



Science Virtual Learning

Biology

Viruses

May 1, 2020



Biology

Lesson: May 1, 2020

Objective/Learning Target: Student will be able to describe the various forms of viruses and how they reproduce.



Let's get started.

By now, most of you know the reason why we are practicing social distancing, but how much do you really know about the particle that is causing all of the disruption? In today's lesson, we are going to delve into structure of viruses and explain how viruses reproduce. By the end, you should be able to describe the basic structure of a virus and explain how they reproduce, which in turn, will explain why social distancing is so important right now.



What is a virus?

Begin by watching this [video](#). Jot down notes on how the virus enters, where the process for stopping a virus starts, and how the parts of the cell work together to create antibodies.

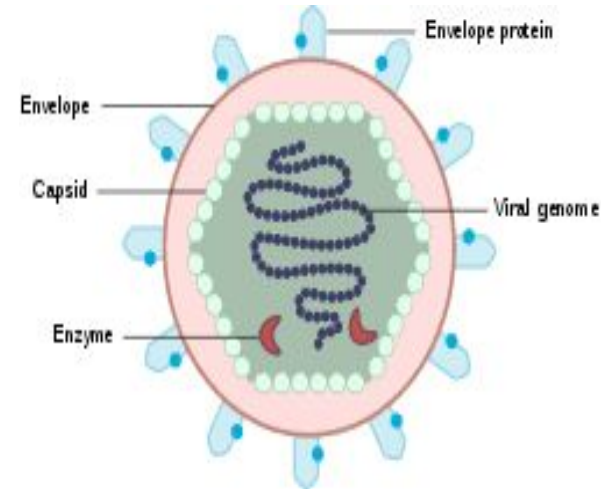
What is a virus?

Next, read the information found in this [LINK](#). As you read, take notes based on the questions posed.

1. What is a virus?
2. How are viruses different from bacteria?
3. Sketch and label the basic structure of a virus
4. What is the capsid?
5. What are 3 common shapes?
6. What is the envelope?
7. Where does the envelope come from?
8. What are the 2 types of genetic material a virus can have?
9. What are the 5 steps in the general viral life cycle?

How did you do?

1. What is a virus? **An infectious particle that can reproduce only by infecting a host.**
2. How are viruses different from bacteria? **Much smaller, cannot reproduce on their own.**
3. Sketch and label the basic structure of a virus
4. What is the capsid? **Protein shell around the genome**
5. What are 3 common shapes? **icosahedral, head-tail, filamentous**



How did you do?

6. What is the envelope? **Lipid membrane surrounding capsid**
7. Where does the envelope come from? **It is taken from the cell from which the virus was “born” in.**
8. What are the 2 types of genetic material a virus can have? **DNA and RNA**
9. What are the 5 steps in the general viral life cycle? **1. Attachment, 2. Entry, 3. Replication and gene expression, 4. Assembly, 5. Release**



Let's look a little closer at the structure of a virus.

Let's read a little more about the structure and shapes of viruses. As you read there are questions embedded in the learning. Answer those questions on a piece of paper.

Virus structure

Virus structure

1. Why are viruses classified by their structure? The shape of the capsid determines the structure of the virus. This structure needs to be known and identified by a vaccine for the vaccine to work.
2. What are the structures and functions of the parts of the virus?
 - a. Genome: Either DNA or RNA and is used to make more of the virus
 - b. Capsid: protective protein coat around the genome
 - c. Envelope: (not all viruses have this), phospholipids and proteins taken from the host cell's membrane.



Virus Reproduction- It can happen in multiple ways

Let's start by reading about the different types of viral replication and answering a few questions.

Viral Replication

What did you learn?

1. The answers you should have chose are:
 - a. Host is destroyed
 - b. Once replicated, the virions leave the cell by sending an enzyme to destroy the cell wall of the host
 - c. Virus uses the host cell's organelles to produce copies of itself
2. Genetic material determines how the virus will replicate
 - a. RNA -- basic transcription and translation process
 - b. DNA -- uses DNA polymerase to transcribe and translate
 - c. Retroviruses and Reverse transcriptase -- goes backward to create DNA so that transcription and translation can take place
 - d. Bacteriophages -- infect bacteria.

How exactly is replication done?

You have already noted that there are 5 basic steps in viral reproduction, but did you know that these steps can occur in 2 ways?

Watch the video below. As you watch answer these questions:

1. Other than bacteriophages that inject their DNA into the host cell, what other 2 ways do viruses enter a cell?
2. Once inside, the virus can go 1 of 2 ways. The first is to be impatient and the second is to hitch a ride. Describe what happens with each.

[Khan academy video](#)

How exactly is replication done?

1. Other than bacteriophages that inject their DNA into the host cell, what other 2 ways do viruses enter a cell?
A. non-enveloped virions will trick the cell's receptors into letting them in. B. enveloped virions will either use the same trickery or will fuse with the membrane to allow the genetic material inside.
2. Once inside, the virus can go 1 of 2 ways. The first is to be impatient and the second is to hitch a ride. Describe what happens with each.
A. the impatient or LYTIC Cycle- will quickly make copies of itself and go on to infect many cells rapidly
B. the Hitch a Ride or LYSOGENIC Cycle - will sit back, insert its DNA into the host DNA and allow copies of the DNA to be made as the cell divides. When ready, the viral DNA will activate and create more virions.



Let's do some practice with what you have learned.

Follow the [link](#) to an interactive website that reviews the lytic and lysogenic cycles.

If you are still a little confused, you can watch this [video](#) to help clarify some questions.

How does the body react to viruses? Why do vaccines work?

As you watch the video below. Answer these questions:

1. What are pathogens?
2. What are the 3 lines of defense?
3. What do antibiotics target?
4. Explain how vaccines work.
5. Explain how antivirals work.
6. Can viruses mutate?

[Antibiotics, Antivirals, and Vaccines](#)

How did you do?

1. What are pathogens? **Bacteria, viruses, or anything foreign in the body**
2. What are the 3 lines of defense? **1. Skin and mucous membranes, 2. Macrophages (white blood cells), 3. B and T cells**
3. What do antibiotics target? **Bacteria**
4. Explain how vaccines work. **Vaccines expose the body to inactive or weakened forms of the virus which launches an immune response to produce antigens and antibodies for memory to when the full strength virus enters. This will allow for a quickened immune response and lessen the effect of the virus on the body.**
5. Explain how antivirals work. **Antivirals make an active viral infection less severe by blocking the reproductive cycle of the virus. These, however, must be administered within a certain time window to be effective.**
6. Can viruses mutate? **Yes, and they do quite frequently.**



What are some misconceptions about viruses?

Use this link to read about some common myths and misconceptions about viruses.

[Myths and Misconceptions](#)



Extra practice and learning opportunities

Articles

[Guide to Animal viruses](#)

[Classifying Viruses](#)

[Interactive on the Life cycle of HIV](#)

[Social Distancing among other organisms](#)

[Why the coronavirus has been so successful.](#)

Videos

[Amoeba Sisters Virus Video](#)

[How do Viruses Jump from Animal to Human Video](#)

Interactives

[HHMI Virus interactive with worksheet](#) [worksheet](#)