STUDENTS - GAME OF KITTENS AND PUPPIES

This is a two player game. Start with two piles of chips - one designated as Puppies and the other as Kittens. On each players turn you can do one of three things:

- Take as many Kittens as you Like.
- Take as many Puppies as you Like.
- Take an Equal Number of Puppies and Kittens.

The Goal is to take the last chip. What is a winning strategy?

STUDENTS - ABBOT AND COSTELLO NUMBERS

Check out the you tube video
https://www.youtube.com/watch?v=MS2aEfbEi7s
What’s going on? How did he do that - are there other pairs of numbers that these tricks work with? Is it the same trick with all 3 operations?

TEACHER’S - CELL PHONE PROBLEM

You have 2 cell phones and a 100-story building. You wish to determine the highest floor from which these phones could be dropped and survive. How can you do it to guarantee the fewest number of drops? For example, if you have only one phone then you have to try floor 1, floor 2, floor 3, floor, etc. until the phone breaks. That might mean you need 100 drops. With two phone you could try every 25th floor and then if the phone breaks you would have 24 more floors to check so you might need 28 drops. What strategy minimizes the number of drops?

TEACHER’S - FLIP IT GAME

Take a 3 by 3 grid of coins and start with all the coins showing heads. Flip over any coin and also all the coins that touch that one either horizontally or diagonally. So for example, if we start by flipping the middle coin then we will move as shown below.

The question is What is the minimum number of moves needed to turn over all the coins? (i.e. convert to all tails)