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| **Unit** | COVID-19 Unit: Lesson 3 | | | | **Driving Question** | “How do vaccines work?” |
| **Date** |  | | **Time** |  | **Class** |  |
| **Real life scenario (context)** | | | | | | |
| After receiving the flu vaccine, Tiffany’s grandma spoke to her doctor who strongly suggested that she should receive the COVID-19 vaccine because of her age. Tiffany mentions this to James who says that he would rather rely on his immune system to defend against COVID-19. | | | | | | |
| **Learning Outcomes** | | | | | | |
| 1. Understand the difference between natural and artificial immunity  2. Explain how the body reacts post-vaccination if it encounters the actual pathogen.  3. Explain why sometimes 'booster' vaccines are needed after a period of time | | | | | | |
| **NGSS links / NYAS STEM Education Framework (key skills and competencies developed)** | | | | | | |
| B.2 STEM Content Integration | | | | | | |
| **Plan of activities** | | | | | | |
| Time | | Teacher Activity | | Learner activity | | Resources / other info |
| *Prior to session: -* | | *Are there spare activities for those who finish early?* | | *Can this be done remotely and in person? Are there alternative approaches?*  *Differentiation?* | | *What resources are needed to be inclusive to all students?* |
| **5 mins**  Welcome and recap | | Introduce the lesson LOs and recap key terms from last lesson (teacher chooses/virtually ‘spotlights’ students to share each definition. | | Students read the scenario and review the keywords from the last lesson. | | PPT |
| **10 mins** | | Ask students to do matching tasks. Discuss the difference between natural and artificial immunity. Highlight the importance of **antibodies** (and the **source** of those antibodies) in each case.  Then ask students to discuss the key question about the role of vaccines. | | Students look at the matching task. Write down their answer and show the teacher at same time (or write in the chat box and press ‘send’ at same time).  SS then discuss the key question in pairs (breakout rooms if virtual). | | Answers to the matching exercise:  1D, 2C, 3A, 4B  Answer to the key question: it’s a question of time (new disease so no time for natural antibodies to build up) and to prevent suffering (people may recover from a disease to gain antibodies but in the process, may suffer) and sometimes death. |
| **20 mins**  Engaging videos re: historical examples of the importance of vaccines and how they work.  See alternative in the last column for older students. | | Choose either the video re: polio or smallpox to provide some historical context to the role that vaccines play in tackling particular diseases. Key point to emphasise is the vaccines stimulate the production of antibodies in a way which is quicker and safer than acquiring active immunity through getting the disease. | |  | | For older students (teachers should view video before to decide suitability), cross-disciplinary activities and film about the eradication of Smallpox provides a good opportunity to discuss medical ethics: <https://www.schoolscience.co.uk/whyyoullnevercatchsmallpox> |
| **20 mins**  Textual analysis task to test for understanding (using modern example of Ebola) | | Use a more modern case study of Ebola (arguably the previous potential pandemic, along with swine flu, before COVID-19. Both were ‘near misses’).  Ask students to deduce what they can about the disease from the picture alone before introducing the disease (very tight safety and hygiene measures the result of very transmissible or very fatal diseases). Then hand out the worksheet based on a news article – run through the answers and cover the role of ‘booster’ jabs.  ALTERNATIVES: More advanced classes can do a textual analysis exercise using: <https://www.cdc.gov/vaccines/hcp/conversations/downloads/vacsafe-understand-color-office.pdf> (this will talk about B- and T-lymphocytes whereas lesson 2 simplified this to lymphocytes). Students may also use this [online resource](https://www.historyofvaccines.org/content/how-vaccines-work) (with AFL activity at the end) for any remote independent learning. | | Students make deductions based on Ebola picture before reading a news article about the search for the Ebola vaccine. Students can complete the worksheet on their own (good for literacy links) and submit it to the teacher to assess their applied understanding of immunity so far.  Students will gain an understanding of booster jabs and should be able to explain the graph on the penultimate slide using key words learnt in this lesson. | | Ebola worksheet.  Answers:  Q2) Unprecedented – (d) never seen before,  Inactive – (c)harmless  Stimulates – (a) triggers  Specific – (a) only one type of  Antibodies – (a) blood proteins that destroy pathogens  Bind – (c) attach is best one  Pathogen – (c) best one  Recognise – (b)  Q4) mutation may change the antigens on a pathogen’s surface so our immune system can’t recognise it.  Q5) Have already been exposed to the virus so body already infected.  Q6) for longer-term immunity (development of memory cells to trigger production of antibodies). |
| **5 mins**  Plenary | | Ask students to discuss in pairs or answer individually the questions regarding the scenarios. | | Students can write their answers to the question as an ‘exit ticket’ for assessment. | | As a ‘trailer’ for the next lesson, teachers should mention the fact that the search for the Ebola vaccine gave researchers a ‘head start’ in the look for a COVID-19 vaccine (in the case of the Oxford-AstraZeneca vaccine which is one of the ones covered in lesson 4). |
| **Total time = 60 mins** | |  | |  | |  |
| **Preparation for next lesson (teacher self-reflection) Gather student feedback to**  **incorporate into your next session** | | | | | | |
| Which aspects of the lesson went well?  Which aspects could be improved upon?  What misunderstandings still need to be cleared up?  Actions for the future: | | | | | | |