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| **Unit** | COVID-19 Unit: Lesson 7 | | | **Driving Question** | | “What is ‘herd immunity’?” | |
| **Date** |  | | **Time** |  | **Class** |  | | |
| **Real life scenario (context)** | | | | | | | |
| James and Tiffany are discussing the vaccine that is being used to vaccinate people against COVID-19. James is young and healthy (and hates needles) so does not think he will need it for himself. Tiffany thinks that young people should still take the vaccine. Why does Tiffany believe that? | | | | | | | |
| **Learning Outcomes** | | | | | | | |
| 1. Understand the difference between individual and group/herd immunity.  2. Explain why a 'herd immunity threshold' is important and how it affects the transmission of disease  3. Provide examples of current vaccination programs recommended which have been successful in preventing other diseases (e.g. MMR vaccine for mumps and measles and rubella for children). | | | | | | | |
| **NGSS links / NYAS STEM Education Framework (key skills and competencies developed)** | | | | | | | |
| B.1 Research-based Pedagogy  B.2 STEM Content Integration  B.3 Real-world Application | | | | | | | |
| **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**  Intro and recap | | Teacher introduces the LOs for this lesson and explains the scenario/context. | | Students read the scenario and reflect on their original instincts to the scenario. | | | PPT |
| **5 mins**  Definition of herd immunity | | Teacher should allow students to try and define herd immunity by themselves first before showing the definition. | | Students use the diagram on slide 3 to write down their own individual understanding of ‘herd immunity’ before class discussion about the definition of this key term. | | |  |
| **20 mins**  Activity demonstrating herd immunity in action | | Ask students to take out their copy of the worksheet and 3 colored pencils (for sake of these instructions: red,  green, and blue). Instructions are given on the PPT - three scenarios. Key concepts to discuss are: disease transmission (scenario 1), herd immunity, idea of threshold and the fact that this threshold is different depending on the characteristic of the disease (which is why scenario 2 deals with the flu and scenario 3 with the more contagious measles).  If virtual classroom, teacher may wish to share the PPT so students can work through the scenarios at their own pace.  Ensure you leave time to discuss all three scenarios and the ‘reflection questions’ (slide 8). | | Students follow the instructions given on the worksheet and with the three scenarios as outlined in the PPT.  Students will be required to do some simple mathematics to work out threshold levels of effective herd immunity for different diseases (flu and measles).  ALTERNATIVE: If this lesson is done in-person, there are some more engaging activities (look to the right) though these need more preparation.  After the chosen activity is completed, students should consider the ‘reflection’ questions (discuss as a class, pairs, or individually – up to the teacher). | | | Herd immunity worksheet (print double-sided) + three different coloured pens. Can also be done virtually though less effective/easy.  Scenario 2 involves basic maths (75% of 50 dots = 37.5, rounded up – 38 dots). 38 people out of 50 need to be vaccinated for herd immunity against flu. For scenario 3, students have to calculate 95% of 50. (Answer 95% of 50 = 48 dots coloured in).  Many of the best and most engaging demonstrations of herd immunity aren’t practical online but if you do have in-person schooling, you may try [herd immunity jenga](https://www.immunology.org/sites/default/files/Herd%20Immunity%20Jenga.pdf) and also [herd immunity lucky dip](https://www.immunology.org/celebrate-vaccines/public-engagement/activity-packs/hands-activities/herd-immunity-lucky-dip).  Finally, students in higher grades may chose to do a ‘case study’ approach (this involves a lot more reading) to learning about herd immunity – this can be found at the National Center for Case Study teaching in science. |
| **20 mins** | | Ask students to do independent research on one example of a current vaccination programme which relies on the concept of herd immunity to protect public health.  Before students do the exercise, teachers may need to address the fact that there are risks to *not* taking the vaccine too (i.e. the disease itself). Too often focus is on the potential side effects -students should be told that the next lesson will discuss more about an approach to risk. | | Students do independent research by going around to ‘stations’ around the classroom (where information e.g. printed off PDFs can be found and articles etc) or, if done virtually, students are expected to do internet research themselves. Outcome is a little ‘fact file’ (no more than half a page) with key details about the disease, vaccination regime (age taken, doses etc). | | | Resource from CDC has handy PDFs of various diseases: <https://www.cdc.gov/vaccines/hcp/conversations/prevent-diseases/index.html> |
| **10 mins**  Plenary | | Teachers ask students to respond to the scenario with a ‘text’ or ‘email’ (collect these in in-person or digitally). | | Students write a text or email to James explaining why he should consider taking the vaccine (using their knowledge gained in this unit and the keywords they have learnt). | | | Teachers may wish to write down, emphasise certain keywords that the student should include in their ‘texts’ to assess their use. |
| **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: | | | | | | | |