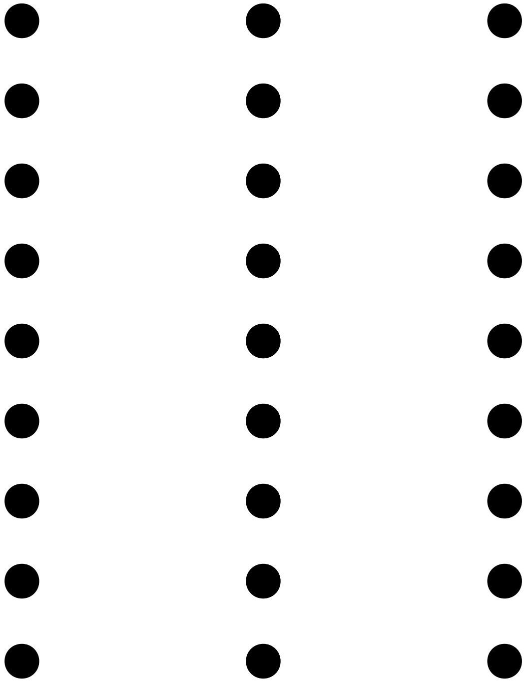
# Grid Coloring

250H

# 3 x n Grids

- No matter how you 2-color a 3 x 9 grid there exists a mono rectangle



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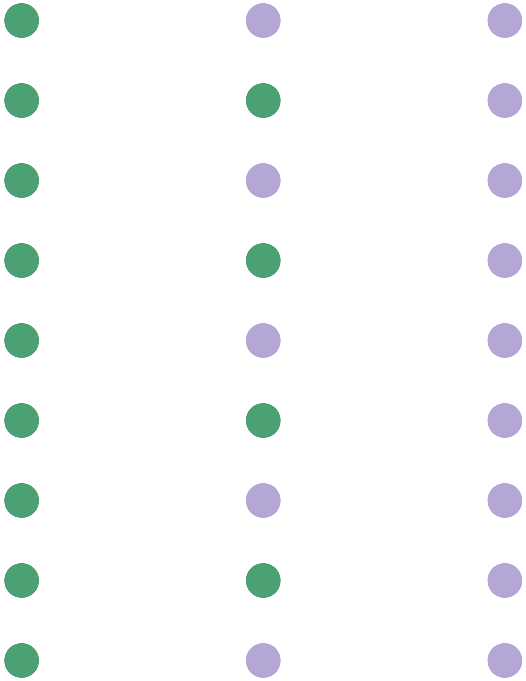

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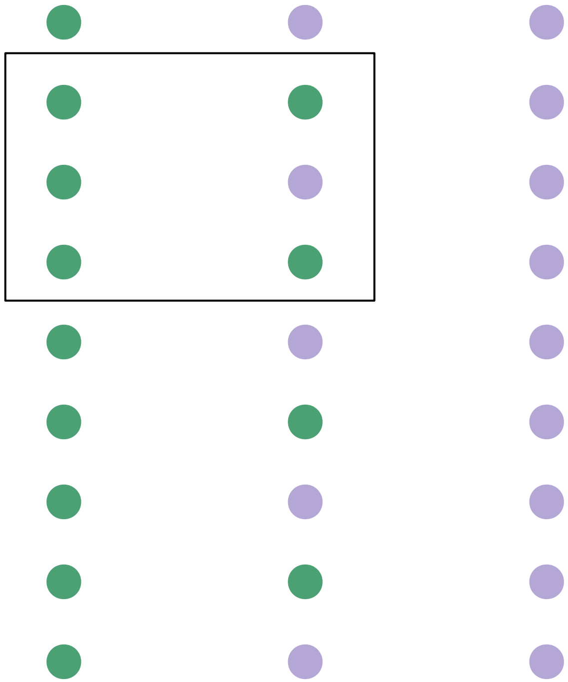

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  - ect?

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- I know you are all super excited to talk about this with your classmates

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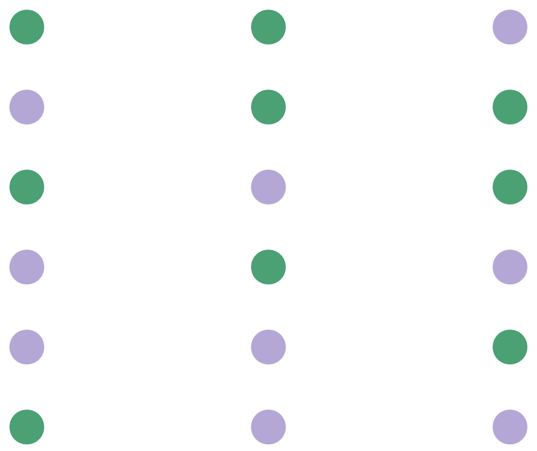
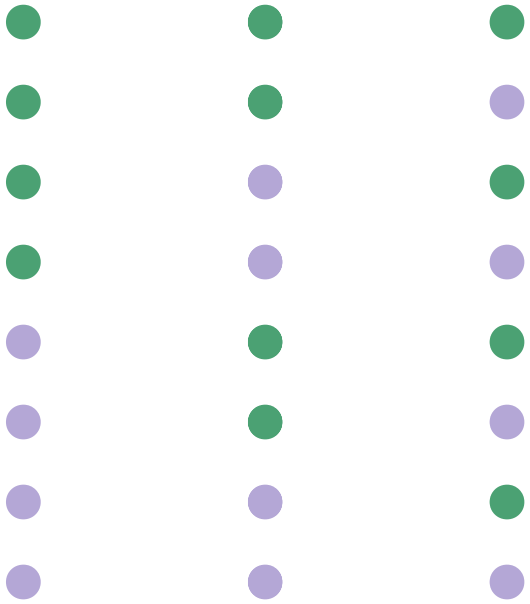


# Let’s Look Closer

A 2-coloring of  a 3x7 grid can be viewed as an 8-coloring of the rows, so if there are 9 rows, two are the same.



# What about?

- 4x4
- 4x5
- 4x6
- 5x5
- 5x6

# What about?

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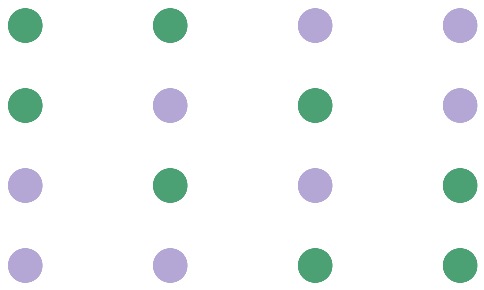

# n x m grid 2-Coloring Theorem

Theorem: n x m is 2-colorable without a monochromatic rectangle if and only if it does not contain a **3 x 7, 7 x 3, or 5 x 5** grid.

# What if we have 3 colors?

We can expand this to look at what grids we can color for 3 colors