Empty Seats

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Introduction

This activity allows students to use a simulation to understand why airline companies routinely overbook flights.

Grades 6-8

NCTM Data Analysis and Probability Standards

- Understand and apply basic concepts of probability
- Use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations

Files/Materials Needed

None

1

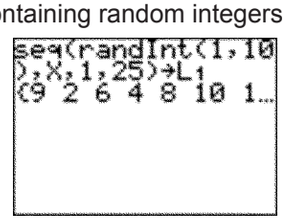
Explain to students that airlines routinely overbook flights based on the fact that they expect that a certain percentage of people will not show up for their assigned flight. Tell students that in this activity, they will make a decision as to how much they should overbook a flight with 25 seats in which 20% of all passengers have historically not shown up for their flight.

2

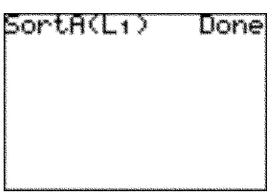
a. Launch TI-Navigator™ on the computer and start the session.
b. Have each student log into NavNet and then exit to the home screen.

3

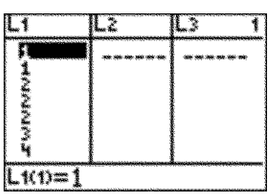
a. To ensure student's have different random number generators, have each student type a different number on the home screen (phone number, student ID, etc), press STO▸ then MATH, arrow over to the **PBR** menu, and select **1: rand**.
b. On the home screen, have students enter the function shown which will create a list (L1) of 25 numbers containing random integers from 1 to 10.



c. Have students sort the numbers in ascending order.



d. Because there is a 20% chance of randomly getting a 1 or 2 from the numbers 1 to 10, those numbers represent a 'no-show.' The screen shows a sample list in which there are two 1s and three 2s. This would mean that 5 people did not show up for the flight or, conversely, that 20 people did show up for the flight.



4

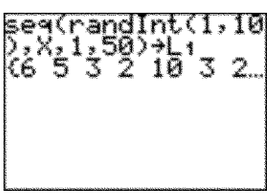
a. Have students log back into NavNet and use **Quick Poll** (with *Open Response*) to determine how many people showed up for each student's flight. The use of *Open Response* with a single number answer will provide a bar graph illustrating that most (if not all) flights had empty seats.
b. This experiment can be repeated several times to convince students that it makes sense for airlines to overbook their flights.

Empty Seats

5

a. Use **Quick Poll** again to ask students:
- *If there are always empty seats, then how many extra seats should the airline book to ensure that the flight is full each time?*

b. To answer the question posed above, instruct students to exit NavNet and return to the home screen. Have them modify the command from step 3b to determine how many tickets need to be issued to completely fill the flight (see the screen below).



c. Note that the list has been extended to include 50 random numbers from 1 to 10. Students should not sort this list. Instead, they should go to L1 and see how far down the list they must go until they've found 25 numbers that are 3 or greater.

6

a. Have students log back into NavNet and use **Quick Poll** to determine, for each student trial, how many tickets needed to be sold to completely fill the plane. The bar graph will illustrate that airlines can definitely sell more tickets than available seats without running into a problem of too many people showing up for the flight.

b. This experiment can be repeated several times. Use **Quick Poll** again to ask students:
- *If you ran the company, how many extra seats would you sell to ensure that the flight is full each time?*