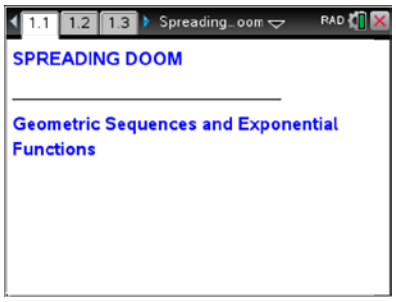
# Spreading Doom
## Student Activity

Name _____
Class _____

**Open the TI-Nspire™ document Spreading_Doom.tns.**




In this activity, you will explore a geometric sequence that models the spread of the 2004 mydoom virus. After finding a rule for the sequence, you will apply it recursively to extend it and graph the resulting data as a scatter plot. You will use the function to make predictions about the number of viruses at specific periods of time.

**Move to page 1.2.**

Press ctrl ▶ and ctrl ◀ to navigate through the lesson.

1. On page 1.2, read about the mydoom virus. In your own words, describe how the virus spread.

**Move to page 1.3.**

2. What is the common ratio for this sequence?

3. What is the rule for finding the next term?

**Move to page 1.4.**

4. Move to cell B6, and enter the formula for finding the value of the next term in this sequence. Then, press enter.

**Move to page 1.5.**

5. Move to cell B6, and press **Menu > Data > Fill**.

6. Notice the bold, dashed frame around the cell.

7. Press the down arrow until the next five terms have been selected; press enter.

8. The highlighted cells will be populated with values based upon the formula entered.

**Move to page 1.5.**

9. This is a *Data & Statistics* page displaying the events from the spreadsheet.

10. To graph a scatter plot of the data, click on the "Click to add variable" message in the center of the lower part of the screen, and select the variable **hour**. Then click on "Click to add variable" on the left side of the screen, and select the variable **email**. The scatter plot will be displayed.

11. Describe the shape of the scatter plot.

12. Complete the table on your worksheet and on page 1.6 of the TI-Nspire™ document to help determine a function to model the spread of the mydoom virus.

| $x$ | **f**($x$) | **Exponential Expression** |
|---|---|---|
| $x = 0$ | **f**(0) = 6,000 | **f**(0) = 6,000 · 1.8^____ |
| $x = 1$ | **f**(1) = **f**(0) · 1.8 = 6,000 · 1.8 | **f**(1) = 6,000 · 1.8^____ |
| $x = 2$ | **f**(2) = **f**(1) _____ = 6,000 · 1.8 · 1.8 | **f**(2) = 6,000 · 1.8^____ |
| $x = 3$ | **f**(3) = **f**(2) _____ = 6,000 · _____ | **f**(3) = 6,000 · 1.8^____ |
| $x = 4$ | **f**(4) = **f**(3) _____ = 6,000 · _____ | **f**(4) = 6,000 · 1.8^____ |

**Move to page 1.7.**

13. Write a function that gives the number of e-mails, f($x$), sent by the virus in the $x^{th}$ hour after its release.

**Move to page 1.8.**

14. Select the *Calculator* application, enter **f1(144)**, and press enter.

> **Tech Tip:** Change the Document Settings to **float** to display more significant digits for this result.

**Move to page 1.9.**

15. To copy the spreadsheet, move to page 1.4, and move to the *Lists & Spreadsheet* application. Press ctrl K to select this application (the frame should be flashing), and press ctrl C to copy it. Move to page 1.9, and press ctrl I to insert a new page. Press esc to close the menu, and finally press ctrl V to paste the spreadsheet.

16. Move to the formula row in column C. Enter your function, using **hour** for the independent variable, and then press enter.

17. Compare the values in column B with those in column C.

**Move to page 1.5.**

18. Press **Menu > Analyze > Plot Function**.

19. Enter your function in the dialogue box, and press enter.

20. This function is an exponential function of the form $\mathbf{f}(x) = a \cdot b^x$. In your own words, explain what the values of *a* and *b* represent.