**Task 5 – Investigation Modelling the spread of pathogens**

**Guidance for teachers**

To achieve the A/B grades students will need to design and create an investigation question to test. This can be achieved through brainstorming with the class potential variables they could change to investigate in relation to the aim “To investigate the spread of pathogens within a population” whilst in the classroom setting.

An example of how this could be achieved if students were to investigate the effects of vaccination on the spread of pathogens are as follows:

Advise students you will be giving them a card that will identify them as either:

* Infected with the disease (this will be the person who, when shaking hands, will squeeze the hand of the other person slightly harder but still discretely)
* Not infected or vaccinated (If their hand is squeezed when shook, they are now infected and should also squeeze the following student’s hands to ‘infect them’)
* Vaccinated (Even if an infected person shakes hands, you are not infected as you have immunity against the disease).

In this simulation, all students once they have been allocated a card should spread out around the room. They will wander around the room on the teacher’s command shaking hands with each other (at a steady pace to ensure a fair test/controlled). They will do as stated above depending on what card they have been provided, shaking hands as normal/gently if they are not infected. Remind students they should not be looking for who is infected as this will flaw the results.

1. Prepare cards prior to the lesson (see following pages for templates) that will be discretely provided to each student. One per student (so no other student can see what is on the card). These should be randomly distributed and allocated as outlined below.

**To test the control group – No vaccination within the population**

Materials:

One student ‘Infected’ card.

All other students to be provided with ‘Not infected or vaccinated’ card.

1. Select one student to secretly pretend to be infected by a disease. This will be the student who has been given the card identifying them as the person who is infected. This student will squeeze the other participants hand while shaking hands with other students when advised to move around the room.
2. Once a student’s hand is squeezed, they are also infected with the disease and must squeeze others hands when you shake their hand to pass on the infection.
3. The movement around the room should commence on the teacher’s command and should do so for 5 seconds (you may trial this as an example of what to do before students collect the data, you may then decide to alter the time up or down, depending on the class size).
4. Following the 5 seconds when students have been advised to stop, ask the students if they had their hand squeezed (if they had been infected - this includes the original infected person). The number of infected students should be counted and recorded in a suitable table for Trial 1.
5. Collect all of the cards in, shuffle them and re-distribute, one per student.
6. Repeat steps 2-6 as above and record results in a suitable table for Trial 2.
7. Repeat steps 2-6 again and record results in a suitable table for Trial 3.
8. An average can be calculated.

**To test 20% of the group being vaccinated group**

Materials:

20% of the class population should be calculated. This is how many ‘Vaccinated’ cards will need to be provided randomly to students. E.G If a class of 20 students, then 4 ‘Vaccinated’ cards will be needed.

One student ‘Infected’ card.

All other students to be provided with ‘Not infected or vaccinated’ card.

1. Follow the same steps as above in relation to distributing the cards randomly (though this time, 4 students will be provided with a ‘vaccinated’ card) and repeat the same method.
2. A reminder to students, if they have a vaccinated card, they still shake hands but if another student squeezes their hand they do not become infected and so cannot infected other people. They should not put their hand up after the 5 seconds when the number of infected people are being counted.

**To test 70% of the group being vaccinated group**

Materials:

70% of the class population should be calculated. This is how many ‘Vaccinated’ cards will need to be provided randomly to students. E.G If a class of 20 students, then 14 ‘Vaccinated’ cards will be needed.

One student ‘Infected’ card.

All other students to be provided with ‘Not infected or vaccinated’ card.

1. Follow the same steps as above in relation to distributing the cards randomly (though this time, 14 students will be provided with a ‘vaccinated’ card) and repeat the same method.
2. A reminder to students, if they have a vaccinated card, they still shake hands but if another student squeezes their hand they do not become infected and so cannot infected other people. They should not put their hand up after the 5 seconds when the number of infected people are being counted.

Students should then collate their results independently and continue with the assessment guidance.

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| Vaccinated | Vaccinated | Vaccinated |
| Vaccinated | Vaccinated | Vaccinated |
| Vaccinated | Vaccinated | Vaccinated |
| Vaccinated | Vaccinated | Vaccinated |
| Vaccinated | Vaccinated | Vaccinated |
| Infected with the disease  (you will be squeezing hands discretely to infect others) | Not infected or vaccinated | Not infected or vaccinated |
| Not infected or vaccinated | Not infected or vaccinated | Not infected or vaccinated |
| Not infected or vaccinated | Not infected or vaccinated | Not infected or vaccinated |
| Not infected or vaccinated | Not infected or vaccinated | Not infected or vaccinated |
| Not infected or vaccinated | Not infected or vaccinated | Not infected or vaccinated |
| Not infected or vaccinated | Not infected or vaccinated | Not infected or vaccinated |