Pascal's Triangle and Probability

When you were younger I bet that you figured out how probable it was to toss a coin and have your coin land head up.

Now I'm going to ask the same question but I'll make it a little bit harder ... because you are older now and need some new challenges.

Here are my 3 pennies. I've chosen pennies that look different so that we can talk about which one comes up heads and which come up tales. My first penny, pictured above, is corroded. The second penny is just dull and the third penny looks shiny and new.

I'm wondering what is the likelihood that when I toss these 3 pennies they will land with two heads showing and one tail.

Don't forget that probability is expressed as a fraction with the numerator equaling the count of how many ways you could achieve success and the denominator equaling the total number of ways the coins could land.

1. Make a guess about the probability of getting 2 H and 1 T.

2. How many ways could we achieve success (numerator) and get 2 heads and 1 tail?

3. How many different ways could the coins land (denominator value)? Just make a guess.

OK. I'm changing my approach. Maybe I should have started at the beginning.

4. How many ways could I have tossed these 3 coins and gotten all heads?

I guess I should figure out and list how many ways the coins could fall. Lets give the coins some abbreviated names ... CP for corroded penny, DP for dull penny, and SP for shiny penny.

5. In an orderly manner, list all of the possible outcomes.

6. From looking at your list, how many ways can you end up with each of the following combinations?

All heads	One head and two tails	Two heads and one tail	All tails

7. Looking back at your answers to problem numbers 1, 2, and 3, were your answers correct?

8. If not, what was the misconception that caused you to not count correctly. If you did count correctly, what do you suppose the common misconception of this sort of problem is?

Hopefully you will be extremely competent at figuring out the probabilities of tossing 4 coins and calculating the probability for each outcome.

9. In an orderly manner, list the number of ways that tossing 4 coins could occur and then sum up your conclusions.

Coin #1	Coin #2	Coin #3	Coin #4

10. Fill in this chart again but this time for 4 coins.

All heads	Three heads and one tail	Two heads and two tails	One head and three tails	All tails

11. Have you seen these patterns of numbers before? Please explain.

12. Go back to your Pascal's Triangle work and tell me how many ways the outcome of tossing 10 coins could occur.