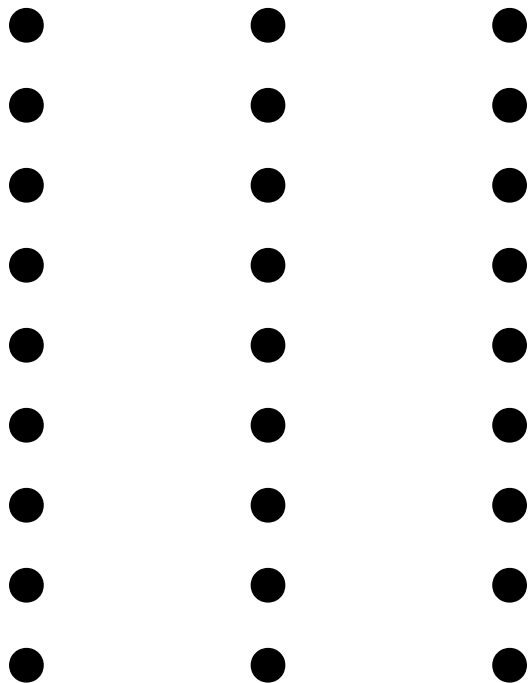


Grid Coloring

250H

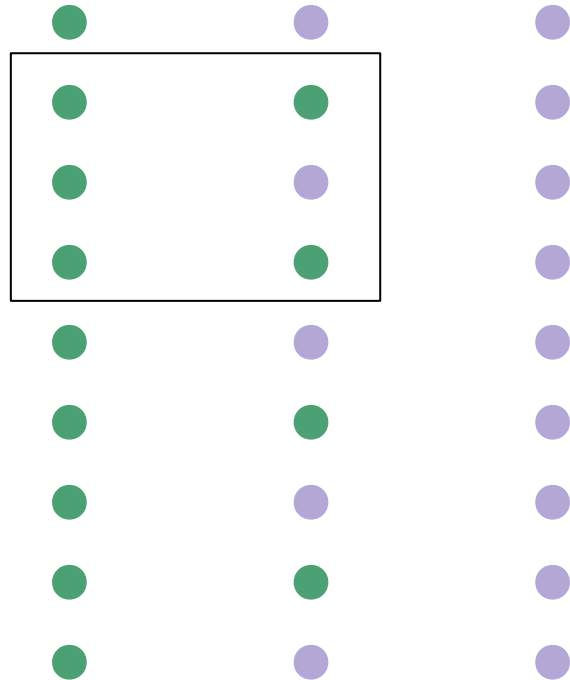
3 x n Grids

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



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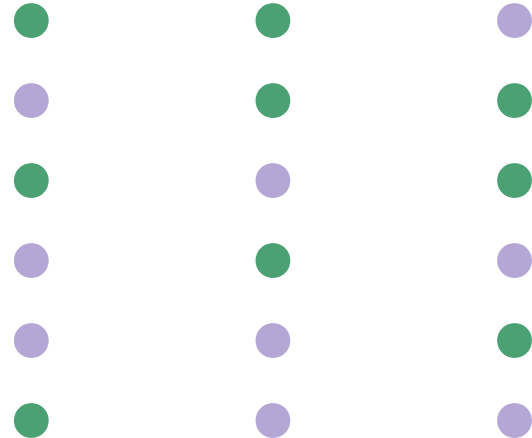
- No matter how you 2-color a 3 x 9 grid there exists a mono rectangle
- What about a
 - 3 x 8
 - 3 x 7
 - 3 x 6
 - ect?

3 x n Grids

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- What about a
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 - ect?
- I know you are all super excited to talk about this with your classmates in Breakout Rooms

3 x n Grids

- No matter how you 2-color a 3 x 9 grid there exists a mono rectangle
- What about a
 - 3 x 8
 - 3 x 7
 - 3 x 6
 - ect?

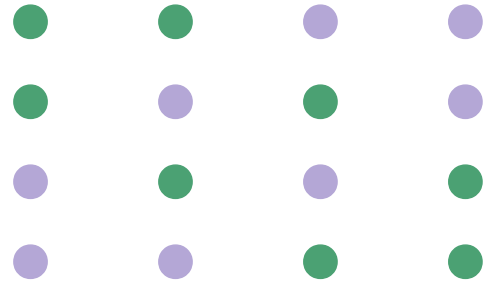


What about?

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

What about?

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



$n \times m$ grid 2-Coloring Theorem

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

What if we have 3 colors?

What grids can we color without getting a monochromatic rectangle?

What if we have 3 colors?

Theorem: $n \times m$ is 3-colorable without a monochromatic rectangle if and only if it does not contain a 19×4 , 16×5 , 13×7 , 11×10 , 10×11 , 7×13 , 5×16 , 4×19 grid.