

Bacteria/Viruses

Standards
Biology/Life Science
10. Organisms have a variety of mechanisms to combat disease. As a basis for understanding the human immune response, students know:
c. that there are important differences between bacteria and viruses, with respect to their requirements for growth and replication, the primary defense of the body against them, and effective treatment of infections they cause.

Immune System

Standards
Biology/Life Science
10. Organisms have a variety of mechanisms to combat disease. As a basis for understanding
the human immune response, students know:
a. the role of the skin in providing nonspecific defenses against infection.
b. the role of antibodies in the body's response to infection.
c. how vaccination protects and individual from infectious diseases.
e. why and individual with a compromised immune system (for example, a person with AIDS), may be unable to fight off and survive infections of microorganisms that are usually benign.
f. *the roles of phagocytes, B-lymphocytes, and T-lymphocytes in the immune system.

COMPARE AND CONTRAST EUKARYOTES, PROKARYOTES, AND VIRUSES
Objective: To demonstrate an understanding of how prokaryotic cells, eukaryotic cells (including those from plants and animals), and viruses differ in complexity and general structure.
Directions:

1. Complete this chart using your textbook, notes, and brain.
2. Create an original poster using all of the information from the chart above.
3. Cut rubric and put on the back of the poster.

	Eukaryote	Prokaryote	Virus
DNA structure			
Nucleus or membrane-bound organelles			
Cell membrane			
Examples	(2)		
Diagram			

	1	0
DNA structure is correct among all three	DNA structure is somewhat correct or missing parts	DNA structure is not described among all three
Poster depicts the organelles or lack of organelles among the three	Poster depicts some of the organelles or lack of organelles among the three	Poster does not depict the organelles or lack of organelles among the three
Cell membrane or additional outer layers are described	Cell membrane or additional outer layers are somewhat described	Cell membrane or additional outer layers are not available or not correct
Examples are thorough and accurate	Some examples are thorough and accurate	No examples are provided
Diagrams are accurately and neatly drawn and labeled	Diagrams are somewhat accurate or neatly drawn and labeled	Diagrams are missing or too messy to observe or not labeled
Poster is legible	Poster is illegible on some or all parts of the poster	Poster is not professional (messy or unorganized)
Poster is colorful	Poster is somewhat colorful	Poster is not colorful
Group members:	_____ x 2 = _____	Period: _____/28
Total	_____	_____

Immune System Essay Entry

Organisms have a variety of mechanisms to combat disease caused by bacteria and viruses.

Respond to this statement in ONE TYPED paragraph. Include the following BUT DO NOT number your responses!!!!!!!

- Explain the difference between bacteria and a virus and give examples of each as well as examples of the diseases they cause.
- Explain the role of the skin in providing non-specific defenses against infection.
- Explain the role of antibodies in the body's response to infection. (Refer to your video concept map.)
- Explain how a vaccination protects an individual from infectious diseases. (Refer to your video concept map.)
- Explain the roles of phagocytes, B-lymphocytes, and T-lymphocytes in the immune system. (Refer to your video concept map as well as your notes.)

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Vocabulary: Microbiology

Name _____

Word Part	Meaning	Vocabulary Word
sep,sepsis,septic	rot, putrefy, decay	antiseptic
path	disease	pathogen
derm	skin	dermatitis
-itis	inflammation	dermatitis
mal	bad	malignant
benign	Good natured	benign
aer	oxygen	aerobic
an	without	anaerobic
staph	cluster	staphylococcus
anti	against	antibiotic
tox	toxin	toxin
lyse	break apart	lytic

Format

Word	Part of speech	Word parts/meanings
antiseptic		
pathogen		
dermatitis		

malignant		
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benign		
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aerobic		
---------	--	--

anaerobic		
-----------	--	--

staphylococcus		
----------------	--	--

antibiotic		
------------	--	--

toxin		
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lytic		
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Bacteria Identification

Bacteria are _____ on Earth and today are _____ where the temperature is 360° C
 Bacteria are _____ and can _____ with a microscope.
 Bacteria come in _____
 spherical or cocci spiral Rod or bacillus hexal

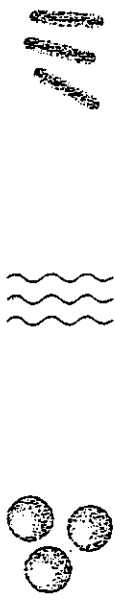
Bacteria are _____
 They do not have a _____ or _____
 They have a _____ BUT they also have an _____
 _____ and some even have a _____ These
 _____ and can be used to _____

GRAM +
 These bacteria have a _____ made of
 disaccharides that _____
GRAM -
 Bacteria have an additional _____ that
 and _____ These are _____

Strep throat is caused by Gram + bacteria E Coli is Gram -
Autotrophic bacteria _____ Many
 on land and _____ : they _____
 and _____ some use _____
 Bacteria that _____ are heterotrophs.

Bacteria can be helpful.

When an animal dies, bacteria from _____ settle on the organism
 and begin _____ releasing _____ to be used again.
 _____ poses another problem. The plants and animals can't use it.
 _____ can _____ from an
 _____, usable product. These bacteria _____ and their relatives.



1. _____ 2. _____ 3. _____

Bacteria are used in food and medical production

MILK	FERMENTED FOOD	HOST/MICROBE
sour cream	sauerkraut	_____
yogurt	green olives	fight other bacteria
_____	sausage	_____

Bacteria Can Cause Disease

A _____ is called a pathogen. They will
 _____ and often _____ (poison) that will
Pathogenic bacteria is transmitted by:
 _____: cholera in drinking water or in and on fish from polluted water.
 _____ - E Coli, and Salmonella and C. botulinum which causes _____
 by producing a toxin. Consuming one-millionth of a gram can _____
 _____ that are _____ Diphtheria, scarlet fever,
 _____ and many others are carried this way.

- Tuberculosis** Fatigue, persistent cough, bleeding lungs
- Diphtheria** fever, sore throat, fatigue
- Tetanus** severe prolonged muscle spasms
- Leprosy** nerve damage, skin lesions, tissue degeneration
- Bubonic Plague** swollen glands, bleeding under skin, often fatal
- Lyme Disease** rash, pain, swelling in joints

Advances in _____ have
 _____ the outbreaks of lethal bacteria. Drinking water
 _____ Food is _____ afterwards.

Vaccinations _____ and _____ help
 _____ of _____ bacteria.

Bacteria usually live in groups. The names of bacteria often tell how the bacteria are grouped. If the name starts with *Diplo-*, the bacteria live in pairs. If the name starts with *Strepto-*, they live in chains like grapes. If the name starts with *Staphylo-*, they live in clusters like grapes. Write the prefix of the name of the bacteria below each figure.



4. _____ 5. _____ 6. _____

E3

BACTERIA

National Geographic

1. How many species of bacteria have been identified?

2. What are the three BASIC shapes of bacteria?

3. What are the configurations that they are found in?

4. Where have SQUARE bacteria been found?

5. Describe the unique structures that bacteria have and their functions.

1.

2.

3.

6. What are ways bacteria help and harm humans?

Good	Bad

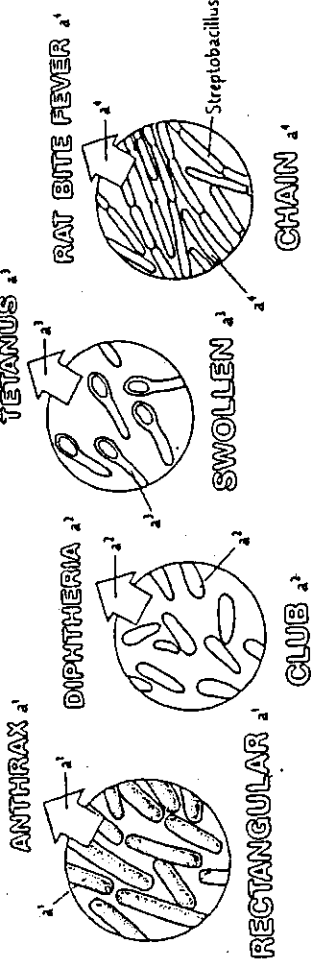
7. What is the role of bacteria in GENETIC ENGINEERING?

8. Identify what these three key people did

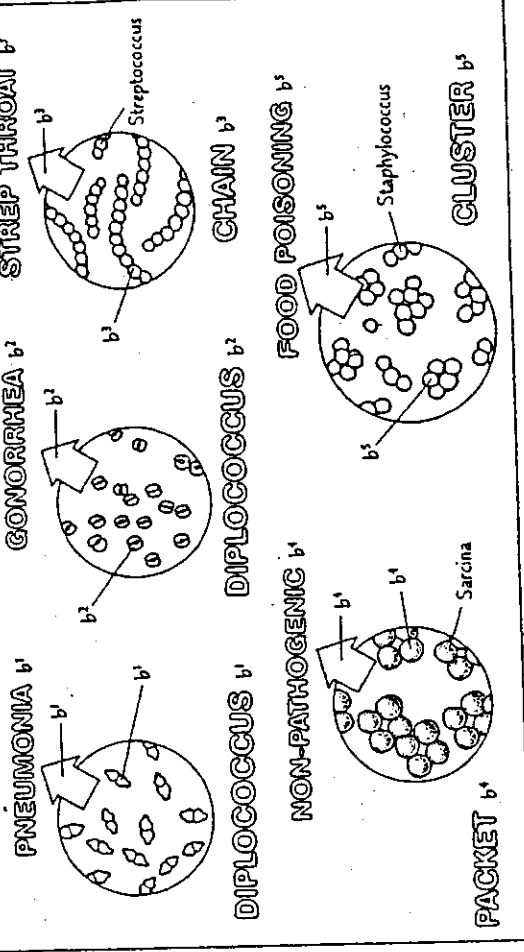
Van Leewenhooke
Pasteur
Robert Coch

FORMS OF BACTERIA

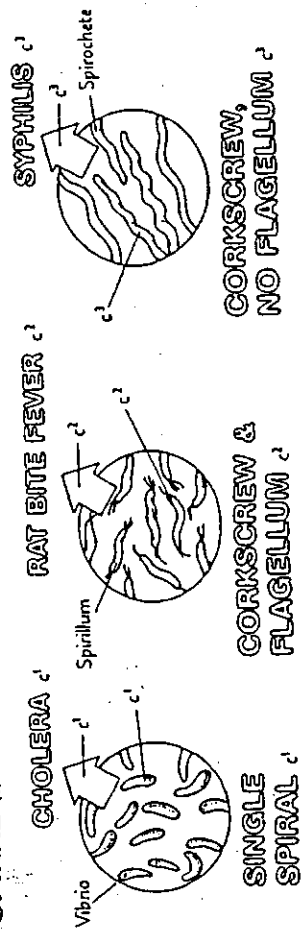
BACILLUS (a)



COCCUS (b)



SPIRAL (c)



Name _____ Period _____

Summary Sentences

Paragraph 1
Paragraph 2
Paragraph 3
Paragraph 4
Paragraph 5
Overall Summary

accompanied by fluid formation. Another type of diplococcus (neisseria gonorrhoea) (b2) resembles two tiny beans lying face to face. N. gonorrhoea (b2), a disease transmitted by sexual contact. The streptococcus is a well-known group of cocci characterized by individuals in a chain (b3). "Streptthroat" (b3), a serious infection of the pharynx is caused by a series of streptococcus. In contrast, a harmless species of streptococcus is one of the "active cultures" in a cup of yogurt. A cube like packet of four or eight cocci (b4) is called a sarcina. One sarcina called micrococcus luteus is a common nonpathogenic inhabitant of the human skin (b4). Another type of coccus, called staphylococcus, occurs in clusters (b5) and produces toxins in food resulting in staphylococcal food poisoning (b5). Other staphylococci enter hair follicles and inflame the skin causing boils.

4. A third form of bacterium is the spiral (c). These bacteria are about 15 um in length. In the spiral form called the vibrio (c1), the bacterium has only a single turn, appearing curved, like a comma. One vibrio caused cholera (C1), a serious disorder characterized by vomiting, diarrhea, and cramps. Severe dehydration caused by cholera is induced by toxins that interfere with the sodium absorption in the intestines. Another type of spiral bacteria is called spirillum. It resembles a corkscrew with the spiral making several turns (C2). The spirillum possess a rigid cell wall with flagella for movement. This bacterium causes rat bite fever. A spirochete is responsible for syphilis (C3), a disease in which the bacteria enter the tissues through breaks in the skin, such as the genital organs.

5. The anatomical pattern of a bacterium can be of great practical value. In the diagnostic lab for example, a technician may note the characteristic diplococci of gonorrhoea in a patient's urine sample and report this observation to the physician. The diagnosis of syphilis is aided considerably by locating the characteristic spirochetes in material from a skin lesion. And Streptthroat may be pinpointed by observing streptococci in bacterial colonies isolated from the throat.

Forms of Bacteria

1. The word "bacterium" may have been used for the first time in the 1850s when the French investigator Casimir Davaine used the term to mean "rod" or "staff". As the years unfolded it became apparent that many bacteria are not rod like, but the name remained and soon it was applied to all microscopic organisms of that general size and with properties similar to the rods. In this plate, three basic forms of bacteria and their arrangements are examined and related to their role as disease agents.

2. The rod form of the bacterium is called a bacillus (a: pl bacilli). Bacilli vary in size, and may be as long as 20 um or as short as 0.5 um. Bacilli (bacillus anthracis) are rectangular with sharply rounded ends (1); these bacilli cause anthrax (a1), a disease of such animals as cows, goats, sheep, and deer. The disease is communicable to humans by air, contaminated meat, and contact with animals. Certain rod shaped bacilli are wide at one end and tapered at the other end (club shaped Cory bacterium diphtheria). They are known to cause diphtheria (a2). In this disease of the respiratory tract, bacterial toxins damage the nerves and the heart. One type of bacillus (Clostridium tetani) is rod like but swollen at one end (a3). These swollen ends contain endospores, a very resistant form of the bacterium. Tetanus (a3) a disease caused by these bacteria is characterized by muscle spasms, seizures, and paralysis of the respiratory muscles. There are several species of bacilli that occur in chains (a4). A streptococcus is shown here; strepto refers to a bacterium linked end to end in chains. Certain streptobacilli cause rat bite fever (a4), a disease characterized by chills, vomiting, and fever.

3. The spherical form of a bacterium is known as a coccus (b: pl. cocci). A coccus is about 0.5 um in diameter. Some cocci called diplococcus are paired (diplo-, double). One species of diplococcus (streptococcus pneumoniae) ahs tapered sides (b1) and causes pneumonia (b1), an inflammation of the air spaces of the lungs

WRITE CLEARLY!!

1. What is the rod form of bacterial called? _____
2. What is an endospore _____
What does it do? _____
3. What is the name of the bacteria that occur in chains? _____
4. What is the spherical form of a bacterium called? _____
5. What does diplococcus mean? _____
6. What is the shape of staphylococcus? _____
What is a disease it causes _____
7. What is the third form of bacteria? _____
What is a disease it causes _____

Name -----

Chapter 18: Viruses and Bacteria
18.2 Archaeobacteria and Eubacteria

Diversity of Prokaryotes

Main Idea

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Supporting Detail

Chemosynthesis:

Word Origin: cyanobacterium

What is a Bacterium

Main Idea

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Supporting Detail

Binary Fission:

Conjugation:

Adaptations in Bacteria

Main Idea

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Supporting Detail

The Importance of Bacteria

Main Idea

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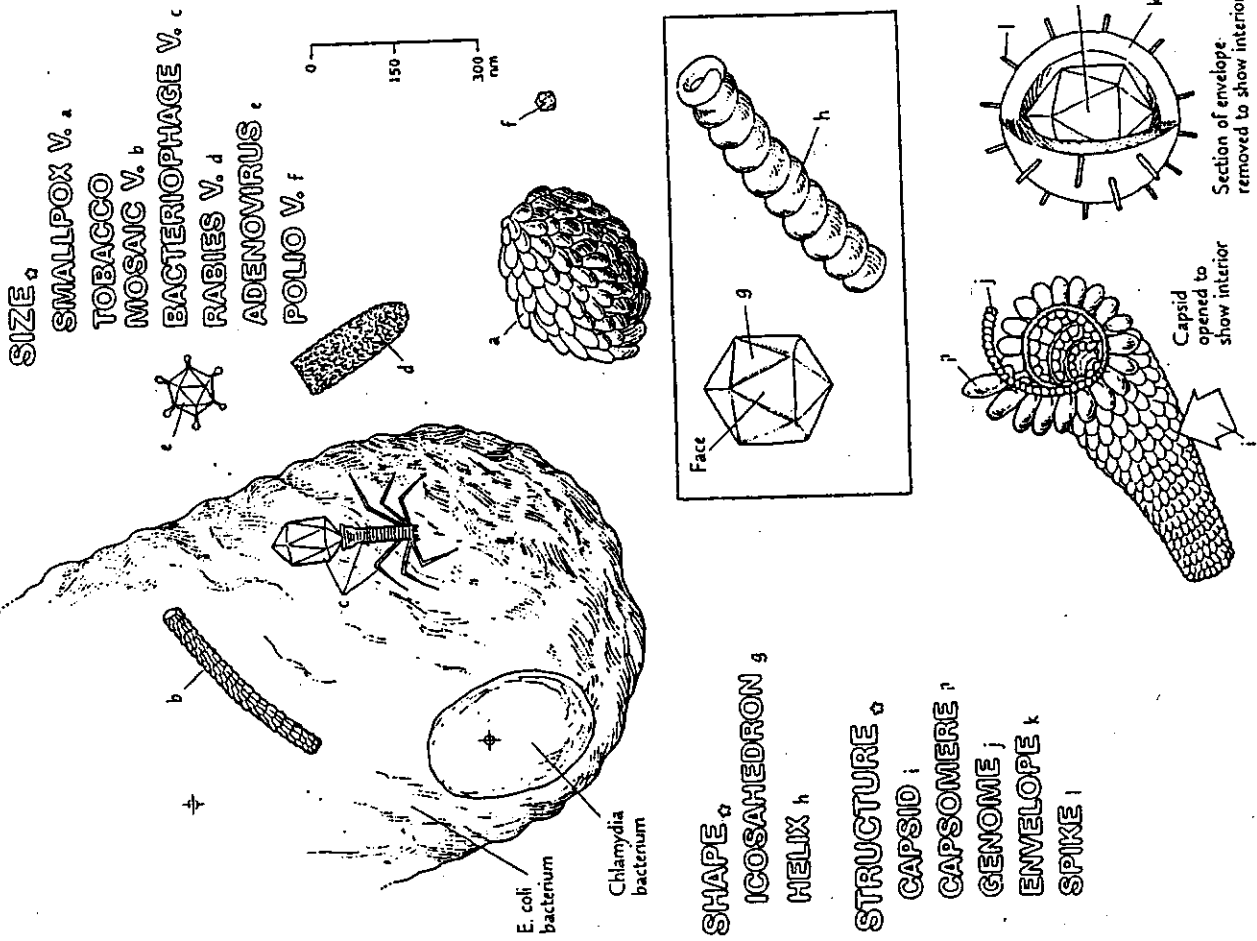
Supporting Detail

Nitrogen Fixation:

Section Assessment 1-5

1. Describe six parts of a typical bacterial cell. State the function of each.
2. What are endospores? How do they help bacterial survive?
3. Explain how penicillin affects a bacterial cell.
4. Explain how bacteria avoid osmotic rupture.
5. Some scientists have proposed that bacterial like cells were probably among the earliest to live on Earth. List the reasons why this is possible THEN EXPLAIN EACH.

INTRODUCTION TO VIRUSES



Viruses

Viruses are _____ that _____ of _____. There is a _____ in the scientific community on _____ entities.

A typical virus has an _____ (RNA or DNA), cytoplasm, _____, and ribosomes.

Viruses _____ and _____ into the host. The RNA or DNA _____ to make ONLY many _____.

Our _____ - are usually the ones _____ foreign things.

Name	Transmitted by	Some Symptoms
Chicken pox		
Measles		
InFLUENZA		
Infectious Hepatitis		
Polio		
AIDS		

DO NOT work on viruses because they work to _____ and the virus doesn't make these. Vaccines are _____ but still _____ to recognize and destroy these if seen again

Introduction to Viruses

- The virus is among the smallest and simplest agents of disease. Viruses are so tiny that they cannot be seen with a light microscope and researchers must use the electron microscope to view them. Viruses have a unique chemical structure and a parasitic dependence on the other organisms associated with an unusual method of reproduction. Viruses cause such well-known diseases as chicken pox, influenza, hepatitis, and infectious mononucleosis.
- During the early 1900's, medical scientists observed that carefully filtered fluids of diseased tissue (disrupted devitalized tissue caused by the growth and toxins of microorganisms) were capable of inducing disease. They reasoned that tiny microorganisms (viruses) in the diseased fluid passed through the smallest filters, and when this filtered fluid was injected into a living, healthy host, the viruses present induced disease processes to occur.
- Viral dimensions are measured and viral structural characteristics are observed with the aid of the electron microscope. Most viruses are substantially smaller than bacteria. The average *Escherichia Coli* (*E. coli*) bacterium, used here as a reference bacterium, is about 3000nm in length (plate B). The bacterium *Chlamydia* is about 250 nm long and is tiny in comparison with *E. coli* bacterium. The rabies virus (*d*), well known for its catastrophic effect in humans after bites from infected animals, is about 200 nm long. The smaller adenovirus, agents of a number of human miseries, including pneumonia, conjunctivitis, measure about 75 nm in length. One of the smallest of this group of microorganisms is the polio virus (*f*) with an average diameter of 25 nm. Polioviruses affect the central nervous system of humans, destroying the motor neurons that supply the skeletal muscles of the body.
- Electron microscopy has revealed that viruses generally have one of two shapes. One

is the icosahedron (*g*), a geometric shaped virus include bacteriophages, chicken pox, genital herpes, mononucleosis, and polio. The second shape is that of a helix or tightly wound coil (*h*), somewhat resembling a corkscrew. Helical viruses include those that cause rabies and tobacco mosaic virus.

- Viruses consist of two main components: the outer capsid (*i*) and the inner genome (*j*). The capsid is the outer coat, and gives shape to the virus, either icosahedral or helical. In most viruses the capsid is composed of multiple protein subunits called capsomeres (*i1*), the number of which varies among viruses. The genome is found in the core of the virus. It consists of a single or double strand of nucleic acid which is either DNA or RNA, but not both. In some viruses the strand is unbroken, in others it is divided into segments. In icosahedral viruses, the genome is commonly a closed loop folded over itself (not shown), in helical viruses, the genome is coiled in the shape of a helix.
- The outermost membrane of some viruses is the flexible, lipoprotein envelope (*k*) around the capsid. It is usually derived from the host cell during replication. Many envelopes have an array of spikes (*l*) that contain enzymes that assist in cell penetration. The influenza and human immunodeficiency virus are notable for the presence of spikes coded for by viral genes.
- No cytoplasm or organelle has been identified in viruses. The virus is dependent upon a host for metabolic machinery and for reproduction. An apparent inert particle in isolation, it swiftly replicated in the appropriate host, even to the extent of killing every living entity upon which it depends.

Name _____

Summary Sentences

Paragraph 1
Paragraph 2
Paragraph 3
Paragraph 4
Paragraph 5
Paragraph 6
Paragraph 7
Overall Summary

WRITE CELARLY

- What instrument do scientists use to see a virus? _____
- Are viruses larger or smaller than Bacteria? _____
- What are 2 shapes of viruses? _____
- What are two main components of a virus? _____
- What are two different genomes (genetic material)? _____
- What is the job of the spikes? _____
- What does the it depend on for reproduction? _____

ES

Chapter 18: Viruses and Bacteria
18.1 Viruses

pgs. 489-497

What is a Virus

Main Idea

<u>Supporting Detail</u>			

Viruses:

Host Cell:

Bacteriophage:

Capsid:

Word Origin: lytic

Viral Replication

Main Idea

<u>Supporting Detail</u>			

Name _____

Lytic Cycle:

Lysogenic Cycle:

Provirus:

Retrovirus:

Virus and Cancer	Plant Viruses	Origin of Viruses

Section Assessment 1-5

1. Why is a virus considered to be nonliving?
2. What is the difference between a lytic cycle and a lysogenic cycle?
3. What is a provirus?
4. How do retroviruses convert their RNA to DNA?
5. Describe the state of a herpes virus in a person who had cold sores several years ago but who does not have them now.

The Immune System

Keeping Pathogens out

Skin: _____ that is constantly _____. In only about 40 minutes your body looses and replaces _____. Oil and sweat make the skin _____ line many passages inside the body. Their _____

Local Infection

In the event of a _____ the body _____ the compromised area inflames _____

White Blood Cells WBC

Phagocytes _____, _____ and foreign particles. _____ - most common type neutrophil _____ common to those in bleach, killing _____ around it. Pus is a combination of _____

How are pathogens recognized?

Every cell has channels, receptors and _____. Marker proteins _____ to tell the _____ that they _____

Cells that do not have the _____ and are _____ trigger a _____ engulf and consume _____ identified by the _____

The _____ involves two kinds of White Blood

Cells: _____ and _____.

T cells come in three types: _____ T cells, _____ T cells, and _____ T cells.

Sequence of Events

1. Virus enters _____
2. Cells along your respiratory track die (you feel sick) _____
3. _____ cells eat the _____ (name tag) around with them
4. Helper T cells _____ and release a protein as a _____ to the _____
5. Killer T cells _____
6. Suppressor T cells _____ and _____ the Killer response.

B Cells _____ proteins known as _____

Sequence of Events

1. B cell _____ (name tag)
 2. For _____ the B cells _____ (This is why it takes a while to recover from the flu.)
 3. B cells _____ that bind to the pathogen.
 4. Macrophages _____
 5. Some B cells become Memory Cells that _____ same pathogen again because the Memory Cells kill it.
- What do antibiotics do?

At any one time _____ are circulating in your body.

Additional defenses

Fever: Macrophages have _____ that stimulate the hypothalamus (_____)

Moderate fever _____ of pathogens
Very high fever can _____

Vaccines are _____ that _____
The body responds and makes the **Memory Cells** that will _____

Viruses can _____ The shapes of the proteins change _____ and _____ before the viruses start to kill your cells.

Blood types

Blood cells have _____ People with type
A blood have _____
B have _____
AB have _____ antigens
O have _____

If type B blood is given to a person with Type A, their _____ will cause the _____ and they will die.

Immune over reaction

Allergies are the _____ to a _____

The cells in the body _____, which cause capillaries to _____
Antihistamines

_____ Auto-immune disease results when _____ is an auto-immune disease

Cancer cells _____ to recognize and destroy them.

HIV destroys the T cells, allowing _____ to invade the body.

The _____

Video: The Flu

Name _____

Identifying a Pathogen

1. Study the experimental steps shown in the transparency. They summarize one of the main procedures used to establish the cause of a disease. What must take place in the first step of this procedure?

2. Assuming one or more potential pathogens are found in Step 1, what is the purpose of Step 2?

3. What is being done in Step 3 and for what purpose?

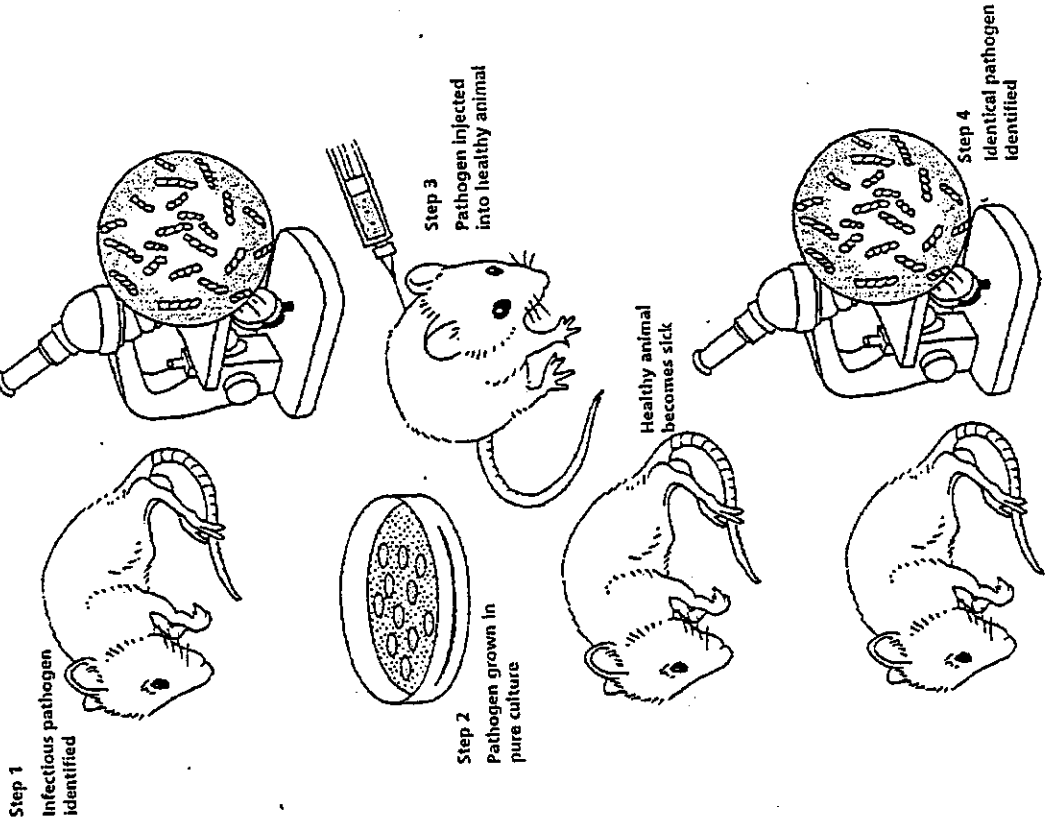
4. What is being done in Step 4 and for what purpose?

5. Why would it not be possible to establish the cause of viral disease, using the experimental steps shown in the transparency?

6. Step 1 shows a single diseased organism. Explain why this represents a simplification of the process used in establishing the cause of a disease.

7. Why isn't it possible to use Koch's postulates if a suspected pathogen causes a disease only in humans?

Identifying a Pathogen



39.2 Defense Against Infectious Diseases

Innate Immunity

Main Idea

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Supporting Detail

Innate Immunity:

Word Origin and meaning: Phagocytes

Macrophages:

Interferons:

Main Idea

Acquired Immunity

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Supporting Detail

Acquired Immunity:

Tissue Fluid:

Name _____

Lymph:

Lymph Node:

Lymphocyte:

Antibody Immunity

Main Idea

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Supporting Detail

T Cell:

B Cell:

Main Idea

Cellular Immunity

--	--	--	--

Supporting Detail

Main Idea

Passive and Active Immunity

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Supporting Detail

AIDS and the Immune System

Main Idea

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Section Assessment 1-5

1. What role do phagocytes play in defending the body against disease.
2. What role does a lymph node play in defending your body against microorganisms?
3. What is the difference between naturally acquired passive immunity and naturally acquired active immunity?
4. How does histamine release lead to inflammation of a wound?
5. Why is it adaptive for memory cells to remain in the immune system after an invasion by pathogens?