 Modelling modified exponential decay using dice

Resource required:

* 1 to 2 classes of students
* 1 die per student
* Grid paper for graphing

Activity:

1. Start with all students to represent the initial population (5 of which do not have a die or have a modified die so they always survive).
   * The students without a die represent the fixed quantity, P, in the modified decay model.
   * The students with a die represent the arbitrary constant, A, in the modified decay model.
2. The students with a die, roll their die.
3. Each student who rolls an even (or other condition to represent decay) leave the population, they decay.
4. Record the population into the table after each time period (each roll of the dice)

| Roll (time period) | Population |
| --- | --- |
| 0 | (starting population) |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| And so on |  |

1. Repeat steps 2 to 4 until it the natural carrying capacity is reached.
2. Graph the population (dependant variable – y axis) verse time (independent variable – x axis)

The activity can be repeated for various conditions to represent growth.

Sample data for the activity:

This was conducted with a total of 40 students and a 3 or 6 being the condition for population decay. The population started with 40 students, all but 5 had a die.

| Roll (time period) | Population |
| --- | --- |
| 0 | 40 |
| 1 | 30 |
| 2 | 24 |
| 3 | 19 |
| 4 | 14 |
| 5 | 10 |
| 6 | 8 |
| 7 | 8 |
| 8 | 7 |
| 9 | 6 |
| 10 | 6 |
| 11 | 5 |
| 12 | 5 |

Compare the modified growth model to the simple growth model:

It may be beneficial to compare the results with that obtained for the simple growth model, Resource: modelling-exponential-decay-using-dice.DOCX. The sample data for this is shown below:

This was conducted with a total of 40 students and multiple of 3 (3 or a 6) being the condition for population decay.

| Roll (time period) | Population |
| --- | --- |
| 0 | 40 |
| 1 | 26 |
| 2 | 18 |
| 3 | 11 |
| 4 | 7 |
| 5 | 4 |
| 6 | 3 |
| 7 | 3 |
| 8 | 2 |
| 9 | 1 |