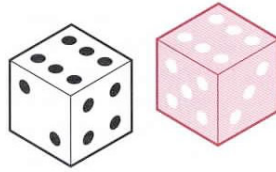


Dice Roll Investigation



Tools

You could do this investigation with actual dice, but it would take a very long time. So I suggest you use the ProbSim application on your TI-84. (You can find other simulations of dice rolls on the internet and they are acceptable.) To use ProbSim, start the App and from the main menu, select Roll Dice (Option 2). Set the number of dice to 2 (Press the Zoom Key to get to the Set menu). Set "StoTabl" to All so that all rolls gets stored to the table. Exit the menu and begin rolling. Scroll through the table to find the roll numbers where various outcomes occurred.

Starting Points for Investigations

1. A gambling question that arose in the seventeenth century concerns the number of times 2 dice must be tossed to obtain double 6's (sum of 12).
 - a. Try predicting the average number of rolls needed to obtain double 6's. First, make a guess. Then, use what you know about probability distributions to make a more educated guess. Show your calculations and explain the reasoning behind your guess.
 - b. Use the Dice Roll Simulation and at least 25 repetitive trials to determine the average number of rolls of 2 dice to obtain double 6's. Comment on how the results of the simulation compare with your guesses.
2. Another seventeenth-century gambling question involves tossing 3 dice until obtaining a sum which is greater than or equal to 15.
 - a. Calculate the probability of getting a sum of 15 in one roll of 3 dice. Make a guess about how many rolls, on average, it will take you to get a sum greater than or equal to 15.
 - b. Use a simulation with at least 25 repetitive trials to determine the average number of rolls of 3 dice to obtain a sum greater than or equal to 15.
3. The numbers 7 and 11 are lucky numbers in some dice games. Do you think a 7 or 11 would appear sooner by rolling 2 dice or 3 dice? Make a prediction. Use simulations with at least 25 repetitive trials to answer the following questions.
 - a. How many times on the average must 2 dice be rolled to obtain a 7 or 11?
 - b. How many times on the average must 3 dice be rolled to obtain a 7 or 11?
 - c. Reflect on how and why your experimental results either support or refute your guesses.

Tips:

Your write up should be no more than one page long, front and back if needed. Attach raw notes as supporting evidence. Your write up need not be typed, but write it neatly and answer all questions as thoroughly as you can. Summarize your investigation with a short reflection about what you learned.

Make all your predictions in writing before you do the experiments. Do not change predictions to match results, rather reflect on how the results inform you understanding and would help you make better predictions next time.

Before you begin, work with your partner to devise a clear way to record the results of each trial. If you do this neatly as you go, you won't have to rewrite it.

Your write up is due Thursday, May 23 at the beginning of class.