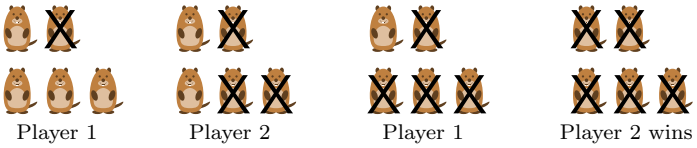
## Nim

Number of players: $N = 2$

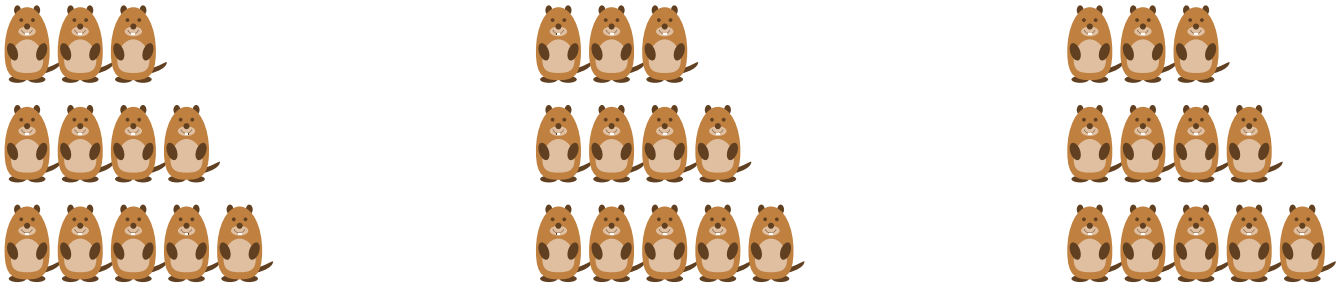
Instructions: on your turn, choose any row that still has at least one marmot, and remove (cross out) any number of marmots in that row. Whoever takes the last marmot wins.

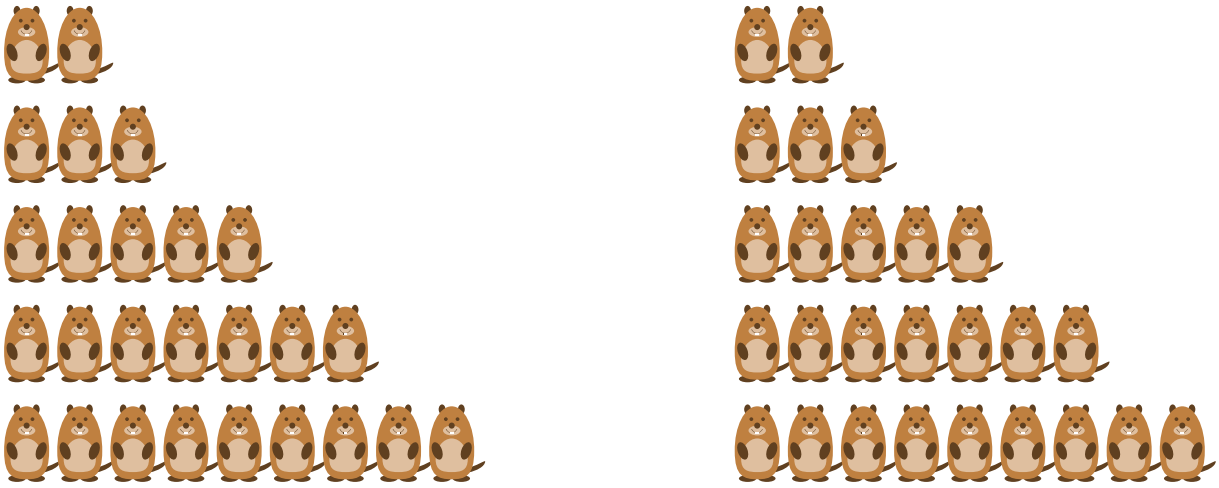
Simple example:




Variation: whoever takes the last marmot loses.

Game boards:



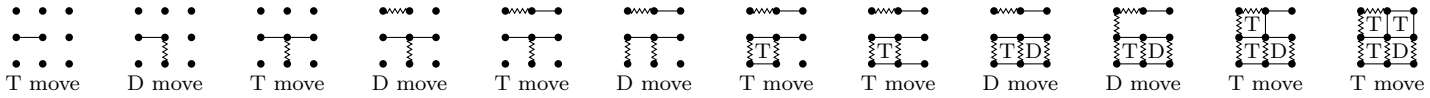


## Dots

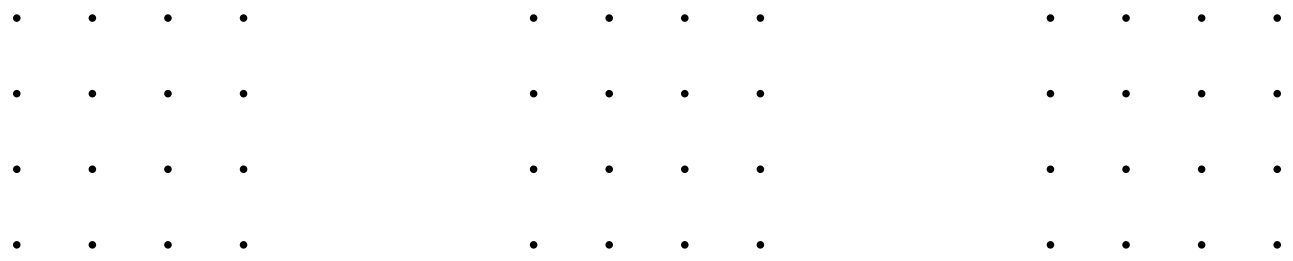
Number of players: $N \geq 2$

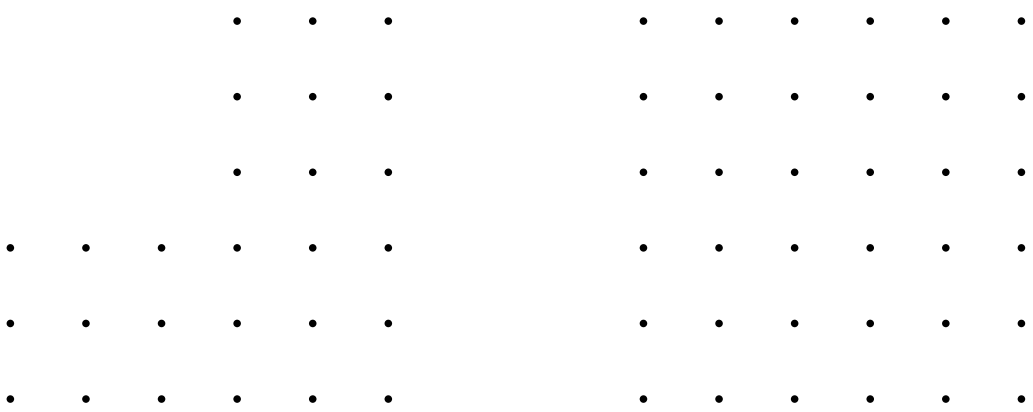
Instructions: on your turn, draw a line connecting two adjacent dots (next to each other) with a horizontal or vertical line, so it looks like ⊷ or ⁞ . If you complete a box like ⊡ then write your first (or last) name's initial inside like [D] and you (must) take another turn. You are not ever required to complete a box (although if you don't, then the next player may take it), but you are required to take another turn if you do. After the board is full, count how many points you got.

Example game sequence (two players):




Here are some game boards. You can also draw your own on any blank piece of paper, whatever shape/size you like.





## Word morph

Number of players: $N \geq 1$

Instructions: the first player says/writes any four-letter word. (Well, almost any. . . we are still at school!) After that, on your turn, you change (only) one of the letters in the word to make another real word. Keep taking turns until you get to a word whose letters are all different than your original word; then, your team wins!

Example: player 1 says "fake," player 2 says "make," then "male," then "mile," then "milk" wins (the first letter "f" of "fake" turned into "m," the second letter "a" turned into "i," the third letter "k" turned into "l," and the last letter "e" turned into "k").

Example: surf→sure→cure→core→code

(Yes: this is math! We'll return to this game later when we explore graph theory.)

## Addy

Number of players: $N = 2$ (some variations allow $N > 2$)

Instructions (original Addy):

1. Decide who is Player X and who is Player Y.
2. Both players secretly write down either a 1 or a 2.
3. Both players show what they wrote.
4. If the sum is a prime number $(2, 3, 5, 7, \ldots)$, then Player X wins; if not, then Player Y wins.
5. Play again! (Does the same player always win? Why?)

If this version gets boring (why?), try the following variations. Do the same strategies work? Does the same player always win?

Addy variation #1: same as original, except Player X says their number first, then Player Y picks their number.

Addy variation #2: same as original, except players can choose 1, 2, or 3.

Addy variation #3: same as variation #2, except Player Y has to say their number first, then Player X gets to pick.

## Daisy

Number of players: $N = 2$

Instructions: start at zero, and take turns adding either 1 or 2; whoever says 11 wins. (Equivalently: start with a daisy flower that has 11 petals; each turn, you can remove 1 or 2 petals; whoever removes the last petal wins.)

Example: Player A says 1; Player B says 2; A says 4; B says 6; A says 7; B says 9; A says 11 and wins.

Goal: work together to find a strategy for Player A to always win.

Variations: try changing the winning number (to 14, for example); try changing the amount you can add each turn (to 1, 2, or 3, for example). Can Player A or B always win in your version? Which player? How?

## Bizz Buzz

Number of players: $N \geq 2$ (more the better, but ideally not 3 or 7)

Instructions: on your turn, your number is one higher than the last player's number; the first player's number is one, then two, then three, etc. Normally, you will just say this number. However, if it is divisible by 3, then instead you say "bizz," and if it is divisible by 7, then you say "buzz." Also, if your number is divisible by both 3 and 7, then you say "bizz-buzz." If you say the wrong thing, then your group loses a life. Your group starts with $N$ lives (the number of players in your group); see how high you can get before you lose all your lives!

Example: the first player says "one"; the next player says "two"; the next player says "bizz" (because 3 is a multiple of 3); then "four"; then "five"; then "bizz" (6 is a multiple of 3); then "buzz" (7 is a multiple of 7); then "eight"; then "bizz" ($9 = 3 \times 3$); then "ten"; etc.

Variation #1: change 3 and/or 7 to other numbers; for example, say "bizz" on multiples of 4 and "buzz" on multiples of 6.

Variation #2: besides bizz and buzz, say "bang" for prime numbers (a number bigger than 1 whose only whole-number divisors are 1 and itself, like 2, 3, 5, 7, 11, etc.). So the play would start "one," "bang" (2 is prime), "bizz-bang" (3 is a multiple of 3 and prime), "four," "bang" (5 is prime), "bizz" (6 is a multiple of 3), "buzz-bang" (7 is a multiple of 7 and prime), "eight," "bizz" ($9 = 3 \times 3$), "ten," etc. Or play with only bizz and bang, or only buzz and bang.

Variation #3: instead of prime numbers, have "bang" for square numbers ($1^2 = 1 \times 1 = 1$, $2^2 = 2 \times 2 = 4$, $3^2 = 3 \times 3 = 9$, $4^2 = 4 \times 4 = 16$, etc.), or for triangle numbers (1, $1 + 2 = 3$, $1 + 2 + 3 = 6$, $1 + 2 + 3 + 4 = 10$, etc.), or whatever type of numbers you like; or keep "bang" for primes, and add "squidge" for squares or another new type; or whatever combination you'd like!

## Sprouts

Number of players: $N \geq 1$

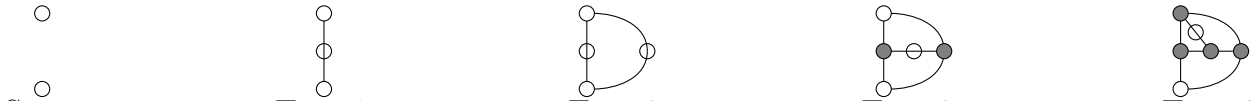
Instructions: start with three open dots (small circles), which means they're alive. On your turn, you draw a line to connect any two alive dots; the line can curve and wiggle but can't cross any existing line. Draw a new alive dot somewhere along the line you drew. If any dot now has three lines coming out of it, then it dies, and you fill it in.

Goal: see how long you can keep the sprouts going before you can't connect any two living dots without crossing an existing line (or all but one are dead).

Variation: see how few turns you can use before you can't connect any two living dots.

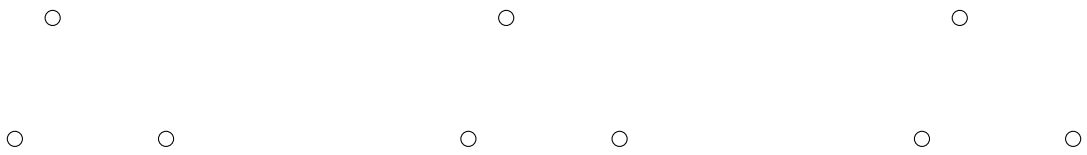
Variation: start with four dots (or any number you want).

Example (two-dot start):

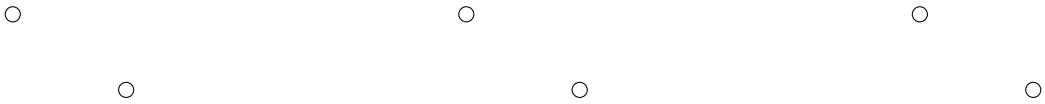


Start | Turn 1 | Turn 2 | Turn 3 two die | Turn 4 end

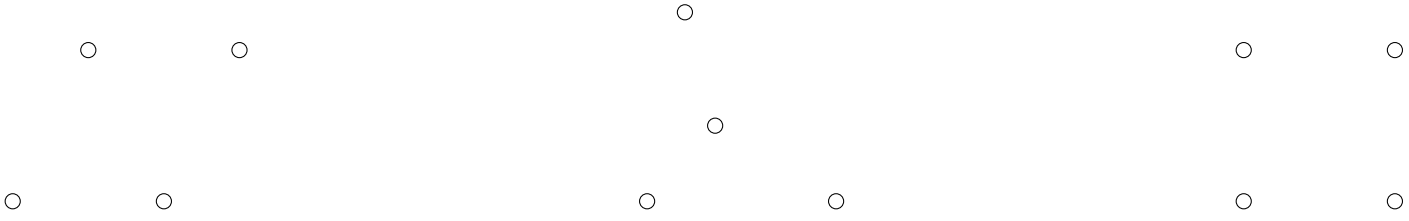
Starting positions (three dots):



Starting positions (two dots):



Starting positions (four dots):

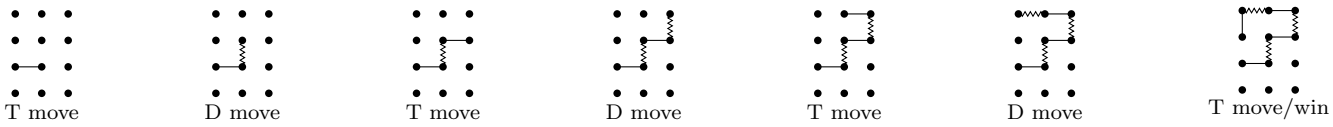


## Snake

Number of players: $N \geq 2$

Instructions: Player 1 draws a horizontal ⊷ or vertical ⁞ line to connect any two adjacent dots. Player 2 starts at the dot where Player 1 stopped, connecting it to a vertically or horizontally adjacent dot that was not yet part of the snake. Keep taking turns, adding one segment to the snake every turn. The game ends when there is no legal move left (all adjacent dots are already part of the snake).

Example game sequence (two players):




Game boards (or draw your own):