

# Life-saving maths: How does vaccination work?



## The Network Disease

You will need:

- lots of people
- room for them to stand up

The activity:

- Everyone in the class should write down the names of two individuals who are also in the class. It doesn't matter if people are chosen more than once, or not at all.
- The person who is going to start off the epidemic stands up - this is Step 0.
- They choose the two people whose names they have written down, and they stand up - this is Step 1.
- These two people choose the two people whose names they have written down, and they stand up - this is Step 2. If someone is chosen who is already standing up, then there is no new infection.
- This continues until either everyone is standing up, or both people chosen are already standing up.

You should have noticed that this is very similar to Standing Disease

([https://motivate.maths.org/content/sites/motivate.maths.org/files/Vaccination\\_StandingDisease.pdf](https://motivate.maths.org/content/sites/motivate.maths.org/files/Vaccination_StandingDisease.pdf)).

Questions to discuss:

- Did everyone in the class get Network Disease (ND)?
- How many steps were there in this epidemic?
- If you did it again, would everyone get ND?
- Try it and see if you are right.
- Put everyone's name on a post-it note, arrange them on a large sheet of paper and draw a network diagram of people's choices.
- Try running the epidemic again with the same choices, but a different person starting it off. How does the network diagram compare with the first one?
- If you could only vaccinate one person who would it be? How about if you could vaccinate two people?
- Run the epidemic again - WITHOUT changing people's choices - but with one or more people 'vaccinated', meaning that when they are chosen, they do not get the disease, so remain seated.
- How does vaccinating key people affect the epidemic?

### Life-saving maths: Network Disease

<http://motivate.maths.org/content/MathsHealth/Vaccination>

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