COVID: Understanding how the COVID-19 Virus works

Big Ideas: Viruses, Antigens, Antibodies

Time	Task	Description	Needs
10 min	**Myth or Fact**	Students will vote on which of the "facts" about Corona are facts or Myths.	Have information on the slide and in the handout
5 min	**Your Challenge: Protect Your Family**	**Directions:** As scientists, our job is help our community stay healthy. Your job is to help everyone in your family learn about Viruses in order to keep everyone safe.	- Have info in the worksheet and the slides
10 min	**Understanding Viruses Video**	**Directions:** We will watch a brief video about Viruses and will listen for answers for the following questions: (1) What is a Virus? (2) What are the parts of a Virus? (3) How does a Virus copy itself? (4) What is an Antigen? (5) What are antibodies? (6) What are Alveoli?	Have info in the worksheet and the slides
10 min	**Discuss Questions**	Student will share their answers	Have info in the worksheet and the slides
10 min	**VR Exploration**	(LINK)	Have info in the worksheet and the slides
10 min	**Quick Read**	Virus Antibodies Antigen Alveoli	Have info in the worksheet and the slides
10 min	**Explain it To me?**	**Directions:** will write written explanations of each big idea.	Have info in the worksheet and the slides
10 min	**What's wrong with this picture? Can you identify Myths now?**	- Students will review myths and identify which are facts and which are myths.	Have info in the worksheet and the slides

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10 min	**Video Analysis**	Watch video (1) What are 3 things your family needs to know? (2) How do we protect people (3) Who are most likely to get sick?	https://www.kqed.org/science/1963200/how-covid-19-attacks-your-lungs
10 min	**Laboratory Introduction: Build a Model Build a Lung**	To help us understand how a lung works and how COVID impacts our body, we will make two models: (1) One model will be a model of a virus, (2) the second will be a model of a lung.	Have slides ready
10 min	**Laboratory**	Build a Model Build a Lung	
	Record Video	**Directions:** Use the remaining time to record a news broadcast that teaches everyone in your family about how viruses work and what we can do to be safe. In your video explain: a. Viruses, b. Antibodies, c. Antigens, d. What we can do to protect ourselves from COVID-19?	Have info in the worksheet and the slides

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Myth or Fact

Directions: Read each of the sentences below and circle whether it is a Myth or a Fact:

1. **Spraying chlorine or alcohol on the skin kills viruses in the body? Myth or Fact**
2. **UV light damages the protein layer of the virus causing it to die quicker? Myth or Fact**
3. **Only older adults are at risk? Myth or Fact**
4. **The virus damages our body two ways. The virus attaches our Alveoli and our body's defense system also attacks our cells? Myth or Fact**
5. **Everyone with COVID-19 will get really sick? Myth or Fact**
6. **Washing our hands with soap can kill the virus? Myth or Fact**

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The Challenge: Protect your Family

Directions: As scientists, our job is help our community stay healthy. Your job is to help everyone in your family learn about Viruses in order to keep everyone safe.



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Understanding Viruses Video

Directions: We will watch a brief video about Viruses and will listen for answers for the following questions:

(1) What is a Virus?

(2) What are the parts of a Virus?

(3) How does a Virus copy itself?

(4) What is an Antigen?

(5) **What are antibodies?**

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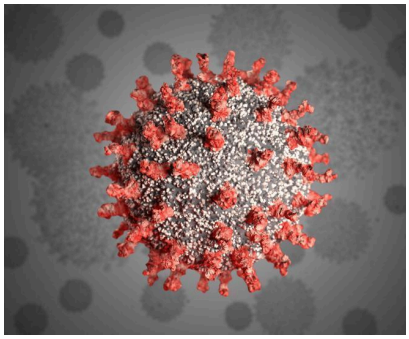
(6) What are Alveoli?

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Quick Read: Body Basics When Fighting Viruses

Viruses

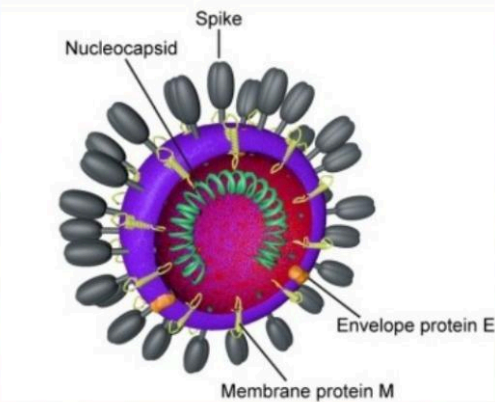
This is a picture of the Corona Virus (COVID-19). It is so small, hundreds of them can fit on one hair! All the little “knobs” on the outside of the virus help to give the virus structure. And it is this structure that must be identified by a vaccine.



Structure of Viruses

Viruses vary in their structure. A virus particle **consists of DNA or RNA** within a protective protein coat called a **Capsid.** The shape of the capsid may be different from one type of virus to another. The capsid is made from the proteins that are decided by the genes The shape of the capsid is how scientists give the viruses their name. The Corona virus is called Corona, which mean “Crown” in Spanish. They thought the virus’s capsid looked like a crown.

The picture below shoes the basic structure of the virus. It has the protein spikes that allow it to attach to cells, RNA in the middle, and a protein coat known as the Capsid.

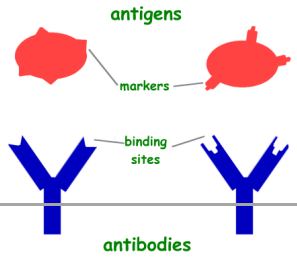


Antigen

Scientists call the invaders that can cause disease **antigens**. Anything that enters your cells that are not supposed to be there are called antigens. Antigens trigger our body to send out things to fight the antigens. We have specific immune response in the body for different types of antigens. Your body will attack bacteria and viruses different. One of the main immune responses is the production of special proteins that help to fight off the antigens called **antibodies.** If you have a virus, your body makes antibodies to fight it, so the next time you get exposed to the virus your body can fight it off quickly.

How do the antibodies know which cells to attack?

In order to work properly, the immune system must know which cells are good cells and which are bad. Antibodies are designed with specific binding sites that only bind with certain antigens. They ignore "good" cells and only attack the bad ones. You can see from the picture on the lef that the antibodies each have a specially designed



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binding sites. They will only bind with the antigen that has a "marker" that matches up perfectly.

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Explain it to Me

Directions: Use the space below to explain each of the key concepts?
What is antigen?

What is an antibody?

How do viruses replicate?

How can we fight COVID in our body?

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What's Wrong with this Picture?

Directions: Which of the following **statements is myth and which is a fact about COVID?**

(1) COVID mutated from a common cold? **Myth or Fact**

(2) There is no cure for COVID, but we have treatments to help heal us? **Myth or Fact**

(3) The Virus will die in summer temperatures? **Myth or Fact**

(4) Creating a vaccine will help us make our own antibodies to fight COVID? **Myth or Fact**

(5) The Virus started because people ate Bats? **Myth or Fact**

(6) The virus enters our cells and causes are cells to make more viruses? **Myth or Fact**

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Video Analysis

Directions: After watching the video answer the following questions

(1) What are 3 things your family needs to know?

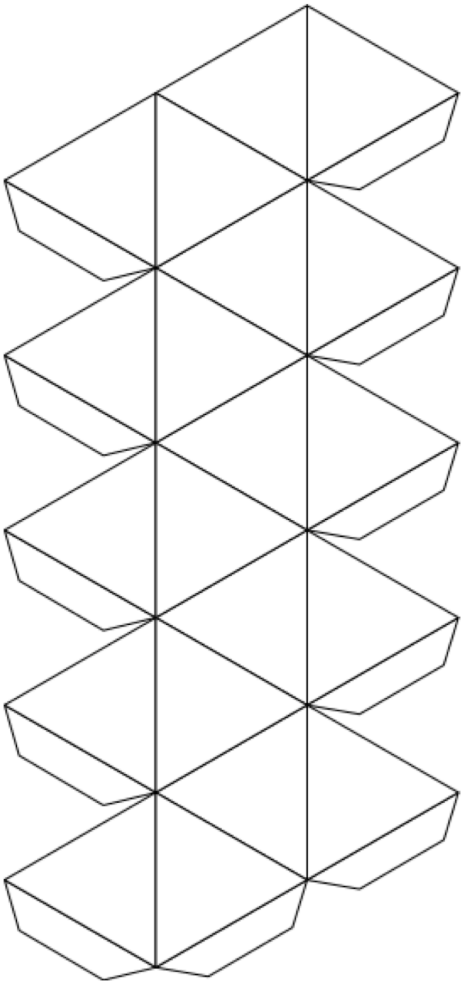
(2) How do we protect people?

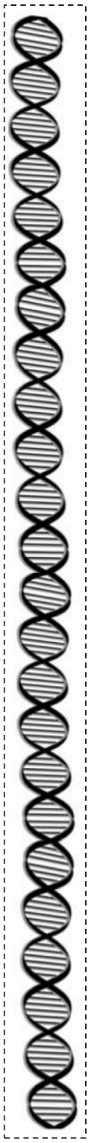
(3) Who are most likely to get sick and why?

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Laboratory

Directions: Use these materials to make your model of Virus. Cut the viral DNA out, and the paper shape underneath to model the icosahedral capsid, with the viral DNA inside.





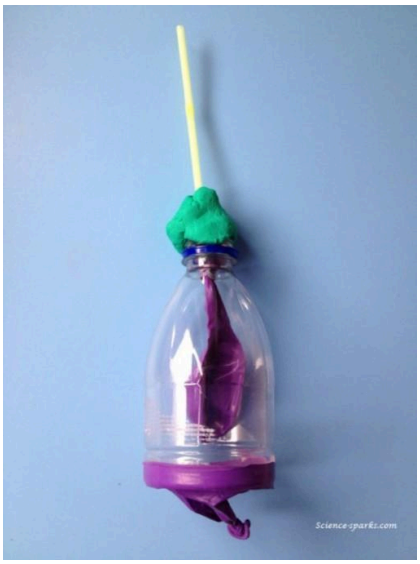
Building a Model Lung

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Materials:
1 Plastic bottle, 1 Straw, 3 Rubber Bands, 2 pair of Scissors, 2 Balloons, Play Dough

Building Directions

1. Carefully cut your bottle to about half the size.
2. Tie a knot in one end of one balloon and cut off the fat end.
3. Stretch the balloon around the bottom of your plastic bottle.
4. Put a straw in the neck of the other balloon and secure tightly with the elastic band but not so much that you crush the straw. The air must flow through, so test it with a little blow through the straw to see if the balloon inflates.



5. Put the straw and the balloon into the neck of the bottle and secure with the play dough to make a seal around the bottle – make sure that again, you don't crush the straw.

6. Hold the bottle and pull the knot of the balloon at the bottom. What happens?

7. You should find that the balloon inside the bottle inflates, and as you let go the balloon deflates.

WHY DOES THIS HAPPEN?

As the knotted balloon is pulled it creates more space inside the bottle. Air then comes down the straw and fills the balloon with some air to fill the space! When

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you let go of the knot the space no longer exists, so the air from the balloon is expelled making it deflate.

Inside the lungs are a network of tubes which allow air to pass though. Air is warmed, moistened and filtered as it travels through the mouth and nasal passages. It then passes through the a network of tubes, eventually reaching tiny sacs called alveoli which are where gas exchange occurs

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Laboratory: Build a Virus Model & Build a Lung Video

Directions: Use the remaining time to record a news broadcast that teaches everyone in your family about how viruses work and what we can do to be safe. In your video explain: **a. Viruses, b. Antibodies, c. Antigens, d. What we can do to protect ourselves from COVID-19?**

Footnote =[1]
Footnote=[2]

[1] *Myth or Fact Answers: 1.M, 2.F, 3.M, 4. F, 5. M, 6. F*

[2] Part 2: Answer 1=F; 2=F; 3=M; 4=F; 5=M; 6=

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