*Institute for Research in Schools*KS5 Covid-19 Lessons

This lesson is aimed at KS5 students studying A-Level sciences. Lesson 1 is most relevant to Biology students. Lesson 2 is equally relevant to A-Level mathematicians and statisticians. The lessons are produced by the Institute for Research in Schools in partnership with the University of Bristol.

The lessons aim to help students apply their studies to the Covid-19 pandemic, discovering important STEM career possibilities and applying mathematical principles to better understand the Covid-19 data available.

Staff leading the sessions should be sensitive to the possibility that students may have been affected directly by illness or bereavement due to Covid-19.

Lesson 2 delves deeper into the data that is available on Covid-19 and asks students to interpret and analyse the data to answer some questions. Some students may then choose to take this research further, carrying out their own research project through the Institute for Research in Schools.

Lessons comprise a broad lesson plan, an accompanying PowerPoint and all other necessary materials. They can be carried out in the classroom, as a lesson over virtual platforms such as MS Teams, or they can be set for independent study.

**Lesson 1:**

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| Slide 1 | Titles |  |
| Slide 2 | Outcomes:   * Why do we have organisations such as Public Health England ? * How does the incidence and prevalence of a communicable disease can change over time? * Apply what you know about immunity to a novel pathogen * Be able to explain how mathematical modelling of disease spread can be useful | Introduction of outcomes. These fit with the A-Level curriculum (better fit with OCR Specification than AQA)  (5 mins) |
| Slide 3 | How can scientists help during a pandemic?  What is a pandemic?  Which scientists help during a pandemic? | This can be discussion that is teacher-led, either in person or on an online platform, or students can do this independently, making their own notes on the lesson. Encourage students to think more deeply than frontline medical staff; the outcomes should have given hint at the response of scientists goes a lot further than that.  (10 mins) |
| Slide 4 | Scientists who help in a pandemic. | Students may have thought of additional scientists who help during a pandemic – there are many more. Encourage discussion about this to broaden out their assumptions about jobs in STEM.  (10 mins) |
| Slide 5 | What is an epidemiologist? | Can students think of examples of how they have seen these people work in the past year? Examples include the modelling of the spread of Covid-19 that was used by Professor Chris Whitty on the televised Covid-19 updates. Infection control epidemiologists will have advised on what Personal Protective Equipment (PPE) was required to minimise the spread of the virus.  (5 minutes) |
| Slide 6 | What is Public Health England (5 mins)  Why are bodies like PHE useful? (5 mins) | Students are asked what they would do if they were a GP who had identified a new illness. They should come round to the idea that there needs to be a coordinated system of reporting such diseases (and others, known as ‘notifiable’ diseases) so that monitoring of the population can be carried out, and steps taken to identify and limit the spread of any new disease. They may already be familiar with the organisation called ‘Public Health England’ who are responsible for preparing for and responding to public health emergencies.  (10 minutes) |
| Slide 7 | Covid as a disease caused by a virus | There are three key points here – COVID-19 is the disease caused by the novel coronavirus SARS-CoV2; there are several coronaviruses already known, including the one that causes the common cold; SARS-CoV2 is new to us – we haven’t seen it before.  (5 minutes) |
| Slide 8 | Written task (or can be done as a Think pair share if students are in class) Why do novel illnesses cause such problems? | This is a writing task; it can be used as practice for a longer-answer examination question if required. Novel illnesses are a particular problem because: The immune system has no memory cells for a new virus that it has not encountered before. This means that the first time it is encountered, the response of the immune system may be slow and not as extensive as if it a previously encountered pathogen. If a disease is new to us, medical professionals may not know what the best treatments are and may not recognise the symptoms. With a new disease, there is the further problem that, as nobody in the population is immune to it, it can spread very quickly. |
| Slide 9 | Immune response diagram | Novel pathogens are more difficult for the body to deal with as the body cannot recognise the pathogen. Vaccination introduces a weakened version or part of the pathogen to the body so that the immune system recognises it if it encounters it again. |
| Slide 10, 11, 12 and 13 | Interpreting graphs (10 mins) | The data is different between the two graphs because the reality was not as serious in terms of deaths as the modelled predictions. The purpose of the modelled graph was to inform the public about the reasons that decisions were being made. The predictions were higher than the deaths in reality. This may be because the population made behavioural changes due to the Tier system being introduced. |
| Slide 14 | Extension task | Worksheet KS5.1 |
| Slide 15 | Review of outcomes |  |