

Mask Myths

Disease Prevention



FOR GRADES
9-12

OVERVIEW

Students will determine whether six myths about face coverings or masks are true or false, based on evidence. They also will examine the data from an experiment demonstrating the value of paper surgical masks in preventing the wearer from airborne viral infections.

LEARNING OBJECTIVE

After completing the lesson module, students will be able to:

- List the three primary behaviors important to limiting the spread of COVID-19.
- Explain why wearing a mask protects both you and the people around you from COVID-19.
- Describe the mistakes people often make in wearing a mask and why they are important to correct.
- List times when it is important to wear a mask.

SCIENCE, HEALTH AND MATH SKILLS

- Comparing and contrasting
- Interpreting information
- Communicating

COMMON CORE STANDARDS FOR ENGLISH LANGUAGE ARTS

- [ELA-LITERACY.RST.9-10.1](#). Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

NGSS SCIENCE AND ENGINEERING PRACTICES

- Analyzing and interpreting data
- Obtaining, evaluating and communicating information

MATERIALS FOR SCIENCE INVESTIGATION

Each student will need:

- Digital or print version of the *Student Exploration Sheets A and B*
 - a. Mask Myths: Disease Prevention A
 - b. Mask Myths: Disease Prevention B

Teacher will need:

- Accompanying slides to guide student discussion.

SET UP AND TEACHING TIPS

Students will explore evidence supporting various myths around masks and report back to the class. Use the accompanying slide set to discuss or debrief students' work. As an extension, have students review and discuss the "mask experiment" described in the second section of the student exploration sheet.

TIME

- 2 class periods

PROCEDURE

ENGAGE

1. Remind students of the three important things they can do to stop the pandemic: Wear a mask, wash their hands, and watch their distance.
2. Project the slide on wearing a mask. Ask students to respond verbally or using a response app about what is “incorrect” about each person wearing a mask.

EXPLORE: STUDENT SHEET A

3. In *Part One* of the student handout, students will explore several “myths” about masks that have arisen during the pandemic. They will look at valid sources to determine whether the statement is true. The myths are outlined on the *Student Exploration Sheet*. You can assign all 6 myths to each student or you can assign a different myth to small groups to explore and present during class. You also may allow students to come up with their own questions or myths to investigate.

NOTE: The slides outlined below can be used by you, the teacher, to guide a discussion by students after they’ve presented their information.

EXPLAIN

4. Use the slides below to guide your discussion with students and their findings about mask myths.

SLIDE 1 + 2

1 Medicine, Infection and Masks

- Masks over the nose and mouth have been worn since early 1900's in healthcare settings.
- Masks protect surgical patients from infection.
- Doctors found masks and gloves “irritating” when they first began using them.
- Evidence grew that masks protect both patients and medical staff.
- Disposable masks were developed in the 1960's.

Source: Marzocchi C, Mori F, Pagnoni M, et al. The history and value of face masks. *PLoS ONE* 2020;15(12): e0241831. doi:10.1371/journal.pone.0241831

BioEd COVID HUBS STEM Teacher Resources from Baylor College of Medicine

Medicine, Infection, and Masks

- Introduce the topic of medical masks before having students discuss their findings regarding mask myths.

SLIDE 3

3 Investigate these statements...

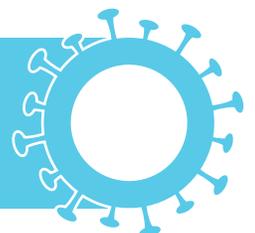
1. Health officials keep changing their minds on whether or not people should wear masks.
2. The only masks that make any difference are the N95 masks worn by medical workers.
3. Masks aren't useful because they don't remove 100% of the viruses in the air you breath in or out.
4. Masks only should be worn by people who have COVID-19.
5. Wearing a neck gaiter is worse than wearing no mask at all.
6. Now that some people are getting vaccinated, it's not necessary for everyone to wear a mask.

BioEd COVID HUBS STEM Teacher Resources from Baylor College of Medicine

Mask Myths

- Point out that students were asked to evaluate whether statements about masks are supported by evidence.
- Ask each group of students to present their findings.
- Use the following table to comment on students’ conclusions.

Wearing a mask is one of the most important things you can do to help stop the spread of the virus. Masks block the droplets that come from your mouth and nose when you sneeze, cough, talk or sing. Symptoms of COVID-19 infection may not appear for 2-14 days, so a person may not know he or she has the virus.



#	STATEMENT	Q + A
1.	<i>Health officials keep changing their minds on whether or not people should wear masks.</i>	<p><u>Did they change their minds?</u> Yes.</p> <p><u>Why?</u> In the early days of the pandemic, scientists didn't know much about the SARS-CoV-2 virus. They knew it was similar to other coronaviruses in structure and attacked the respiratory system, but they did not have clear evidence of whether it was highly contagious, whether it was transmitted in large droplets, aerosols or by touching contaminated surfaces. Initially, they didn't have strong evidence to say that "everyone should wear a face mask." But as researchers learned more about the virus and how it is transmitted, the data led to the clear conclusion that wearing masks, social distancing, and washing hands frequently could help slow the spread of SARS-CoV-2 virus.</p>
2.	<i>The only masks that make any difference are the N95 masks worn by medical workers.</i>	<p><u>Is that true?</u> No.</p> <p><u>What impact can masks have?</u> A review of multiple studies found that surgical and cloth masks are 67% effective in protecting the wearer. That is very similar to the hamster study we just looked at where 75% of the hamsters in Group C were protected by "wearing" a surgical mask. Although N95 masks are slightly more effective, regular surgical and homemade masks with multiple layers can help prevent transmission.</p>
3.	<i>Masks aren't useful because they don't remove 100% of the virus from the air you breath in or out.</i>	<p><u>Is that true?</u> No.</p> <p><u>How does the cloth mask trap particles?</u> Large particles stick to the threads, small particles can move around inside the spaces in the fabric, and medium particles are most likely to make it through. Synthetic fibers, like those in an N95 mask, are electrostatically charged and attract and hold particles of all sizes, making them more effective. New guidelines recommend wearing masks that fit the face closely. Double masks also are more effective, because they provide more layers of filtration.</p> <p><u>What happens to the particles when most people are wearing masks?</u> Two things happen. First, fewer particles overall are reduced into the air. Second, the masks block droplets containing virus particles from being breathed in by a person wearing a mask.</p>
4.	<i>Masks only should be worn by people who already have COVID-19.</i>	<p><u>Is that true?</u> No.</p> <p><u>As we already discussed, masks should be worn by everyone because:</u></p> <ul style="list-style-type: none"> • If you ARE infected, they reduce the number of viruses you are breathing out into the air. • If you are NOT infected, they help to prevent you from getting infected. • Sometimes people do not have symptoms when they are infected with COVID-19 and can unknowingly spread virus particles to other people.
5.	<i>Wearing a neck gaiter is worse than wearing no mask at all.</i>	<p><u>Is that true?</u> No, but knit fabrics do not protect as well as do tightly woven cotton fabrics. In addition, two or more layers are preferable—whether a single mask or two layered masks.</p>
6.	<i>Now that some people are getting vaccinated, it's not necessary for everyone to wear a mask.</i>	<p><u>Is that true?</u> No. It is possible for people who are vaccinated (or who previously have been infected with COVID-19) to become infected and not develop symptoms. These individuals could then transmit the virus unknowingly to other people.</p>

5. Use the information on slides 5-7 to remind students how to wear and care for their masks.

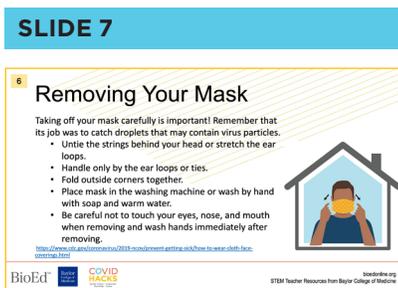


Effective Mask Design

- The CDC has some basic rules for selecting a mask that will be effective. Do choose masks that:
 - a. Have two or more layers of washable, breathable fabric.
 - b. Completely cover your nose and mouth.
 - c. Fit snugly against the sides of your face and don't have any gaps.
 - d. Wear glasses? Be sure your mask fits closely over your nose or has a nose wire.
 - e. Do NOT use a face shield instead of a mask as they do not prevent breathing in virus particles. You may wear a face shield in addition to a mask to protect your eyes.
- Do NOT choose masks that:
 - a. Are made of fabric that makes it hard to breathe.
 - b. Have exhalation valves which allow virus particles to escape.
 - c. Are intended for healthcare workers, including N95 respirators or surgical masks.

Wear Your Mask Correctly

- Wash your hands before putting on your mask.
- Put it over your nose and mouth and secure it under your chin.
- Try to fit it snugly against the sides of your face.
- Make sure you can breathe easily.



Taking off Your Mask

- Taking off your mask correctly is important! Remember that its job was to catch droplets that may contain virus particles.
 - a. Wait until you get home to remove your mask.
 - b. Untie the strings behind your head or stretch the ear loops.
 - c. Handle only by the ear loops or ties.
 - d. Fold outside corners together.
 - e. Place mask in the washing machine or wash by hand with soap and warm water.
 - f. Be careful not to touch your eyes, nose, and mouth when removing and wash hands immediately after removing.

■ EXTEND: STUDENT SHEET B

Have students read the experiment described on *Student Sheet B* and complete the table at the bottom of the page. If students are interested, the full paper can be accessed at the following link:

- Chan J, et al., 2020. Surgical Mask Partition Reduces the Risk of Noncontact Transmission in a Golden Syrian Hamster Model for Coronavirus Disease 2019 (COVID-19).
<https://academic.oup.com/cid/article/71/16/2139/5848814>.

Say to students, let's look at the results of the hamster study:

- 67% of the hamsters in Group A (N=6-7) caught the virus. That is, two-thirds of the animals without a "mask" caught the virus.
- 25% of the hamsters in Group C (N=2-3) caught the virus. That is, only 25% of the animals caught the virus because they were "wearing" a mask.
- What if the mask is flipped? The researchers also flipped the mask so that the infected animal was "wearing" the mask. In this case less than 17% of the animals (N=1-2) caught the virus.

What can we conclude?

- Masks protect us in two ways: 1) by reducing the number of viral particles breathed out into the air by people infected with COVID-19 (including those with symptoms and those who have not yet developed symptoms; and 2) by reducing the number of viral particles that uninfected people breathe in.

THE SCIENCE

Face masks have been worn by medical personnel since the early 1900's, primarily to protect surgical patients from infection. Many early masks were made of gauze or cloth and, at first, some doctors found wearing both masks and surgical gloves "irritating." But the evidence grew that wearing masks could not only protect patients from germs carried by medical staff, but also showed that masks could protect the medical staff from patients who had infections. By the 1960s, disposable medical masks made of paper and fleece were developed in the US and quickly spread to other countries.

Wearing a mask is one of the most important things you can do to help stop the spread of the virus. Masks block the droplets that come from your mouth and nose when you sneeze, cough, talk or sing. Symptoms of COVID-19 infection may not appear for 2 to 14 days, so a person may not know he or she has the virus. During that time, an infected person who does not wear a mask or take other precautions (such as careful hand washing or physical distancing) can pass the infection to family, friends, and strangers. Masks also provide some protection from virus particles that come from others. And they help to keep you from touching your nose, and face. Since the mask is also close to your eyes, it is a great reminder not to touch your eyes either.

■ RESOURCES

- BioMed Central (BMC). The History and Value of Face Masks.
<https://eurjmedres.biomedcentral.com/articles/10.1186/s40001-020-00423-4>.
- Centers for Disease Control and Prevention (CDC). How to Wear Masks.
<https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-to-wear-cloth-face-coverings.html>.
- Oxford Academic. Surgical Mask Partition Reduces the Risk of Noncontact Transmission in a Golden Syrian Hamster Model for Coronavirus Disease 2019 (COVID-19).
<https://academic.oup.com/cid/article/71/16/2139/5848814>.

COVID HEALTHY ACTIONS, COMMUNITY KNOWLEDGE AND SCIENCE

■ A SCIENCE-BASED CURRICULUM FOR THE COVID-19 PANDEMIC

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Mask Myths: Disease Prevention



LEARNING OBJECTIVES

After completing this exploration, you will be able to:

- List the three primary behaviors important to limiting the spread of COVID-19.
 - Explain why wearing a mask protects both you and the people around you from COVID-19.
 - Describe the mistakes people often make in wearing a mask and why they are important to correct.
 - List times when it is important to wear a mask.
-

PART 1

SIX MYTHS ABOUT MASKS

In this section, you will be a myth buster, determining whether common statements about masks are supported by evidence. The sources used in this section are reliable science information sources or are articles citing reliable scientific information sources.

1. Health officials changed their minds on whether or not people should wear masks.
 - a. Read this: <https://www.cdc.gov/media/releases/2020/p0714-americans-to-wear-masks.html>.
 - b. *Is the statement **true** or **false**?* (Underline your answer.)
 - c. If true, *Why did they change their minds?*
 -

2. The only masks that make any difference are the N95 masks the medical workers wear?
 - a. Review the article in **1a** above and read the “All in the Fabric” section of this article:
 - <https://www.nature.com/articles/d41586-020-02801-8> or <https://media.nature.com/original/magazine-assets/d41586-020-02801-8/d41586-020-02801-8.pdf>.
 - b. *Is the statement **true** or **false**?* (Underline your answer.)
 - c. If false, *What impacts can masks have?*
 -

3. Masks aren't useful because they don't remove 100% of the viruses in the air you breath in or out.
 - a. Watch this simulation: <https://www.nytimes.com/interactive/2020/10/30/science/wear-mask-covid-particles-ul.html>.
 - b. *Is the statement **true** or **false**?* (Underline your answer.)
 - c. If false, *What happens when most people are wearing masks?*
 -

4. Masks only should be worn by people who have COVID-19.
 - a. A study in "The Lancet" looked at 172 studies on transmission of respiratory viruses, including SARS-CoV-2 to learn the effects of social distancing and masks. Their results are here:
 - [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)31142-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)31142-9/fulltext) or a summary that is easier to read provided by the American College of Cardiologists here: <https://www.acc.org/latest-in-cardiology/journal-scans/2020/06/08/12/37/physical-distancing-face-masks-and-eye-protection>.
 - b. *Is the statement **true** or **false**?* (Underline your answer.)
 - c. If false, *How much does a mask protect us when we have not been infected?* (See the opening paragraphs of this article by the University of California Davis: <https://www.ucdavis.edu/coronavirus/news/your-mask-cuts-own-risk-65-percent/>.)
 -

5. Wearing a neck gaiter is worse than wearing no mask at all.
 - a. Read this MIT Medical article: <https://medical.mit.edu/covid-19-updates/2020/08/neck-gaiters>.
 - b. *Is the statement **true** or **false**?* (Underline your answer.)

6. Now that some people are getting vaccinated, it's not necessary for everyone to wear a mask.
 - a. On this FAQ page on vaccinations, find the section on wearing a mask: <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/faq.html>.
 - b. Based on information from the CDC, *Is the statement **true** or **false**?*
 - c. *What other measures should we follow?*
 -

7. Based on what you learned, *Who do you think should wear a mask and why?*
 -

EXTEND

WHAT'S WRONG WITH EACH PICTURE?

On the following page, write underneath each picture what the mask wearer is doing wrong.¹



<p>•</p>	<p>•</p>	<p>•</p>	<p>•</p>
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<p>•</p>	<p>•</p>	<p>•</p>
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¹ Illustrations by CDC

Mask Myths: Disease Prevention

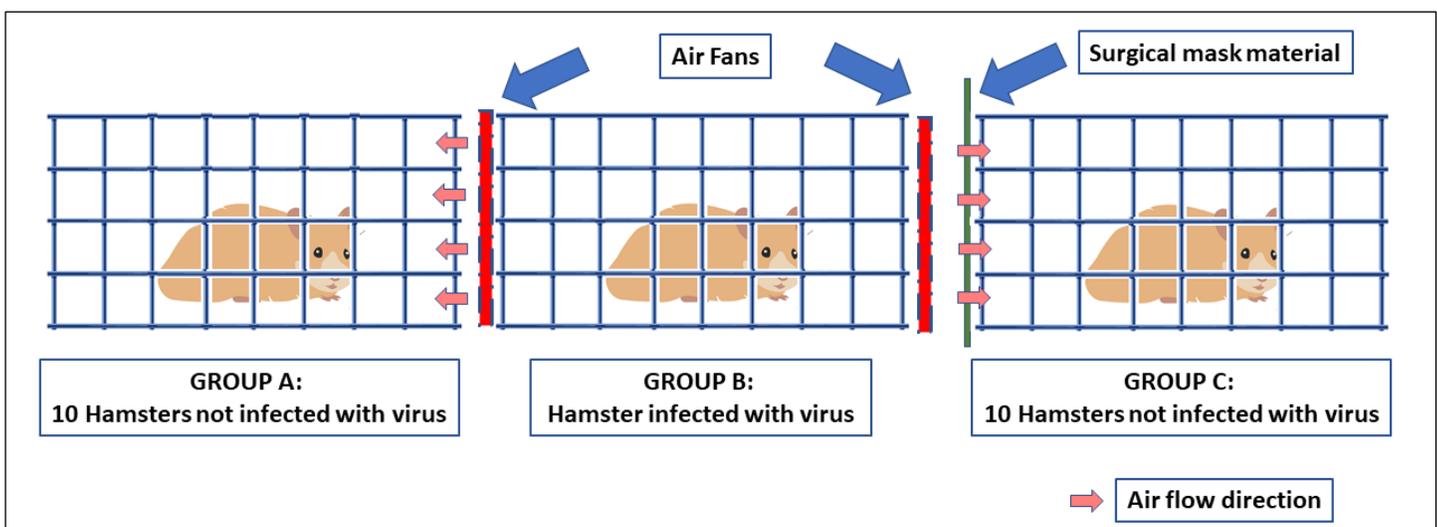
LEARNING OBJECTIVES

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- List times when it is important to wear a mask.

PART 1

AN EXPERIMENT USING PAPER SURGICAL MASK MATERIAL



1. Scientists wanted to learn whether masks can protect the wearer from airborne viral infections. Look at the experimental set up in the picture above. There are three cages of hamsters. Groups A and C each have 10 hamsters; none of the hamsters in Groups A and C are infected with the virus at the start of the experiment. Group B has one hamster who is infected with the virus.
2. The cages are separated by barriers except for one side. Fans move air from the Group B cage toward the Group A and C cages. However, there is surgical mask material between the Group B and Group C cage with the outside of the surgical mask facing the Group B (infected) cage (e.g., the Group C animals are “wearing” the mask. The air must flow through the mask material to reach Group C.

3. Over the next few days, the health of the animals is closely monitored.
4. Make a prediction in the space below: *Are the animals in Group C protected from the virus by “wearing” a mask? What about the animals in Group A?*

PART 2

RESULTS

Write your results in the chart below. Find the full article describing this research here:

- Chan J, et al., 2020. Surgical Mask Partition Reduces the Risk of Noncontact Transmission in a Golden Syrian Hamster Model for Coronavirus Disease 2019 (COVID-19). *Clinical Infectious Diseases*(71): 2139–2149.

GROUP	<i>How many do you estimate will catch the virus? (0–10)</i>	<i>What percentage* do you estimate will catch the virus?</i>	<i>How many do you estimate will <u>not</u> catch the virus?</i>	<i>What percentage do you estimate will <u>not</u> catch the virus?</i>
A (no mask)	•	•	•	•
C (mask)	•	•	•	•

*Percentage = (Number estimated/10) x 100