



TEACHER GUIDE

BACTERIA AND VIRUSES GRADES 6-8

COMMON MISCONCEPTIONS

- **All bacteria are harmful.**
There are many different kinds of bacteria. Some can make you sick, and others live in and on your body to benefit you.
- **Colds and flus are caused by bacterial infections and can be treated with antibiotics.**
Colds and flus are most commonly caused by viruses. Antibiotics work against bacteria, but not viruses. Antibiotics do not work against viruses because viruses are nonliving particles and bacteria are living, single-celled organisms.
- **Viruses move and eat things inside our bodies, which is what makes us sick.**
Viruses do not move on their own and do not eat because they are not living cells. They make us sick by “hijacking” living cells inside of our bodies and using those cells to make more viruses. They destroy cells by bursting out of the cell, and then they go attack other cells to make more viruses.

LIVING AND NON-LIVING

Bacteria are single-celled living organisms and viruses are nonliving. Viruses are made of a protein capsule that enclose DNA (or RNA) and need a living host cell to reproduce. Viruses are not living organisms. Bacteria are unicellular (single-celled) organisms that divide very quickly and grow in groups called colonies.

FORMS OF TREATMENT

Bacterial and viral infections have different forms of treatment. Antibiotics are used to treat bacterial infections because they break down the cell walls of bacterial cells. Viruses are not cells, and they do not have cell walls. So antibiotics don't work on them.

BACTERIA AND VIRUSES ARE EASILY SPREAD

Bacteria and viruses are easily spread through bodily fluids like saliva. To prevent the mass spread of an infection, people should wash their hands, cover their nose and mouth when they sneeze or cough, and refrain from being around other people to prevent bacteria and viruses from spreading. Respiratory infections (infections in the respiratory system—i.e.,

lungs) like COVID-19, infect others easily because they are spread through droplets when you sneeze or cough. Social distancing prevents others from contracting the infection because if you are not around other people, you cannot pass the infection on to them.

TEACHER TIPS

The most common student misconceptions are those around the differences and similarities between bacteria and viruses. That is why this lesson contains a comparison activity in which students predict the similarities and differences before watching the Generation Genius video and then revise their charts afterward. This provides students the opportunity to reflect on how their thinking has changed in light of new information. This reflects the process of science and encourages students to use science and engineering practices to figure out what they did not initially know.

ABOUT THIS LESSON

This lesson was created by the National Science Teaching Association (NSTA) to pair with the Generation Genius video and support NGSS.

They have requested we provide the following background with this lesson:

The Next Generation Science Standards (NGSS) are the national standards on how students learn science, and they are based on contemporary research presented in *A Framework for K–12 Science Education (the Framework)*. The shift in science teaching and learning required by the Framework is summarized in this infographic: [A New Vision for Science Education](#).

At the start of each Generation Genius lesson, students are presented with a phenomenon, then they try to explain it. Students will notice they have gaps in their knowledge and ask questions, which motivates them to build ownership of science ideas they need in order to explain how or why the phenomenon occurred. The way students build ownership of science and engineering ideas is through active engagement in the science and engineering practices (SEPs). This process of sensemaking, or doing science to figure out how the world works, is one of the major shifts the *Framework* encourages.

To engage in the SEPs, students should be part of a learning community that allows them to share their ideas, evaluate competing ideas, give and receive critiques, and reach consensus. Students can start by sharing ideas with a partner, then with a small group, and finally, with the whole class. This strategy creates opportunities for all students to be heard, build confidence, and have something to contribute to whole-class discussions. Each Generation Genius lesson provides conversational supports to facilitate such productive student discussions to contribute to sensemaking.

Excited to continue your shift toward the new vision for science education? Check out the [Generation Genius Teacher Guide](#) page on the NSTA website for resources and strategies to engage every student in your classroom in **doing** science.

