Buzz Contest Rules and Keywords

1 Introduction

Contestants take turns in rotation. The group of contestants is *counting* out loud, starting with 1, each person saying the next number when it comes his turn. Anyone who says the wrong number is eliminated, and the survivors continue. When someone makes a mistake, the next player says the number that is actually next in line, the one the loser should have said. If two contestants are eliminated in a row, the contest emcee will remind the players what number we're at. This gives an unfair advantage to the third contestant to try at that number—but who gets this unfair advantage is pretty random, so it's fair after all, in a way.

This goes on until only the winner remains.

Well, not quite. That would be boring. Sometimes, instead of saying the number that is due to be named, you instead say each of the *buzzwords* that apply to the number. If a contestant says a word that does not apply, or leaves out a word that does, he is out. There is one little endgame wrinkle: when only two contestants remain, if one makes a mistake, he has not yet lost. The other player has to say the correct list of buzzwords, or the correct number if no buzzwords apply. They go back and forth on that number until one gets it right and wins.

The buzzwords are *buzz, bang, crash, whizz, zip, pop, fibbi*, and *squawk*. Not all words are in force from the beginning; the game emcee will say when a word comes into force.

The heart of the matter is the rules for when a buzzword applies to a number. The first few buzzwords are simple enough, but then it gets more complicated.

2 Buzzwords

- *Buzz.* The number is a multiple of 7, or one of its digits is a 7.
- *Bang.* The number is a multiple of 5, or one of its digits is a 5.
- *Crash.* The number is *prime.* The primes are the numbers

  $$2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, \cdots$$

  that cannot be written as the product of two whole numbers, both greater than 1.
- *Whiz.* The number is *squarefree.* That is, it may not be prime, but it's not divisible by any square other than 1. Thus, the squarefree numbers are

  $$1, 2, 3, 5, 6, 7, 10, 11, 13, 14, 15, 17, 19, 21, 22, 23, 26, 29, 30, 31, 33, 34, 35, 37, \cdots .$$

  (Never say "crash" without also saying "whiz", because all primes are squarefree.)
- *Zip.* The number is a *power.* That is, the number is got by multiplying some other number times itself more than once. Thus, the powers are

  $$1, 4, 8, 9, 16, 25, 27, 32, 36, 49, \cdots .$$
- *Pop.* The number is the *product of two distinct primes.* The pop numbers are

  $$6, 10, 14, 15, 21, 22, 26, 33, 34, 35, \cdots$$
- *Fibbi.* The number is part of the *Fibonacci* sequence. This sequence begins with 0,1 and self-extends by the rule that the next number is the sum of the two that came just before it. So the Fibonacci sequence starts off with

  $$0, 1, 1, 2, 3, 5, 8, 13, 21, \cdots$$
- *Squawk.* A squawk number is one that can be written as the sum of exactly two squares. A square is a number that is got by multiplying a whole number times itself. So 0 is a square, so the squares themselves are squawk numbers. ($9 = 9 + 0$, for instance.)

  $$1, 2, 4, 5, 8, 9, 10, 12, 13, 16, 17, 18, 20, 25, 26, 29, 34, 36, 37 \cdots$$