So Call Us Freaks, But That's Just The Way We Roll

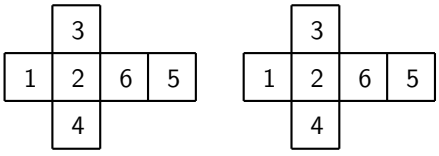
1. Random Experiment: Roll the freaky pair of dice in class and record the sum of the numbers on the faces.
   (a) Write down the sample space S for one roll of such a pair of dice.
   (b) Use the numbers from your class's experiment to estimate the probability assignment for this probability space.

2. Pictured below are a standard pair of dice, unfolded, and a second pair of dice, also unfolded. Notice that the numbering appearing on the second pair is nonstandard. We'll call these "Sicherman Dice" after their inventor George Sicherman. These Sicherman Dice were the main topic of a Martin Gardener article ("Mathematical Games," *Scientific American* 238/2 (1978): 19-32).

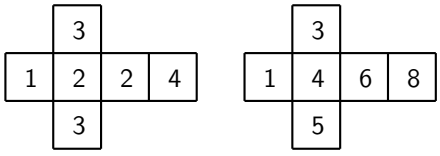
   What is so special about placing random numbers on a pair of dice (anyone can do that!), and why would this inspire a 13 page article by Martin Gardener? Hopefully the following exercises will answer this question!

   (a) Consider the random experiment of rolling a pair of Sicherman dice and observing the number that comes up on each die.
      i. Write down the sample space S for this random experiment. Record each outcome as an ordered pair of the form (g, y) where g is the number that comes up of the die on the left (the "green" die) and y is the number that comes up on the die on the right (the "yellow" die).
      ii. Find each of the following probabilities: $\Pr((2,4))$, $\Pr((1,8))$, and $\Pr((3,3))$.
   (b) Next consider the random experiment of rolling a pair of Sicherman dice and observing the sum of the numbers on the two faces.
      i. Write down the sample space $\hat{S}$ for this random experiment.
      ii. Give the complete probability assignment for this probability space.
   (c) Would substituting Sicherman Dice for a standard pair of dice in any game of chance requiring dice be fair? Why or why not?

Standard Dice



Sicherman Dice



Names: _____ .

Sicherman Dice: Frequencies

Random Experiment: Roll a pair of Sicherman dice, observing the sum of the numbers that come up on the dice.

Trials: Perform the number of trials of this random experiment suggested by your instructor. Record the frequency of each outcome in the table below.

2	3	4	5	6	7	8	9	10	11	12

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