

## Estimation Games

Intuition is one good way to estimate, but some calculations are usually helpful in refining your intuition. For each of these problems, write:

- A guess! Be quick!
  - A number that sounds almost reasonable but you're pretty sure is too small.
  - A number that sounds almost reasonable but you're pretty sure is too big.
  - An estimate, calculated by multiplying and dividing numbers that you can reasonably estimate.
1. How many pennies in a line would it take to reach all the way across the room?
  2. How many pennies would it take to completely cover the floor?  
Bonus question: how many pennies would it take to make a Sierpinski triangle the size of the floor? A Sierpinski triangle is made by building a triangle, then removing the middle triangle (half as long as the big one), then removing the middle triangle of each of the three resulting triangles, and so on, repeatedly removing the middle triangle.
  3. How many pennies would it take to completely fill this room, from floor to ceiling, if they were stacked neatly?  
Bonus question: How many fewer would fit if they were jumbled in without much organization?
  4. How many pennies in a line would it take to make a path all the way across the United States? (First make a guess as to how big it is compared with your answers to the previous questions.)
  5. How many pennies would it take to cover the entire United States?
  6. Which is more, the number of pennies it would cost to buy a car, or the number of pennies that would fill the inside of the car? How many times more?
  7. How many pennies would it take to make a stack that would touch the International Space Station? (That's about 300 miles up.)
  8. If Bill Gates sold all his assets and converted them into 50 billion dollars worth of pennies, how long a line would he be able to make with them?
  9. How big an area could he cover with them?
  10. How big a cube would he be able to fill with them?