

# How Your High School Science And Math Classes Relate to COVID-19

The current global situation of trying to combat the COVID-19 pandemic offers a good example of how scientists have to work together to solve a real-life problem. To fight this pandemic, we need scientists from different fields all over the world to work as one. Every discipline of Science, Technology, Engineering and Math (STEM) offers a unique and critical piece to help tackle the COVID-19 puzzle.

Have you ever sat in a class at school and questioned why you needed to learn something? Tackling this pandemic showcases many great examples. You already have at your fingertips many tools from science to help understand this COVID-19 pandemic, from exponential functions, microbial biology, statistics, physics, to computer science and so much more.

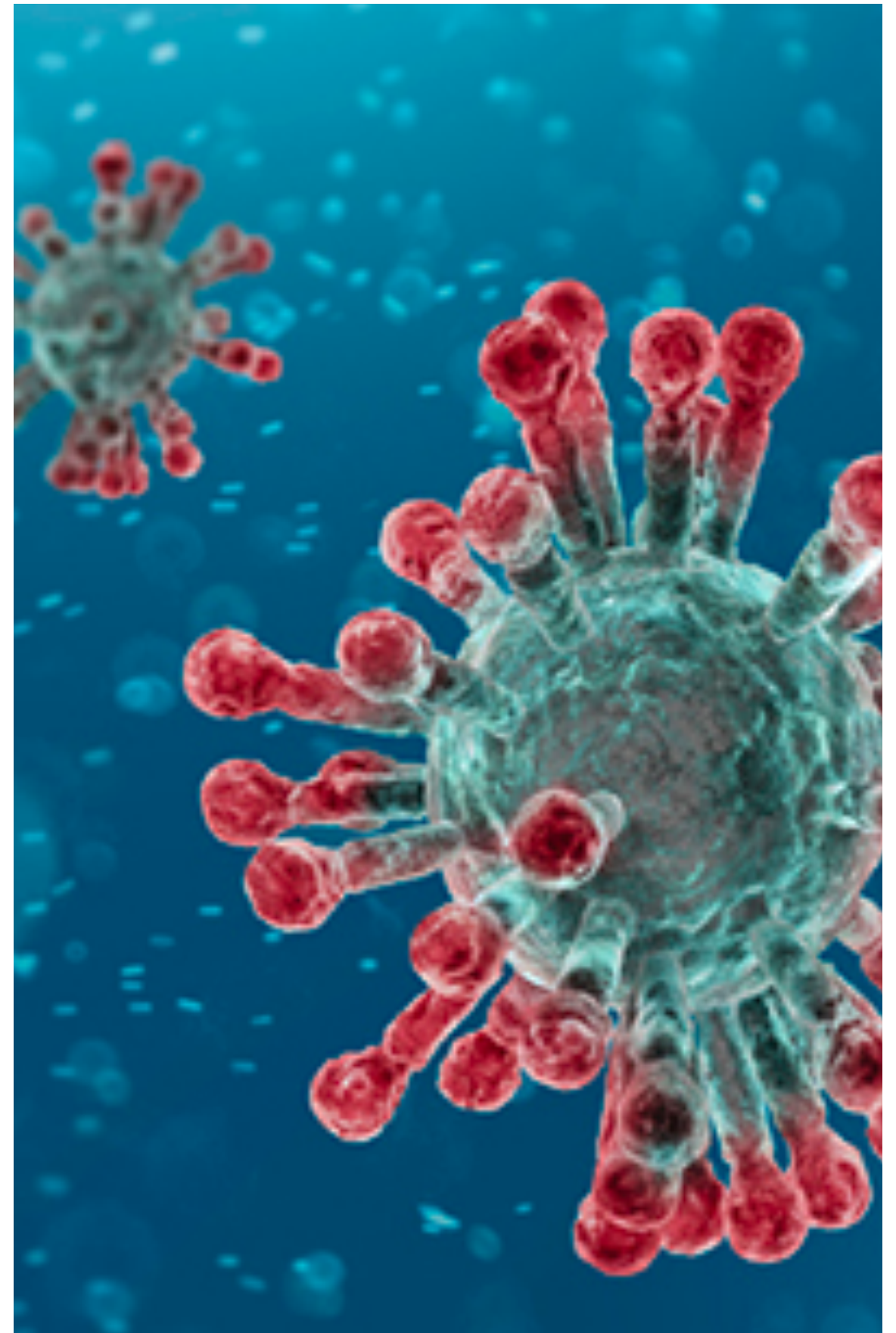


Figure 1: Illustration of COVID 19 virus <https://www.atlanticbridge.com>

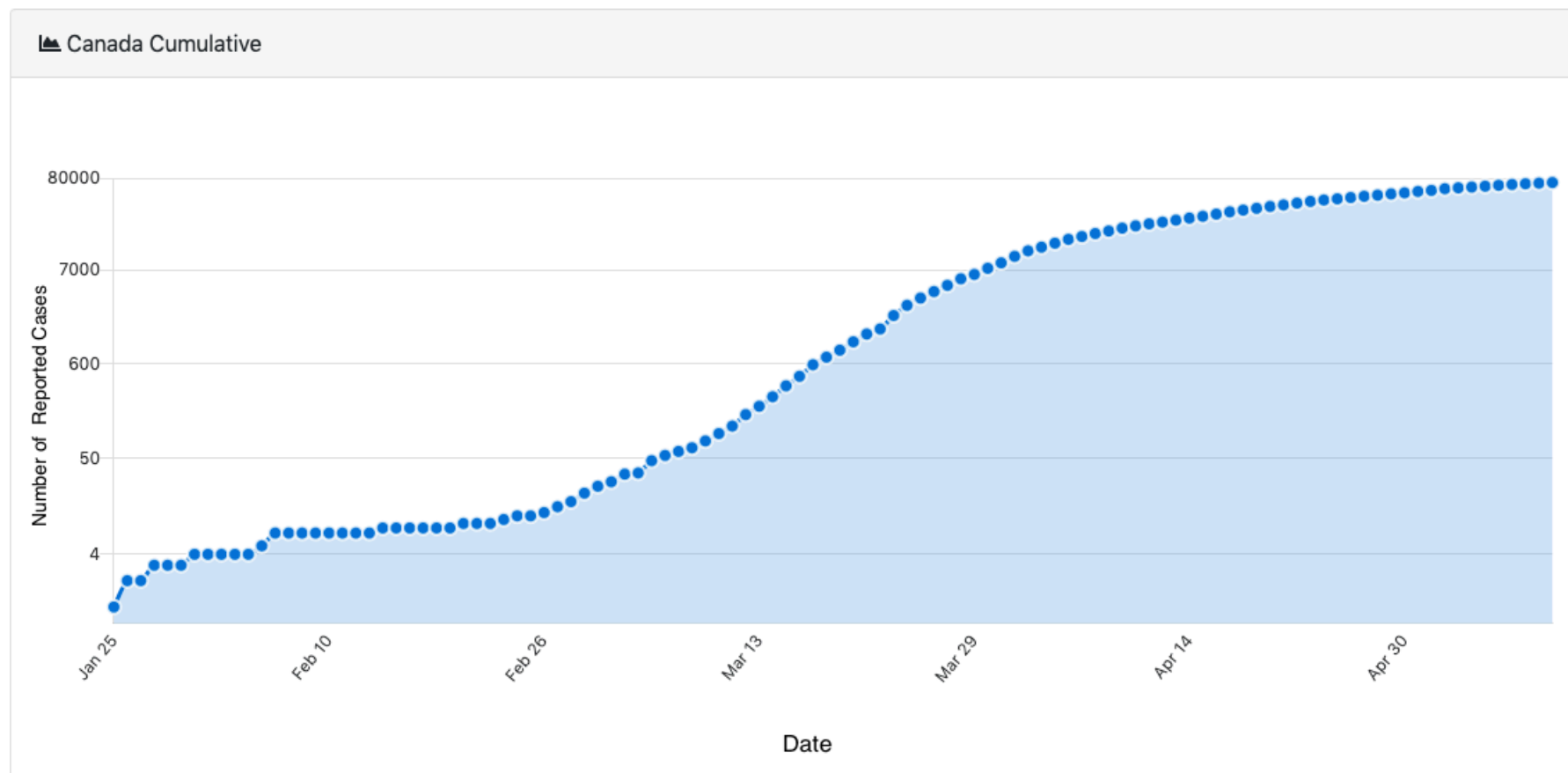


Figure 2: COVID-19  
Tracker Canada  
[COVID19Tracker.ca](https://COVID19Tracker.ca)

## HOW DOES YOUR MATH CLASS RELATE TO COVID-19?

Math is a subject that already has a huge range of specialties, that apply to everyday life. Epidemiologists and mathematicians use data collected daily on the number of new COVID-19 infections to track the spread of the virus. They often graph the data so that trends can be spotted. If no measures were put in place to stop the spread of the virus (such as social distancing, hand-washing) then the typical graph we would see is an exponential graph. The graph of an exponential curve can show the number of cases occurring over time in a community which then can be compared to other geographic areas. Have you looked at the COVID-19 infection map on google? That is made possible through the use of statistics. To see the map, click [Here](#)

Using exponential functions can allow us to compare the infection rate of COVID-19 with other pandemics that have occurred in the past. Mathematical modelling of data also allows us to predict alternative situations that can happen if we change certain variables. A good example of this is social distancing. The math shows that if human contact (variable) is decreased it will decrease the amount of spread. That is where the term “flattening the curve” comes from; when we take preventative measures to stop the spread from person-to-person, ultimately less people end up getting infected and the spread slows., we can alter the curve and change the spread of COVID-19. Using math gives us insight into all the possibilities so we can be prepared. For a great video on how your math class relates to COVID-19 click [Here](#)



## HOW DO YOUR CHEMISTRY & BIOLOGY CLASSES RELATE TO COVID-19?

As one might expect, biology is a field of science that is making large contributions to the COVID-19 fight. Biology helps us understand the virus' molecular structure; how it infects humans, and how human bodies react to the virus and so much more. All of these questions need answers and biologists work to provide them. Chemistry also plays a big role in the science behind COVID-19 by helping us understand how different components will interact and synthesize new treatments. These two disciplines are important contributors in the fight to understand COVID-19. Biology and chemistry are both needed together in order to understand the structure of the virus, how it infects humans and how we can develop vaccines.



Figure 3: COVID Vaccine. <https://learningenglish.voanews.com/a/scientists-warn-of-going-too-fast-to-develop-coronavirus-vaccine-/5324983.html>

Remember learning about ribonucleic acid (RNA) in class? RNA is a single strand of molecule whereas deoxyribonucleic acid (DNA) is a double stranded molecule. Both RNA and DNA contain genetic material that is important for cell function and the creation of new cells. DNA is found in the nucleus of the cell whereas RNA is found in the cytoplasm. COVID-19 is an enveloped RNA virus which means that the virus is single stranded and is protectively covered. Because COVID-19 is an RNA virus, scientists are thinking about making the vaccine out of RNA. You have RNA in every single one of your cells acting as the blueprint for the building of proteins. The vaccine will create a new RNA blueprint for your body so it is able to build antibodies to help your immune system fight the COVID-19 virus.

We also know that COVID-19 is very similar to other viruses like severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). This is because all of these viruses target the respiratory system causing pneumonia-like symptoms. The most significant way physicians differentiate COVID 19 from other similar viruses is through imaging of the lungs. In patients with SARS or MERS the damage is only in one lung; whereas with COVID-19 it's more likely to be throughout both lungs. This is because even though these viruses have similar characteristics, there are genetic differences that cause different effects to the body.

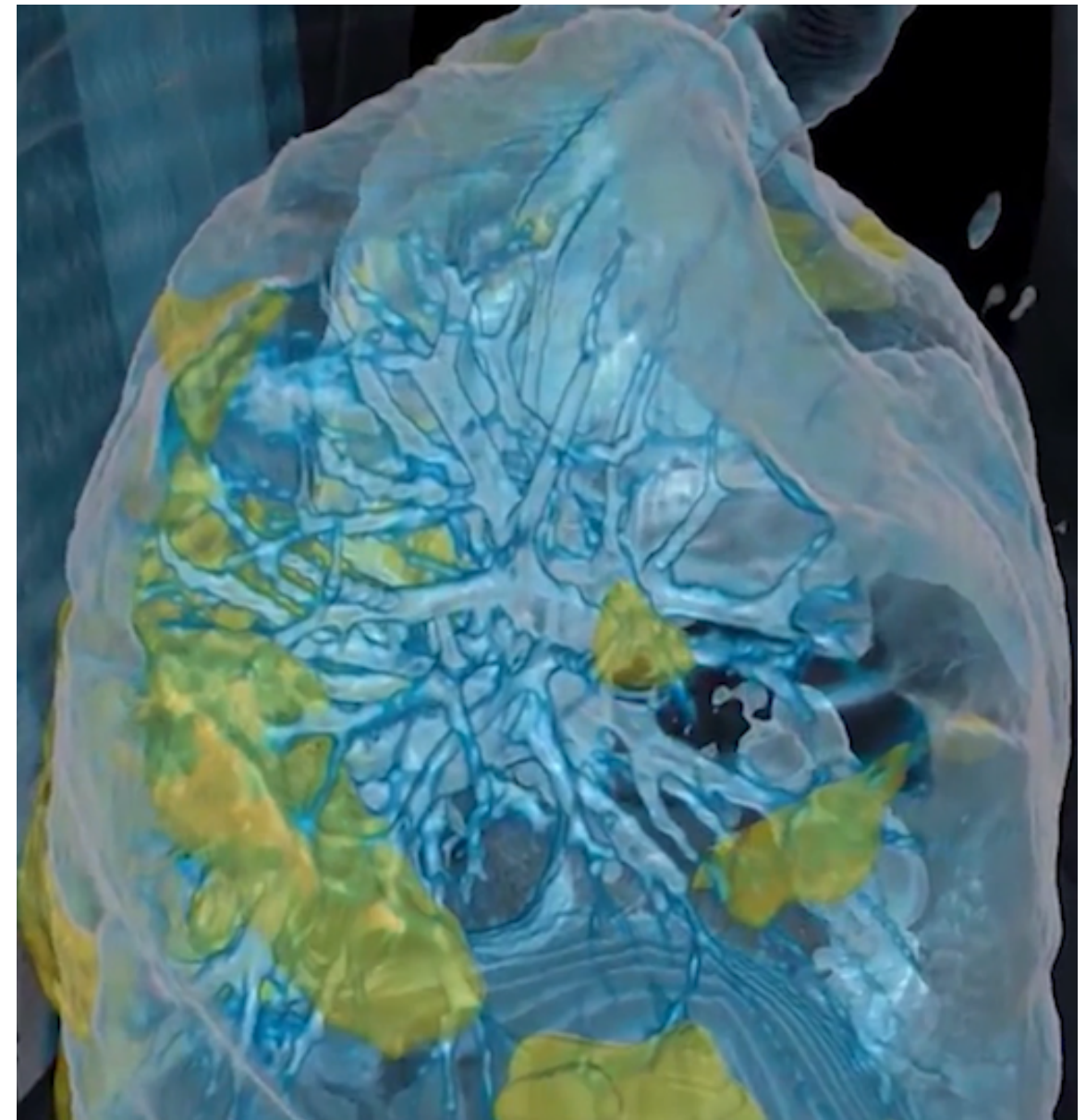


Figure 4: Lung of COVID 19 Patient. <https://www.ctvnews.ca/health/coronavirus/3d-imaging-shows-how-quickly-covid-19-can-attack-a-healthy-person-s-lungs-1.4872716>



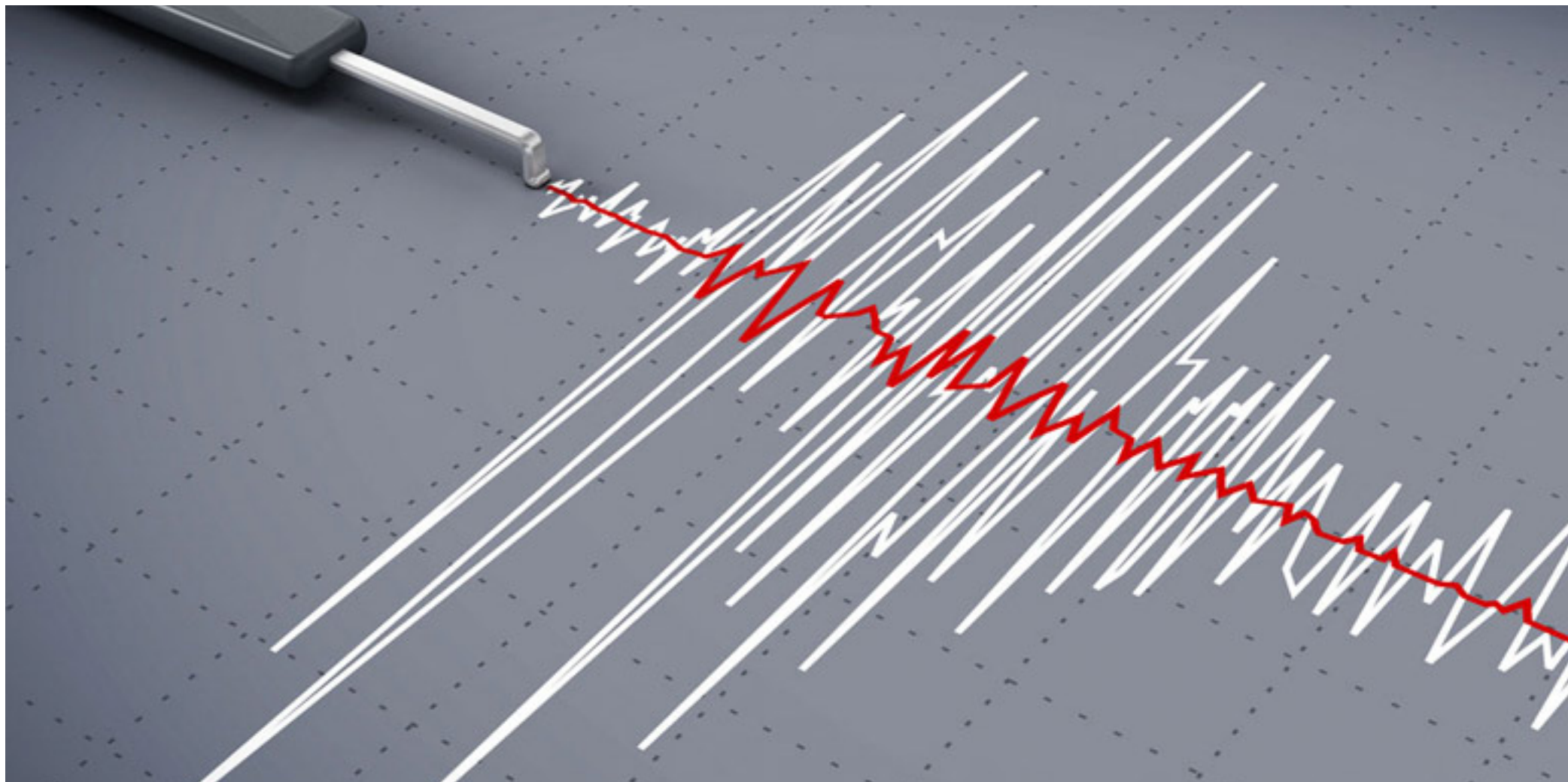


Figure 5: Image of Seismic Activity. <https://news.stanford.edu/2015/12/16/natural-manmade-quakes-121615/>

## HOW DOES YOUR GEOLOGY CLASS RELATE TO COVID-19?

You may wonder, how are COVID-19 and geology related? Now that humans are staying home, daily life has changed; streets are now emptier, and the amount of modern transportation used on a daily basis has decreased. Less cars, buses, trains moving around the world causes less seismic noise within the earth. All of these modes of transportation cause a vibration of the earth's ground creating continuous seismic noise. This noise makes it hard for seismologists to monitor earthquakes worldwide, because the earth will never be completely quiet. Since preventative isolation measures have been placed on communities; seismic noise in that area

decreases. As a result, seismologists are able to spot smaller earthquake events in the earth. This is important because smaller earthquakes can lead to stronger ones later. Being able to anticipate when an earthquake will occur in a specific location allows the community to be better prepared. A good example of this is in Brussels. Since isolation measures began in mid-March, there has been an approximate 30%-50% reduction in seismic noise in Brussels.



Figure 7: Contact Tracing <https://medium.com/dataseries/mit-has-an-idea-to-contact-tracing-during-the-covid-19-pandemic-that-respects-your-privacy-f07ac1d4a0f8>

## HOW DOES YOUR COMPUTER SCIENCE CLASS RELATE TO COVID-19?

Computer science offers a whole new tool in the COVID-19 fight that was not available for past pandemics: artificial intelligence (AI). Artificial intelligence can chart the genetic evolution of COVID-19 as it becomes more infective; help with diagnosis; and be able to use information from past pandemics to predict how people will react. Another example of technology helping in the COVID-19 fight, is the development of *contact tracing*. Google, along with Apple recently announced that they are developing a COVID-19 tracking app for Apple and Android device users. This application would track where infected individuals have

travelled. This data can then be shared with local health authorities. This is helpful because if you were in a place where you could have been exposed to COVID-19, you will be made aware through the app; and receive instructions for next steps you should take. Even though this idea is still in development and somewhat controversial, it is a great example of how computer science can be utilized to help in the fight against COVID-19. Computer science is also used to write programs to 3D print face masks, cost efficient ventilators and ventilator parts.



## HOW DOES YOUR PHYSICS CLASS RELATE TO COVID-19?

Understanding what COVID-19 looks like was one of the first questions that needed to be answered. Physics made this possible! Scientists needed to know the virus' physical appearance and components. To understand the structure of COVID-19, a physics technique called X-ray crystallography was used. This special type of X-ray was used because viruses are too small to be seen with a regular X-ray. X-ray crystallography can create the three-dimensional structure of molecules by diffraction of light. The diffractions of light are layered on-top of each other creating a map of the molecule. The more intense spaces of the X-ray express that it is a zone of high electron density. Using these spots allows scientists to understand the molecular components of the virus and where each of them are located. Physics is also used to understand how far a sneeze spreads when a person is walking, running or riding a bike.

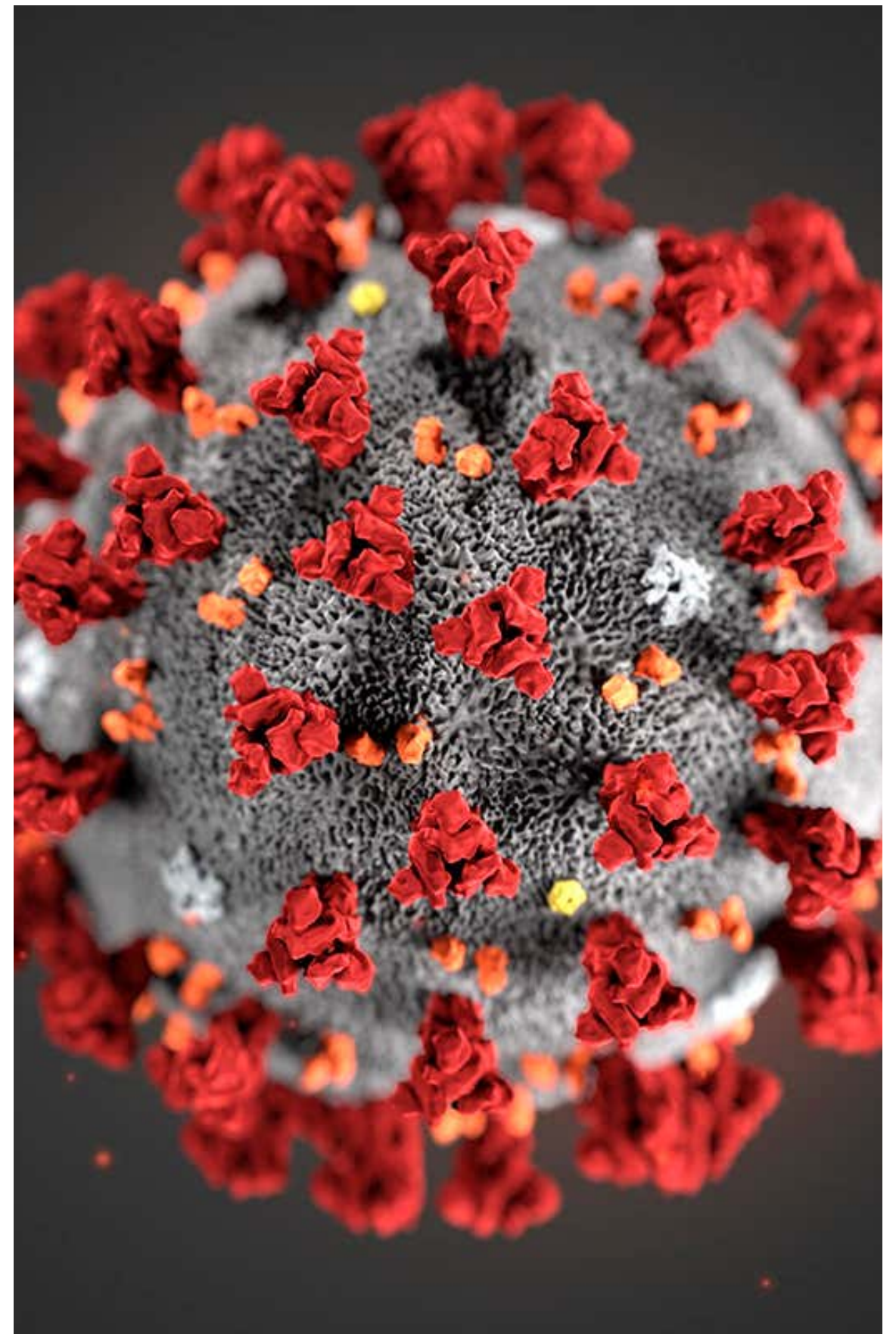


Figure 8: Illustration of the ultrastructure of COVID 19 virus. CDC/Science Photo Library. <https://www.newscientist.com>

All STEM topics that are covered in school are taught with a purpose; they create a basis of knowledge that can be expanded and developed throughout your lifespan. The biggest scientific issues in the world can be reduced down to concepts that you have learned in your high school STEM courses. Science gives us a foundation to grow and to be proactive instead of reactive in complex circumstances such as COVID 19.

#### SOURCES:

<https://www.newscientist.com/article/2233386-coronavirus-how-maths-is-helping-to-answer-crucial-covid-19-questions/>

<https://www.ncbi.nlm.nih.gov/pubmed/16877062> , <https://www.sciencedaily.com/releases/2020/02/200228142018.htm>

<https://www.theatlantic.com/ideas/archive/2020/03/two-extreme-long-shots-could-save-us-coronavirus/608539/>

<https://www.cnn.com/2020/04/02/world/coronavirus-earth-seismic-noise-scn-trnd/index.html>



<https://sciencebusiness.net/news/computer-science-versus-covid-19>

<https://www.cbc.ca/news/business/apple-google-smartphone-covid-19-1.5529407>

<https://physicsworld.com/a/covid-19-how-physics-is-helping-the-fight-against-the-pandemic/>

Produced by Molly Murray, BSc Science Communications student at MSVU and Communications Assistant with WISEatlantic.



@ wiseatlantic / [WISEatlantic.ca](https://wiseatlantic.ca)