

Mondrian

Art Puzzles

Rules

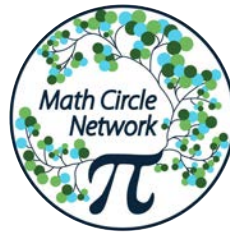
In these puzzles you're Mondrian's nasty mathematical boss. Instead of allowing Mondrian to randomly draw rectangles and colors -you lay out precise requirements:

- 1) Mondrian must cover the entire canvas with rectangles.
- 2) Every rectangle on the canvas must have different **dimensions**... so Mondrian cannot paint both a 4x5 and a 5x4 rectangle.
- 3) When coloring, Mondrian must use as few colors as possible, and rectangles with the same color cannot touch one another.

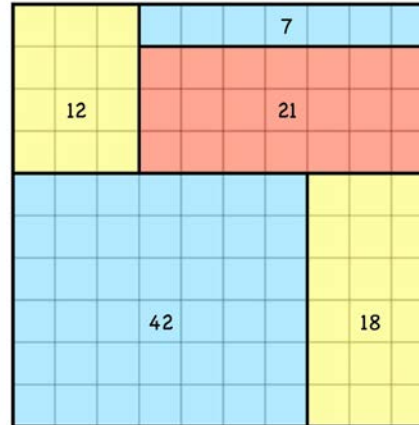
Objective

Mondrian must try to **minimize** his score. A painting's score is the area of its largest rectangle minus the area of its smallest rectangle.

Example Mondrian Paintings On a 7x7 Canvas



A

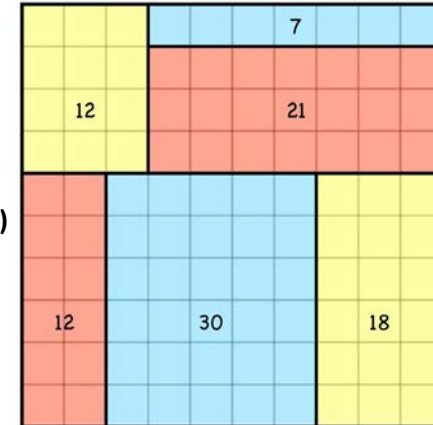


Mondrian's Score
(Largest - Smallest)

$$42 - 7 = 35$$

Too high a score

B

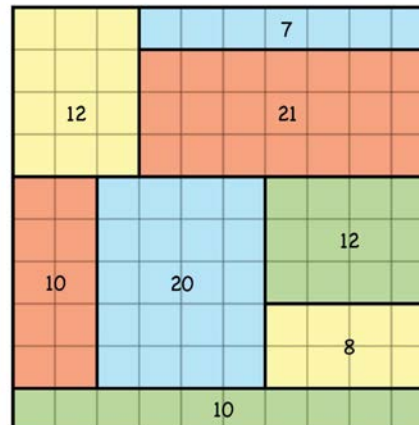


Mondrian's Score
(Largest - Smallest)

$$30 - 7 = 23$$

Better, but we can
get even lower

C

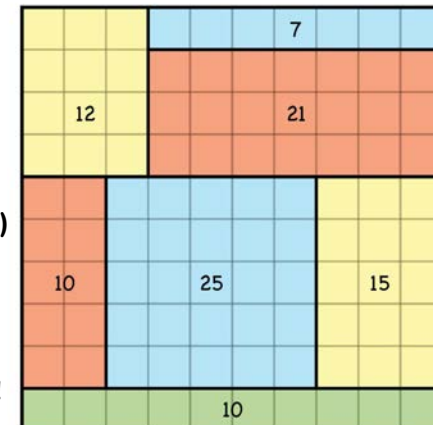


Mondrian's Score
(Largest - Smallest)

$$20 - 7 = 13$$

Great score, but we
have both 3x4 & 4x3
so it doesn't count

D



Mondrian's Score
(Largest - Smallest)

$$25 - 7 = 18$$

Great score, and
Mondrian isn't
breaking any rules!

Painting D has the lowest score while following all the rules, so we would call it the best painting



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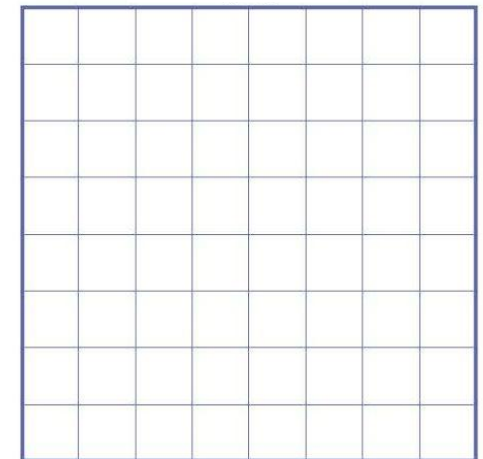
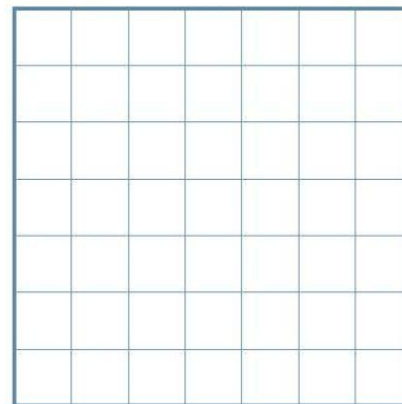
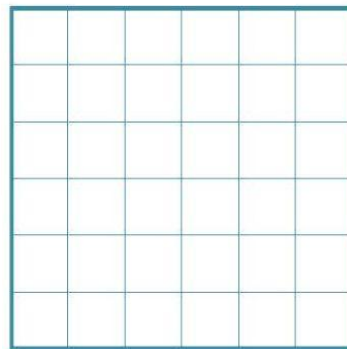
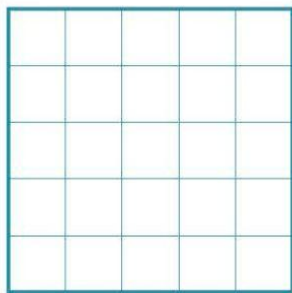
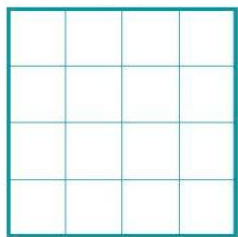
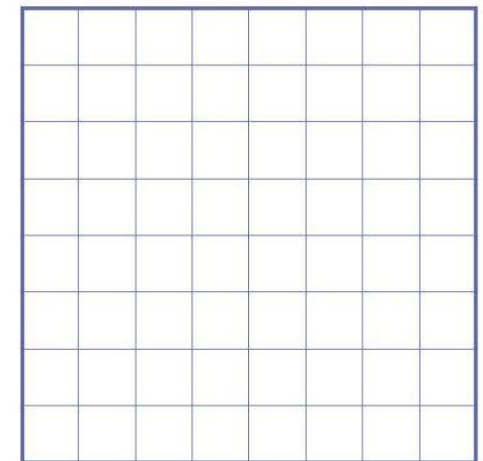
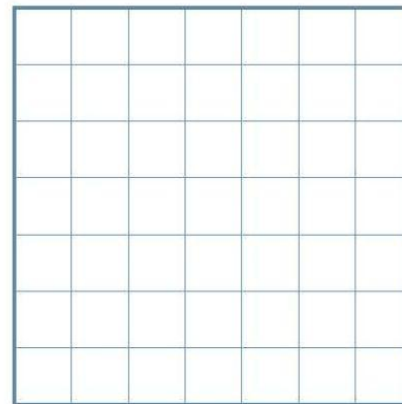
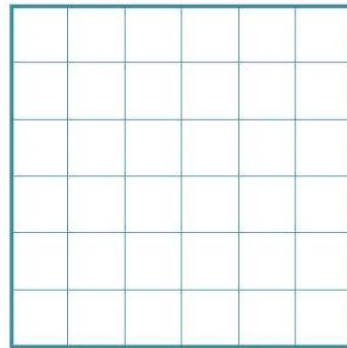
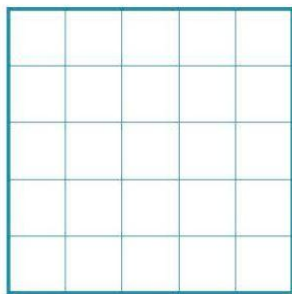
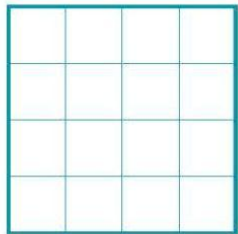
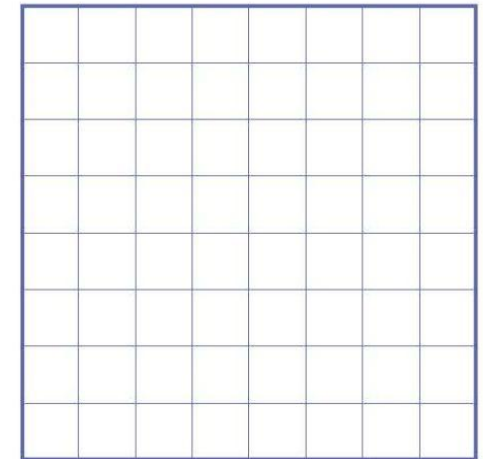
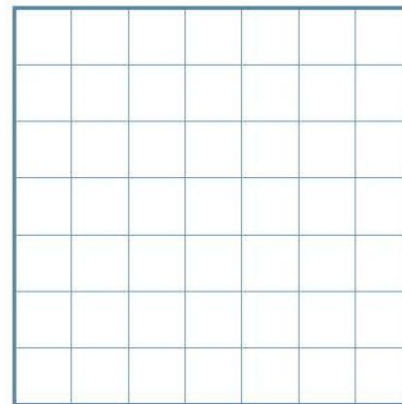
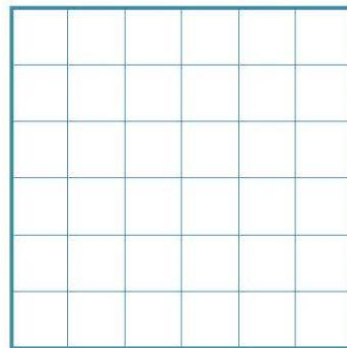
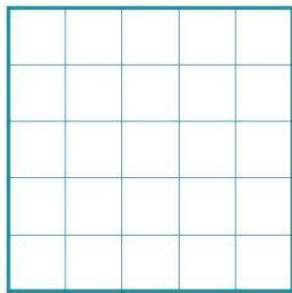
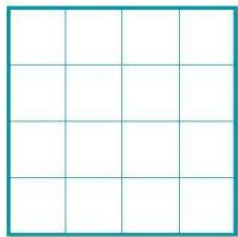
4x4

5x5

6x6

7x7

8x8



Mondrian

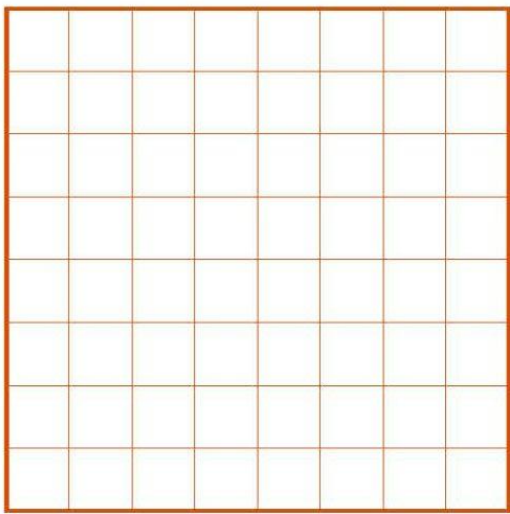
Art Puzzles

Mondrian works in ink, so he can't erase anything. However, you allow him three chances for each canvas size. What is the lowest score he can get for each?

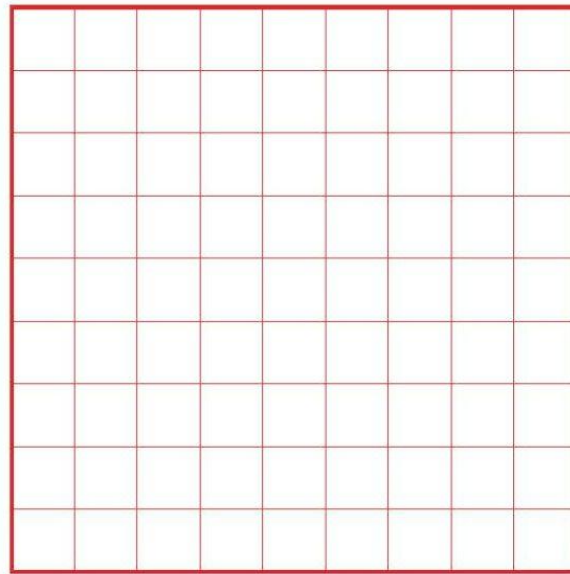
(Try to find the lowest score without using your eraser)



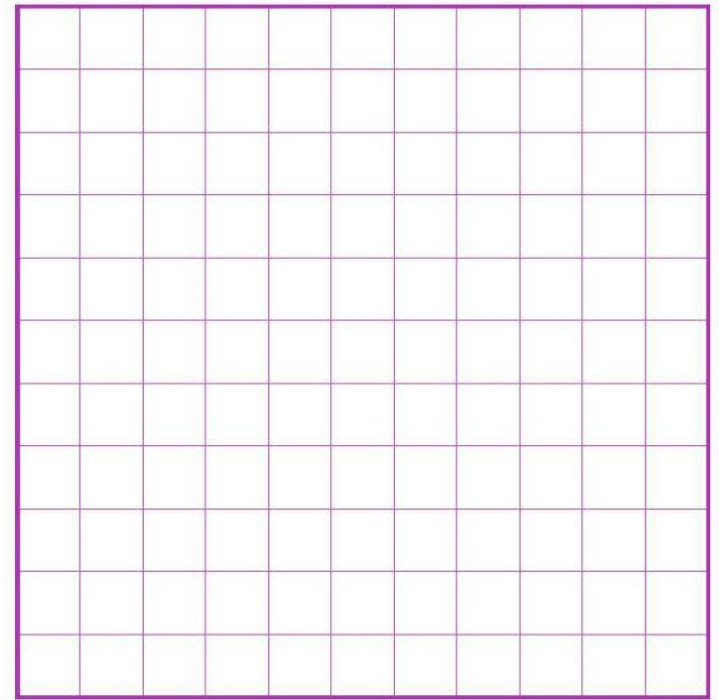
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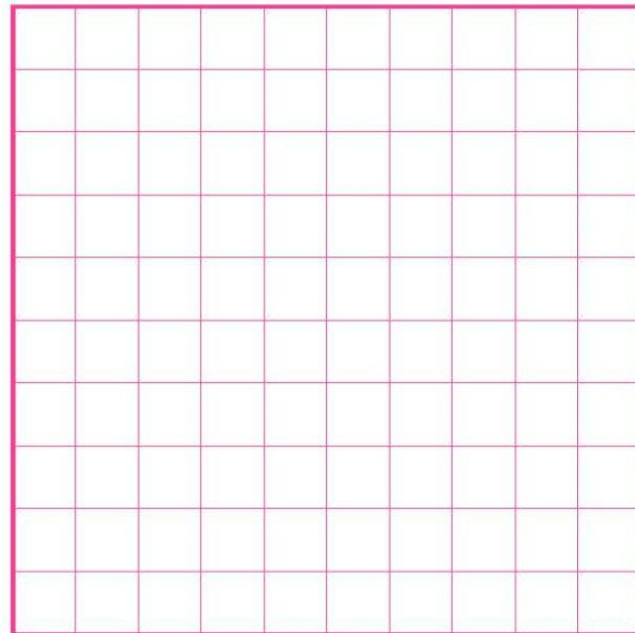
8x8



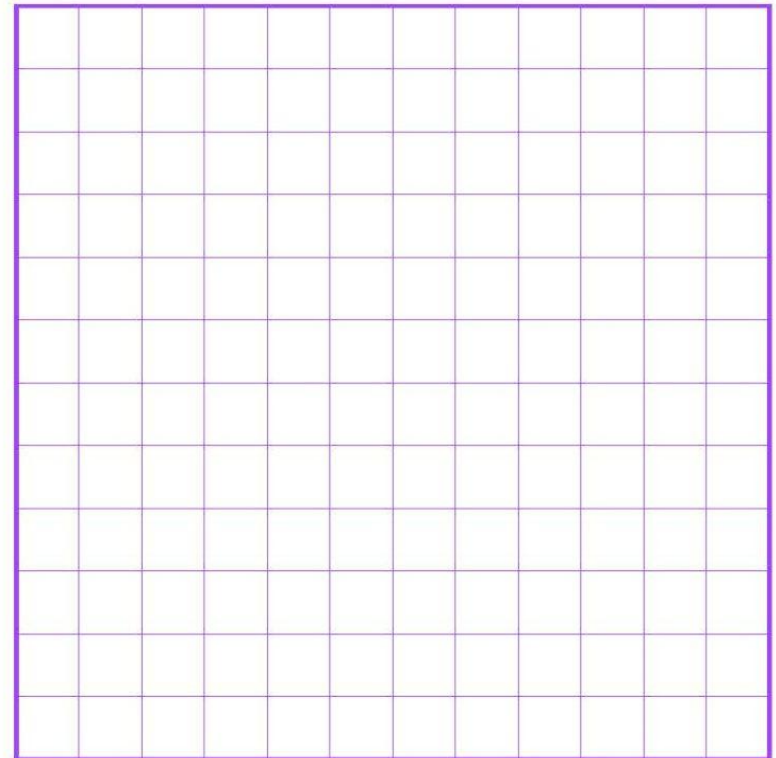
9x9



11x11



10x10



12x12

Mondrian

Art Puzzles

What is the minimum score for each painting? You may use graph paper to explore even larger paintings.

In general, this is what's called an **open problem**, meaning mathematicians have yet to find a solution for every possible painting.

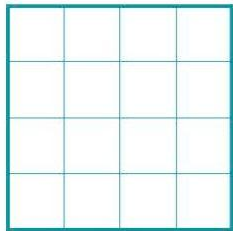


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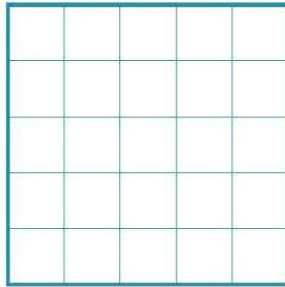
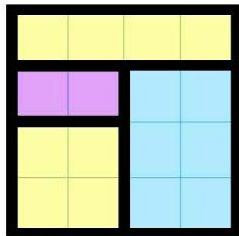
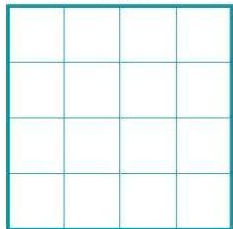
After much effort, the following are the best results obtained from the grade 3 students at Mount View School, Calgary.

Don't look at these until students have made a good stab at it!

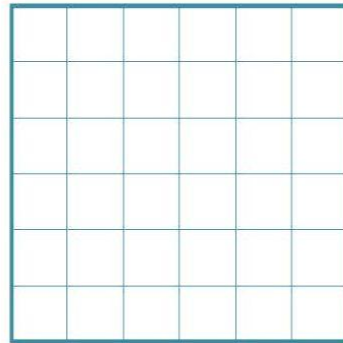
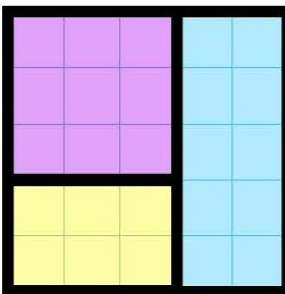
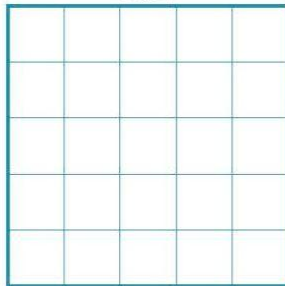
-Gord Hamilton, MathPickle.com



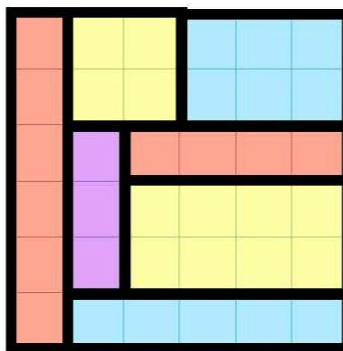
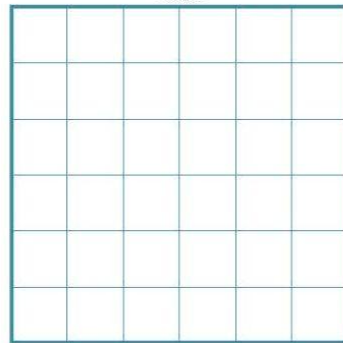
4x4



5x5

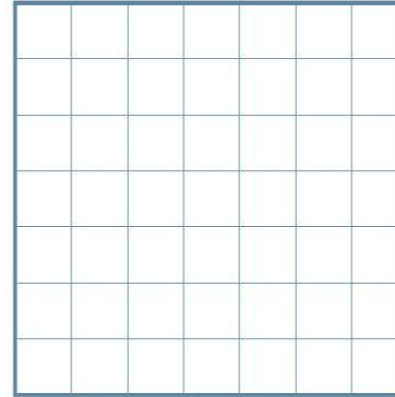


6x6

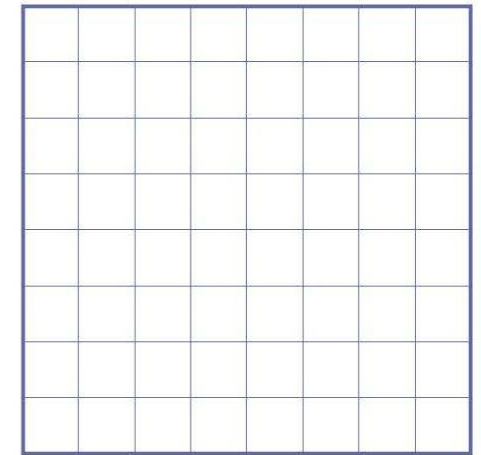
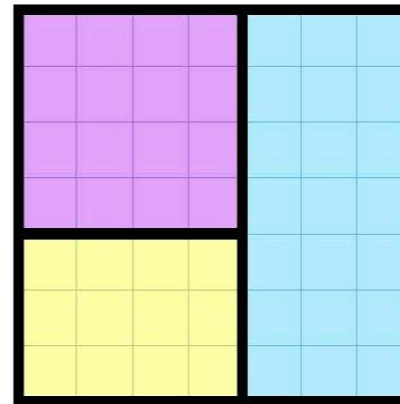
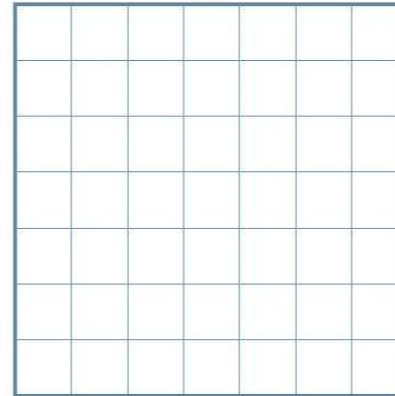


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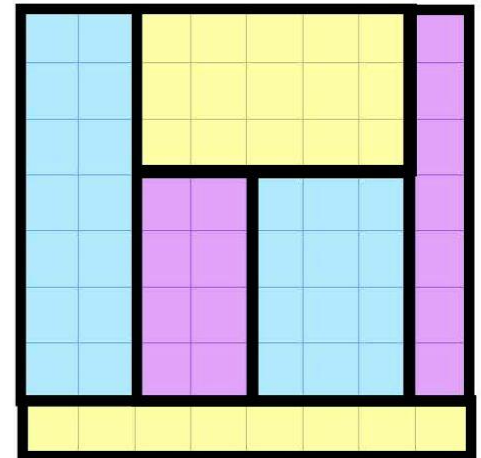
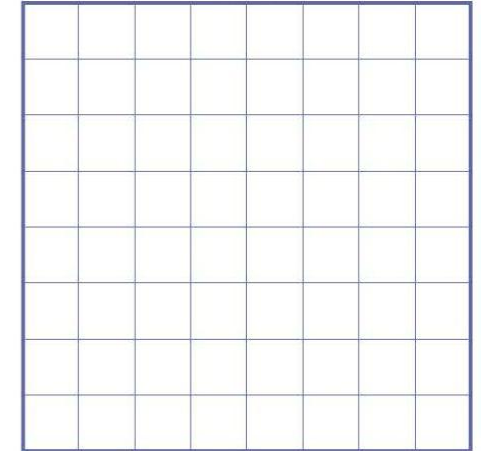
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8x8



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