R naught number = R_0

or

How fast does an infectious disease spread?

R naught (R_o) (Basic reproduction number) is a measurement that tries to approximate the number of people one person might infect during the infectious period of a disease.

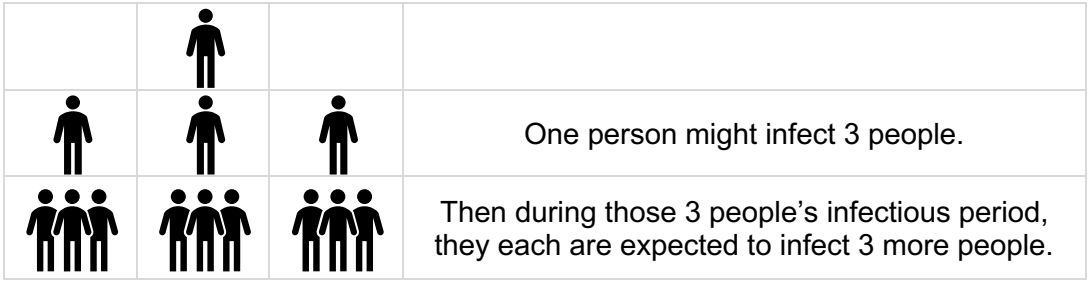
1. What factors about an infection do you suppose contribute to this calculation?

Sample R_0 numbers

Disease	R_0 number
Measles	12 to 18
Seasonal flu	2 to 3
Smallpox	5 to 7
2014 Ebola	1.5 to 2.5
2003 SARS	2.5
Mumps	4 to 7
HIV/AIDS	2 to 5
Original Coronovirus[1]	2.3 to 2.7
Alpha variant (UK)	4 to 5
Delta variant (India)	5 to 8

How do you interpret the R_0 number?

If a virus has an R naught number of 3 then during one person's infectious period they are expected to infect, on average, 3 people. Here is our picture of what the spread of infection might look like.



One person might infect 3 people.

Then during those 3 people's infectious period, they each are expected to infect 3 more people.

2. How many people would you expect to have become infected by this 3rd round of infections.

3. And how many infected by the 4th iteration of this infection?

4. Can you create a formula for the number of people infected by the Nth iteration of this cycle?

5. By what iteration might the virus have infected 1,000 people?

6. Would you expect this virus to die out on its own or keep spreading?

What would it look like for a disease to have an R_0 number of 0.5?

	One person might not have infected anyone. Or maybe 2 infected people might infect one person.
	After 2 infectious cycles, one person might have infected one person.
	After 4 infectious cycles, one of those previously infected people might have infected one person.

7. How would you describe the progression of this virus?

8. Would you expect this virus to keep spreading?

9. What R naught numbers seem to be the cut-off of a virus that will die out on its own or one that will keep spreading?

So, what do we know about the Coronavirus and its ability to remain infectious?

10. Do some research at a trusted source to find answers to these questions and come to class ready to share.
    a. How is COVID-19 (Coronavirus) transmitted?

    b. How long is the infectious period of a person who has contracted the virus?

    c. How long can the virus live on surfaces?

    d. What percent of people who are exposed to an infected person is likely become positive for having the infection?

[1]Scientists from the Chinese Academy of Sciences Institute of Automation and the University of Chinese Academy of Sciences

Sources: https://www.cnn.com/videos/health/2020/03/03/how-viruses-spread-lon-md-orig.cnn
https://www.healthline.com/health/r-nought-reproduction-number - rsubsubvalues
https://sph.umich.edu/pursuit/2020posts/how-scientists-quantify-outbreaks.html
https://en.wikipedia.org/wiki/Basic_reproduction_number
https://www.cdc.gov/coronavirus/2019-ncov/
https://states.aarp.org/west-virginia/the-delta-variant-is-40-more-infectious-than-the-original-covid-19-strain