

Not Three in a Line

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Grade Range	Content Area	Materials
K to 8	<ul style="list-style-type: none">• Geometry and Measurement• Patterning	<ul style="list-style-type: none">• Paper• Pen

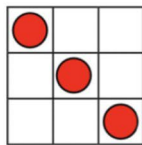
Activity



Puzzle time

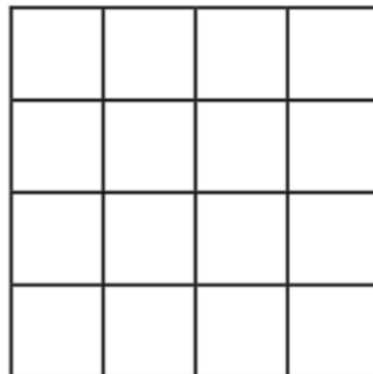
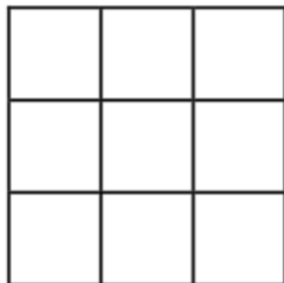
Not three in a line!

This 3 x 3 square has three counters in it in a row.



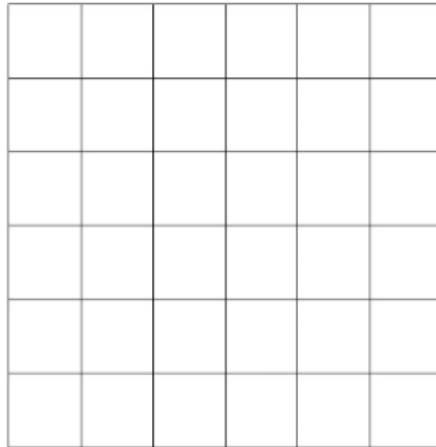
But what I want to know is how many counters you can place without getting three in a row! You can have one or two in a row but not three!

Try it out with a 3 x 3 and a 4 x 4 grid.



How many counters did you put in a 4 x 4 grid without getting three in row!

What about a 6x6 square? Are you starting to see a pattern? How many counters do you think you could put in a 10 x 10 grid without having three in a line?



Extensions, Modifications & Additional Resources

Questions to Provoke Students' Thinking:

1. Do you see a pattern in how many counters can be placed as the grid gets larger in size?
2. How can you use what you know about patterns to try and solve this puzzle?
3. How can you use what you know about symmetry to try and solve this puzzle?
4. What happens when you place the counters on vertices instead of inside the grid squares? Can you fit more or fewer counters in that case?
5. Can you find multiple ways to place the same number of counters in the grid?
6. How can you use what you've learned from this puzzle to solve other mathematical problems or challenges?

Activate Prior Knowledge:

Consider what prior knowledge is necessary for students to successfully complete the task. Ensure that all students understand the concept of 3 in a row and how to arrange objects so there are not 3 in a row.

Communicate Learning Objectives:

Clearly communicate the objectives to students so they understand what they are expected to do and learn.

Differentiation:

Consider the diverse range of learners in your class and plan to make the tasks more accessible for struggling learners and more challenging for advanced learners. One way to modify the difficulty is changing the size of the grid and giving students the number of counters they need to be able to fit into the grid ahead of time.

Provide Context:

Consider how this task is relevant to students' lives and how it connects to other areas of study. Perhaps the task could be modified to represent a real world example (i.e. The teacher needs to arrange desks a certain way but has 8 students they need to keep out of the same row.)

Encourage Collaboration:

Structure the task to encourage students to work together, discuss their ideas and share their thinking with their peers.

Reflection:

Consider how students will be encouraged to reflect on their learning. Plan for opportunities for students to reflect on progress and think about what they have learned. Encourage them to set goals and think about how they can continue to improve.

Acknowledgments:

Task modified from [No three in a line puzzle](#)

Images from [Math Sphere](#)