

Generalities

Work with 1–3 other students, and choose one of your group as the recorder (who will keep a written record of your progress). Make a start on the problem for about 5–10 minutes, then stop and review any choices you’ve made about how to proceed. I have suggested a couple of approaches to consider on the back of this sheet, but you should only look at these after you have made a good start on the problem. Organize your discussion following the “UPEEG” method:

Understand the problem—in particular, are there various ways to represent it?

Plan one approach—or two! What is the outcome you expect from your plan?

Execute your plan.

Evaluate your progress—figure out when and how you became stuck (if you did), and what insights (if any) represented a breakthrough.

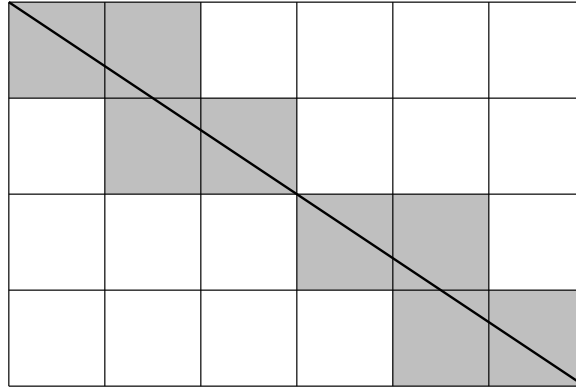
Generalize your results—think of various ways in which the problem could be generalized, and whether or not your approach(es) would still work.

The problem

You have a rectangular grid made up of m rows and n columns (positive whole numbers). Draw a line from the upper left to the lower right corner (the diagonal). How many of the grid squares will the line pass through the interior of? If you are told m and n , can you calculate how many squares the diagonal will meet? Can you derive a formula? Can you justify your formula.

Hint 1—understand: Try out some examples. Since the examples need to be drawn fairly accurately, you might want to use some paper that's already divided up into squares.

Here's an example where $m = 4$ and $n = 6$:



Hint 2—generalize: (This is not really a hint, more of a suggestion.)

Can you find a formula for the similar problem in higher dimensions?