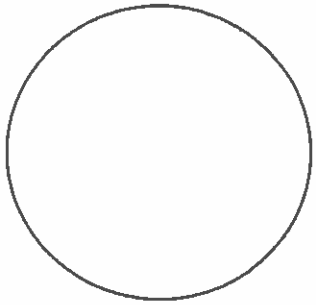


Observations:

_____

_____

Specimen: _____
(Medium power)

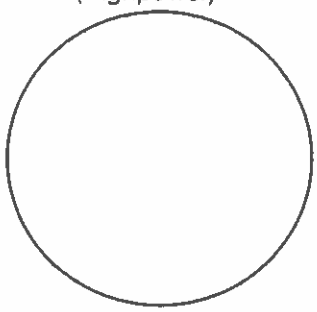


Observations:

_____

_____

Specimen: _____
(Highpower)



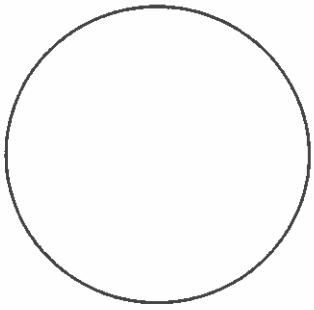
Observations:

_____

_____

Second Rotation:

Specimen: _____
(Low power)

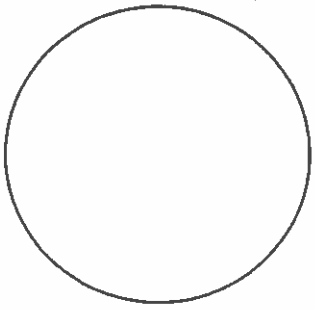


Observations:

_____

_____

Specimen: _____
(Medium power)

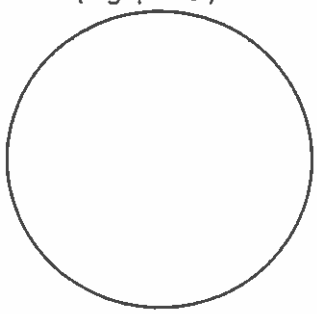


Observations:

_____

_____

Specimen: _____
(Highpower)



Observations:

_____

_____

6.3.3 Task Card: Can You Identify These Cell Structures? (Print 2 copies and place in plastic sleeves)

Guiding Question: *What's the function of an organelle?*

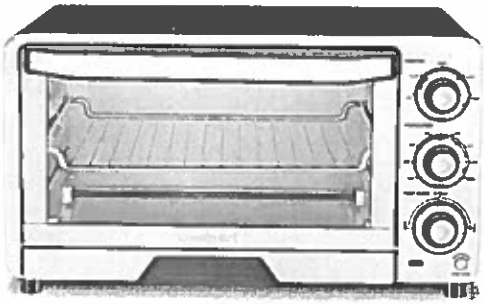
Directions:

1. As a team, you will look at rhymes and objects. Both are clues to identifying an organelle in a cell.
    a. An organelle can only be used once.
    b. You can use organelles in an animal cell or in a plant cell.

2. Explain why this object was used in comparing.

3. Describe why the object may not be the best example (limitations).

Here is an example.

Rhyme	Additional clue to identify organelles' identity
Proteins are made here even though I'm quite small. You can find me in the cytoplasm or attached to E.R.'s wall. 1.What am I?	**Oven** 

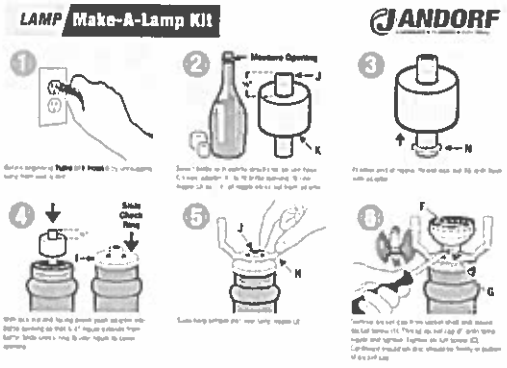
Answer: 1. The organelle is a ribosomes because ribosomes make protein.

Answer: 2. An oven was used to compare to a ribosome because it makes things, it can be attached to a wall or it can be placed on counter-top.

Answer: 3. The limitation of using an oven as a ribosome, is that cells have a lot of ribosomes but most homes do not have multiple ovens.

6.3.3 Task Card: Can You Identify These Cell Structures? (Print 2 copies and place in plastic sleeves)

Clues in the form of rhymes and objects:

Rhymes	Additional clues to identify organelles' identity
I'm a real "powerhouse." That's plain to see. I break down food to release energy. 1.What am I?	**Battery** 
I'm strong and stiff. Getting through me is tough. I'm found only in plants, but I guess that's enough. 2. What am I?	**Tupperware** 
I'm the "brain" of the cell or so they say. I regulate activities from day to day. 3. What am I?	**Directions** 

Solar Cell

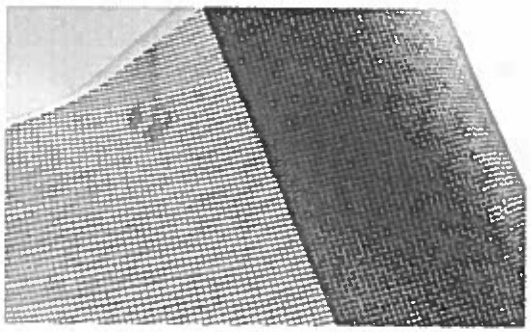
Found only in plant cells,
I'm green as can be.
I make food for the plant
using the sun's energy.

4. What am I?

Screen for a Door/Window

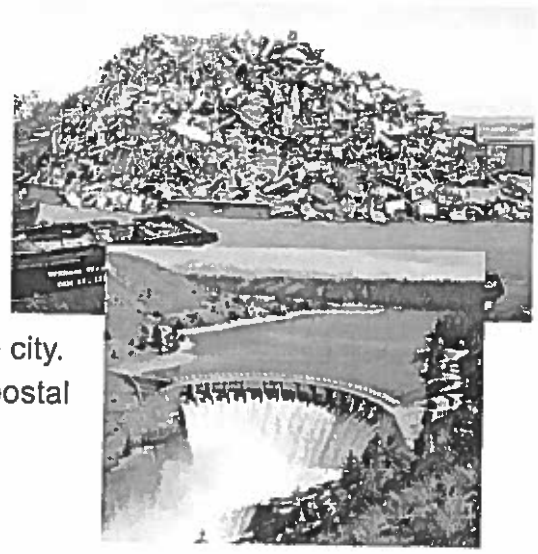
I'm full of holes,
flexible and thin.
I control what gets out
as well as what comes in.

5. What am I?



Guiding Question:

In a far away city called Oaklandia, the main export and production product is the steel tool. Everyone in the town has something to do with steel tool making and the entire town is designed to build and export tools. The ***town hall*** has the instructions for tools making, tools come in all shapes and sizes and any citizen of Oaklandia can get the instructions and begin making their own tools. Tools are generally produced in small shops around the city.



After the tool is constructed, they are placed on special carts which can deliver the tool anywhere in the city. In order for a tool to be exported, the carts take the tool to the postal office, where the tools are packaged and labeled for export. Sometimes tools don't turn out right, and the "rejects" are sent to the scrap yard where they are broken down for parts or destroyed altogether. The town powers the tool shops and carts from a ***hydraulic dam*** that is in the city. ***Security guards*** patrol the edge of the city and only allow postal trucks (and citizens with proper passports) outside the city.

Make this table in your Interactive Notebook.

Match the parts of the city with the parts of the cell.		
Part of the cell	**Part of "Oaklandia"**	**Why**
Mitochondria		
Nucleus		
Cell Membrane		

Limitations -

1. Does Oaklandia represent an animal cell or plant cell?
    a. How do you know?
    b. If its not a plant cell, what could you add to make this a plant cell?

2. Describe why the objects may not be the best example.

Assignment:

As you can see, Oaklandia is an analogy for the cell and it's organelles. Your job is to create your own analogy of the cell. It might be a factory, a school, a restaurant, a farm, etc.

Materials:

- Poster paper
- markers and/or color pencils

Expectations:

For your analogy, you will turn in:

1. The **Analogy Table** filled out for you analogy.
2. A **Visual Representation** of your cell analogy. Label and color parts of your analogy.
3. **Discuss limitations.** Describe why the object may not be the best example.

1. Make an your own Analogy Table in your Interactive Notebook.

Match the parts of your analogy with the parts of the cell.		
Part of the cell	**Part of "_____"**	**Why**
Mitochondria		
Nucleus		
Cell Membrane		
Cell Wall		
Chloroplast		

You will also attach an analogy table to your poster.

2. Make a sketch of your analogy in your Interactive Notebook.

Your final drawing will be on poster paper.

3. Discuss limitations - Describe why the object may not be the best example.

Cell Analogy

Name:
Period:

Antibiotic Resistance

Brain-pop Antibiotic Resistance Notes/Summary and Questions

Continuity of Life Simulation Demo

Predict: Why do penicillin and other antibiotics become less useful over time?

Explain: What happens during the simulation?

Draw what you observed in the demo

Conclude: What other adaptations could the bacteria develop by mutating?

Extension Questions:
Some scientists say that household use of antibacterial soaps does more harm than good. Why do you think that?

What would happen if bacteria took a long time to reproduce rather than a short time?

Understanding Medications and What They Do

Sometimes it seems like there are more medicines than there are diseases, and it can be hard to keep them straight. Some medications can be bought over the counter at pharmacies or other stores. Others require a doctor's prescription. A few medicines are available only in hospitals.

What Are Medicines?

Medicines are chemicals or compounds used to cure, halt, or prevent disease; ease symptoms; or help in the diagnosis of certain illnesses. Advances in medications have enabled doctors to cure many diseases and save lives.

These days, medicines come from a variety of sources. Many were developed from substances found in nature, and even today many are extracted from plants. For example, one medicine that is used to treat certain cancers comes from the Pacific yew tree.

Some medicines are produced in a laboratory by mixing together a number of chemicals. Others, like penicillin, are byproducts of organisms such as fungus. And a few medicines are even biologically engineered by inserting genes into bacteria that make them produce the desired substance.

When we think about taking medications, we often think of pills. But medications can be delivered in many ways, such as:

- liquids that are swallowed (like cough syrup)
- drops that are put into ears or eyes
- creams, gels, or ointments that are rubbed onto the skin
- inhalers (like nasal sprays or asthma inhalers)
- patches that are stuck to skin (called transdermal patches)
- tablets that are placed under the tongue (called sublingual medicines; the medication is absorbed into blood vessels and enters the bloodstream)
- injections (shots) or intravenous (inserted into a vein) medications

No medicine can be sold unless it has first been approved by the U.S. Food and Drug Administration (FDA). The manufacturers of the medication perform tests on all new medicines and send the results to the FDA.

The FDA allows new medicines to be used only if they work and if they are safe enough. When a medicine's benefits outweigh its known risks, the FDA usually approves the sale of the drug. The FDA can withdraw a medication from the market at any time if it later is found to cause harmful side effects.

Different Types of Medicines

Medicines act in a variety of ways. Some can cure an illness by killing or halting the spread of invading germs, such as bacteria and viruses. Others are used to treat cancer by killing cells as they divide or preventing them from multiplying. Some drugs simply replace missing substances or correct abnormally low levels of natural body chemicals such as certain hormones or vitamins. Medicines can even affect parts of the nervous system that control a particular body process.

Nearly everyone has taken an antibiotic. This type of medicine fights bacterial infections. Your doctor may prescribe an antibiotic for things like strep throat or an ear infection. Antibiotics work either by killing bacteria or halting their multiplication so that the body's immune system can fight off the infection.

Sometimes a part of the body can't produce enough of a certain chemical. That can also make you sick. Someone with insulin-dependent diabetes, for instance, has a pancreas that can't produce enough insulin (a hormone that regulates glucose in the body). Some people have a low production of thyroid hormone, which helps control how the body uses energy. In each case, doctors can prescribe medicines to replace the missing hormone.

Some medicines treat symptoms but can't cure the illness that causes the symptoms. (A symptom is anything you feel while you're sick, such as a cough or nausea.) So taking a lozenge may soothe a sore throat, but it won't kill that nasty strep bacteria.

Certain medicines are designed to relieve pain. If you pull a muscle, your doctor might tell you to take ibuprofen or acetaminophen. These pain relievers, or analgesics, don't get rid of the source of the pain — your muscle will still be pulled. What they do is block the pathways that transmit pain signals from the injured or irritated body part to the brain (in other words, they affect the way the brain reads the pain signal) so that you don't hurt as much while your body recovers.

As people get older, they sometimes develop chronic or long-term conditions. Medicines can help control certain conditions like high blood pressure (hypertension) or high cholesterol. These drugs don't provide a cure for the underlying problem, but they can help prevent some of the body-damaging effects of the disease or condition over time.

Among the most important medicines are immunizations (or vaccines). These keep people from getting sick in the first place by immunizing, or protecting, the body against certain infectious diseases. Vaccines usually contain a small amount of an agent that resembles a specific germ or germs that have been modified or killed. When someone is vaccinated, it primes the body's immune system to "remember" the germ so it will be able to fight off infection by that germ in the future.

Most immunizations that prevent you from catching diseases like measles, whooping cough, and chickenpox are given by injection. No one thinks shots are fun. But the diseases they prevent can be very serious and cause symptoms that last much longer than the temporary discomfort of the shot.

Although some medications require a prescription, some are available in stores. For example, many medications for pain, fever, cough, or allergies can be purchased without a prescription. But just because a medicine is available over-the-counter (OTC), that doesn't mean it's free of side effects. Take OTC medicines with the same caution as those prescribed by a doctor.

Living Systems - Unit 3: Task 4 - Cells

Essential Question: How do we prevent illness from spreading in our community?

Task Card: *Cells Working Together* (2 copies per group in plastic sleeves)

Focus Question: *How do different cells come together to fight pathogens?*

Materials:

- Immune System Response Cards
- Annotating Rubric and glue or tape

Procedure:

1. As a class, we will read and annotate 1 response cards using the annotating rubric.

2. During the second read, we will create a data table together in our Interactive Notebook. Your table should take 1 page.

3. For the remaining response cards, we will jigsaw them. Your team will be an expert in one card. Your team will read, annotate and fill out the data table for that response. Your expert group will also plan on how to present this card to someone who has not read it.

4. When your teacher says go, your team will split up and form mixed groups of experts.

5. When you get into your mixed group, you will take turns presenting your cards.

6. Actively listen to the person presenting. Ask clarifying questions when they are done presenting.

7. At the end of each presentation, fill out your data table.

8. Synthesize what you learned using either pictures and words (graphic notes or concept web)

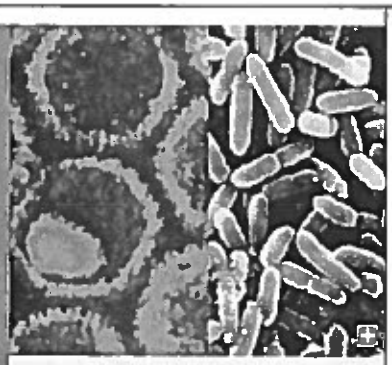
Living Systems - Unit 3: Task 4 - Cells

Essential Question: How do we prevent illness from spreading in our community?

Immune System Response Cards

What does your immune system do?

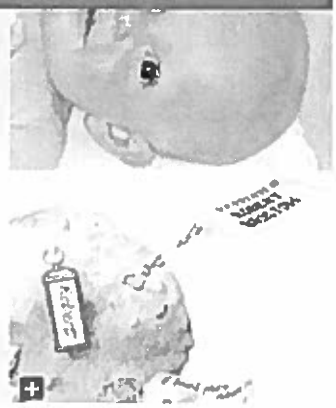
Your immune system is your body's defence against infection and illness. It recognises the cells that make up your body, and will try to get rid of anything unfamiliar. It destroys germs (bacteria and viruses) and parasites. But this defence system can also cause problems. It will attack donated organs or blood from another person, unless carefully matched. It may overreact to harmless invaders such as pollen grains, causing hayfever. In some cases (autoimmune diseases), the immune system turns against the body's own cells.



Herpes simplex virus (left) and Pseudomonas aeruginosa bacteria (right)

How do cells recognise each other?

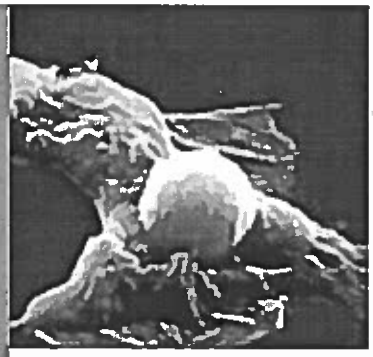
Each of your cells has a set of 'identity tags' on its surface, which mark it out as part of your body and no one else's. Some are only found on cells from the same tissue or organ. These identity tag molecules are called antigens. Your set of antigens is unique, unless you have an identical twin. Your immune system recognises invading germs because they have unfamiliar antigens on their surfaces.



Each of your cells has a set of 'identity tags' on its surface telling your body that it belongs to you.

Which immune reactions are 'natural'?

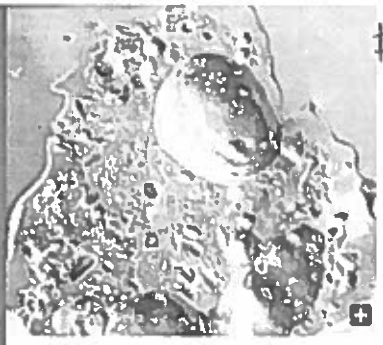
When you are injured, or infected with germs, your body's first line of defence is often inflammation. Blood flow to the affected area increases, making it red, swollen and tender. The blood vessels become 'leaky', allowing defender cells to reach the injured or infected area. Some of the defender cells then produce chemicals that kill bacteria, or virus-infected cells. Others clear up the debris. Inflammation is triggered by special proteins, known as cytokines and complement proteins.



Special cells like this defend your body against infection.

How does your immune system work?

Your immune system uses a huge army of defender cells - different types of white blood cell. You make about 1000 million of them every day in your bone marrow. Some of these cells, called macrophages, constantly patrol your body, destroying germs as soon as they enter. This is your 'natural' or inborn immunity. But if an infection begins to take hold, your body fights back with an even more powerful defence of T- and B-cells. They give you acquired immunity, so that the same germ can never make you as ill again.



Coloured electron micrograph of a white blood cell

Adapted from The Science Museum

Essential Question: How do we prevent illness from spreading in our community?

#4

How do you recognise invaders?

Your T- and B-cells recognise invaders by the shape of molecules - antigens - on their surfaces. Your immune system can produce a T- and B-cell to fit every possible shape. However, any T- or B-cell that recognised molecules found on your cells were destroyed while you were growing in the womb to prevent them from attacking your own body. But you were left with millions of others, one for every foreign antigen you might ever encounter.

Electron micrograph of Escherichia coli, close-up.

#6

What is so special about your B-cells?

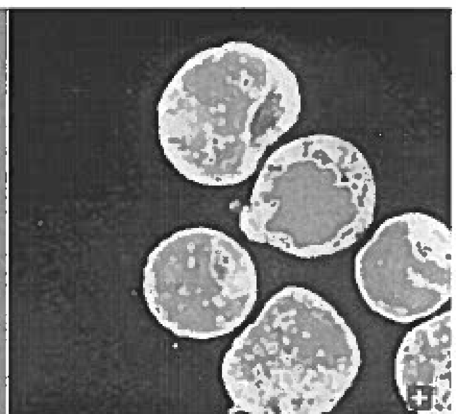
With the help of T-cells, B-cells make special Y-shaped proteins called antibodies. Antibodies stick to antigens on the surface of germs, stopping them in their tracks, creating clumps that alert your body to the presence of intruders. Your body then starts to make toxic substances to fight them. Patrolling defender cells called phagocytes engulf and destroy antibody-covered intruders.

The molecular structure of an antibody

#5

What do T- and B-cells do?

T- and B-cells are highly specialised defender cells - different groups of cells are tailored to different germs. When your body is infected with a particular germ, only the T- and B-cells that recognise it will respond. These selected cells then quickly multiply, creating an army of identical cells to fight the infection. Special types of T- and B-cells 'remember' the invader, making you immune to a second attack.

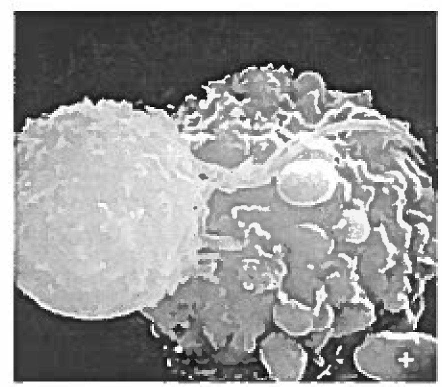


Human T-cells.

#7

What is so special about your T-cells?

Having recognised the invader, different types of T-cell then have different jobs to do. Some send chemical instructions (cytokines) to the rest of the immune system. Your body can then produce the most effective weapons against the invaders, which may be bacteria, viruses or parasites. Other types of T-cells recognise and kill virus-infected cells directly. Some help B-cells to make antibodies, which circulate and bind to antigens.



A T-cell (orange) killing a cancer cell (mauve).

Adapted from The Science Museum

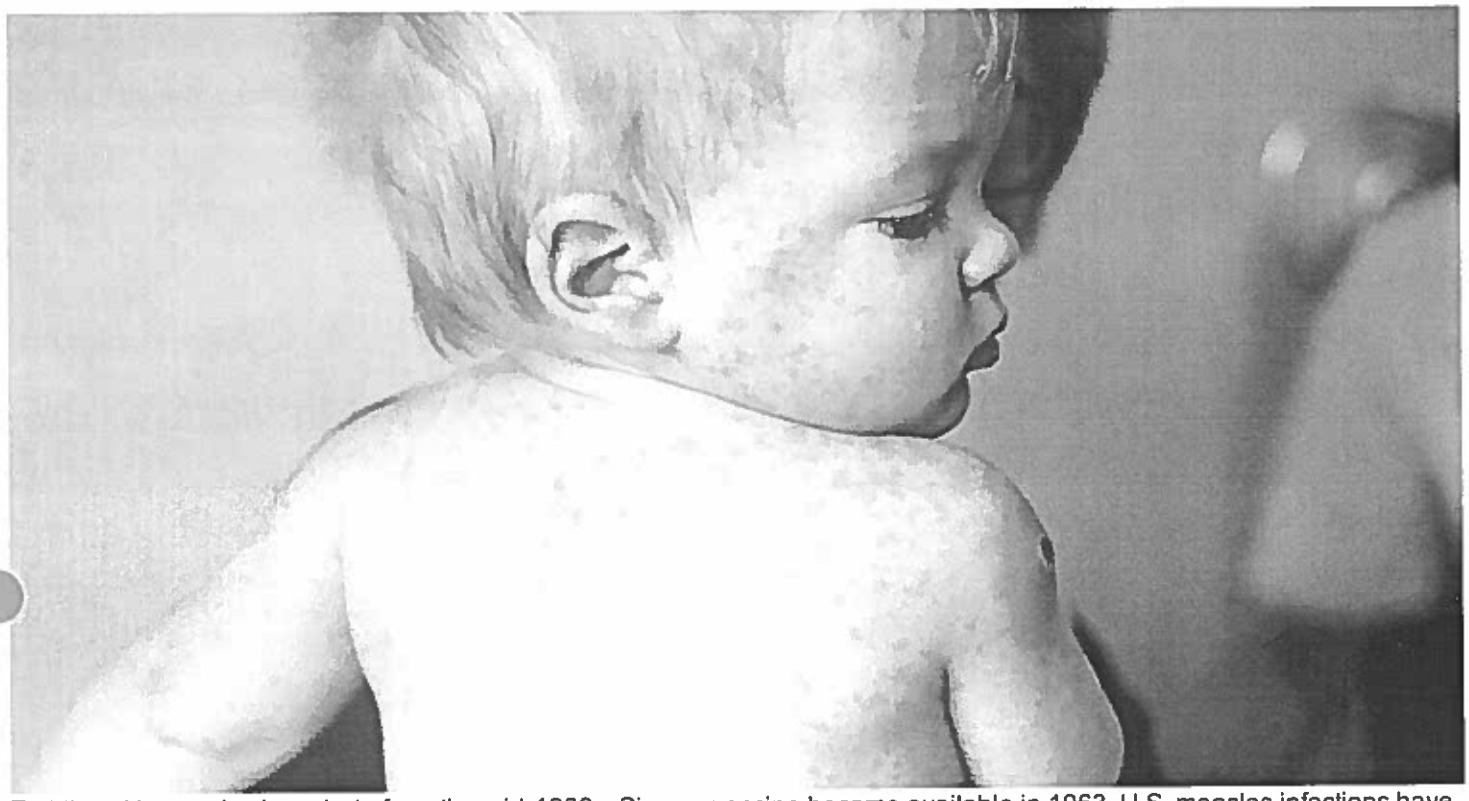
Card #	Title	Summary Sentence
C		
1		
2		
3		
4		
5		
6		
7		

Body & Health

U.S. outbreak of measles emerges

Most patients never received the vaccine to prevent this serious disease

By Andrew Bridges 1:55pm, February 6, 2015



Toddler with measles in a photo from the mid-1960s. Since a vaccine became available in 1963, U.S. measles infections have plummeted. But people who never were vaccinated still can pick up this sometimes deadly virus.

CDC

Measles loves a crowd. Some visitors to southern California theme parks have just learned this the hard way.

Epidemiologists are disease detectives. They trace sources of disease. And they have just tracked a major outbreak of measles to two Disney theme parks. Tens of thousands of people each day visit these parks from all over the world. That can give any contagious virus access to plenty of new hosts.

Sixty-seven cases of measles have been reported among visitors who went to either Disneyland Park or Disney California Adventure Park. They account for most of the recently confirmed U.S. cases of measles.

10 things to know about the measles

"We aren't sure exactly how this year's outbreak began," says Anne Schuchat. She is director of the National Center for Immunization and Respiratory Diseases. It's part of the Center for Disease Control and Prevention, or CDC, in Atlanta, Ga. "We assume that someone got infected overseas, visited the parks and spread the disease to others," she says.

Already, more than 100 U.S. measles cases have popped up in 2015. The patients come from 14 different states. Through surveys and interviews, epidemiologists quickly learned what linked most of the group: They had been to one or both of the adjacent Disney theme parks between December 17 and 20. Most were tourists, but some park workers also fell ill.

Since the beginning of January, "We identified a cluster of measles cases," says Gil Chavez. He's California's state epidemiologist. And the only thing they had in common, he says, was "a December visit to Disney theme parks."

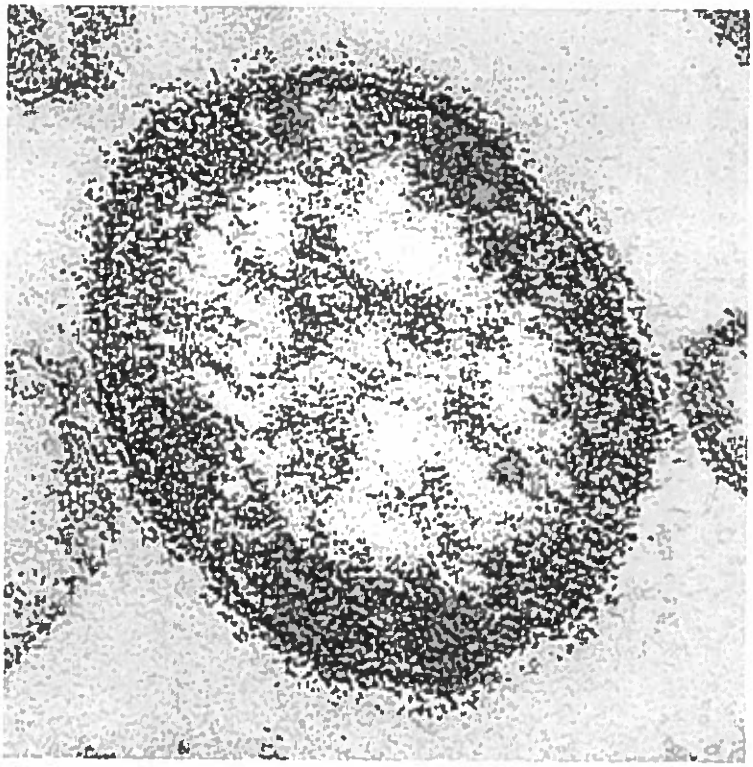
Tracing a disease to its source helps prevent its broader spread. As part of their sleuthing, epidemiologists typically ask patients if they recently traveled through an airport or other places with crowds of people from different countries. Disneyland fit the bill. It is popular with tourists from all over the globe.

Although vaccinations had virtually erased measles from the United States, the disease continues to sicken people in many other countries. And its virus is highly contagious. People pick it up through the air. You can get measles just by being near an infected person, CDC notes. You also can get it just by being in a room where an infected person coughed or sneezed within the last two hours.

Disease detectives quickly learned why measles struck so many Americans this year: Most of theme-park patients had never received the vaccine.

"This is not a problem with the measles vaccine not working. This is a problem of the measles vaccine not being used," the CDC's Schuchat explains.

Some people who got infected were too young to be vaccinated. Others had been too sick. Still others may not have been vaccinated for family reasons. For instance, some people fear that vaccines can lead to autism. A 1998 study did made that claim. But — and this is critical — that paper was later retracted. A follow-up investigation called the study "fraudulent." The journal that had published the first paper withdrew it. And the paper's British author now is banned from practicing medicine.



A single measles-virus particle. People can catch it even by being in a room where an infected person sneezed or coughed two hours earlier.
CDC

Multiple other studies since then have found the vaccine both safe and effective, notes Errol R. Alden. The physician is executive director of the American Academy of Pediatrics, based in

Illinois.

"Getting the measles vaccine is much safer than getting the measles infection," he says.

Guarding the "herd"

And vaccinations don't just help the people who get briefly jabbed with a needle. They also can protect entire communities. Doctors call this "herd immunity" or "community protection."

But herd immunity only works when enough people get vaccinated.

For a disease like measles to survive, someone who is sick has to spread the virus to someone who is susceptible. That second person has to do the same, continuing the chain of transmission, explains Walter Orenstein. This physician is a vaccine expert at Emory University in Atlanta, Ga.

"If I come into contact with an immune individual, that chain is broken," Orenstein tells *Science News for Students*. But herd immunity occurs only "when you have high levels of immunity in a population." Then, he says, "the likelihood I will find a susceptible [person] goes way down.

Measles is so contagious that its spread can occur unless about 92 percent to 94 percent of all people are vaccinated, CDC says. But when that level of vaccine use does occur, in theory measles eventually can be wiped out.

Vaccinating large numbers of people will "act as a firewall," explains Jorge Parada. It will guard most if not all unvaccinated people. Parada is an epidemiologist with the Loyola University Health System in Maywood, Ill.

In some pockets of the United States, the percentage of vaccinated people is much smaller than that ideal number. Get enough of these unvaccinated people together, expose them to someone infected with measles and the virus will start to spread. That appears to be happened in the Disney theme parks. And it will continue to happen elsewhere if infected tourists carry home the virus to communities where vaccination rates are low.

Looking ahead, health officials worry that the current measles outbreak means mumps and rubella cases may spike as well. The reason: The same vaccination delivers protection against those formerly serious childhood diseases as well.

"Measles is a warning sign and what we want to do is take action to correct it, before we start seeing all sorts of other diseases returning," Orenstein says.

And as for Disneyland, airports and other crowded areas: They are safe to visit — if you've been vaccinated.

Power Words

(for more about Power Words, click here)

autism (also known as **autism spectrum disorders**) A set of developmental disorders that interfere with how certain parts of the brain develop. Affected regions of the brain control how

people behave, interact and communicate with others and the world around them. Autism disorders can range from very mild to very severe. And even a fairly mild form can limit an individual's ability to interact socially or communicate effectively.

Centers for Disease Control and Prevention, or **CDC** An agency of the U.S. Department of Health and Human Services, CDC is charged with protecting public health and safety by working to control and prevent disease, injury and disabilities. It does this by investigating disease outbreaks, tracking exposures by Americans to infections and toxic chemicals, and regularly surveying diet and other habits among a representative cross-section of all Americans.

contagion A disease that can be spread by direct contact with an infected individual or the germs they spread into the air, their clothes or their environment. Such diseases are referred to as **contagious**.

epidemiologist Like health detectives, these researchers figure out what causes a particular illness and how to limit its spread.

immune Able to ward off a particular infection. Alternatively, this term can mean to show no impacts from a particular poison or process. More generally, the term may signal that something cannot be hurt by a particular drug, disease or chemical.

immunity The ability of an organism to resist a particular infection or poison by producing and releasing special protective cells.

infection A disease that can spread from one organism to another.

measles A highly contagious disease, typically striking children. Symptoms include a characteristic rash across the body, headaches, runny nose, and coughing. Some people also develop pinkeye, a swelling of the brain (which can cause brain damage) and pneumonia. Both of the latter two complications can lead to death. Fortunately, since the middle 1960s there has been a vaccine to dramatically cut the risk of infection.

outbreak The sudden emergence of disease in a population of people or animals.

pinkeye A highly contagious bacterial infection that inflames and reddens the conjunctiva, a membrane that lines the eyelids' inner surface.

pneumonia A lung disease in which infection by a virus or bacterium causes inflammation and tissue damage. Sometimes the lungs fill with fluid or mucus. Symptoms include fever, chills, cough and trouble breathing.

transmit To send or pass along.

vaccineA biological mixture that resembles a disease-causing agent. It is given to help the body create immunity to a particular disease. The injections used to administer most vaccines are known as vaccinations.

virus Tiny infectious particles consisting of RNA or DNA surrounded by protein. Viruses can reproduce only by injecting their genetic material into the cells of living creatures. Although scientists frequently refer to viruses as live or dead, in fact no virus is truly alive. It doesn't eat like animals do, or make its own food the way plants do. It must hijack the cellular machinery of a living cell in order to survive.

Task Card: Herd Immunity (2 copies per group in plastic sleeves)

Focus question: How can immunization protect the larger community?

Pre-Lab brainstorm:
Why would some people not get vaccines?

Materials (per class):

- Unvaccinated cards
- Red, green and blue cards in a bag.
- Red, green and blue colored pencils
- Paper ball
- Visualize the Spread of Infection

Procedure:

Part I. Why people get vaccinated or not?

1. Each group get one of the Unvaccinated cards.
2. Students read the card in their team and discuss why a person would not get vaccinated.
3. Each team shares discussion highlights with the class.
4. Synthesize what you have learned using either pictures and words (graphic notes or concept web).

Part II.

1. Each student in the class receives a red, green or blue card.

Red = Infectious disease	Green = Vaccinated	Blue = Unvaccinated

2. All "Vaccinated" and "Unvaccinated" students stand. All "Infectious" students remain seated.

Round1 -

3. When the teacher says go, all students representing Infectious diseases toss the paper ball to anyone who is standing. Toss once per round.
4. "Vaccinated" students can use their hands to deflect the paper balls.
5. "Unvaccinated" students must keep their hands to their sides.
6. Students touched by the paper ball read their card out loud.
7. If a student has become infected, they must sit down.

Round 2 -

8. Repeat steps 3 - 7.

Adapted from Have You Heard About Herd Immunity?

Part III.

1. The teacher collects and redistributes colored cards.
2. "Infectious" students remain seated. "Vaccinated" students form a circle. "Unvaccinated" students stand inside the circle.
3. Again, "Infectious" students toss the paper balls to the Unvaccinated students.
4. "Vaccinated" students can use their hands to deflect the paper balls.
5. "Unvaccinated" students must keep their hands to their sides.
6. If a student has become infected, they must sit down.
7. Continue this for a couple of rounds.

Analysis -
What would happen if there was an increase in "Vaccinated" students to blue "Unvaccinated" students?

Part IV. Visualizing the Spread of Infection

5. Obtain the Resource Sheet: Visualize the Spread of Infection.

Part V. Conclusion

6. Should lawmakers require all people to be vaccinated? Provide 3 pieces of evidence to support your claim.

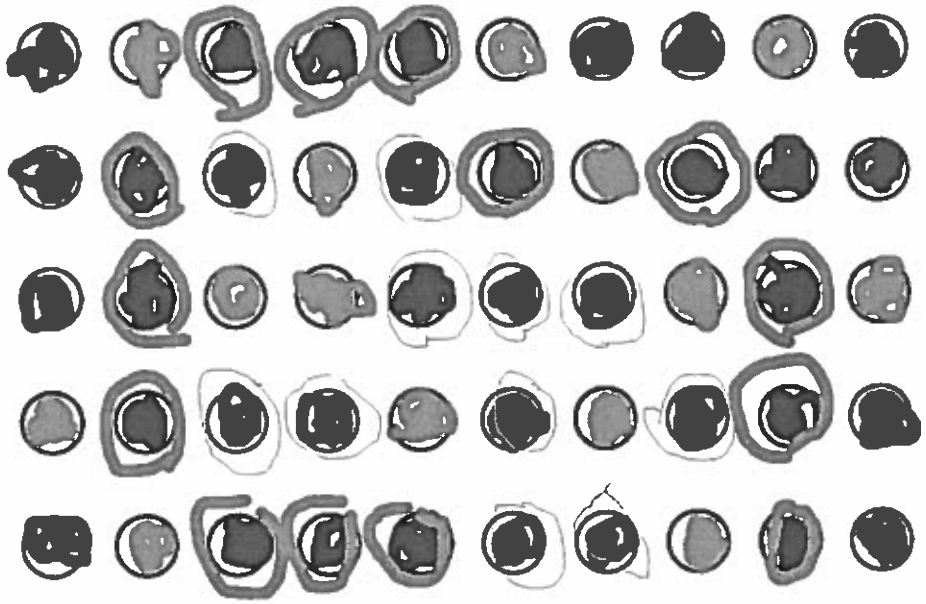
Essential Question: How do we prevent illness from spreading in our community?

Resource Sheet: Visualize the Spread of Infection

Example:

Directions:

1. Pick out 2 circles and mark them red.
2. Pick out 12 circles and mark them green.
3. Mark the rest blue
4. Outline the blue circle adjacent to red circles in red.
5. Outline the blue circle adjacent to the blue circle recently outlined in red.

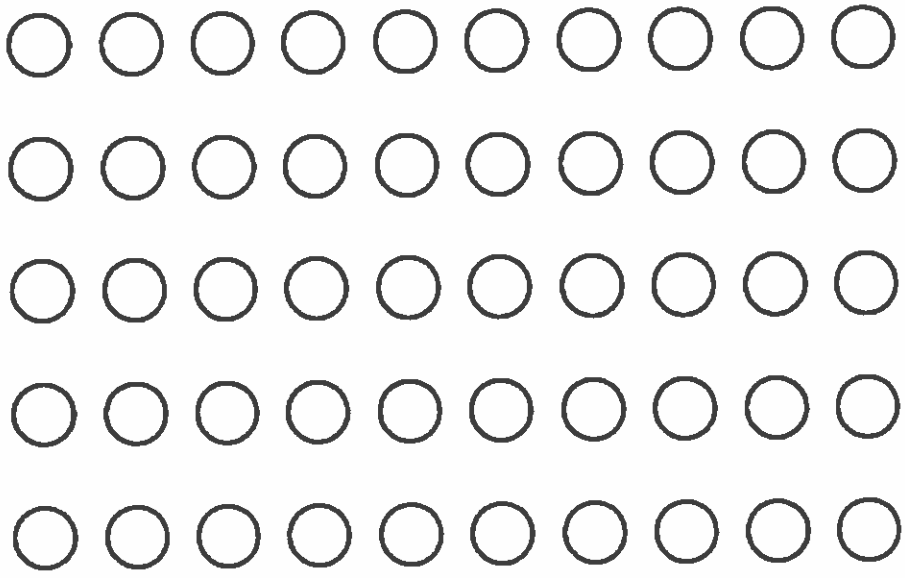


What percentage of this population is vaccinated?
What percentage of the group is unvaccinated? How can you find the answer?

Practice

Direction:

1. Pick out 2 circles and mark them red.
2. Pick out 24 circles and mark them green.
3. Mark the rest blue
4. Outline the blue circle adjacent to red circles in red.
5. Outline the blue circle adjacent to the blue circle recently outlined in red.



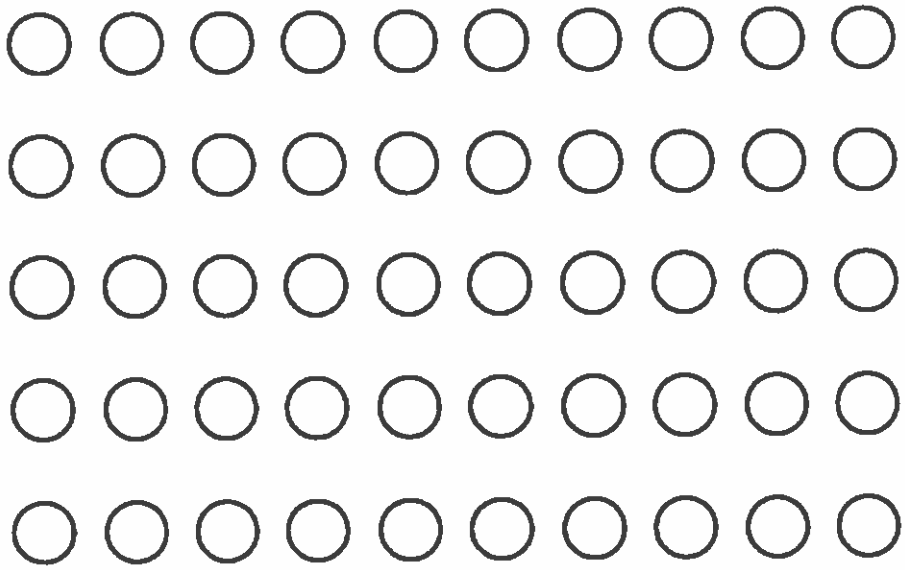
Out of 50 people, how many are now sick?

Adapted from Have You Heard About Herd Immunity?

Essential Question: How do we prevent illness from spreading in our community?

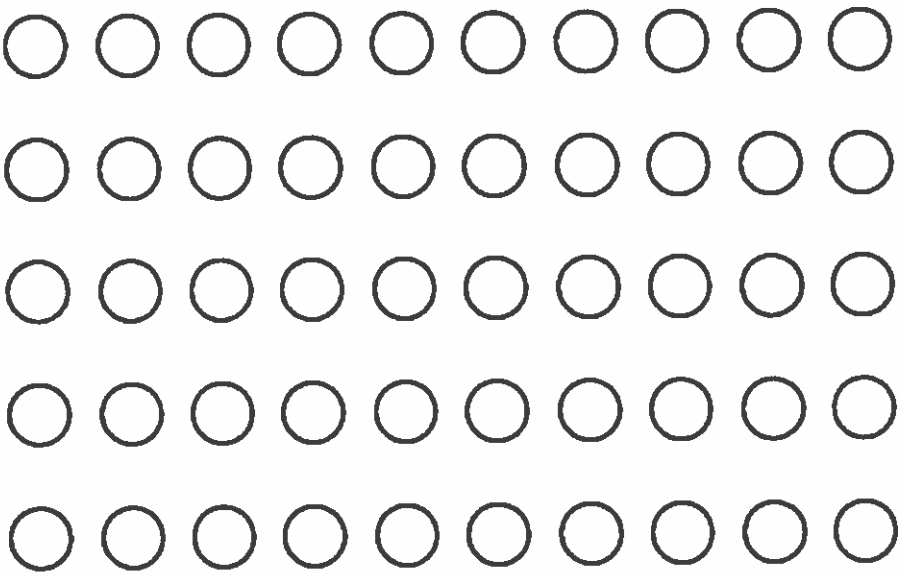
Flu

- For everyone to be relatively safe from the flu, 80% of people need to be vaccinated.
- In a sample of 50 people, how many need to be vaccinated for the population to be safe from the flu?
- Once you've determine how many people need to be vaccinate, color that many circles green.
- Outline the blue circle adjacent to red circles in red.
- Outline the blue circle adjacent to the blue circle recently outlined in red.



Measles

- For everyone to be relatively safe from the measles, 90% of people need to be vaccinated.
- In a sample of 50 people, how many need to be vaccinated for the population to be safe from measles?
- Once you've determine how many people need to be vaccinate, color that many circles green.
- Outline the blue circle adjacent to red circles in red.
- Outline the blue circle adjacent to the blue circle recently outlined in red.



Adapted from Have You Heard About Herd Immunity?

Essential Question: How do we prevent illness from spreading in our community?

Task Card: *Causes of Death, Then and Now* (2 copies per group in plastic sleeves)

Focus Question: How does the leading causes of death today compare with those of a hundred years ago in the US?

In this lab, you'll compare data on the leading causes of death in 1900 and today. The data table below shows the leading cause of death in the United States during two different years. Examine the data and note that two causes of death, accidents and suicides, are not diseases. The other causes are labeled either "I" for infectious disease or "NI" for noninfectious disease.

Materials:

- colored pencils/crayons
- calculators
- compass
- ruler
- protractor
- computer with google spreadsheets

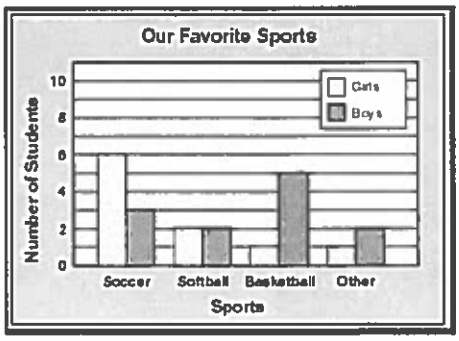
Procedure:

Part 1: Annotate the data table.

1. What symbols and units are used in the data table? How do these symbols and units help us understand the data better?
2. What patterns do you notice between 1900 and today?

Part 2 - *Bar Graph - Comparing Cause of Deaths in 1900 and today*

1. Look at cause of death in the data table for both time periods.
    a. What data exist in both time periods?
    b. Construct a bar graph comparing these causes of death between 1900 and today.
2. Label the horizontal axis and vertical axis.
3. Use different colors, label, title and include a key to show which bars refer to 1900 and which refer to today.



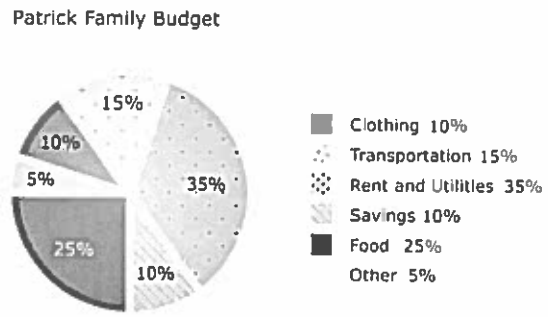
Analysis and Conclusion:

What conclusions can you draw from your graph? Include 3 concluding statements with evidence from your graph to support your statements.

Essential Question: How do we prevent illness from spreading in our community?

Practice Making Circle Graphs

Category	Amount
Clothing	$250
Transporation	$375
Rent and Utilities	$875
Savings	$250
Food	$625
Other	$125
Total:	**$2,500**



1. Calculate the percent for each category.
   a. Divide the category by the total.
   b. Then multiple by 100 to get the percentage.

$\frac{\$375}{\$2,500} = 0.15\%$ $\quad 0.15\% \times 100 = 15\%$

2. Calculate the size of the "pie slice".
   Multiply the percent by 360°.

$0.15\% \times 360^{\circ} = 54^{\circ}$

Part 3 - *Circle Graph - Comparing Causes of Death in 1900 vs. today*

1. Make two circle graphs comparing the causes of death in 1900 vs. today.
   a. Review the data table and group the data into three main causes of death.
   b. Calculate the total number of deaths for each main cause of death.
2. Calculate the percent of deaths for each main cause of death.
3. Calculate the size of the "pie slice" for each main cause of death.
4. Color code, label, title and include a key for each circle graph.

Analysis and Conclusion:

A. What conclusions can you draw from your circle graphs? Include 3 concluding statements with evidence from your graphs to support your statements.

B. What are the differences between a bar graph and a circle graph?

C. Create a real world example where you would use a graph to illustrate data. What type of graph would you use and provide your reasoning.

Adapted from Prentice Hall's Cause of Death, Then and Now

Essential Question: How do we prevent illness from spreading in our community?

Data Table (1 copy per student to annotate)

The 10 Leading Causes of Death in the United States, 1900 and Today			
1900		**Today**	
Cause of Death	**Deaths per 100,000 people**	**Cause of Death**	**Deaths per 100,000 people**
Pneumonia or Influenza (I)	202	Pneumonia or Influenza (I)	16
Tuberculosis (I)	195	HIV Infection (I)	16
Diarrhea (I)	143	Stoke (NI)	41
Diphtheria (I)	40	Liver Disease (NI)	10
Heart Disease (NI)	138	Heart Disease (NI)	193
Stroke (NI)	107	Diabetes (NI)	22
Kidney Disease (NI)	89	Cancer (NI)	186
Cancer (NI)	64	Lung Disease (NI)	39
Senility (NI)	50	Suicide	12
Accidents	72	Accidents	35
Total	**?**	**Total**	**?**
(I) indicates an infectious disease. (NI) indicates a noninfectious disease.			

Reference: CDC, Statista, Live Science

Adapted from Prentice Hall's Cause of Death, Then and Now

Mystery Illness Example Letter

Dear Patient ____,

Paragraph explaining how the body maintains health (use what you learned from this unit and the activities we created).

Paragraph with diagnosis of illness based on symptoms. Also include how it might have been transmitted.

Paragraph explaining how the illness affects the body system it is in and/or a particular organ.

Paragraph describing the treatment they will receive.

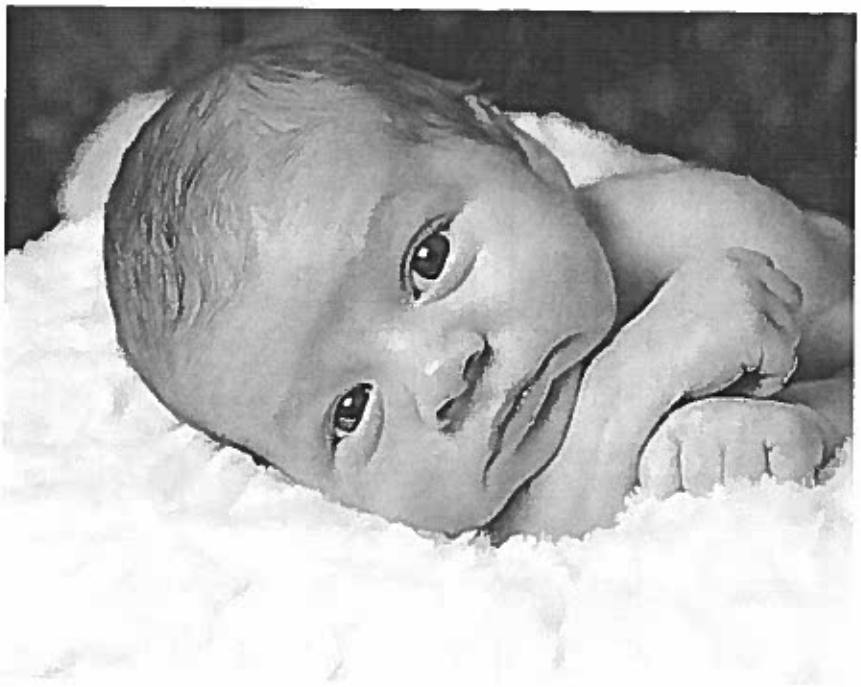
Sincerely,

Dr. your name

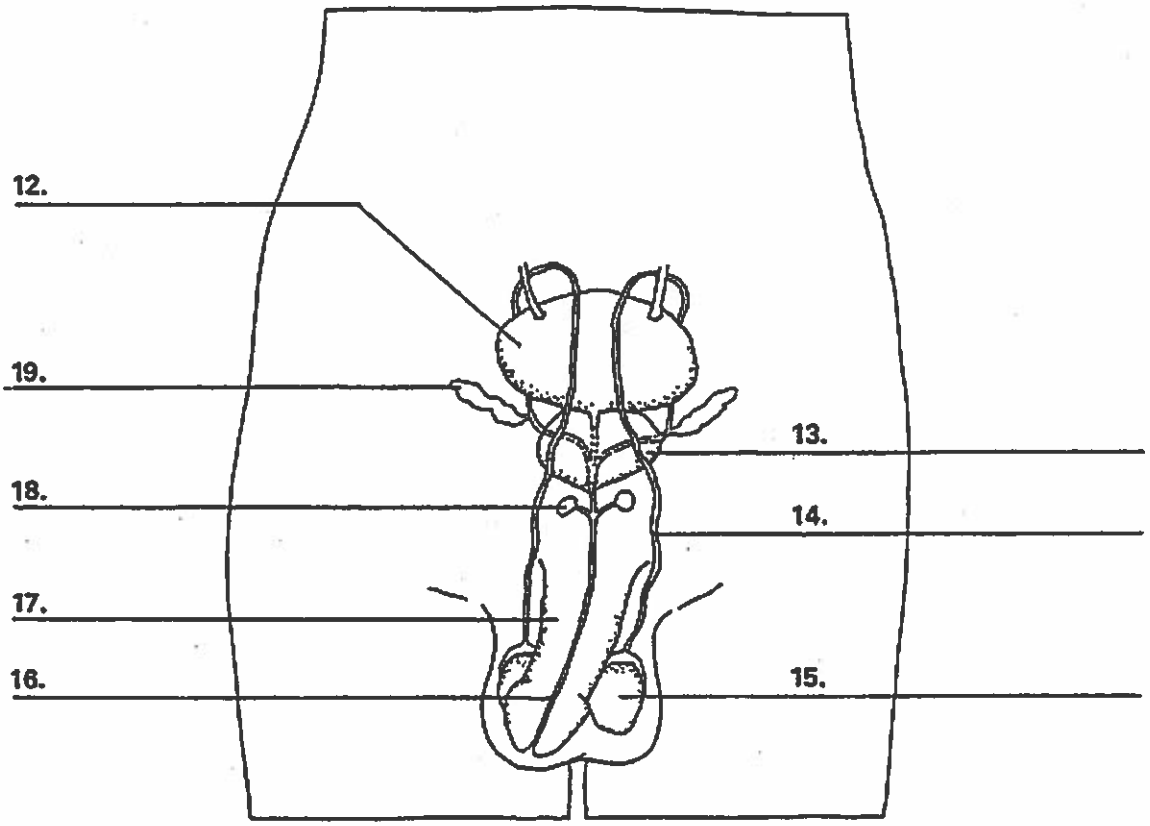
Lathrop Intermediate

6th grade Science

Reproduction Unit



Reproductive System Transparency/Worksheet 1 continued...

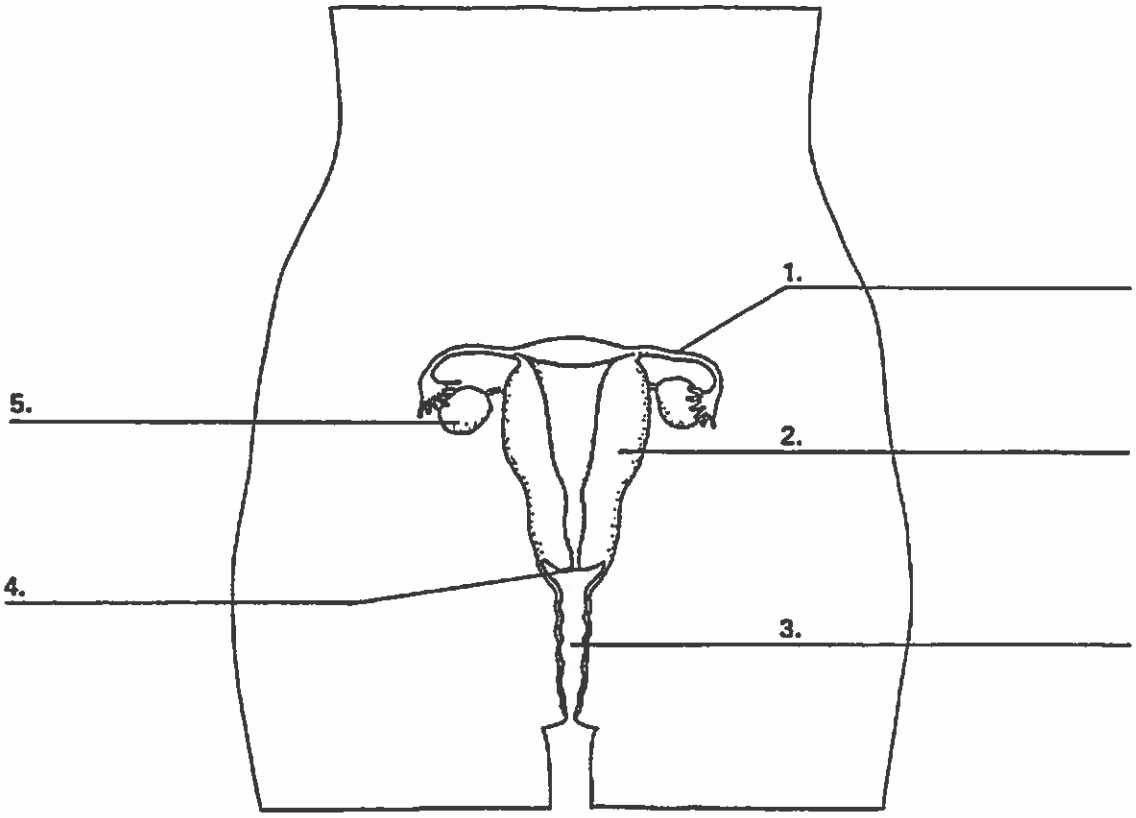


Front view

NOTE: #12 is not part of the reproductive system

Reproductive System Transparency/Worksheet 2

DIRECTIONS: Fill in the name of each body part. Some will be repeated. Use correct spelling and medical, not slang, words.



Front view

Reproductive System Worksheet 3

NAME _____ DATE _____

DIRECTIONS: Mark an "**M**" next to any part of a male's (a boy's or man's) body, an "**F**" next to any part of a female's (a girl's or woman's) body, or "**E**" if the part could belong to either a male or a female.

So your choices are "**M**", "**F**", and "**E**".

_____ 1. Penis
_____ 2. Scrotum
_____ 3. Cervix
_____ 4. Bladder
_____ 5. Vagina
_____ 6. Testicle
_____ 7. Fallopian Tube
_____ 8. Cowper's Gland
_____ 9. Labia
_____ 10. Urethra
_____ 11. Seminal Vesicle
_____ 12. Epididymis
_____ 13. Ovary
_____ 14. Prostate Gland
_____ 15. Uterus
_____ 16. Anus
_____ 17. Vas Deferens
_____ 18. Clitoris

Body Parts
Homework (Lesson 6-3)

Name _____ Date _____

Instructions:

- Check the box that correctly identifies who has each body part.
- Enter the letter from the "Descriptions and Functions" list on the back of this sheet that correctly identifies the description or main function for each body part.
- Locate one source of accurate information about reproduction.

BODY PART	ONLY BOYS HAVE THIS	ONLY GIRLS HAVE THIS	EVERYONE HAS THIS	DESCRIPTION OR FUNCTION (from list on back)
1. URETHRA				
2. PENIS				
3. TESTICLES				
4. VULVA				
5. SCROTUM				
6. VAGINA				
7. ANUS				
8. GENITALS				
9. CLITORIS				
10. OVARIES				
11. BLADDER				

One good place to get accurate information about reproduction is:

_____

Descriptions and Functions:

A. Carries urine from the bladder to the outside of the body.

B. Two small round organs that produce sperm, which are needed to make a baby.

C. Opening where solid waste (poop) leaves the body.

D. The reproductive system parts on the outside of the body.

E. The organ that stores urine (pee).

F. The organs that store the eggs (ova).

G. Part on the outside of the body that contains the vaginal opening, the urethral opening, and the clitoris.

H. The passageway between the uterus and the vaginal opening through which a baby comes out when it is time to be born.

I. A very sensitive part of the body.

J. Part that contains the urethra through which urine leaves the body. (In grown males, semen with sperm in it also leave the body through this part.)

K. Pouch of skin that holds the testicles.

Change Good

Physical Emotional Cognitive Social

Where Can I Learn More about Me?
Homework (Lesson 6-2)

Name: _____ Date: _____

Instructions: With a parent or guardian, visit http://pbskids.org/itsmylife/body/puberty and click on a few links that look interesting to you. Then please answer the following questions:

1. **Do you think what you found there reinforces what we talked about in class today? Why or why not?**

_____

_____

_____

2. **How can you tell this is a reliable website for information about puberty?**

_____

_____

_____

Next, visit http://kidshealth.org/kid/grow/body_stuff/puberty.html and click on a few links that look interesting to you. Then please answer the same questions:

3. **Do you think what you found there reinforces what we talked about in class today? Why or why not?**

_____

_____

_____

4. **How can you tell this is a reliable website for information about puberty?**

_____

_____

_____

Parent/Guardian Signature: _____

Puberty Worksheet 1

NAME _____ **DATE** _____

DIRECTIONS: Put the letter of each word next to the correct definition of the word.

a) erection
b) menstruation
c) nocturnal emission
d) ovum
e) puberty
f) sperm
g) pituitary

___ 1. having a period

___ 2. the penis or clitoris filling with blood and getting larger

___ 3. the cell from a man that can start a pregnancy

___ 4. sperm coming out of the penis during sleep

___ 5. the "egg" cell from a woman that can start a pregnancy

___ 6. a child's body beginning to change into an adult's body

___ 7. the gland in the brain that triggers the beginning of puberty

Puberty Worksheet 2

NAME _____ DATE _____

DIRECTIONS: Write "T" for "true" next to each statement you believe is correct.
Write "F" for "false" next to the wrong statements.

_____ 1. Girls may start puberty any time between the ages of 8 and 13.

_____ 2. Usually, boys start puberty a little younger than girls.

_____ 3. The pituitary gland, in the brain, tells the body when to begin puberty.

_____ 4. Boys only get erections when they think about something sexual.

_____ 5. A person's feelings may change from moment to moment, especially during puberty.

_____ 6. If your parents started puberty early, you might too.

_____ 7. You can tell whether a girl is menstruating by looking at her.

_____ 8. Boys often have some breast growth during puberty.

_____ 9 . It is common for boys to have nocturnal emissions at puberty, but it is also healthy not to.

_____ 10. The main reason teenagers get acne is they eat the wrong foods.

_____ 11. Girls should not use tampons until they are grown.

_____ 12. The vagina is always wet, just like the mouth and eyes.

_____ 13. There is something wrong with a boy if he ejaculates in his sleep.

_____ 14. If a boy has not started puberty by age 13, he should see a doctor, because there might be something wrong with his endocrine system.

_____ 15. It is OK for a girl to shower or play sports during her menstrual period.

_____ 16. A boy should start wearing an athletic supporter ("jock strap") during puberty when he plays sports, to protect and support his genitals.

_____ 17. A girl may start wearing a bra for support when her breasts start to develop, especially if she is uncomfortable being active and playing sports.

_____ 18. It is necessary to wash more often once you begin puberty.

Reproductive System Worksheet 4

NAME _____ DATE _____

DIRECTIONS: Put the letter of each word next to the correct definition of the word.

a. circumcision
b. conception
c. ejaculation
d. erection
e. fertilization
f. genitals
g. implantation
h. intercourse
i. menstruation
j. nocturnal emission
k. ovulation
l. ovum
m. pituitary
n. puberty
o. semen
p. sperm

____ 1. The penis or clitoris filling with blood and getting harder and larger

____ 2. The outside parts of the male's or female's reproductive system

____ 3. Ejaculation during sleep (sometimes called "having a wet dream")

____ 4. The process of fertilization and implantation

____ 5. A cell from a woman's body that can start a pregnancy (sometimes called an "egg cell")

____ 6. A cell from a man's body that can start a pregnancy

____ 7. An operation to remove the foreskin from the penis

____ 8. The meeting of the sperm and ovum

____ 9. The penis being inside the vagina

____ 10. The gland in the brain that triggers puberty

____ 11. A ripe ovum coming out of the ovary

____ 12. Semen coming out of the penis

____ 13. The nesting of a fertilized egg in the wall of the uterus

____ 14. The body beginning to change from a child's into an adult's

____ 15. The liquid that carries sperm

____ 16. The lining of the uterus coming out through the vagina (sometimes called "having a period")

Reproductive System Worksheet 5

NAME _____ **DATE** _____

DIRECTIONS: Fill in the blanks. Then look up each word to make sure you have spelled it correctly.

1. The outside parts of the male reproductive system are the penis and the _____.

2. The outside parts of the female reproductive system are the labia and the _____.

3. A female has three openings: the _____ in the front, the _____ in the middle (where the blood comes out during her period) and the anus in the back.

4. Sperm are made in the testicles. They are stored for 2-3 months in the _____ and then they travel through the _____ and the urethra, which leads out of the penis.

5. The semen is made up of sperm and liquids. The liquids are produced by the _____, the _____, and the _____.

6. In both males and females, urine is stored in the _____ and leaves the body through the urethra.

7. Both males and females have an opening where bowel movements come out. It is called the _____.

8. A baby grows for nine months in the _____.

9. The scrotum is the sac that holds the _____.

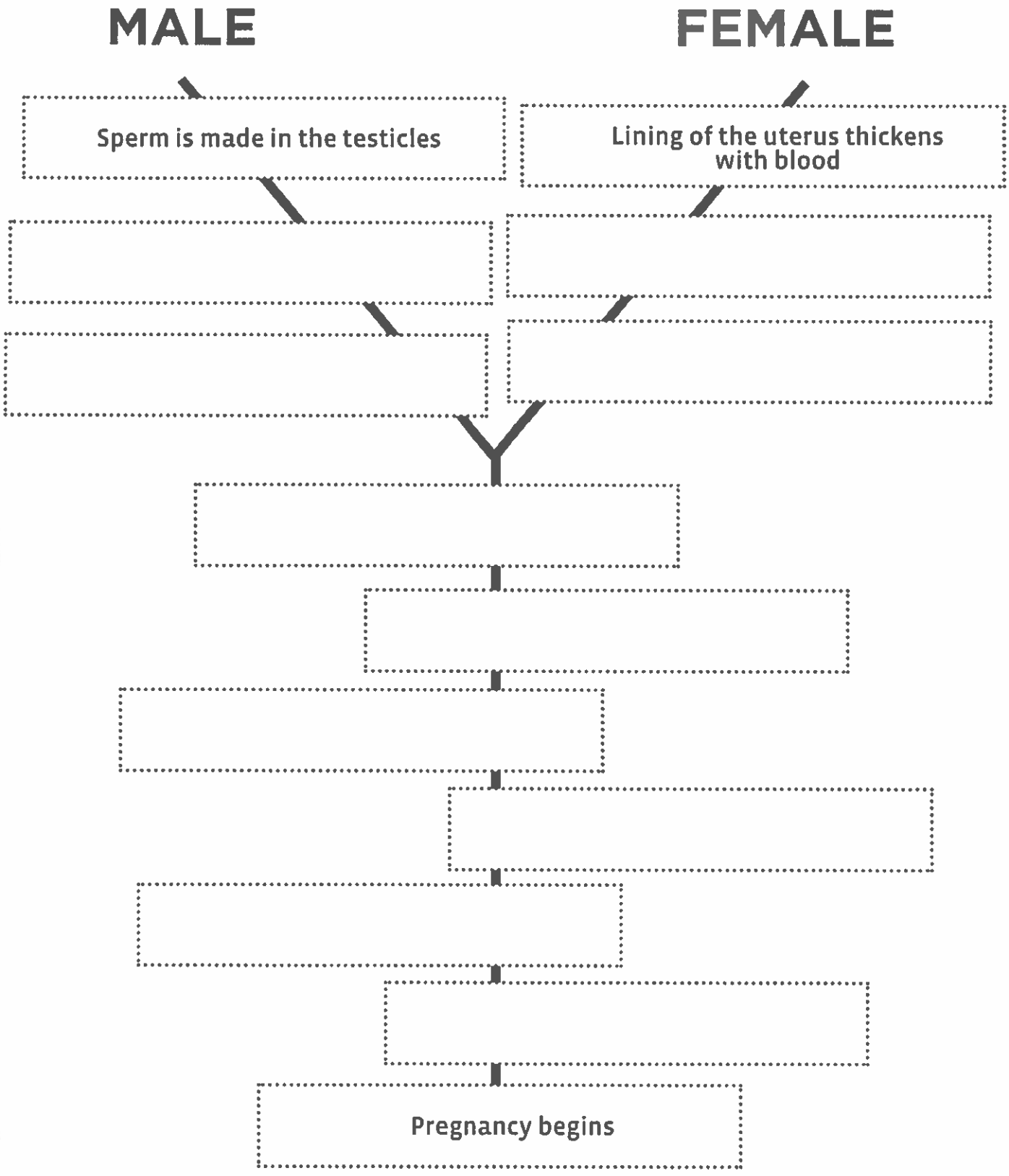
10. The parts of the body that protect the urethra and the vagina are called _____.

11. When an egg cell leaves the _____, it travels through the _____ on its way to the uterus.

12. The opening of the uterus into the vagina is called the _____.

HUMAN REPRODUCTION

Name _____ Date _____



Steps to Human Reproduction Cards

CLASS SET

Sperm is made in the testicles

Sperm travel through the cervix, uterus, and into the fallopian tubes

Sperm exit the testicles and travel up the vas deferens

Sperm cells leave the penis and enter the vagina (ejaculation)

Sperm cells mix with other fluid to become semen

Ovulation occurs (egg is released from ovary around every 25-30 days)

If the male & female have sexual intercourse then the penis is inserted into the vagina

The fertilized egg travels down through the fallopian tube to the uterus

Egg enters the fallopian tube

Pregnancy begins

Fertilized egg attaches to the wall of the uterus (implantation) conception complete

One sperm cell attaches to an egg in the fallopian tube and fertilizes it

Lining of the uterus thickens with blood

Reproductive System Worksheet 6

NAME _____ **DATE** _____

DIRECTIONS: Below are two stories. The events are all out of order. Get a sheet of lined paper. Write "Reproductive System Worksheet #6" at the top. Then choose ONE of the two stories (A or B) and rewrite it. Begin with the title and your name. Find a topic sentence to begin your paragraph. Put the sentences in chronological order. Make sure the last sentence is a good concluding statement.

A) The Menstrual Cycle
It travels through the fallopian tube.
The ovary releases the ovum.
About two weeks later, since the lining of the uterus is not needed for a pregnancy, it comes out through the vagina.
It is incredible how the female body knows how to prepare for pregnancy!
If the egg doesn't meet a sperm, it dissolves.
While the ovum is developing, the lining of the uterus is getting thick and soft.
Another ovum starts to develop in one of the ovaries and the process begins again.
An ovum starts to develop.

B) I am produced in the testicles.
I go from the vas deferens to the urethra.
The Life of a Sperm Cell
I go through the cervix and the uterus and into the fallopian tubes, in search of an egg cell.
I develop for two or three months in the epididymis.
When the penis becomes erect, I leave the epididymis and travel up into the body through the vas deferens.
As I pass the prostate gland, the seminal vesicles, and the Cowper's glands, fluids are added so that I can live longer and swim more easily.
Without me, an egg cell couldn't begin the amazing process of reproduction.
The urethra carries me (along with about 200 million other sperm) out of the penis in a process called ejaculation.
If I can find the ovum before the other sperm do, I will be the winner: part of a fertilized egg!

MORE DIRECTIONS: After you have finished writing your story, reread it, checking off the sentences on this worksheet to make sure you have used them all. Then read the story aloud to a friend to see whether it makes sense.

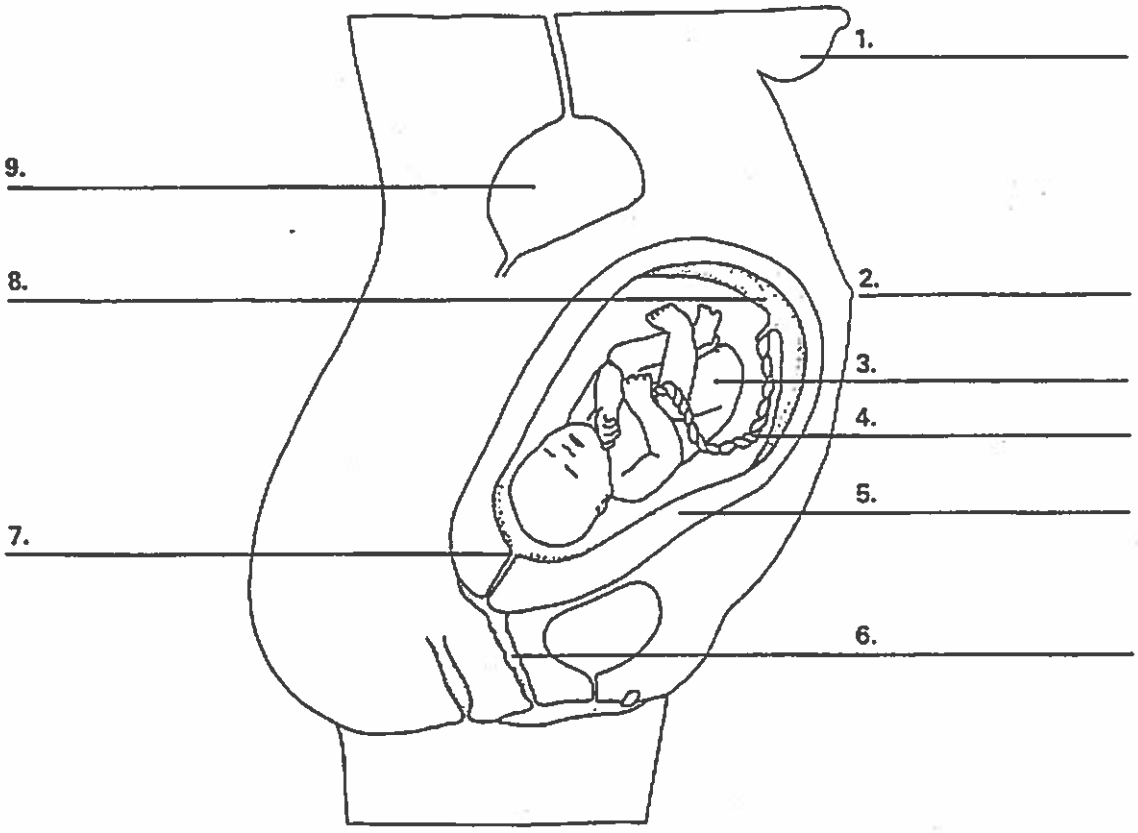
Word	Definition
Cell	
Chromosome	
Gene	
Breast	
Placenta	
Umbilical cord	
Navel	
Fetus	
Embryo	
Vaginal birth	
Caesarian section	
Identical twins	
Fraternal twins	

Pregnancy Transparency/Worksheet 1

NAME _____ DATE _____

DIRECTIONS: Fill in the chart, using the following terms:

BREAST	MOTHER'S NAVEL (clue: it is not connected to the baby)
CERVIX	UMBILICAL CORD
FETUS	STOMACH (clue: this is not where a baby develops)
PLACENTA	UTERUS (clue: this is also called the "womb")
	VAGINA (clue: this is also called the "birth canal")



Pregnancy Worksheet 2

NAME _____ **DATE** _____

DIRECTIONS: Use complete sentences to answer these questions. Watch your spelling, capitalization and punctuation.

1. Why do children often look like their parents?

2. What's the difference between fraternal and identical twins?

3. What is "prenatal care" and why is it important?

4. What kinds of things could cause a baby to be born with a disability?

Pregnancy Worksheet 3

NAME _____ **DATE** _____

DIRECTIONS: Put the following words in the blanks below. Some may be used more than once. Make a word plural if the sentence makes more sense that way.

ALCOHOL	DIET	GENE	PRENATAL
CELL	DRUG	IDENTICAL	SICK
CAESAREAN	EMBRYO	MISCARRIAGE	UMBILICAL
CHROMOSOME	FETUS	NAVEL	VAGINA
CIGARETTE	FRATERNAL	PLACENTA	

The body is made up of _____. Each one contains 46 _____ which determine a lot about how the person looks and how fast he or she grows. The person's mother and father each contributed 23 of these _____ (made up of many separate _____). That's why people often look like other members of their families.

Let's look at how it all begins. Two special _____ (the sperm and the ovum) combine to make one fertilized egg. The fertilized egg travels down the fallopian tube dividing into a ball of _____. This ball nests in the uterus. Inside this special ball is the developing _____. After it grows for about ten weeks, it may be called, instead, a _____.

Once in a while, a fertilized egg will divide into a ball with TWO _____ inside. They have exactly the same _____, so they will grow to look exactly alike. They're called _____ twins. Other times, the ovary may release two separate egg cells at once. If two sperm meet these two eggs, we have _____ twins. They won't look exactly alike. In fact they MAY even be one boy and one girl, because their _____ are different.

While it is growing in the uterus, the _____ gets food and oxygen through its _____ cord. This cord is connected to the _____, a special part which grew from the original ball of cells to feed the developing _____.

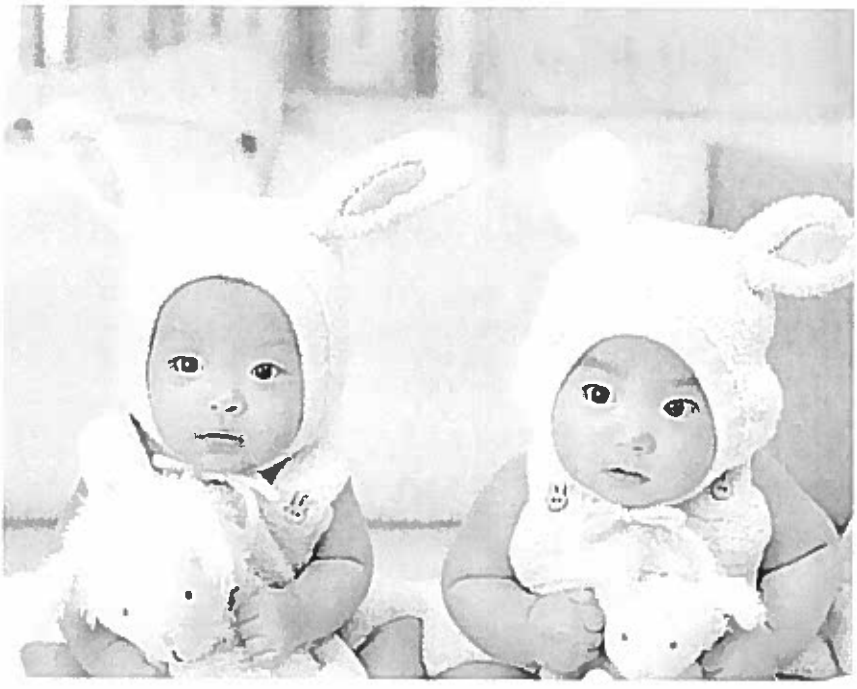
After about nine months a baby is ready to be born. Usually, the uterus will contract and push the baby out through the _____. Sometimes this isn't possible, so the doctor has to operate to remove the baby directly from the uterus. We call this special kind of birth a _____ section.

Once the baby is born it can eat through its mouth and breathe through its nose. It no longer needs the _____ cord so the doctor cuts and ties it, forming a "belly button" or _____. This cutting doesn't hurt. It's like cutting your finger nails.

Why do some babies die before they are ready to be born? We call that a _____. Why are other babies born too soon or born with handicaps? There can be many reasons. There might have been something wrong with the parents' _____. The mother might have been _____. Sometimes we do not know why. We do know this: In order to help make herself and the baby as healthy as possible, a pregnant woman should not drink _____, smoke _____, or use any other _____ without asking her doctor. She should eat a balanced _____ and see a doctor regularly for _____ care.

LET'S HEAR IT FOR STRONG, HEALTHY BABIES!

Lathrop Intermediate
6th grade Science
Genetics Unit



Driving Question: Can you explain how genetic information is passed from one generation to the next?

Learning Goals:

-Argue that plants have structures that increase the likelihood of their survival.
-Argue that animals have behaviors that increase the likelihood of their survival.
-Explain how the environment and genetics can change the growth of a plant or animal.
-Explain how animals use stimuli to react to their environment.
-Develop a model of an asexual and/or sexual scenario and explain the causes for the genetic variation seen observed.

Tier Two Vocabulary:

Asexual Reproduction - (noun) a type of reproduction by which offspring arise from a single organism, and inherit the genes of that parent only
Sexual Reproduction - (noun) the production of new living organisms by combining genetic information from two individuals of different types (sexes)
Trait - (noun) a distinguishing quality or characteristic, typically one belonging to a person
Punnett Square - (noun) a diagram that is used to predict an outcome of a particular cross or breeding experiment
Offspring - (noun) an animal's child or children
Genetic Variation - (noun) the variation in alleles and genes, both within and among populations
Stimuli - (noun) a thing or event that evokes a specific functional reaction in an organ or tissue.
Recessive Trait - (noun) can be carried in a person's genes appearing in that person
Dominant Trait - (noun) an inherited trait that results from the expression of the dominant allele over the recessive
Germination - (noun) process by which a plant grows from a seed
Phenotype - (noun) the set of observable characteristics of an individual resulting from the interaction of its genotype with the environment
Genotype - (noun) the genetic constitution of an individual organism
Allele- (noun) one of two alternative forms of a gene that arise by mutation and are found at the same place on a chromosome
Chromosome - (noun) a threadlike structure of nucleic acids and protein found in the nucleus of most living cells, carrying genetic information in the form of genes.

Lesson 1: Herding=Protection=Reproduction

Date: _____

Simulation Round	Lion Population	Total Zebra Population	Number of Zebra Herds	Average Population of Zebra Herds	Largest Zebra Herd	Smallest Zebra Herd
1						
2						
3						
4						
5						
6						

Make a Claim-Evidence-Reasoning Statement:

	Questions to Think About	My Statement
Claim	What do you know? How does the behavior of herding in animals make them more successful?	
Evidence	How do you know what the claim states? What does your data table say about animals that herd?	
Reasoning	How does the evidence support the claim? What universal rule about animal behavior is created based on the claim and evidence?	

Lesson 2: Tough Conditions

Date: _____

Setting Up The Experiments:

Seed Germination Experiment	Environmental Conditions Experiment
Step 1 - Fill two of the plastic cups 3/4 full with soil. Fill two other plastic cups 3/4 full with sand.	Step 1 - Fill three of the plastic cups 3/4 full with soil.
Step 2 - Use masking tape to label the each soil cup: - Radish / Soil - Lavender / Soil	Step 2 - Bury one radish seed in each cup's soil (try to make them the same depth)
Step 3 - Use masking tape to label each sand cup: - Radish / Sand - Lavender / Sand	Step 3 - Choose one of the following environmental factors to change: - Water quantity - Pollution - Amount of Sun
Step 4 - Bury one radish seed (try to make them the same depth) into their respective cups.	Step 4 - Write your environmental factor into the space provided with step 1 of your "Scientific Method" in the next section
Step 4 - Bury one lavender seed (again, making it the same depth) into their respective cups.	Step 5 - As a group, decide how you will provide a different quantity of your chosen environmental factor to each plant. (- If your group is using pollution, decide how you will "pollute" your soil, and how much to give to each plant. Make sure to have an exact measurement for each. - If your group is using water quantity, decide how much water you will provide to each plant. Make sure to have an exact measurement for each.
Step 5 - Decide as a group a reasonable amount of water to give to each seed/cup. Using the graduated cylinder, provide an initial watering.	Step 6 - Using masking tape, label each cup so that your group understands which plant is which. Make sure the labels are clear so you know which plant is yours, and so your group can continue experimenting with each plant.
Step 6 - Place all four of your cups in a location that will receive at least some sunlight. As the experiment goes on, make sure to not change this location. Doing so might change the experiment and give your group different results.	Step 7 - If your group has chosen water quantity as an environmental factor, provide the initial doses of water to each plant. However, ensure all get the same amount of sunlight. If your group has chosen pollution as the environmental factor, provide initial doses of pollution to each plant. However, ensure each plant gets the same amount of sunlight and water. If your group has chosen sunlight as the environmental factor, provide the same amount of water to each plant. However, ensure the amount of sun they receive is different.
Step 7 - Answer questions 2-4 of the Scientific Method section for the "Seed Germination" Experiment	Step 8 - Answer questions 2-4 of the Scientific Method section for the "Seed Germination" Experiment

The Scientific Method:

Seed Germination Experiment	Environmental Conditions Experiment
1.) Ask a Question: Are plants specialists at growing in different soil conditions? In other words, will the radish and lavender seeds be able to germinate and grow in different soil conditions?	**1.) Ask a Question:** Does the amount of _____ affect the germination and growth of a plant? (Environmental factors to choose from: water quantity, pollution, and sunlight)
2.) Construct a Hypothesis: What do you think is the answer to the question before starting the experiment?	**2.) Construct a Hypothesis:** What do you think is the answer to the question before starting the experiment?
3.) Experiment with an Independent Variable: What is the one thing that is different between the radish and lavender seeds?	**3.) Experiment with an Independent Variable:** What is the one thing that is different between the radish seeds?
4.) Analyze and Collect Data: What data/measurements/information will you collect in order to make a conclusion at the end of the experiment? How will you collect it?	**4.) Analyze and Collect Data:** What data/measurements/information will you collect in order to make a conclusion at the end of the experiment? How will you collect it?

5.) Make a Conclusion Based on the Data: Answer the question in step 1, but this time use the data and measurements collected to do so.

6.) Reflect on the Conclusion and Hypothesis: Does the data that you collected support the initial hypothesis? Explain…

7.) Explain/Communicate Results: Clearly write out the outcome of your overall experiment. Explain what you were testing for, what you changed in the experiment, what data/information you collected and how you collected it, what your conclusion was at the end, and any new questions you have after the experiment was over (new things to test and look for).

5.) Make a Conclusion Based on the Data: Answer the question in step 1, but this time use the data and measurements collected to do so.

6.) Reflect on the Conclusion and Hypothesis: Does the data that you collected support the initial hypothesis? Explain…

7.) Explain/Communicate Results: Clearly write out the outcome of your overall experiment. Explain what you were testing for, what you changed in the experiment, what data/information you collected and how you collected it, what your conclusion was at the end, and any new questions you have after the experiment was over (new things to test and look for).

Lesson 3: What's That I Sense?

Date: _____

Independent testing:

Trial #	Color	Flavor I believe it to be:
1		
2		
3	Clear	

Class test results:

Flavor detected (list below what the class tasted)	Please tally the flavor detected from each sample.		
	Trial #1 Color:	Trial #2 Color:	Trial #3: Clear

Meet the Man Food Giants Hire to Trick Your Tastebuds

How an experiment with Pringles turned food marketing on its ear.

Dave Swanson

November 17, 2015

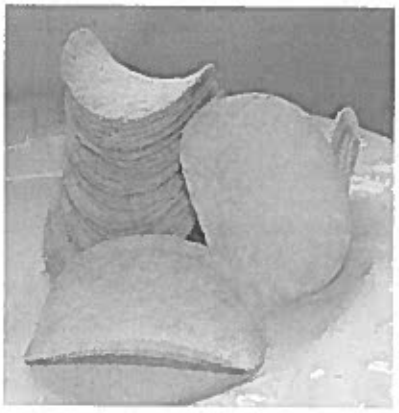
Eating is a multi-sensory experience. Sure, our tongue sends us the most information about what we put in our mouths, but our eyes, our nose, our skin, and even our ears are enlisted to collaborate in sometimes surprising ways. Our brains use audio cues, texture, color, and shape to communicate information about what we're eating.

But, one scientist wondered, what if those stimuli could be adjusted to provide misinformation?

Such is the subject of the research conducted by Charles Spence, a professor of experimental psychology at Oxford University who was recently highlighted in a fascinating piece in The New Yorker.

Spence runs the Crossmodal Research Lab at Oxford, studying how the brain synchronizes information from all five human senses to produce our impression of reality. A significant part of his multisensory research is dedicated to food—specifically, to how it's marketed and packaged.

He first delved into the multisensory world of dining with a 2004 paper titled "The Role of Auditory Cues in Modulating the Perceived Crispness and Staleness of Potato Chips." The results were anything but stale.



It all started with Pringles

For his initial study, Spence asked subjects to sit in front of a microphone wired to a pair of headphones. The volunteers then sampled 200 Pringles potato chips, spitting each one out and assigning a rating of crisper or less crisp, fresh or less fresh. The sound of each crunch was piped through the headphones.

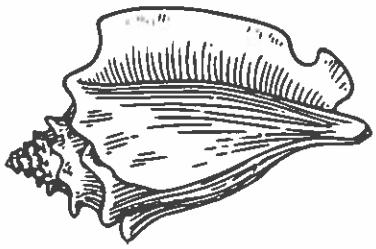
In theory, the sounds shouldn't have mattered—all the chips were identical. But Spence adjusted the crunching sound for each chip through an amp and equalizer.

When the subjects were asked whether the chips were all the same or different, nearly all said the chips varied—that some of the cans were fresh while other chips were from cans that had been open a while. Pringles that made a louder, higher-pitched crunch—via the headphones—were thought to be fresher.

Since then, Spence has repeatedly documented how consumer perceptions of taste can be altered through color, shape, or sound alone. Among the examples The New Yorker cited:

-Strawberry mousse tastes 10 percent sweeter in a white container
-Coffee tastes almost twice as intense, but only two-thirds as sweet, when it's in a white mug
-Adding 2.5oz to the weight of a plastic yogurt container makes it seem about 25 percent more filling
-Bittersweet toffee tastes 10 percent more bitter if it's eaten while listening to low-pitched music.
-A cookie seems harder and crunchier when served from a surface with a rough finish

Spence has worked with top chefs like Heston Blumenthal and Ferran Adria, and these days he's studying ways to make bug-eating acceptable to westerners. As The Guardian put it, Spence is "quietly influencing what we eat and drink" on a global scale.



At Heston Blumenthal's restaurant The Fat Duck a dish called Sound of the Sea comes with an iPod in a conch shell, for diners to listen to crashing waves as they eat.

Who really benefits from this research?

Spence estimates that 75 percent of his sensory neuroscience work is funded by major food and beverage companies, much of which results in carefully revised packaging. The obvious aim is to improve the consumer experience and boost sales. But food companies are under increased government pressure to reduce salt and sugar in packaged foods, and increased enjoyment via other senses could help compensate for less flavorful products.

Considering how much control over the processed foods market they have already, I'm not sure I'm comfortable with food giants like Unilever (one of Spence's major clients) artificially manipulating my sensory input. But maybe there's a silver lining?

Spence notes that older eaters, whose taste buds may have dulled with time, tend to salt food more heavily. His research also shows that the color blue can make food taste significantly saltier, so why not package soup cans in blue to offset the increased health risk of a salt-laden diet?

In fact, The Guardian reports Spence is already quietly helping famous brands reduce salt and sugar in packaged foods. Could misleading packaging actually contribute to the greater good?

THINKING MAP: Meet the Man Food Giants Hire to Trick Your Tastebuds: How an experiment with Pringles turned food marketing on its ear.

Journaling: Explain how your sense of sight and smell may have skewed your sense of taste.

Lesson 4: What's That I Sense? (Part II)

Date: _____

Hand Squeeze:

What is the stimulus? _____

What is the reaction? _____

Trial	Time	Notes/Observations
Prediction for trial #1		
Actual: #1		
Prediction for trial #2		
Actual: #2		
Prediction for trial #3		
Actual: #3		
Prediction for trial #4		
Actual: #4		
Variable introduced:		
Prediction for trial #5		
Actual: #5		

Journal Prompt: What are some other examples of stimuli and responses?

Stimuli	Response
Example: Touch hot pan	Pull hand away

Lesson 5: Gather and Synthesize

Date: _____

Circle which sensory receptor you will be researching:

Thermoreceptor	Baroreceptor	Magnetoreceptor
Chemoreceptor	Nociceptors	Electroreceptor
Photoreceptor	Proprioceptor	
Mechanoreceptor	Osmoreceptor	

What electronic source(s) did you retrieve your information from? Write the name of the website, which appears at the top of the webpage or on the tab at the top of the screen.

How do you know the information from the source(s) is/are reliable?

What is the receptor's purpose? How is the receptor classified (electromagnetic, mechanical, or chemical)?

What are some example organisms that have and use the receptor?

How does the receptor make the organism(s) successful in reacting to their environment?

Other interesting information discovered about the receptor during your research:

Lesson 6: Gather and Synthesize

Date: _____

Brainstorm Ideas for Your Group's Presentation.

Lesson 7: Gather & Synthesize

Date: _____

Record the necessary information as other student teams make their presentations.

Receptor & Type (chemical, electromagnetic, mechanical)	Function & Example
Baroreceptor	
Chemoreceptors	
Photoreceptors	
Electroreceptor	
Magnetoreceptor	
Mechanoreceptor	
Nocireceptor	
Osmoreceptor	
Proprioceptor	
Thermoreceptor	

Video - "Mother Bison Protects Her Young"

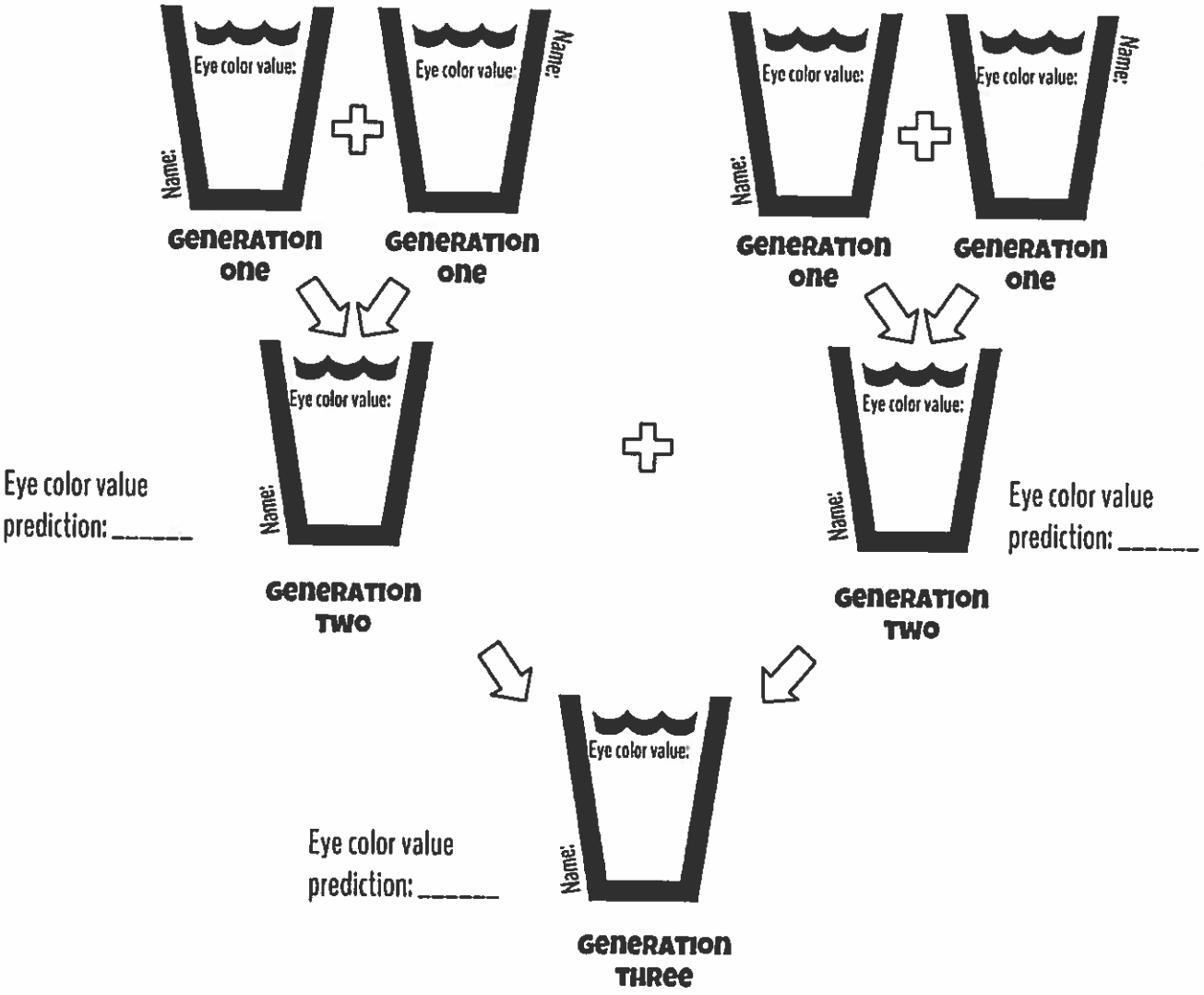
Use your list of receptors from the previous page to brainstorm the receptors the baby bison uses in the video.

Choose one of the receptors from your brainstorm. Write a detailed paragraph incorporating information about the receptor, its function, and how you felt the baby bison used it to survive.

Lesson 8: Through the Generations

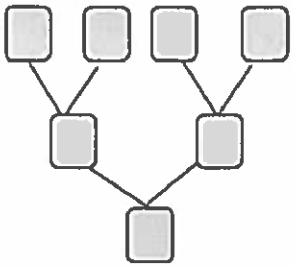
Date: _____

Family Tree: A Model of Sexual Reproduction

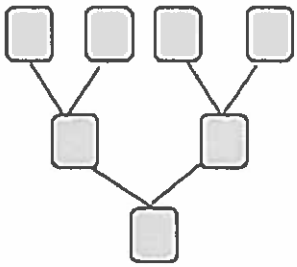


Family Tree Data Collection

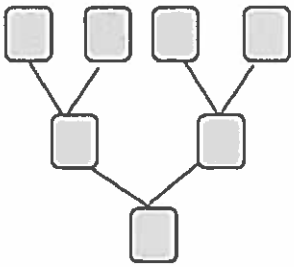
Family 1



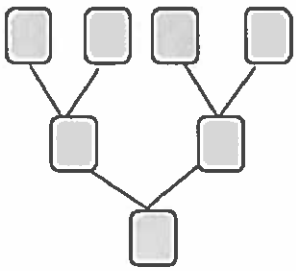
Family 2



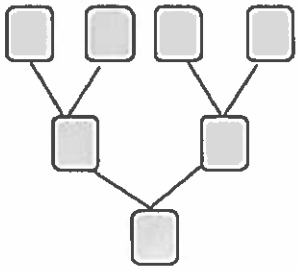
Family 3



Family 4



Family 5



Analyze the Data:

	Same Eye Color	Different Eye Color
Compare Eye Color of 2nd Generation to the 1st Generation	/10 Percent =	/10 Percent =
Compare Eye Color of 3rd Generation to the 2nd Generation	/5 Percent =	/5 Percent =
Compare Eye Color of 3rd Generation to the 1st Generation	/5 Percent =	/5 Percent =
Compare Eye Color of Each Offspring to Each Parent (all generations)	/30 Percent =	/30 Percent =

Using the information from the data analysis, write a Claim-Evidence-Reasoning statement.

	Questions to Think About	My Statement
Claim	What do you know? Do sexually reproducing organisms produce genetically different offspring?	
Evidence	How do you know it? What does the data from the family trees say about genetic variation in sexually reproducing organisms?	
Reasoning	How does your evidence support the claim? Write a rule for genetic variation in sexually reproducing organisms.	

Lesson 9: Intro to Punnett Squares

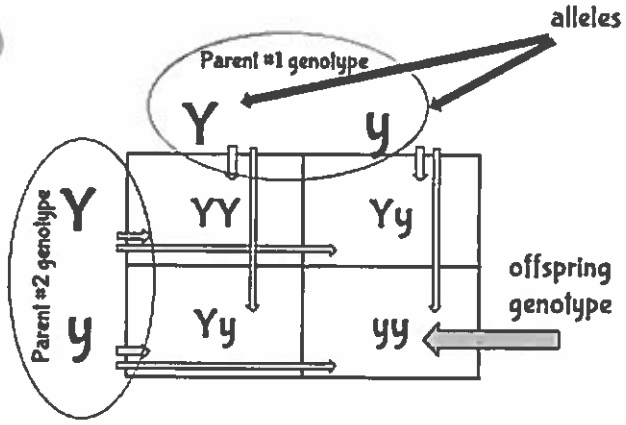
Date: _____

What phenotypes (observable characteristics) did Spongebob get from either his mom or dad? Create a Thinking Map.

How to draw a Punnett Square:

Follow along to the video.

Example: Pea Plant



Y=dominate (Yellow phenotype)
y=recessive (Green phenotype)

What are the chances the offspring have the phenotype:
yellow? ____ green? ____

How do you know?_____

Practice:

	S	s
s		
s		

S=dominate (smooth phenotype)
s=recessive (bumpy phenotype)

What are the chances the offspring have the phenotype:
smooth? ____ bumpy? ____

How do you know?_____

	K	k
K		
k		

K=dominate (savory phenotype)
k=recessive (sweet phenotype)

What are the chances the offspring have the phenotype:
savory? ____ sweet? ____

How do you know?_____

Opinion: We can engineer a better baby, but we should be careful

By Project Syndicate, adapted by Newsela staff on 01.20.16

Our genes set the pattern for many aspects of our lives, from hair and skin color to our likelihood to contract certain diseases. If we are able to save future generations from illnesses through gene editing, we should use that tool to stop suffering. But we should set limits on how that technology is used. Photo: AP/Allison Joyce

NEW YORK, N.Y. – Genes make us who we are. They are responsible for what we look like. For example, there is a gene for red hair. Genes can also be responsible for serious physical problems.

Genes are inherited, or passed down from parent to child. That is why we look like our parents. Unfortunately, we also sometimes inherit harmful genes that make us more likely to become sick.

Scientists have long hoped to be able to change the genes in our bodies. If they could do that, they could stop a harmful gene from being passed down. Perhaps doctors could even remove harmful genes from a baby's body while it is still inside its mother's womb.

The day scientists have hoped for is almost here. Very soon they will be able to remove or change human genes. A new tool is already being used to change the genes of insects and animals. Removing, adding or changing genes is known as gene editing.

A Promise To Help Stop Diseases

The new tool is called CRISPR. It allows scientists to remove and add genes cheaply and easily. It is only a matter of time before it will be used on humans. Soon, scientists may be able to get rid of many dangerous inherited diseases.

Still, some people are worried about possible problems. They say human gene editing could be unsafe and might be used unfairly. They also worry that it will be used for much more than just getting rid of diseases.

None of these fears will stop CRISPR from being widely used, however.

Fears about safety are probably unnecessary. All tests and experiments so far show there is little risk involved. CRISPR seems to work well.

Fairness is certainly an important concern. Gene editing will probably be expensive, so the rich may be the ones using it. The poor may not be able to afford it.

However, that probably will not stop doctors from offering gene editing.

Fears About How Technology Will Be Used

After all, the world is unfair in many ways. The rich send their kids to the best schools, while the poor are often forced to send their children to the worst. The same thing will probably happen with gene editing, whether we like it or not.

The most important fear is that gene editing will lead to eugenics. It is a science that tries to improve the human race by selecting the genes of future children. The goal of eugenics is not to make people well but to make them perfect. The problem is, who gets to decide what perfect is?

Many people may want to pay doctors to make their children smarter, stronger or better looking. However, such unnecessary enhancement may not be the right thing to do. Perhaps doctors should only use CRISPR to stop people from becoming sick.

If We Have The Tool, We Should Use It

Such worries are understandable. However, they are not enough of a reason to block the use of CRISPR. There are so many terrible inherited diseases, and it is unreasonable not to get rid of them when it is possible to do so. The sick should not be left untreated just because of fears that some parents will want to build superkids.

It is time to stop arguing about whether CRISPR should be used in humans. It will be, whether we like it or not. We should begin trying to make sure it will be used safely, and not only by the rich.

We should also get ready for the problems and questions gene editing will bring.

Soon enough, doctors will start using CRISPR simply for enhancement. It can be done, and it will be. We need to think about their promise to give us taller, smarter, healthier, cuter, stronger, and more loving children. We need to decide if such changes are worth making.

The next "rock star" apple is not far off

By Minneapolis Star Tribune, adapted by Newsela staff on 12.07.14

David Bedford tastes an apple at the University of Minnesota apple orchard in Excelsior, Minnesota. Photo: Renee Jones Schneider/Minneapolis Star Tribune/TNS

EXCELSIOR, Minn. — On a late fall afternoon, David Bedford plucks an apple from a young tree. He bites into the fruit and chews thoughtfully.

He declares it is "perfectly good," but no more than that. It's "not excellent — not a wow." He tosses the apple to the ground, then sprays a stripe of orange paint on the trunk that tells the orchard crew to take it down. "You're going to the firewood farm," he tells the tree, with a grin.

Bedford is calm and easygoing. However, he is unforgiving in his attempts to produce the next great apple.

After many years as an apple breeder, Bedford knows what he is looking for. Unfortunately, this apple isn't it. So the tree has to go to make room for other, more promising types.

Take A Bite

Bedford works as a scientist for the University of Minnesota's apple-breeding program. During peak apple season, he tastes around 500 to 600 apples a day. His sense of what is a good apple and what is not has a real effect. It shapes what people find in grocery stores in this country, and even around the world.

Bedford is one of the best apple breeders in the world, said grower John Jacobson. "One of his strengths is his ability to take an apple, bite it and project what's going to be popular." He can immediately spot what people will love.

Bedford does not do the job alone, he is quick to point out, but as part of a team. He and Jim Luby have been working together for 30 years.

But Bedford is the person who does the day-to-day work. He personally tastes all those soso apples in hopes of finding the next big thing.

"He's our front line, making the decisions about what gets thrown out," Luby said. Out of 100 apples, 99 end up getting tossed out, he added.

Honeycrisp Rocks

The program's biggest success is the Honeycrisp. Introduced in 1991, it is now one of the most popular types of apple in the country. "It's a doggone good apple," Mark Seetin of the U.S. Apple Association said.

"When they released Honeycrisp, they hit it out of the park," Jacobson said.

Bedford looks for certain things when sizing up apples. Appearance is not that important. Crunchiness and flavor "are the two most important things," he said.

Achieving the perfect apple takes a lot of experimentation. Bedford crosses different parent trees in hopes of producing the perfect offspring.

His latest apple has yet to be given a proper name. For now, it is simply known as MN55. The fruit will not be in markets for a couple of years, but Bedford is excited about it.

MN55 is the child of Honeycrisp and an Arkansas type. The result is an apple that tastes much like Honeycrisp, but it does better in hot weather and ripens earlier.

Another Winner Is Coming

Jacobson was convinced that MN55 was a winner after tasting it in mid-August. "I ate it, and thought, 'This is really something.'"

Jacobson shared his excitement with Bedford. In his usual, laid-back way Bedford just said, "We've gotta do a little more testing on it."

Bedford, who is 63 years old, has no desire to stop working anytime soon. "We are nowhere near reaching the limit of how far we can go," he said. He hopes to keep breeding apples as long as he can. "If an apple a day keeps the doctor away, I'll live forever," Bedford said with a smile.

Thinking Map: What are the positive and negative outcomes that humans create through genetic manipulation?

Take It Off the Map: Choose a stance, for or against gene manipulation, and defend it with evidence from the articles.

Lesson 10: Punnett Square as a Model for Sexual Reproduction Date:_____

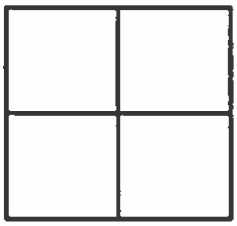
Trait	Letter	Dominate Allele (Upper case) Coin toss as heads.	Recessive Allele (lower case) Coin toss as tails.	Allele One Coin Toss 1 (heads= dominate tails=recessive)	Allele Two Coin Toss 2 (heads= dominate tails=recessive)	Genotype (two alleles from coin toss)	Phenotype (appearance)
Face Shape	S	Round (S)	Square (s)				
Body Shape	B	Round (B)	Square (b)				
Eye Color	E	Blue (E)	Red (e)				
Covering	C	Scales (C)	Hair (c)				
Tail	T	No tail (T)	Tail (t)				
Horns	H	Horns (H)	No horns (h)				
# of limbs	D	4 (D)	6 (d)				
Mouth	M	Teeth (M)	Beak (m)				
Antenna	X	No antenna (X)	Antenna (x)				
Neck Length	N	Medium (N)	Long (n)				
Eye Position	Y	Center of face (Y)	Top of head (y)				
Digits	F	Fingers (F)	Claws (f)				

Monster drawing:

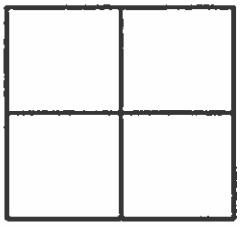
Partner up and create punnett squares using genotype from your monster and your partner's.

Write your monster's genotype on the top and your partner's monster's genotype on the side.

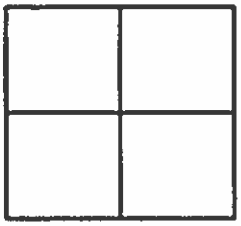
Face Shape:



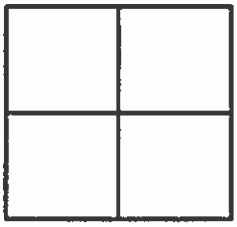
Body Shape:



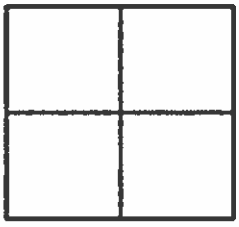
Eye Color:



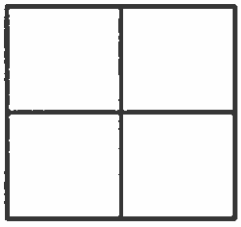
Covering:



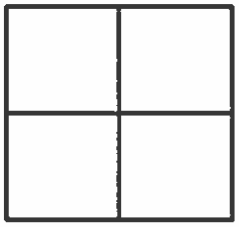
Tail:



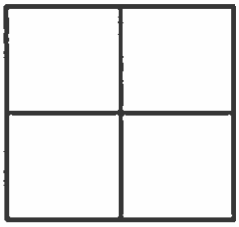
Horns:



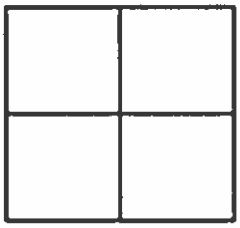
# of limbs:



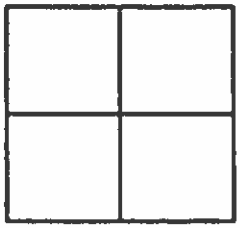
Mouth:



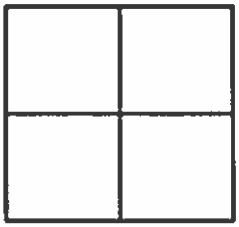
Antenna:



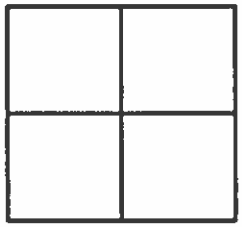
Neck Length:



Eye position:



Digits:



Make a claim using the above information about possible offspring:

	Questions to Think About	My Statement
Claim	What do you know? Will a certain phenotype occur every time? Never?	
Evidence	How do you know what the claim states? What does the data from the alleles/genotypes say about genetic variation in sexually reproducing organisms?	
Reasoning	How does the evidence support the claim? Write a rule for genetic variation in this sexually reproducing organism.	

Lesson 11: Furry Family

Date: _____

FAMILY PORTRAIT

AS YOU COMPLETE THE GAME THE BABY BUNNIES' PICTURES WILL BE FILLED IN

TRAIT	PHENOTYPE	GENOTYPE	
FUR COLOR	White	Ff	FATHER
HEAD SHAPE	Slim	hh	
EAR SHAPE	Floppy	Ee	
EYE COLOR	Black	Ss	
GENDER	Male	XY	

	TRAIT	PHENOTYPE	GENOTYPE
MOTHER	FUR COLOR	White	Ff
	HEAD SHAPE	Round	Hh
	EAR SHAPE	Straight	ee
	EYE COLOR	Pink	ss
	GENDER	Female	XX

TRAIT TABLE				
	FUR COLOR	HEAD SHAPE	EAR SHAPE	EYE COLOR
DOMINANT	WHITE	ROUND	FLOPPY	BLACK
RECESSIVE	BROWN	SLIM	STRAIGHT	PINK

Gender: Female

Name of bunny: _____

Trait	Genotype	Phenotype
Fur Color		
Head Shape		
Ear Shape		
Eye Color		

Gender: Female

Name of bunny: _____

Trait	Genotype	Phenotype
Fur Color		
Head Shape		
Ear Shape		
Eye Color		

Gender: Male

Name of bunny: _____

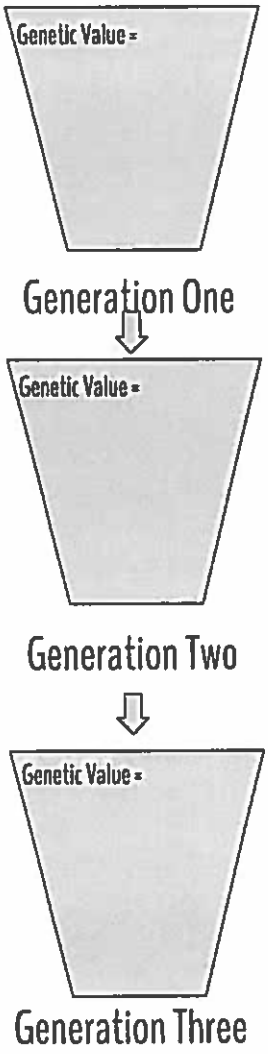
Trait	Genotype	Phenotype
Fur Color		
Head Shape		
Ear Shape		
Eye Color		

How are Punnett Squares used as a model to display the variations seen in offspring of sexually reproducing organisms?

Lesson 12: Flying Solo/Asexual Reproduction

Date: _____

A Model of Asexual Reproduction



Make a Claim-Evidence-Reasoning Statement:

	Questions to Think About	My Statement
Claim	What do you know? What is the difference between sexually and asexually reproducing organisms?	
Evidence	How do you know what the claim states? What does your data from Lesson 9 say about sexually reproducing organisms compared to the data in this lesson?	
Reasoning	How does the evidence support the claim? What universal rule about genetic variation can be written based on your claim and evidence?	

Lesson 13+: Develop a Model

Date: _____

Fish Simulation

What did you observe about the fish as the simulation ran? Write as many observations as you made:

-
-
-
-
-

Was the Fish Simulation a model of Sexual or Asexual Reproduction? Explain how you know...

_____

_____

_____

_____

_____

_____

_____

_____

Explain the Genetic Variation seen in your model.

IMPORTANT: Be specific and show how much you learned about genetic variation in sexually and/or asexually reproducing organisms. That means use the vocabulary, evidence and observations from throughout this unit to support your model's design, as well as a detailed explanation of how these elements were incorporated into your model.

Record daily observations below. Date each observation.

Daily Seed Germination Experiment Data and Observations:

Radish in Soil

Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:

Daily Seed Germination Experiment Data and Observations:

Radish in sand

Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:

Daily Seed Germination Experiment Data and Observations:

Lavender in soil

Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:

Daily Seed Germination Experiment Data and Observations:

Lavender in sand

Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:

Daily Environmental Conditions Experiment Data and Observations:

Radish #1

Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:

Daily Environmental Conditions Experiment Data and Observations:

Radish #2

Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:

Daily Environmental Conditions Experiment Data and Observations:

Radish #3

Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:
Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data:	Date: Measurement Data: