



Light Bulbs

A long hallway has 1000 light bulbs with pull strings, numbered 1 through 1000. If the light bulb is on, then pulling the string will turn it off. If the light bulb is off, then pulling the string will turn it on. Initially, all the bulbs are off.

At one end of the hallway, 1000 people numbered 1 through 1000 wait. Each person, when they walk down the hallway, will pull the string of every light bulb whose number is a multiple of theirs. So, for example, person 1 will pull every string; person 2 will pull the strings of bulb number 2, 4, 6, 8, 10, ..., and person 17 will pull the strings of bulb number 17, 34, 51, 68,





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For each situation below, which light bulbs are on after all the indicated people are done walking?

1. Everyone
2. The evens, or in other words, all the people whose numbers are even
3. The odds
4. The primes
5. The perfect squares
6. The multiples of 3
7. The perfect cubes
8. The people 1 more than a multiple of 4
9. The people 2 more than a multiple of 4 (that is, the evens not divisible by 4)

Given the set of people who walked, what is a general strategy for figuring out which light bulbs are turned on?