

“Struck by Lightning” Supplementary Materials
Group Experiment about “Gambler’s Ruin”

Within your group, proceed as follows:

1. Take one 6-sided die, and eight pennies, and one index card.
2. Decide who will be “**A**” and who will be “**B**”.
3. Give six pennies to **A**, and two pennies to **B**.
4. Roll the die. If it comes up 1 or 2, then **B** gives one penny to **A**. If it comes up 3, 4, 5, or 6, then **A** gives one penny to **B**.
5. Repeat step 4 until either **A** or **B** wins all eight pennies. That person is the “winner”.
6. Repeat steps 2–5 many times (10? 20? more?), keeping track of who wins each time. See if you can estimate, as accurately as possible, the chance that **A** wins. Is it more or less than 50%?
7. Write your best estimate of the probability that **A** wins the game, together with all of your names, on the index card, and hand it in to the instructor. **Note:** There will be a prize later on for the pair that comes the closest to the true probability.

If you have time, you can try some variations on the game, such as:

8. Suppose **A** starts with seven pennies (and **B** with one)? Or **A** starts with five pennies (and **B** with three)? How does that affect their chance of winning?
9. Suppose that each time we bet two pennies instead of one. That is, suppose we change step 4 to say, “Roll the die. If it comes up 1 or 2, then **B** gives two pennies to **A**. If it comes up 3, 4, 5, or 6, then **A** gives two pennies to **B**.” Does this affect the chance that **A** will win?
10. Suppose that for each bet, **A** can choose how much the bet will be. (So, betting one penny is like step 4 above, betting two pennies is like step 9 above, etc.) What should **A** choose to have the best chance of winning?

While you’re trying these things out, you might start wondering:

11. How could we figure out, mathematically, the chance that **A** will win these different games? (This is not an easy question; it will take many weeks to answer. Why do you think it is so difficult?)
12. How is this exercise related to the figure “one chance in 37,650” in the middle of page 27 of the book?