

# PreCalculus

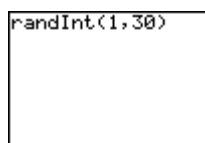
## ACHOOO!

### INTRODUCTION:

A particular type of curve is common in investigating situations such as the rate of bacterial growth and the spread of disease. For example, as a virus spreads over time, the rate starts increasing slowly, accelerates rapidly and then levels off to a maximum value.

### PROCEDURE:

1. Have the students count-off by ones and write their number on their paper.
2. Turn on calculator and press **[2nd] [QUIT] [CLEAR]**.
3. Random numbers may not appear random, therefore the calculator random number generator may need to be “seeded”. This is done as follows: last four digits of your phone number stored in **rand** .
4. Press **[MATH] [2] [5]** to paste **RandInt(** on the home screen. Type 1,n if you have n participants. See the screen below, n = 30.



5. After each trial record in a table the total number of people infected (standing).
6. The teacher is the initial infected person. **ONLY** the teacher should press **[ENTER]**. This is the number of the first infected person and he/she should stand up.
7. The infected person should press **[ENTER]**. The new number generated represents the second infected person. The newly infected person should also stand.
8. Both infected people should press **[ENTER]** to possibly infect two new people. Repeat the process for ten trials.

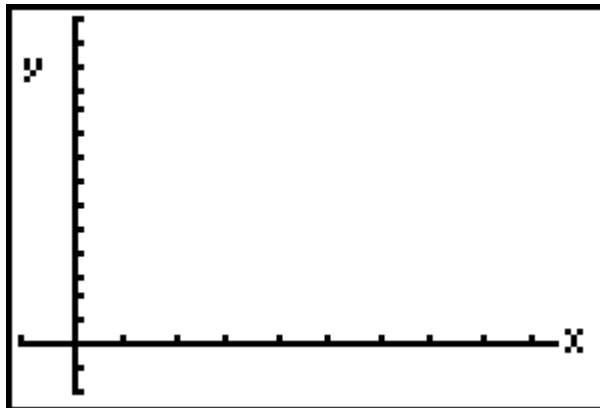
### DATA RECORDING:

1. Complete the following table.

trial	0	1	2	3	4	5	6	7	8	9
# sick										

# PreCalculus

2. Press **[STAT]** **1: Edit** and enter trial number data into  $L_1$  and # sick into  $L_2$ .
3. Press **[2nd]** **[STAT PLOT] : 1** and make the appropriate selections **[ON]**, **[ ]**, Xlist:  $L_1$  and Ylist:  $L_2$ .
4. Press **[ZOOM]** **9** to see the graph.
5. Sketch the graph in the window at the right. Be sure to label each axis.



## ANALYSIS:

1. Along the horizontal axis the numbers represent; the numbers on the vertical axis represent \_\_\_\_\_.
2. In your own words, briefly describe the shape of this graph.  
\_\_\_\_\_  
\_\_\_\_\_
3. Refer to the graph of the classroom simulation and describe how the disease is spread.
4. Predict the number of trials necessary to run in order to infect the whole class.
5. How do you think increasing the number of people will affect the shape of the graph?

## CONCLUSION:

1. Write a paragraph explaining why you think the number of people being infected by a disease seems to “level out” over a period of time.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# PreCalculus

2. In a real world situation, what factors increase the rapid spread of a communicable disease? What factors reduce its rapid growth rate?
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3. What other situations might be expected to demonstrate a similar behavior? Explain.
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4. In the 1930s, the Soviet ecologist G.F. Gause studied the population growth of yeast. Make a scatter plot of the data in the window below or use the graph link to make a printout of your graph. Does the plot seem to have attributes similar to the plot from the first activity? Why?
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Time in hours	0	10	18	23	34	42	47
Yeast population	0.37	8.87	10.66	12.50	13.27	12.87	12.70

