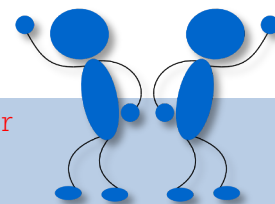


# Back-to-Back



## Strands:

Number & Quantity	
Algebra	X
Functions	
Geometry	
Statistics & Probability	

Players think informally and algebraically as they solve linear equations to find a missing number when given a numerical expression verbally.

## Materials Needed:

- Whiteboard
- Whiteboard markers
- Calculator
- Alternatively, "Short wall" to put up between players (manila folders)
- Scrap paper
- Pencils

## Where:

Outside	
Inside	X
On-line	
On-site	



## Set-Up:

- Create groups of 3 players.
- The player with the longest last name is the judge.
- Players 1 and 2 stand back-to-back at a whiteboard holding dry erase markers.
- The judge stands in a location that enables the judge to see numbers written by Players 1 and 2.

**Object of the Game:** Use informal reasoning to solve for a missing value in a linear equation.

## Playing the Game:

1. Judge calls out, "Number Up, 2 through 9!" This signals Players 1 and 2 to each write a number of their choice, from 2 through 9, on the whiteboard.
2. Players continue to stand back-to-back so they cannot see their opponent's number.
3. The Judge does the following:
  - a. Choose two numbers, say A and B.
  - b. Multiply Player 1's number by A and Player 2's number by B.
  - c. Find the sum or difference of the two results and tell Players 1 and 2.
  - d. State, "A times Player 1's number  $\pm$  B times Player 2's number is C." Replace A, B, and C in this statement with the values of A, B, and C in your equation. Also state the operation you used. You may use a calculator. For example, Player 1 writes 2 while Player 2 writes 3. The judge chooses  $A = 5$  and  $B = 4$ . After calculations, the Judge says to the players, "5 times Player 1's number plus 4 times Player 2's number equals 22."
4. Players 1 and 2 solve for their opponent's mystery number.
5. The first player to solve for their opponent's mystery number correctly wins the round!
6. Repeat Steps 1 through 5 for a total of three rounds, switching the role of Judge each round.

**To Win:** The player who wins the most rounds wins the game!

## Think About It:

7. How did you solve for your opponent's mystery number?
8. Can you solve for your opponent's number in more than one way?
9. Solve the problem using pictures. At each step in your solution process, write an equation using algebra to show what you are doing in pictures.

## Variations:

**Use Dice:** The Judge can use two 6-sided dice to determine the values of A and B instead of choosing the numbers.

**More Operations:** The Judge can also use multiplication or division to combine the results of Player 1 and Player 2's numbers.

## Helpful Hints:

- If players have trouble solving equations, play a sample round and ask players to share how they are thinking about solving for their opponent's mystery number.