

Code Breaker

Topics: permutations, logical deduction

Materials: paper and pencil, or whiteboard and marker

Players: two or more

Recommended Grades: 2-8

Common Core Mathematical Practice Standards: MP1, MP3, MP5, MP6, MP7

The codemaker has a secret code number. Discover that code in as few guesses as possible. Use your clues wisely.

Why We Love Code Breaker

Code breaker is a game of mystery and logic. Students need to think carefully to make guesses that will give them the most information, and the challenge to break the code with the fewest guesses motivates this. Students will likely choose and hone various strategies and tools for recording what they know. Logical deduction skills will be put to the test.

How to Play

Code Breaker can be played with two or more players. One player (the *codemaker*) thinks of a three-digit number from 000 to 999, writes this number on a piece of paper, and folds the paper to hide it. The other players (*codebreakers*) draw a two-column chart labeled, “Guesses” and “Clues”. Players can each keep separate written records, or all may share a single chart on a whiteboard.

The codebreakers take turns guessing a three-digit number which is recorded in the guess column. The codemaker responds by recording the appropriate clues:

- ✓ If one of the digits is **the right digit in the right place**, say, “There’s one number correct,” and draw a smiley face in the clues column. Do not tell which digit won the smiley.
- ✓ If one of the digits is **a correct digit but in a wrong place**, say “There’s one number right, but it is not where it belongs,” and draw an empty circle in the clues column.
- ✓ If **more than one digit matches the secret code**, tell the total number of correct and almost right digits – and draw that many smiley faces and circles – but **never** reveal which digit matches which clue.

With two players, a round of play is two hidden numbers, so each player has a chance to be the codemaker. Whoever breaks the code with the fewest guesses wins. For group play, whoever guesses the number gets to be the codemaker for the next round. The group should cooperate to try to break the code in as few guesses as possible.

Prompts and Questions

- Is it bad to make a guess and get no digits right?
- How can you use the clues from your previous guess(es) to help you make your next guess?
- How can you break the code with the fewest guesses?

Variations

1. **Beginners Game:** Don't allow any repeating digits in the three-digit number, and/or make it easier by only using the digits 1-5.
2. **Advanced Game:** Use four to six-digit numbers and allow for repeated digits.
3. **Challenge Game:** Try playing without paper and pencil, keeping track of the guesses and clues in your head. This is a mind-bending challenge, but it can be done.

About this Game

Adapted from the book Math You Can Play by Denise Gaskins

More About this Game

This game can also be found in the Family Math book under the name Pico Fermi Bagels. There is also a commercial board game version of this game called **Mastermind** that uses colors instead of digits.