Texas CARES 5E Lesson
Grades 3-5

TABLE OF CONTENTS

Teacher Background Information

Engage

Explore

Explain

Elaborate

Evaluate

Teacher Background Information

What is Texas CARES?

The Texas Coronavirus Antibody REsponse Survey (Texas CARES) measures the percentage of participants who have antibodies to SARS-CoV-2 virus in their blood (this measurement is called "seroprevalence"). All Texans 5-80 years of age can participate in the survey. Volunteers complete an informed consent, fill out a questionnaire, and then receive a blood draw at three time points (each three months apart) to determine if they have SARS-CoV-2 antibodies.

Texas CARES is not just *about* the Texas population. It's also *for* the Texas population.

Texas CARES is sharing information with the public, so that anybody – from public health officials to schoolchildren – can learn more about this project and the antibody response to COVID-19 across Texas! The Texas CARES dashboard presents the data from the participants updated weekly. Please download the Dashboard Guide for how to navigate the dashboard and more details about what the data represents

People learn can more about Texas CARES and enroll at www.TexasCARESproject.org.

What are the survey's goals?

- Estimate how many people in Texas have been infected with SARS-CoV-2.
- Estimate how many people have been vaccinated for SARS-CoV-2 and develop antibodies.
- Learn how long COVID-19 antibodies last in someone's system.
- Identify the characteristics of people who develop COVID-19 antibodies.
- Identify the characteristics of people who never develop COVID-19 antibodies.

Interviews

Dr. Eric Boerwinkle shares pertinent information that will set the stage for a successful teaching and learning experience in this 20-minute interview. Dr. Eric Boerwinkle is dean and M. David Low Chair of Public Health at The University of Texas Health Science Center at Houston (UTHealth) School of Public Health.

ABC13 coverage of Texas CARES: "More than 20 percent of Texans may have COVID-19 antibodies, study shows" by Marla Carter from March 15, 2021.

Texas CARES 5E Lesson for Grades 3-5

Learning Targets
- I can describe what a virus is.
- I can explain how my immune system fights viruses.
- I can describe how to stop viruses from spreading.
- I can explain how scientists learn more about health problems like the coronavirus.

Key Vocabulary

Antibody: antibodies help your body recognize and destroy germs, like viruses, that make you sick

COVID-19: a newly-discovered infectious disease caused by a coronavirus

Immune system: the body system responsible for fighting disease

Scientist: a person who is trained in a science and whose job involves doing scientific research or solving scientific problems

Survey: a research method used to collect data

Vaccine: a vaccine gives your body directions to make the antibodies that fight germs like the coronavirus so you don't get sick

Virus: a non-living germ that infects cells and causes disease

TEKS alignment:

Health TEKS	3.1F explain strategies for maintaining a personal-health plan such as a commitment to good personal hygiene and checkups and an awareness of safety skills. 3.3A identify health behaviors that prevent the spread of disease and avoid behaviors that cause the transmission of disease 3.3B explain the body's defense systems and how they fight disease 3.4B name and locate major components of the body systems 3.8B describe ways in which peers and families can work together to build a healthy community 3.11A practice critical-thinking skills when making health decisions 4.5A set personal-health goals for preventing illness 4.5B identify different pathogens and explain how the body protects itself from pathogens such as viruses, bacteria, and fungi; 4.5C discuss ways in which prevention and transmission of disease are affected by individual behaviors 5.3B demonstrate ways to communicate health information such as posters, videos, and brochures 5.4A explain how to maintain the healthy status of body systems such as avoiding smoking to protect the lungs; 5.4B relate the importance of immunizations in disease prevention 5.8C describe how a safe school environment relates to a healthy community
Science TEKS	4.2A plan and implement descriptive investigations, including asking well defined questions, making inferences, and selecting and using appropriate equipment or technology to answer his/her questions; 4.2B collect and record data by observing and measuring, using the metric system, and using descriptive words and numerals such as labeled drawings, writing, and concept maps; 4.2C construct simple tables, charts, bar graphs, and maps using tools and current technology to organize, examine, and evaluate data; 4.2D analyze data and interpret patterns to construct reasonable explanations from data that can be observed and measured; 4.2E perform repeated investigations to increase the reliability of results; and

UTHealth
The University of Texas
Health Science Center at Houston
School of Public Health

TEXASCARES
*Texas Coronavirus
Antibody Response Survey*

	4.2F communicate valid oral and written results supported by data. 4.3A analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning, and experimental and observational testing 4.3B represent the natural world using models such as the water cycle and stream tables and identify their limitations, including accuracy and size; and 4.3C connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists. (Note: 3rd and 5th grade have similar science TEKS.)
Math TEKS	3.1A, 4.1A, and 5.1A apply mathematics to problems arising in everyday life, society, and the workplace 3.1D and 4.1D communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate 5.1D communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate 3.8A summarize a data set with multiple categories using a frequency table, dot plot, pictograph, or bar graph with scaled intervals 4.9A represent data on a frequency table, dot plot, or stem-and-leaf plot marked with whole numbers and fractions 5.9A represent categorical data with bar graphs or frequency tables and numerical data, including data sets of measurements in fractions or decimals, with dot plots or stem-and-leaf plots

The 5E Model: Each part of the 5E is summarized below. The parts should be done in order, starting with Engage. The Explore and Explain can be done in a back-and-forth manner as students need information to complete and understand the Explore activity and communicate their findings from the data investigation.

|	
Engage Teacher Directions and Key The purpose of the Engage activity is to get students interested and personally involved in the lesson and for the teacher to assess prior knowledge.	**Germ Fighters!** is an activity that will engage students in thinking about protection measures against COVID-19, a topic for which they will have familiarity. Have students work in pairs or groups to answer the question and justify their answer and then share. Lead a discussion and come to a class consensus as to the best answer and a reasonable justification. The correct answer is Ashley. Each of the other students named a correct protection strategy, but Ashley gave the complete answer.
Explore Teacher Directions and Key The purpose for the Explore activity is for students to collaborate with other students to build knowledge of the topic by interacting with phenomena.	Be sure you have read the Teacher Background Information on page 3 prior to doing this activity with your students. There are opportunities throughout the activity to discuss viral infection and prevention, immunity, antibodies, vaccination of adults and children, and how scientists with the Texas CARES project are answering important questions about the frequency of antibodies in the population. The teacher background information will help you prepare for these discussions. Consider using a Lead4Ward movement and discourse strategy for Part I of the data investigation. Student pairs can share their data representations with other groups using Chair Share, Four Corners, Pair-Square-Share, or Think and Throw. Note that when you show students the Texas CARES dashboard in Part II, it will display updated information which will likely vary from the data that was accurate at the time the activity was written. Background Information for Students: Show these slides to students and use the notes section of the slides to find opportunities for students to answer and ask questions. Have students work in pairs or work with small groups of students. Answer Key to **COVID-19 Attack!** Data Questions, Part I: 1. 7 out of 10 children 2. No could be a reasonable answer because the more kids that are tested, it's possible they will find more kids who have never had COVID, especially when this age group becomes eligible to get vaccinated. The more adults that are vaccinated means less virus circulating in the community. Yes is a reasonable answer because the more kids that participate across all areas of Texas -- and the more

UTHealth
The University of Texas
Health Science Center at Houston
School of Public Health

TEXAS CARES
Texas Coronavirus Antibody Response Survey

	time goes on -- it's possible researchers will see a higher frequency of antibodies in this age group. Answer Key to Data Questions, Part II: 1. 15% 2. The antibodies have waned to the point that they cannot be detected 3. The vaccine will trigger the body to create antibodies that are specific to the COVID-19 virus. For the Conclusion activity, be sure you have explored the Texas CARES dashboard prior to exploring it with your students. The Dashboard Guide is a helpful resource.
Explain Teacher Directions and Key The purpose of the Explain activities is for students to build knowledge of the topic and use appropriate vocabulary as they communicate what they have learned.	Use the **vocabulary activity** that is provided or use the vocabulary words and have students play Think and Throw defining the vocabulary words or drawing a picture as their response. Answer Key: The answers go in the blanks in this order: viruses, COVID-19, lungs, immune system, antibodies, vaccine, blood
Elaborate Teacher Directions and Key The purpose of the Elaborate activities is for students to use their new knowledge to further communicate understanding.	There are three options: health activity, a data activity and science activities. You can assign one or more of these to students, or you can use this as a menu and have students choose one. Students should be creative but also use accurate health and science information. The poster, video and model projects should be shared with other students in class or on campus, as these are intended to serve as peers teaching peers.
Evaluate Teacher Directions and Key The purpose of the evaluate activities is for students to demonstrate what they have learned.	There are two options: a short quiz (slides linked here) and a Claims-Evidence-Reasoning prompt. You may do one or both with your students. For the CER, students make a claim that answers the question that is posed. They use evidence to back up the claim, then the student provides their reasoning behind the claim using a scientific principle, providing a justification for why the reasoning is important for the claim, or explaining how or why the data counts as evidence. A further step can be added -- peer review or rebuttal. In this fourth step, students examine each other's CERs and provide feedback.

The Each activity page can be found on the following pages or linked above.
The Student Background Information and Quiz slides are linked above.

UTHealth®
The University of Texas
Health Science Center at Houston
School of Public Health

TEXASCARES
Texas Coronavirus
Antibody Response Survey

Engage Activity | Grades 3-5
Germ Fighters!

Directions: Read the scenario and student responses below, then answer the question and justify your decision.

Students are talking about ways to protect themselves and others from getting infected with the virus that causes COVID-19.
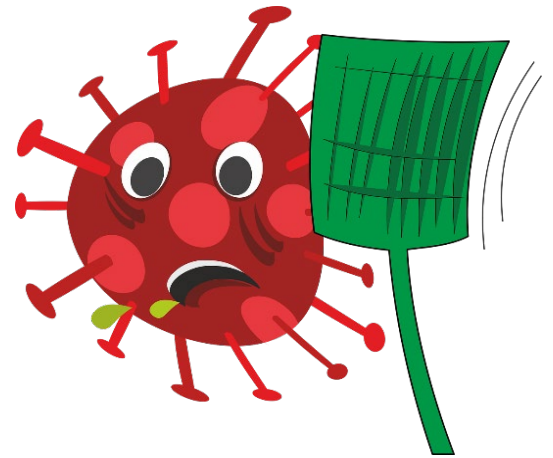
Didi thought that wearing a mask would be the best way to protect someone from getting COVID-19.

Maya thought that keeping at least three feet away from other people would be the best way to protect someone from getting COVID-19.

Jared thought that staying at home when you were sick would be the best way to protect someone from getting COVID-19

Sergio thought keeping hands away from eyes, nose and mouth would be the best way to protect someone from getting COVID-19

Ashley thought that Didi, Maya, Jared and Sergio were all correct and that doing all of these things would provide the best protection from getting COVID-19.

Question: Which student or students had the best solution to protecting themselves and others from getting COVID-19? Explain your reasoning.

Explore Activity | Grades 3-5
COVID-19 Attack!

Student Data Investigation Part 1: Children and Antibodies

When children ages ten and under had their blood tested by scientists to see if there was evidence they had COVID-19 sometime in the past, this is what they found:

For every ten children tested, three had antibodies for COVID-19. This means they had COVID-19 in the past whether they had been sick or not! With your partner, draw a picture using symbols or a bar graph in the space below that communicates this data:

Compare your picture or bar graph with two other groups. Use these sentence stems to have your conversation:

We decided to use _____ (pictures, symbols, bar graph) to show the data. The ten children are shown as _____ and the three children with antibodies are shown as _____.

In the space below, use one of the ideas from your group conversations to show the data in a different way than in your original drawing or bar graph:
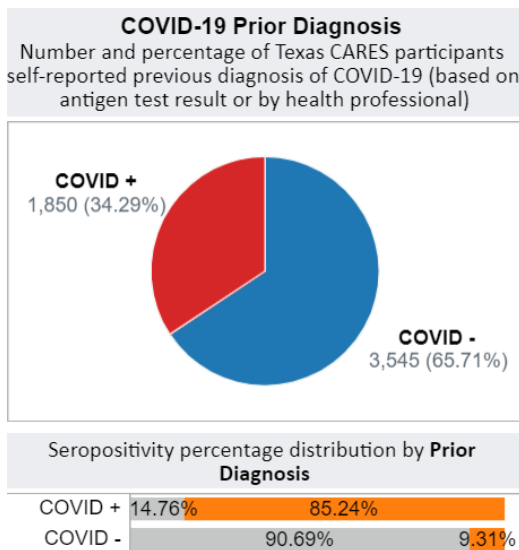
Data Questions, Part I:

1. If three out of ten children under the age of ten years old tested by the scientists showed they had COVID-19 in the past, how many never had COVID-19?

2. Do you think that as scientists test more children that more than three out of ten will have antibodies? Why or why not?

Part II: Prior COVID-19 Diagnosis and Antibodies

Look at the circle graph below. The red-shaded portion of the graph shows that 34% of the people in all age groups who participated in the survey reported that they had previously been diagnosed with COVID-19.

Researchers with Texas CARES have found that a little over 85% of these people who had COVID-19 in the past have antibodies in their blood.

COVID-19 Prior Diagnosis
Number and percentage of Texas CARES participants self-reported previous diagnosis of COVID-19 (based on antigen test result or by health professional)

COVID +
1,850 (34.29%)

COVID -
3,545 (65.71%)

Seropositivity percentage distribution by **Prior Diagnosis**

COVID +	14.76%	85.24%
COVID -	90.69%	9.31%

Data Questions, Part II:

1. If 85% of people who had COVID-19 in the past have antibodies in their blood, what percentage do not have antibodies?

2. What are some reasons they may not have antibodies in their blood?

3. How would getting vaccinated allow the immune systems of people in this group to develop antibodies against COVID-19?

Conclusion

What other questions do you think scientists should be asking about Texans and the presence of antibodies in their blood? Write down as many questions as you can think of. Your teacher will show you the Texas CARES dashboard (https://sph.uth.edu/projects/texascares/dashboard) to see if researchers are answering your questions.

UTHealth
The University of Texas
Health Science Center at Houston
School of Public Health

TEXASCARES
*Texas Coronavirus
Antibody Response Survey*

Explain Activity | Grades 3-5
Vocabulary Activity

Word Bank:

Antibodies   Blood   Lungs   Viruses   Vaccine

COVID-19   Immune System   Survey

_____ are pathogens that can enter your body and make you sick. A new virus that has spread around the world and has made many people sick is a coronavirus that causes _____. When a person infected with COVID-19 breathes out air or coughs, the virus can enter your body through your nose or mouth and settle in your _____ and make copies of itself. It can also enter your body when you touch a surface that has the virus on it and then you touch your nose, mouth or eyes.

Your _____ protects your body from outside invaders like viruses. The immune system creates attackers called _____ that will help fight off COVID-19 the next time you are exposed to it. A person who has had COVID-19 or has received a COVID-19 _____ will produce antibodies in their blood.

Scientists with the Texas CARES _____ are finding out more about who has antibodies to COVID-19 by testing people's _____.

UTHealth
The University of Texas
Health Science Center at Houston
School of Public Health

TEXASCARES
*Texas Coronavirus
Antibody Response Survey*

Elaborate Activities | Grades 3-5

Option 1: Health Activity Stop the Spread!
Create a video, poster or brochure that helps kids know how to prevent being infected with COVID-19 at school, at home or in the community. This should be in the form of a personal, school or community health plan. This is a great opportunity for kids to be role models to help kids and adults make healthy decisions!

Option 2: Data Activity: Be a Scientist!
Create your own data investigation as a class or in pairs.

Option 3: Science Activities
Antibody Cut and Paste
Use the templates attached below to create a model of how antibodies attack the virus that causes COVID-19. Color the virus and the antibodies, then cut them out. Glue the antibodies to the virus to tag it so the immune system can destroy the virus. Explain in writing or as part of a class discussion what is happening in your completed model.

Antibody Attack!
Create a model showing how the virus that causes COVID-19 invades the body and how the body attacks the invading virus with antibodies. Use your imagination and any materials you have on hand to make this fun and creative while communicating accurate science information. Be sure and label your poster or model using vocabulary such as coronavirus, lungs, respiratory system, blood, circulatory system, immune system, COVID-19 and antibodies.

Elaborate Activities | Grades 3-5
Be a Scientist!

A **scientist** collects information to try to understand or solve a problem.

A **survey** is a set of questions that researchers ask to learn more about people in a study.

Data is all of the pieces of information that researchers collect or measure in a research study.

Sample Size is the number of people signed up for a study. The more, the better!

Now it's your turn to be a scientist!

1. Brainstorm some scientific questions that scientists could study. *Example: How does the food that people eat affect their health?*

2. Pick ONE of your questions. *The question I am going to focus on is:*

   _____
   _____
   _____

UTHealth
The University of Texas
Health Science Center at Houston
School of Public Health

TEXAS CARES
*Texas Coronavirus
Antibody Response Survey*

Designing a Study

1. Now that you know what scientific question you are going to research, it's time to design a study. Use the template below to plan your study design. See an example on the next page.

Who will participate in your study?

_____

_____

How many people will you recruit for your study?

_____

What data will you collect?

_____

_____

2. One study tool that can help you learn more about your participants is a survey. Use the template below to plan out your key survey questions.

Survey Questions to Include:
- _____
- _____
- _____
- _____

What conclusions will you be able to make from your study?

_____

_____

_____

UTHealth
The University of Texas
Health Science Center at Houston
School of Public Health

TEXAS CARES
*Texas Coronavirus
Antibody Response Survey*

Study Example: How does the food that people eat affect their health?

Who will participate in your study? I will recruit people ages 5 to 50 who live in Texas.

How many people will you recruit for your study? I will aim to recruit as many people as possible. Ideally, I will recruit 250,000 people.

What data will you collect? I will give my participants a survey where I ask them about their health and the foods that they eat. I will also ask about other lifestyle aspects like whether or not they exercise. I will also have each of my participants take a physical exam at a doctor's office, including blood work. I will also ask for information like their age, gender and where they work.

Survey Questions to Include:
- What kinds of foods do you regularly eat?
- How long do you exercise for each week?
- Do you have any medical conditions?
- Do you currently take any medicine?
- How old are you?
- Do you identify as male, female or prefer not to say?
- Where do you work?

What conclusions will you be able to make from your study? I will be able to look at the foods that they eat and compare it to their physical exam results to be able to try and make a connection between the foods that the participants regularly eat and how healthy they are.

UTHealth
The University of Texas
Health Science Center at Houston
School of Public Health

TEXASCARES
*Texas Coronavirus
Antibody Response Survey*
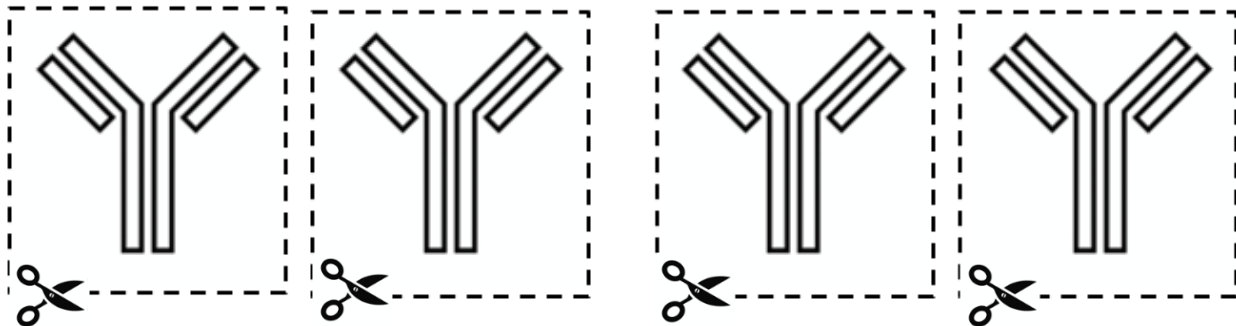
Elaborate Activities | Grades 3-5
Antibody Cut & Paste

Color the virus and the antibodies, then cut them out. Glue the antibodies to the virus to tag it so the immune system can destroy the virus. Explain in writing or as part of a class discussion what is happening in your completed model.
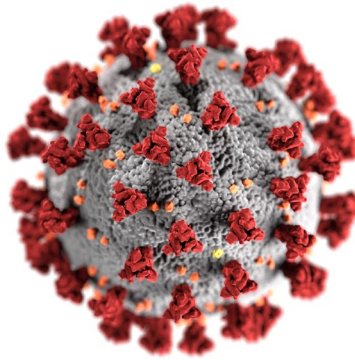
Virus
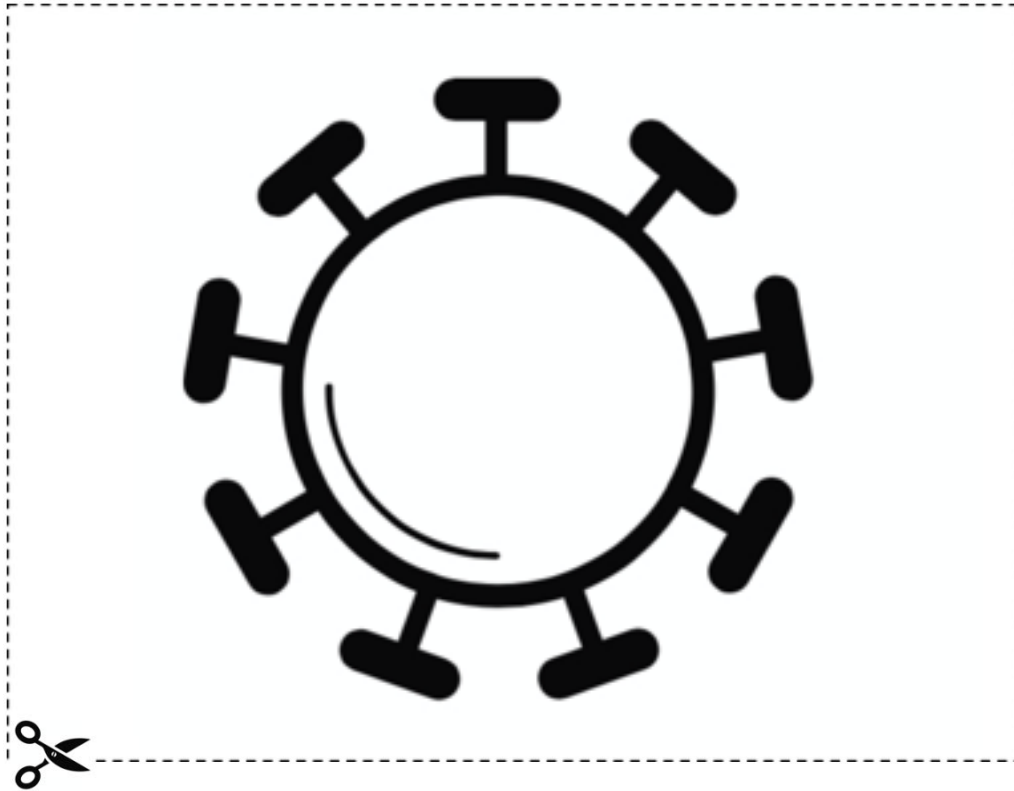
Antibodies

Evaluate Activity | Grades 3-5
Claim-Evidence-Reasoning Spikey Viruses

The virus that causes COVID-19 is pictured above. Do you see the spikey things sticking out of the virus? Antibodies stick to these spikes. How do you think antibodies attaching to the spikes keep a person from getting sick with COVID-19?

Develop a Claims-Evidence-Reasoning to answer this question using what you learned about COVID-19 and antibodies.

Claim:

Evidence:

Reasoning: