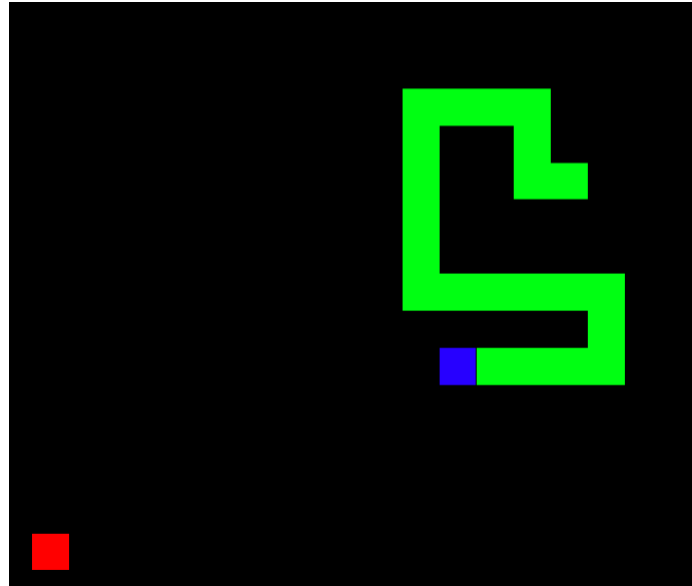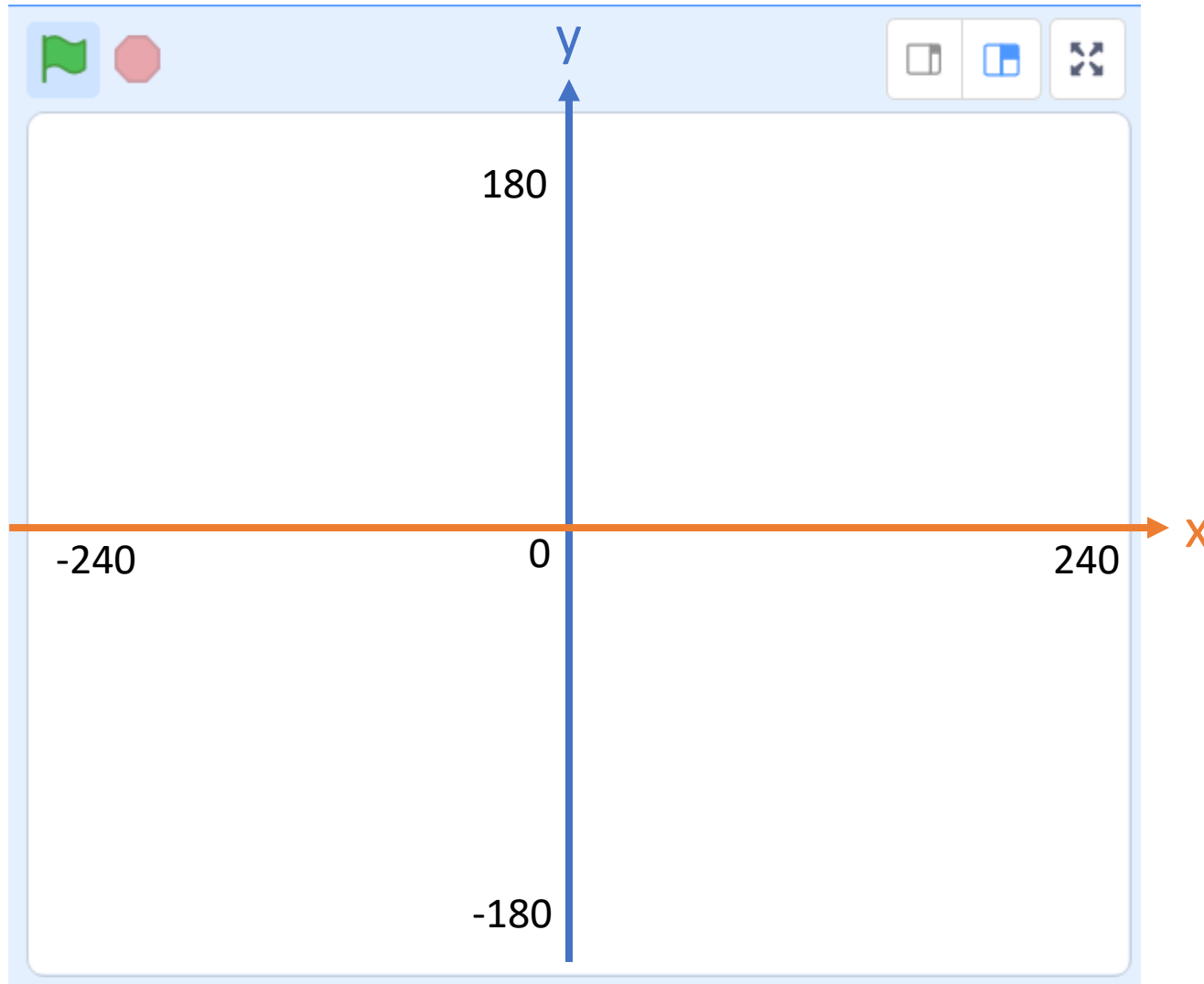# Scratch Programming

Snake
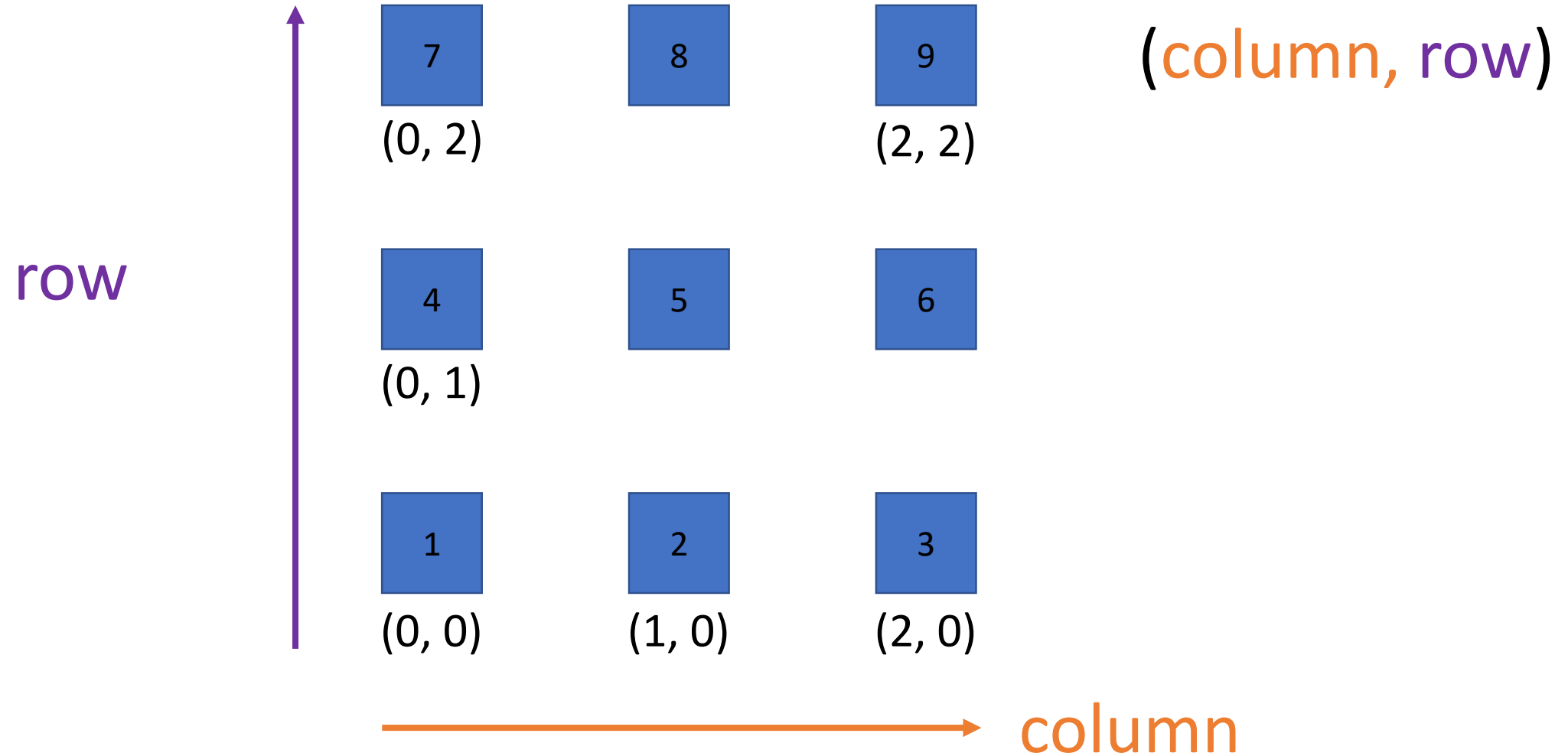
Instructor: Aaron Low

HELP University, Faculty of Computing and Digital Technology
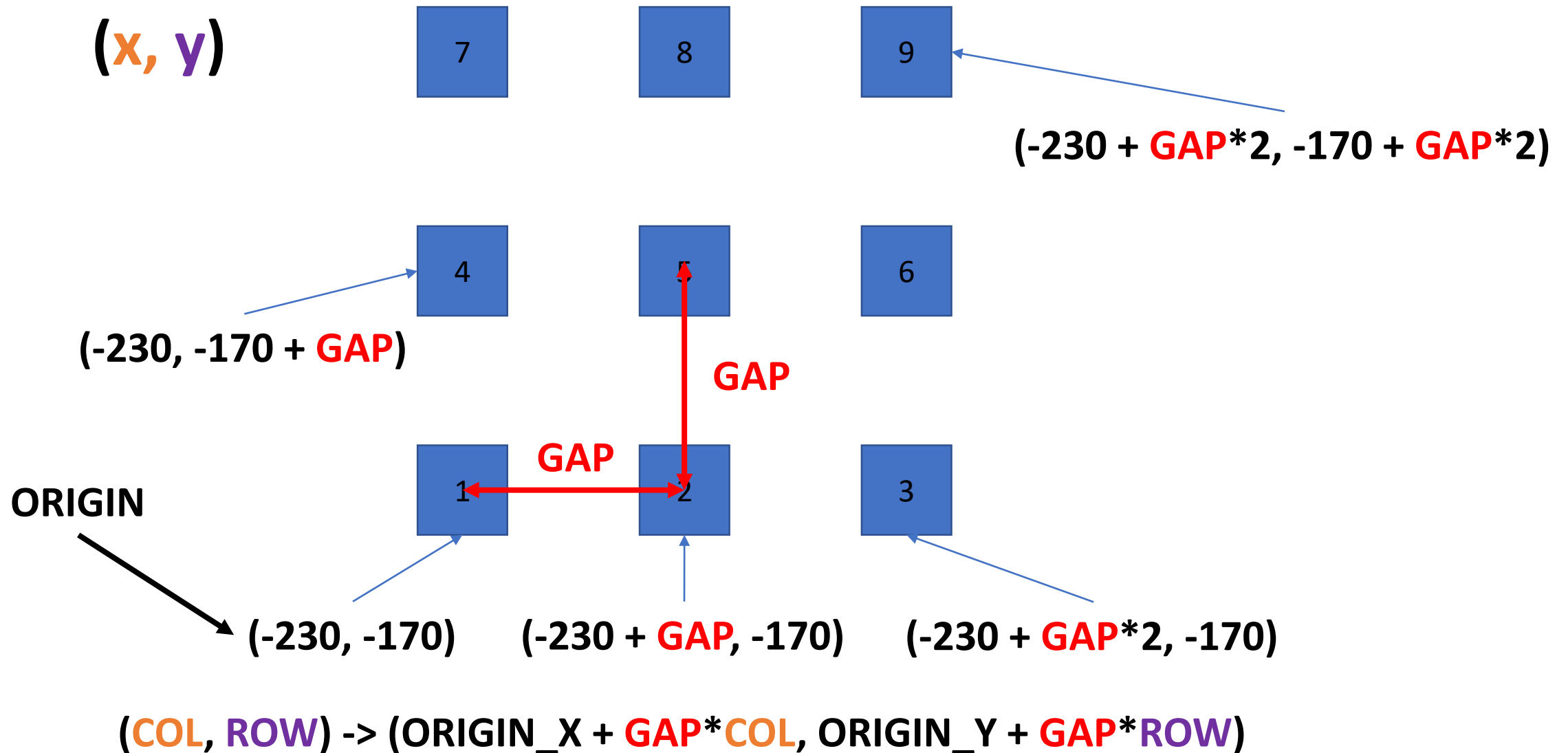
Scratch Stage

2D Grid: Grid Representation

2D Grid: Coordinate Representation

(x, y)

7	8	9

(-230 + GAP*2, -170 + GAP*2)

4	5	6

(-230, -170 + GAP)

GAP

GAP

ORIGIN

1	2	3

(-230, -170)　　**(-230 + GAP, -170)**　　**(-230 + GAP*2, -170)**

(COL, ROW) -> (ORIGIN_X + GAP*COL, ORIGIN_Y + GAP*ROW)
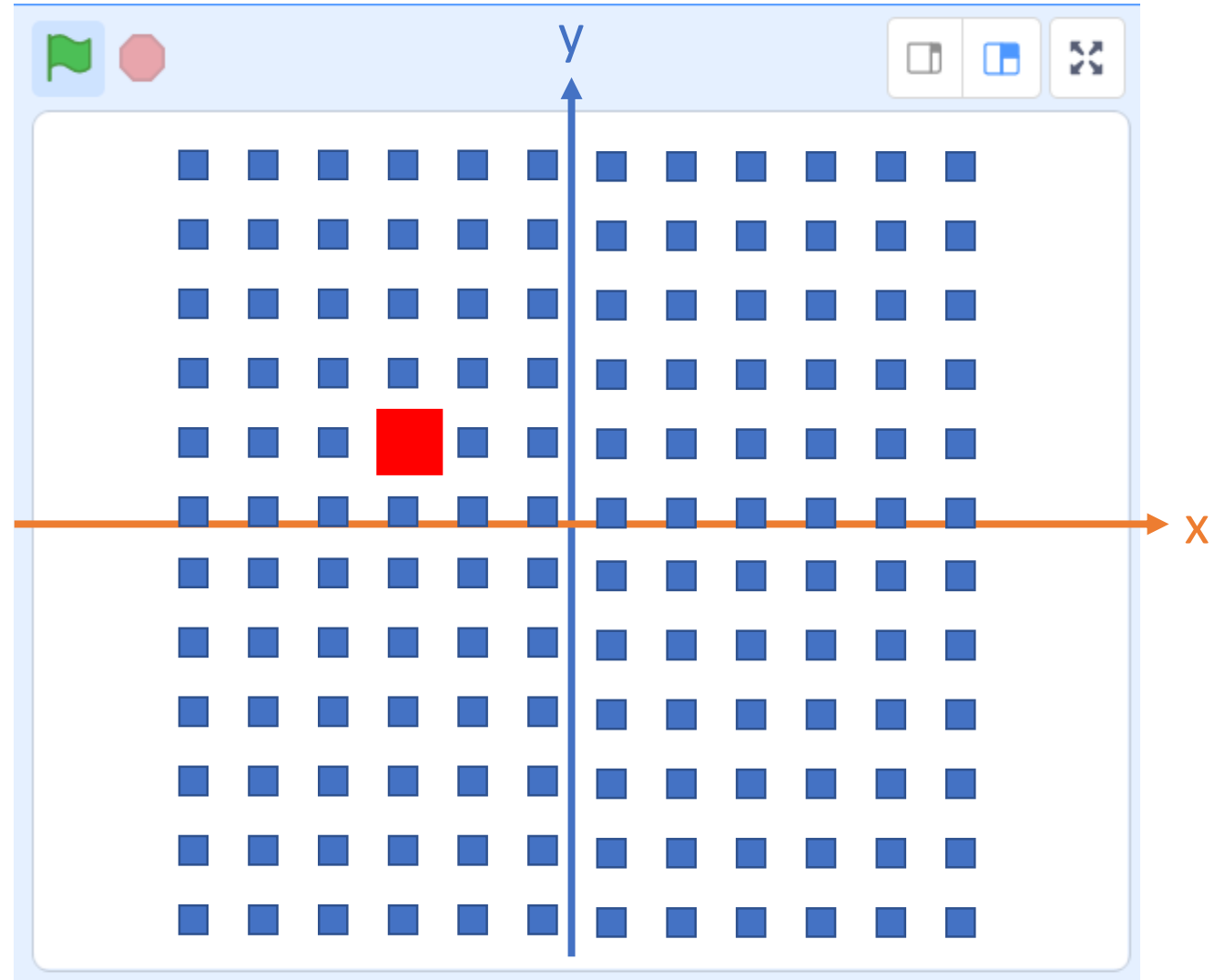
2D Grid
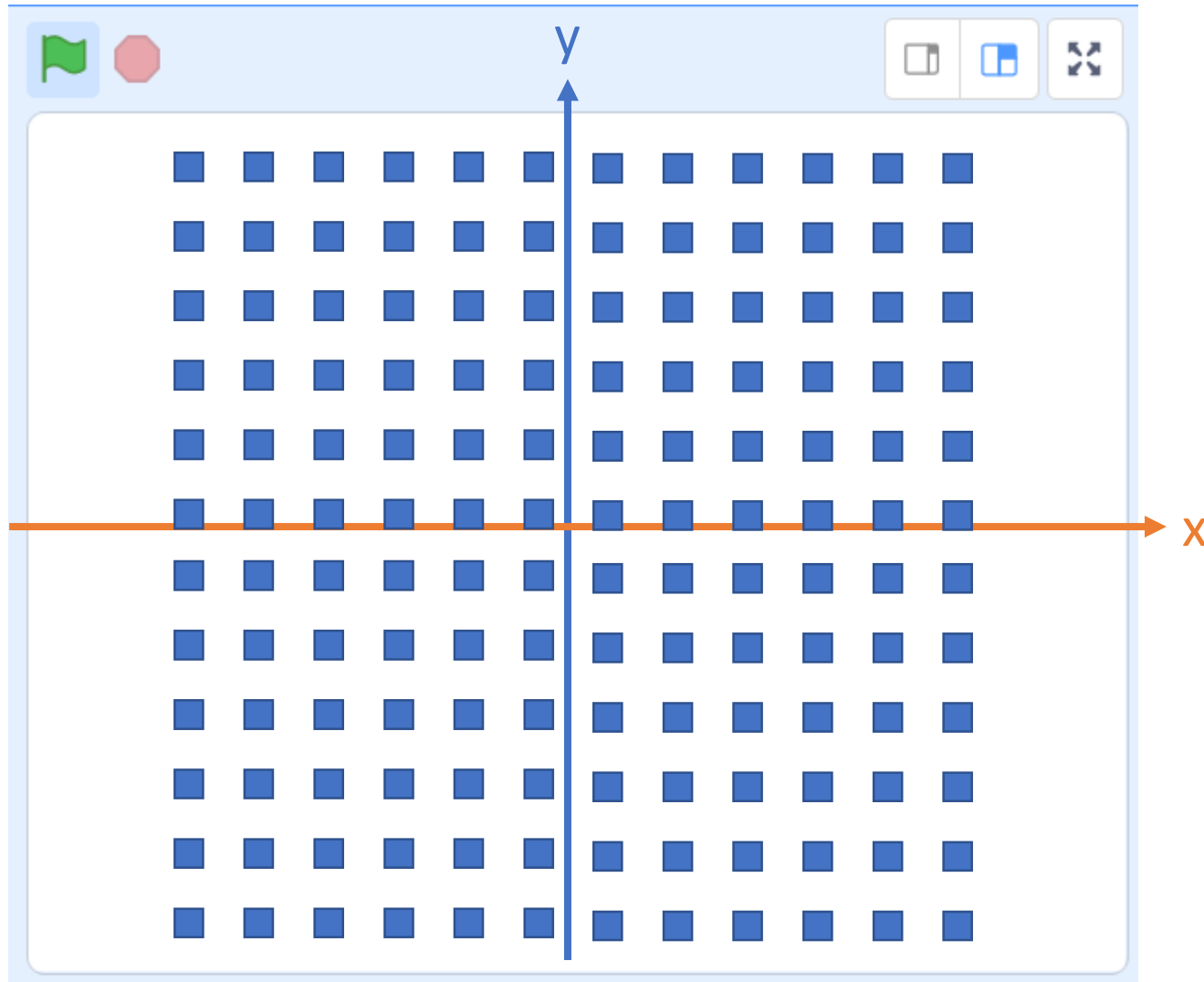
Player Movement
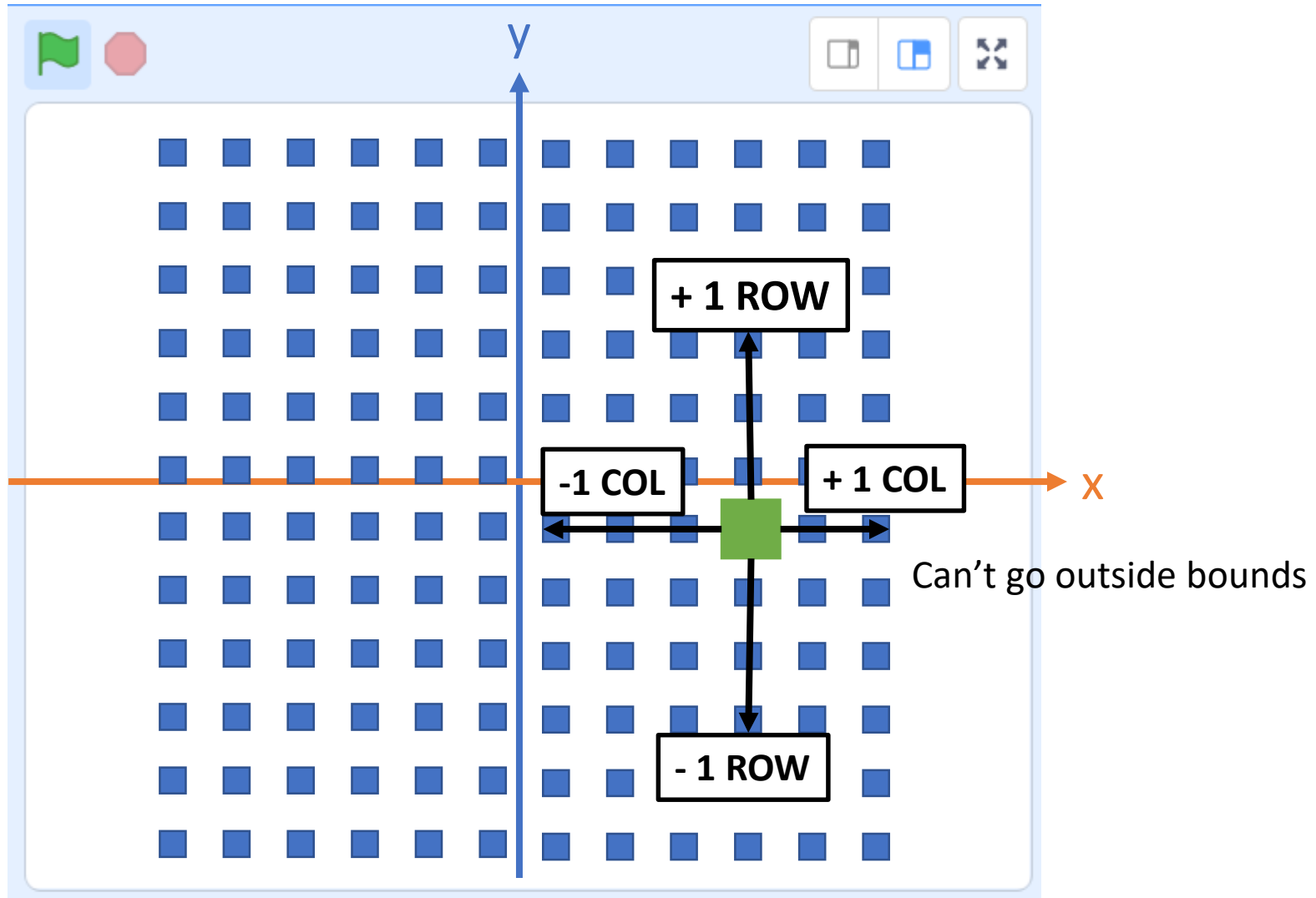
Spawning "Food"

- "Food" spawn randomly within the bounds
- Generate a new one every time the player "eats" it

Tail: Tail Representation

- Represent tail positions with **TWO** lists

List: Tail Column Positions

3
3
3
4
5

List: Tail Row Positions

1
2
3
3
3

Tail: Tail Representation

- Can also represent in **ONE** list by linearly indexing the grid

Linear Index = COL*(**TOTAL_COLS**) + ROW **+ 1**

**NOTE: We have a + 1 since Scratch indexes starting with 1

List: Tail Positions

1
2
3
4
5

Linear Index

1		2		3

Grid Coordinate (0, 0)   (1, 0)   (2, 0)

Tail: Moving the tail

Next Head Position

Head

Head

Update Position

Update Position

t = 0

t = 1
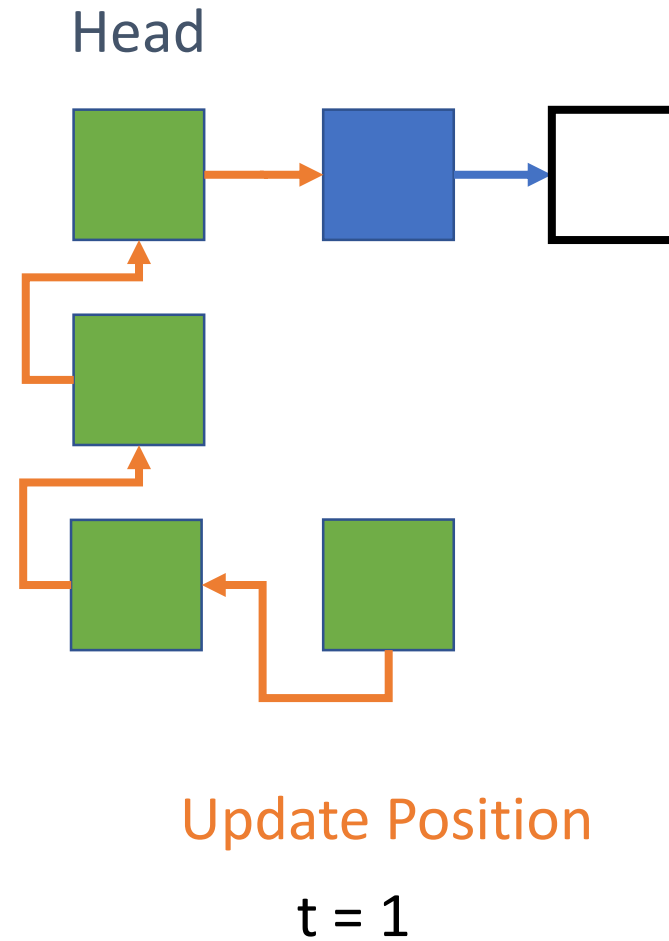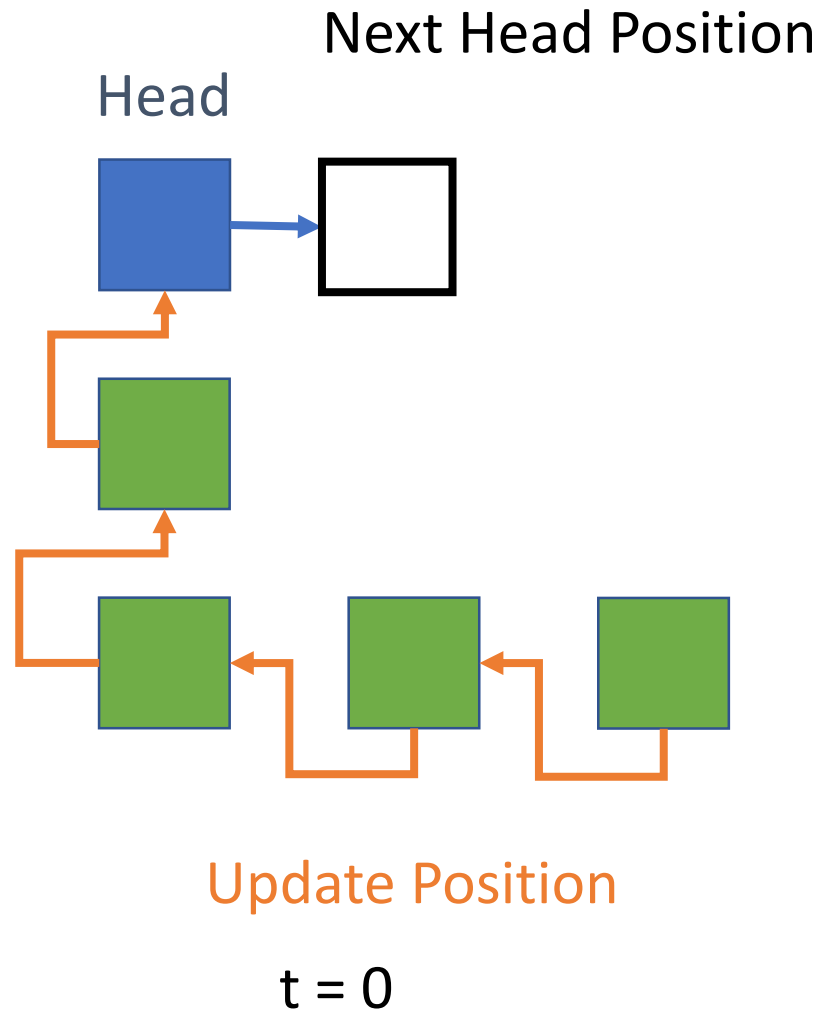
Tail: Moving the tail

- **We need to start iterating from behind to replace positions correctly**

	Last **Head** Column	Last **Head** Row
	List: Tail Column Positions	**List: Tail Row Positions**
Iter 5	3	1
Iter 4	3	2
Iter 3	3	3
Iter 2	4	3
Iter 1	5	3
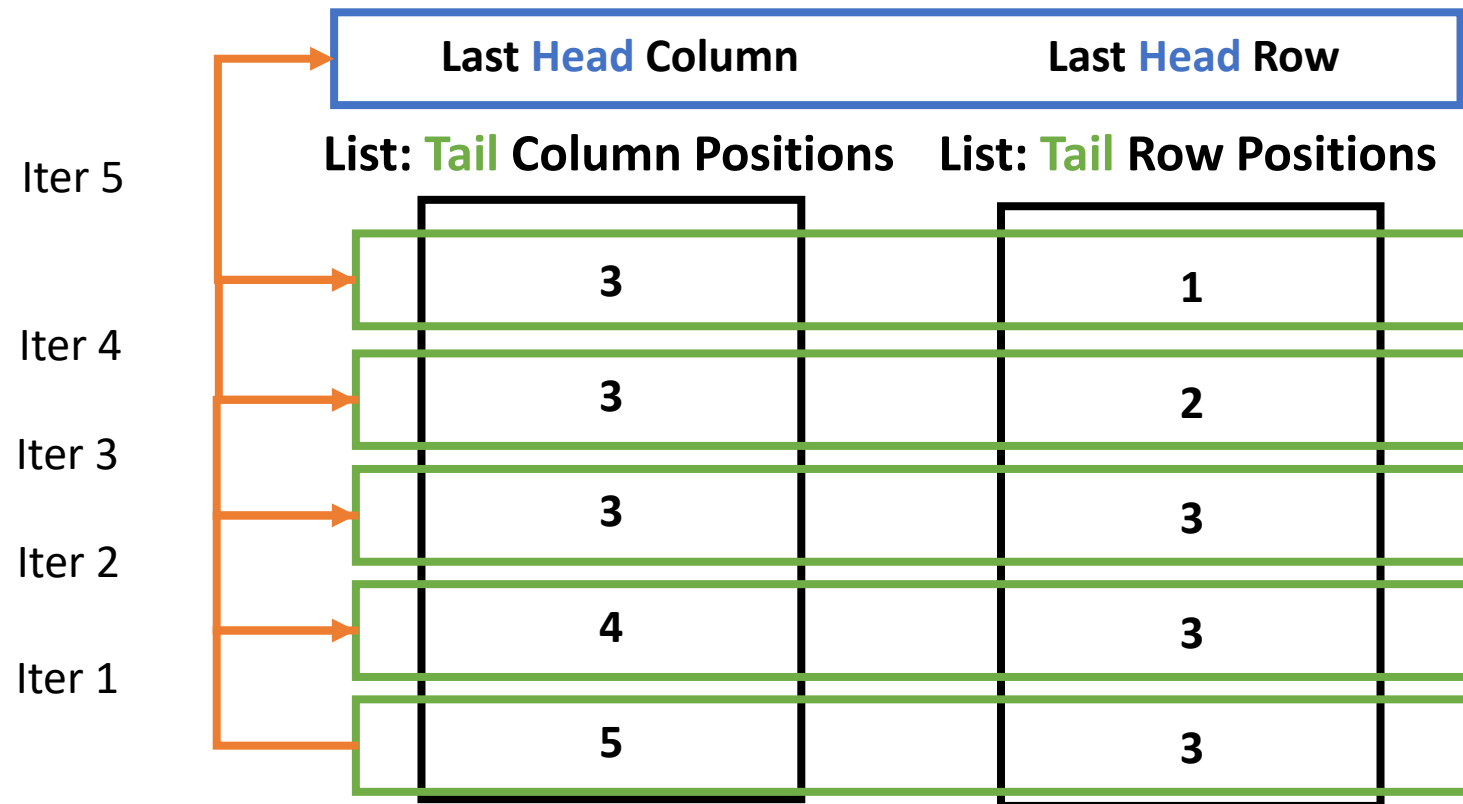
Tail: Moving the tail

- **Starting from the top**

Last **Head** Column	Last **Head** Row
List: Tail Column Positions	**List: Tail Row Positions**
3	1
3	2
3	3
4	3
5	3

Tail: Moving the tail

- **Starting from the top**

List: Tail Column Positions	List: Tail Row Positions
Last Head Column	Last Head Row
3	2
3	3
4	3
5	3

Last Head Column   Last Head Row

Tail: Moving the tail

- **Starting from the top**

List: **Tail** Column Positions	List: **Tail** Row Positions
Last **Head** Column	Last **Head** Row
3	2
3	3
4	3
5	3

Last **Head** Column   Last **Head** Row

We have lost information on this position