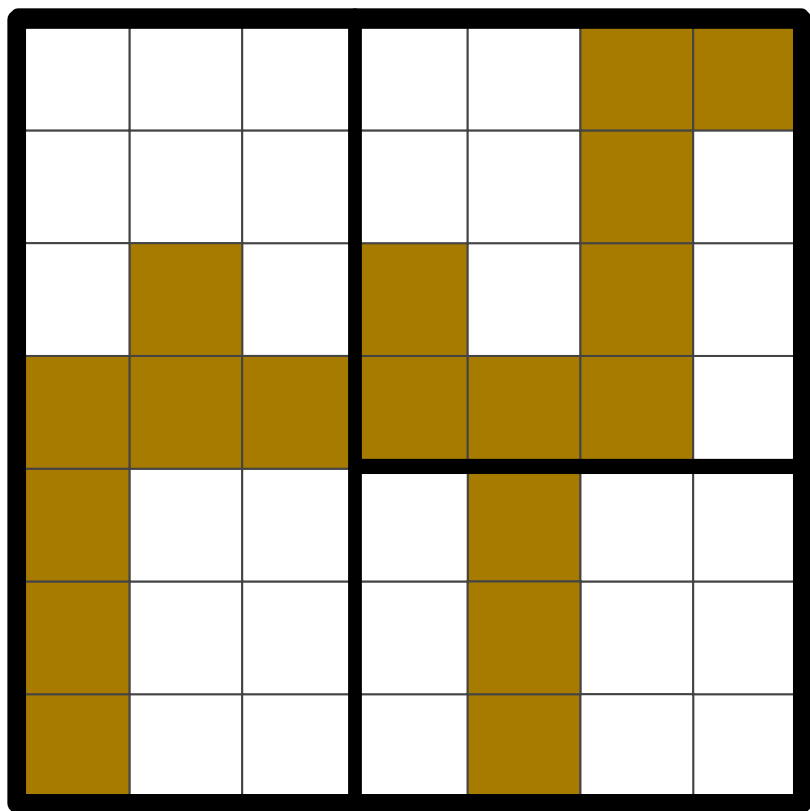


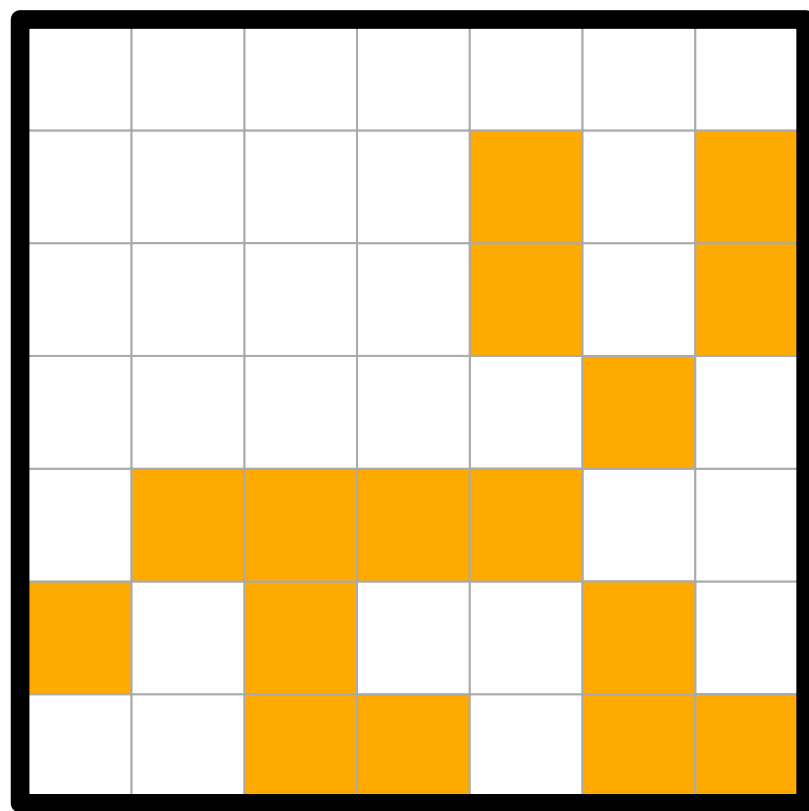
FRACTURED FRACTION PUZZLES



$1/2$

$1/3$

$1/4$



$1/2$

$1/3$

$1/7$

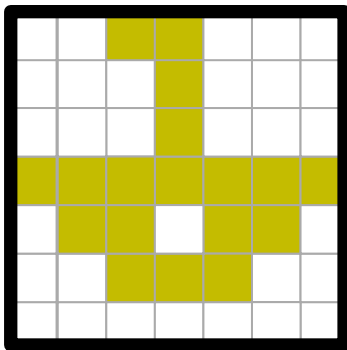
Contents

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	Common Core Standards	4	
Most of the first class will be spent here	{	Puzzle to project and solve as a class	5
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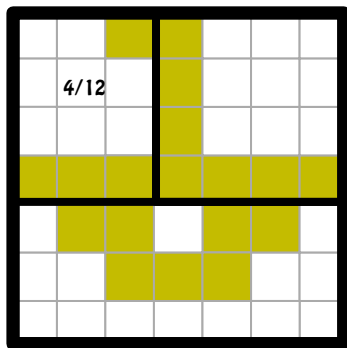
FRACTURED FRACTION PUZZLES

These puzzles belong in any classroom learning about equivalent fractions. Here's an example: Cover the 7x7 tiles of the yellow submarine with three rectangles... One rectangle must be half yellow; one must be a third yellow, and one must be a quarter yellow.



1/2
1/3
1/4

The following looks like it might be correct. The upper left rectangle has got 4/12 grey which is equivalent to 1/3. Good we'll check off that.



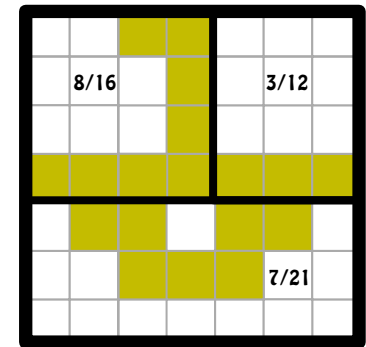
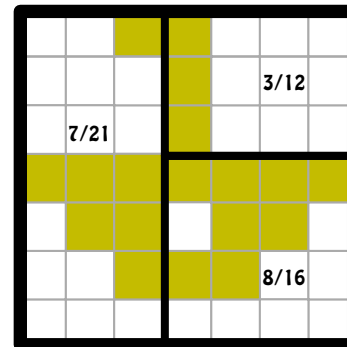
1/2
1/3 ✓
1/4

Unfortunately, the bottom rectangle is 7/21 grey which is also equivalent to 1/3. The upper right rectangle (which is also a square) is 7/16 which is a disaster because it doesn't simplify.

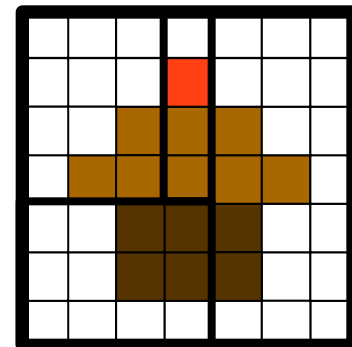
After a little exploration you'll find one or both of these solutions to the yellow submarine.





$$\begin{aligned} 8/16 &= 1/2 \\ 7/21 &= 1/3 \\ 3/12 &= 1/4 \end{aligned}$$

$$\begin{aligned} 8/16 &= 1/2 \\ 7/21 &= 1/3 \\ 3/12 &= 1/4 \end{aligned}$$



Students inventing their own puzzles may decide to use multiple colors. In this case, when a fraction is specified, the color must also be specified. For example here is the solution to Lauren & Noelle's cupcake puzzle:



1/3 
1/3 
1/4 
1/7 



Standards for Mathematical Practice

All MathPickle puzzle designs, including FRACTURED FRACTION PUZZLES, are guaranteed to engage a wide spectrum of student abilities while targeting the following Standards for Mathematical Practice:

MP1 Toughen up!

This is problem solving where our students develop grit and resiliency in the face of nasty, thorny problems. It is the most sought after skill for our students.

MP3 Work together!

This is collaborative problem solving in which students discuss their strategies to solve a problem and identify missteps in a failed solution. MathPickle recommends pairing up students for all its puzzles.

MP6 Be precise!

This is where our students learn to communicate using precise terminology. MathPickle encourages students not only to use the precise terms of others, but to invent and rigorously define their own terms.

MP7 Be observant!

One of the things that the human brain does very well is identify pattern. We sometimes do this too well and identify patterns that don't really exist.

Common Core State Standards

FRACTURED FRACTION PUZZLES targets the following Common Core State Standards:

Grade 3

CCSS.MATH.CONTENT.3.NF.A.3

Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

CCSS.MATH.CONTENT.3.NF.A.3.A

Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

CCSS.MATH.CONTENT.3.NF.A.3.B

Recognize and generate simple equivalent fractions.

CCSS.MATH.CONTENT.3.NF.A.3.D

Compare two fractions with the same numerator or the same denominator.

Grade 4

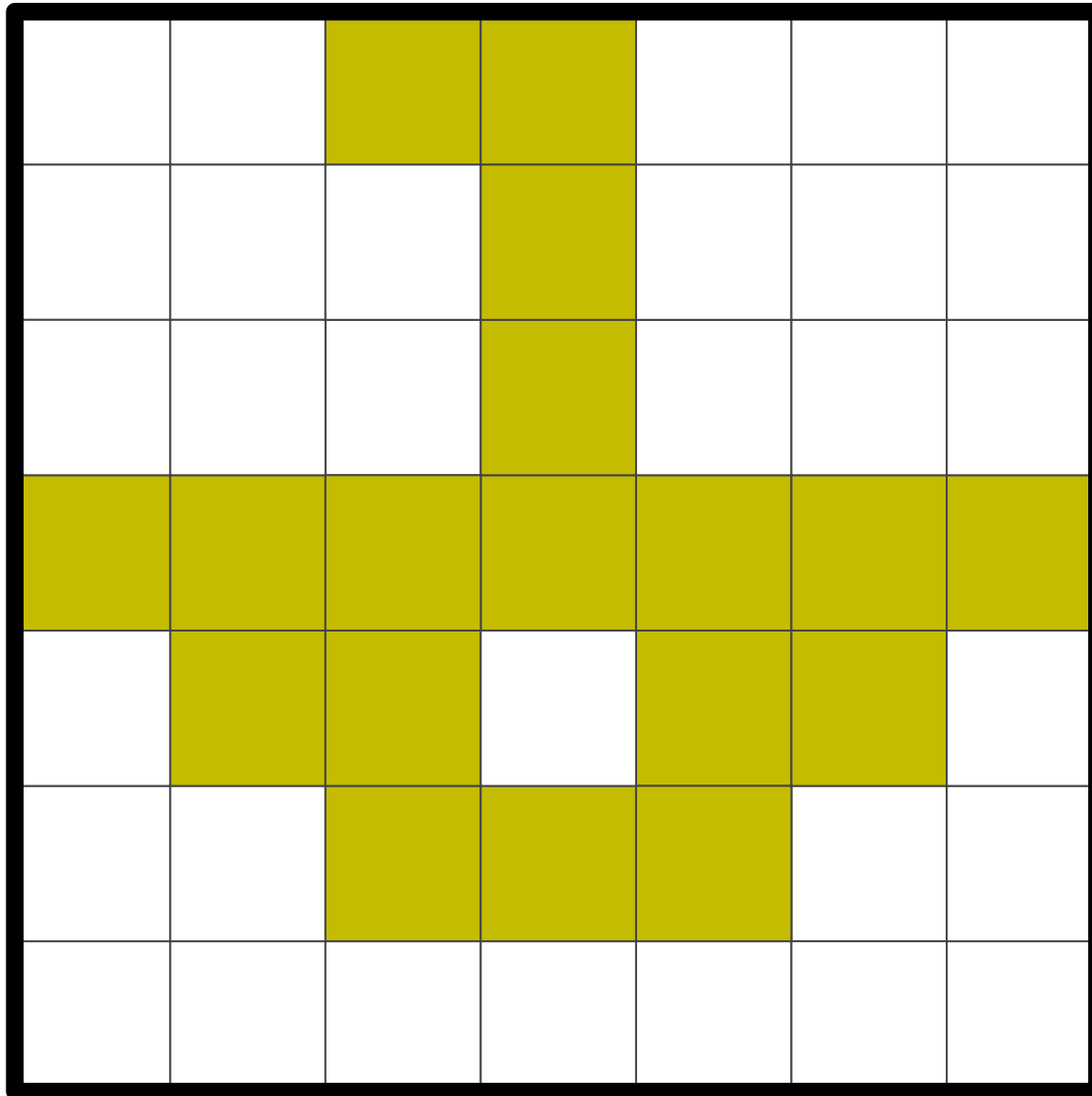
CCSS.MATH.CONTENT.4.NF.A.1

Recognize and generate equivalent fractions.

CCSS.MATH.CONTENT.4.NF.A.2

Compare two fractions with different numerators and different denominators,

Yellow Submarine

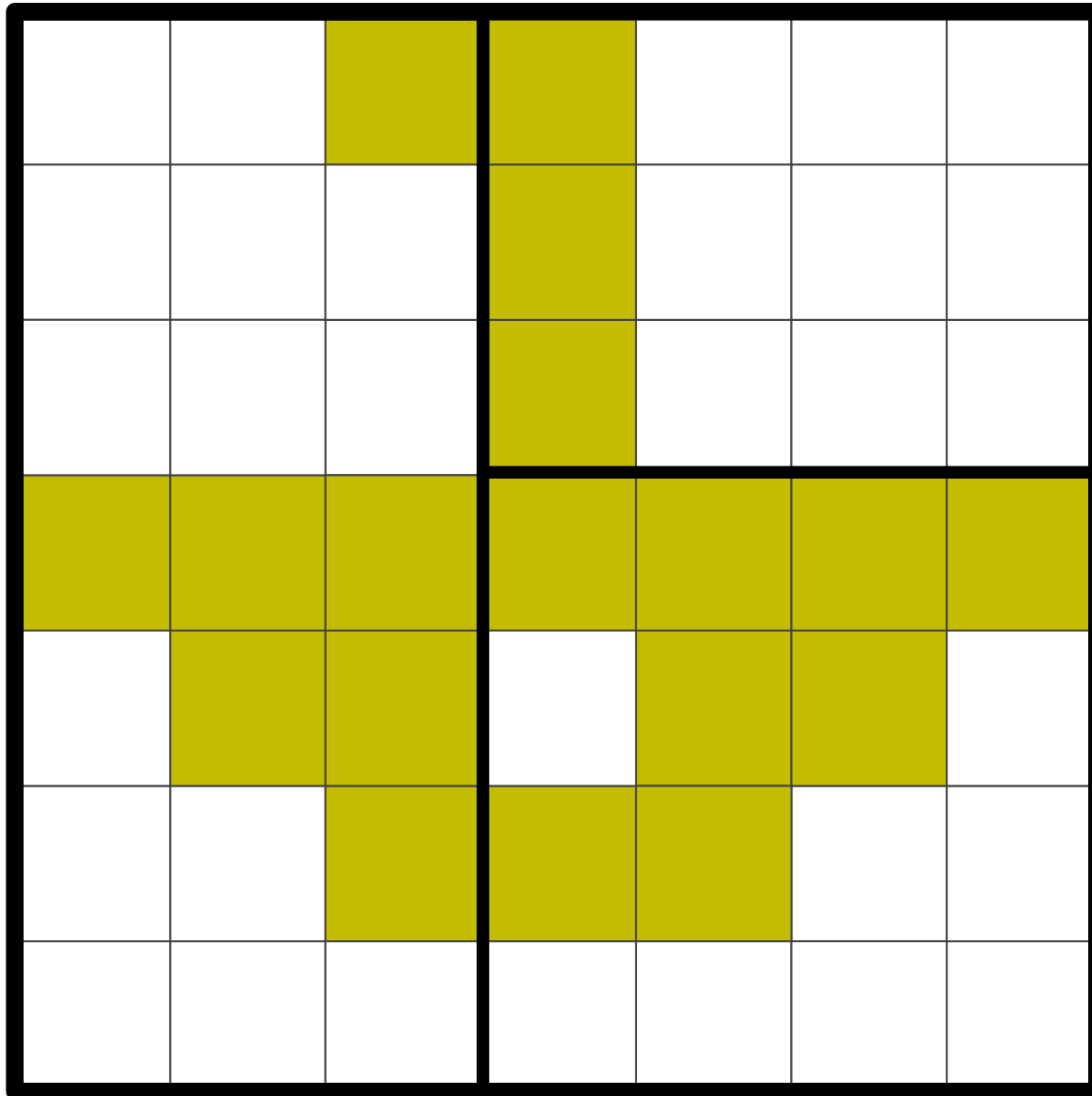


1/2

1/3

1/4

Yellow Submarine

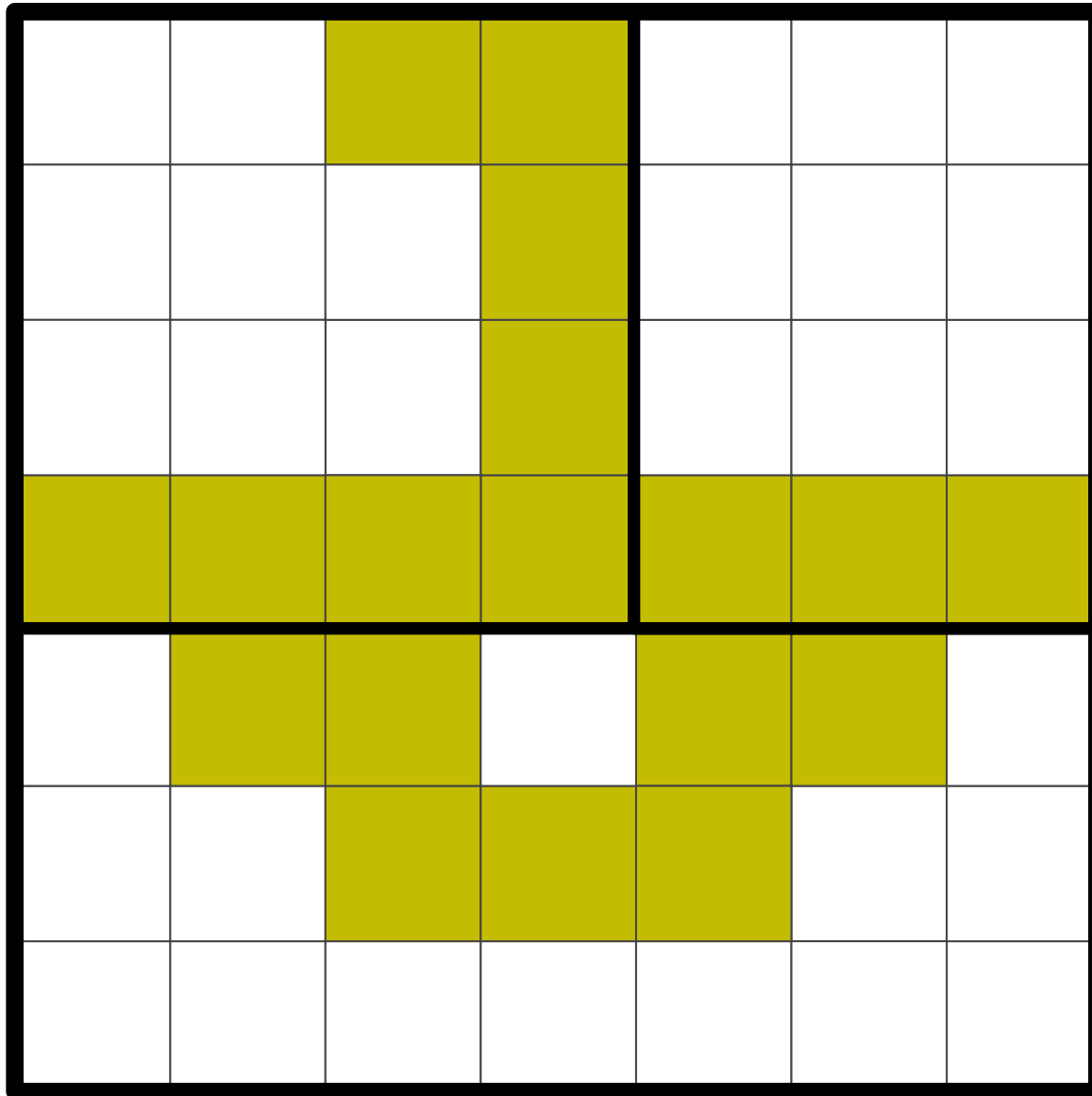


1/2

1/3

1/4

Yellow Submarine



1/2

1/3

1/4

Elephant

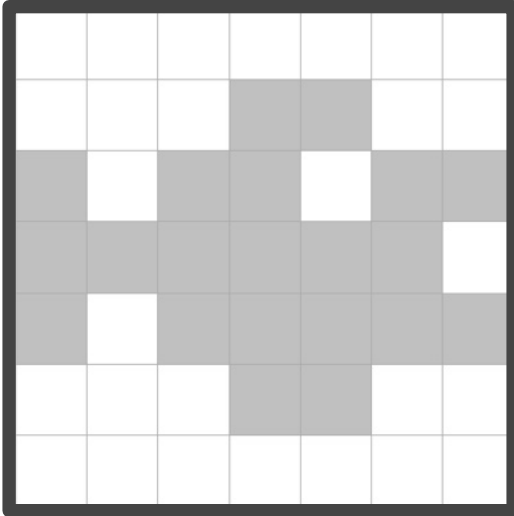
Frog

RABBIT

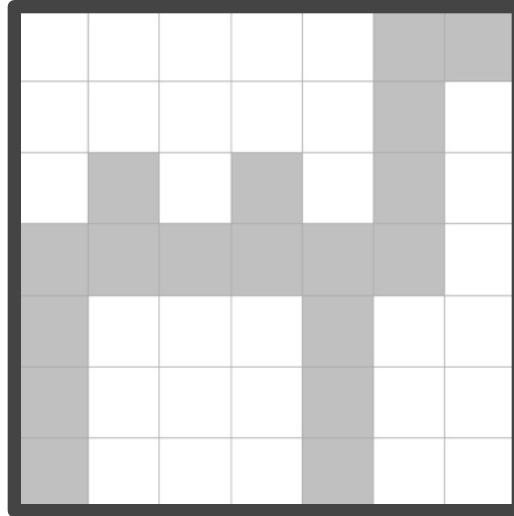
camel

Jellyfish

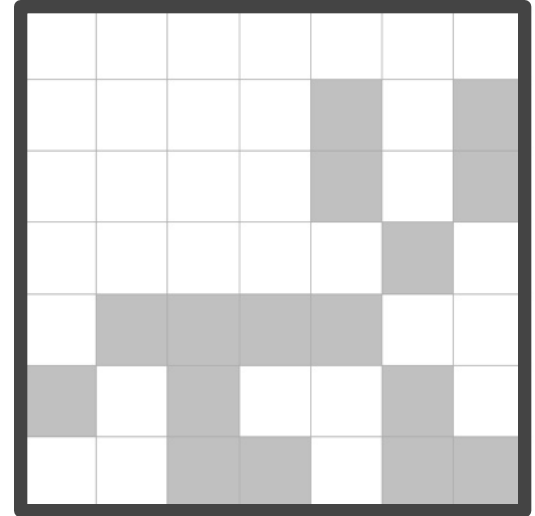
Piranha



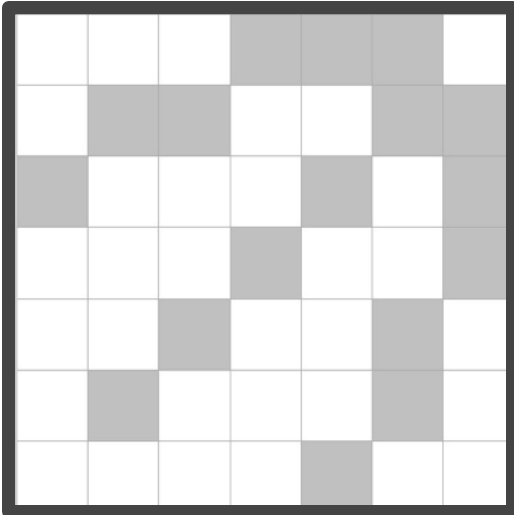
1/2
1/3



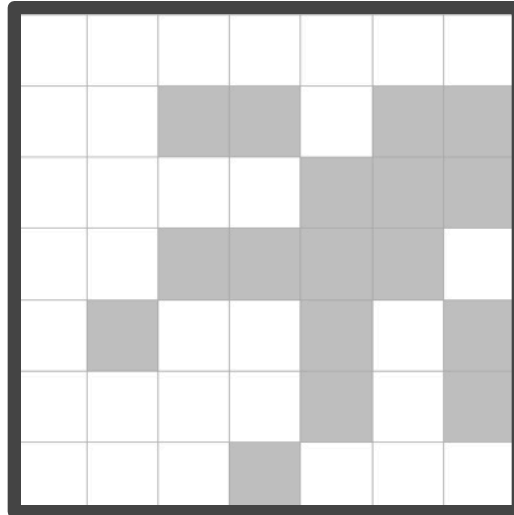
1/2
1/3
1/4



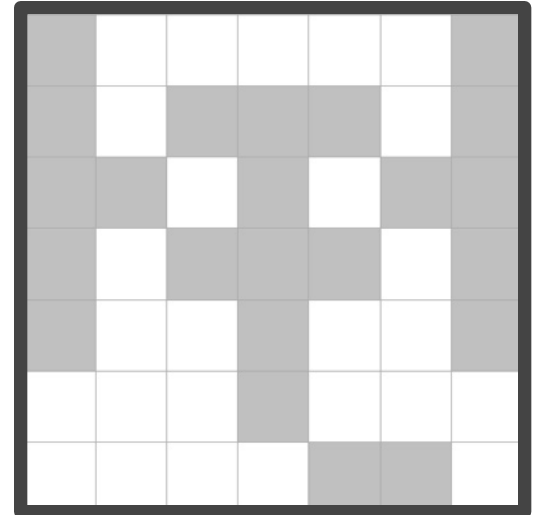
1/2
1/3
1/7



1/2
1/3
1/4

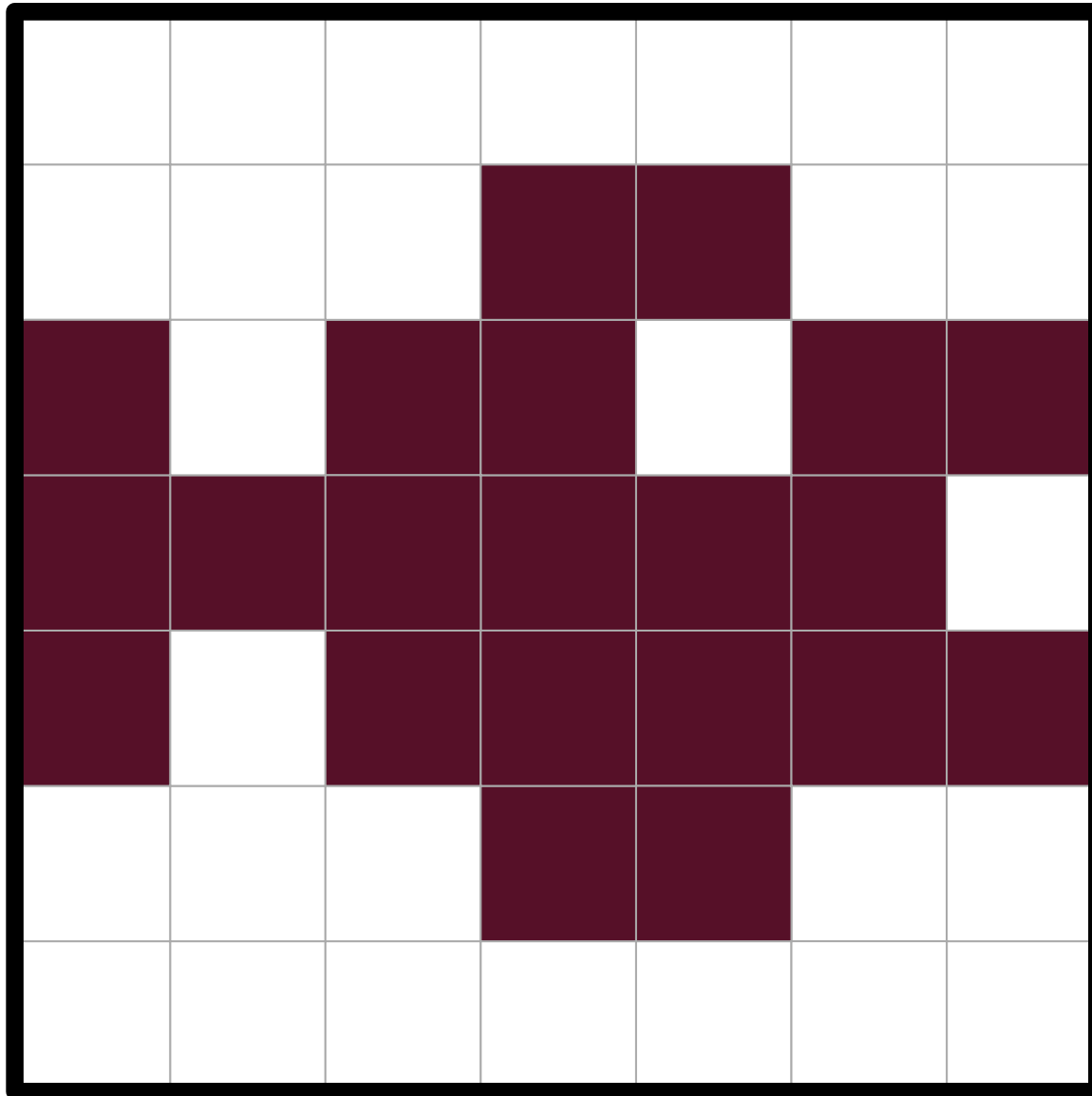


1/2
1/3
1/4



1/2
1/3
1/4

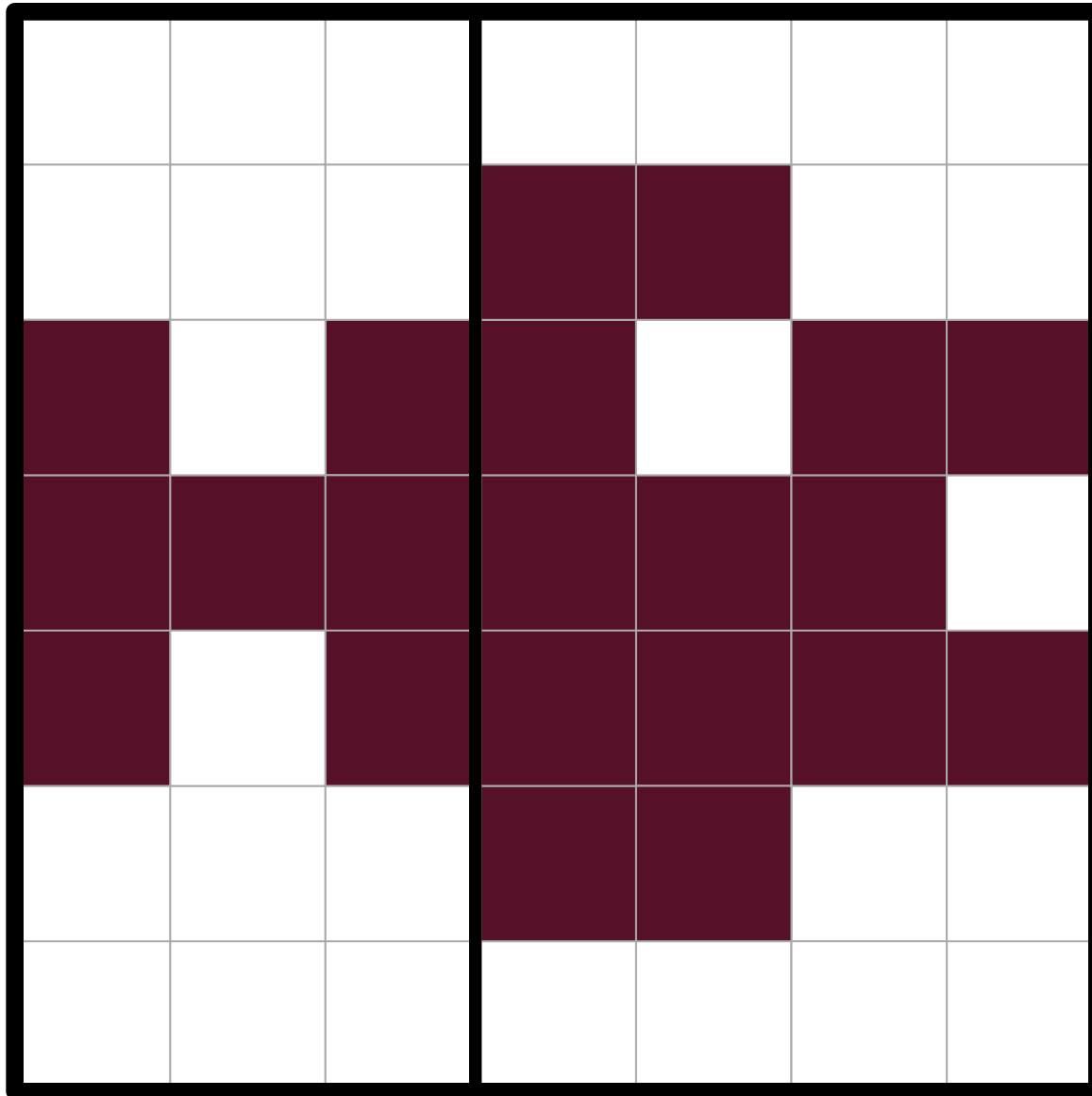
Piranha



$1/2$

$1/3$

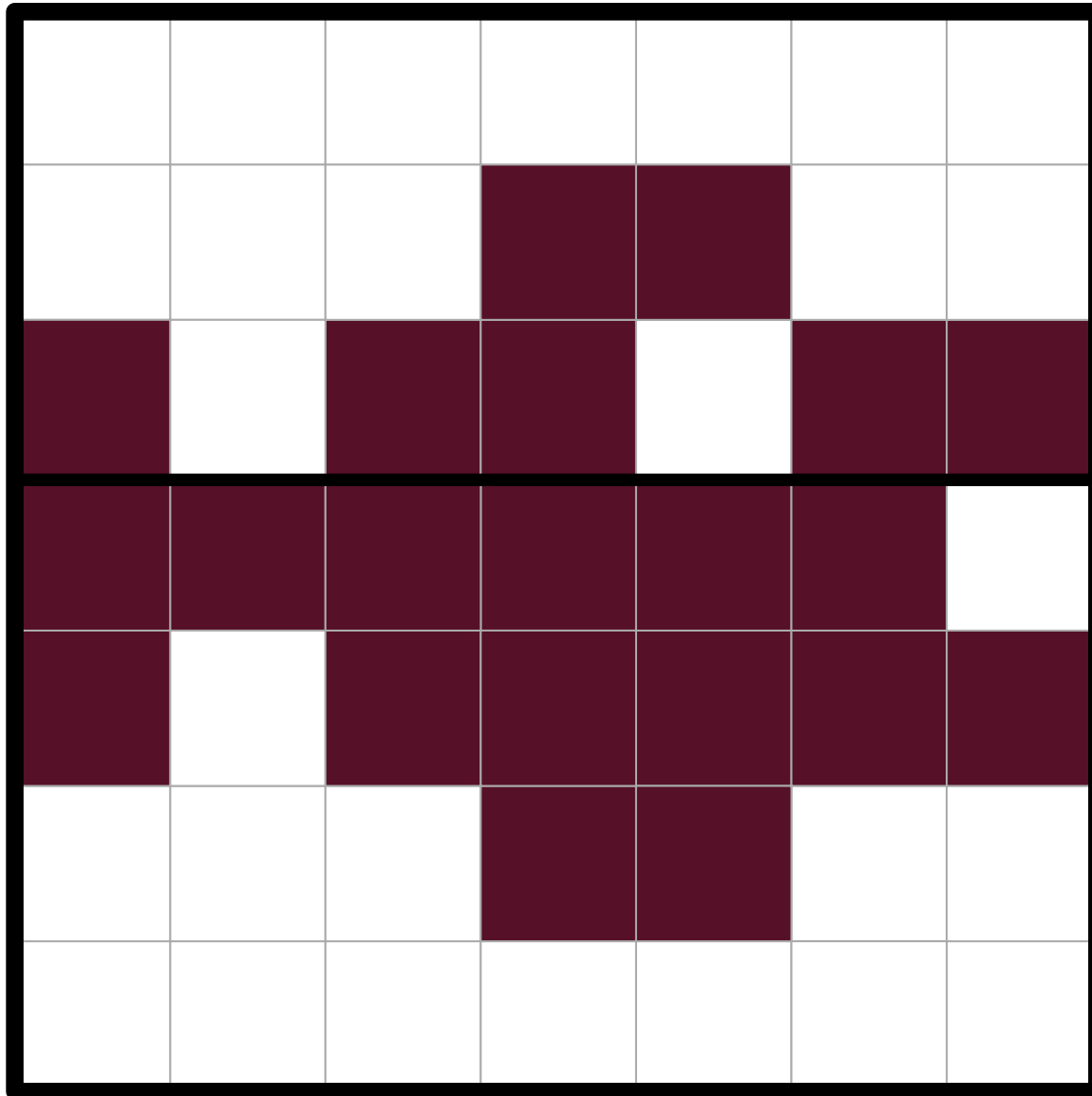
Piranha



1/2

1/3

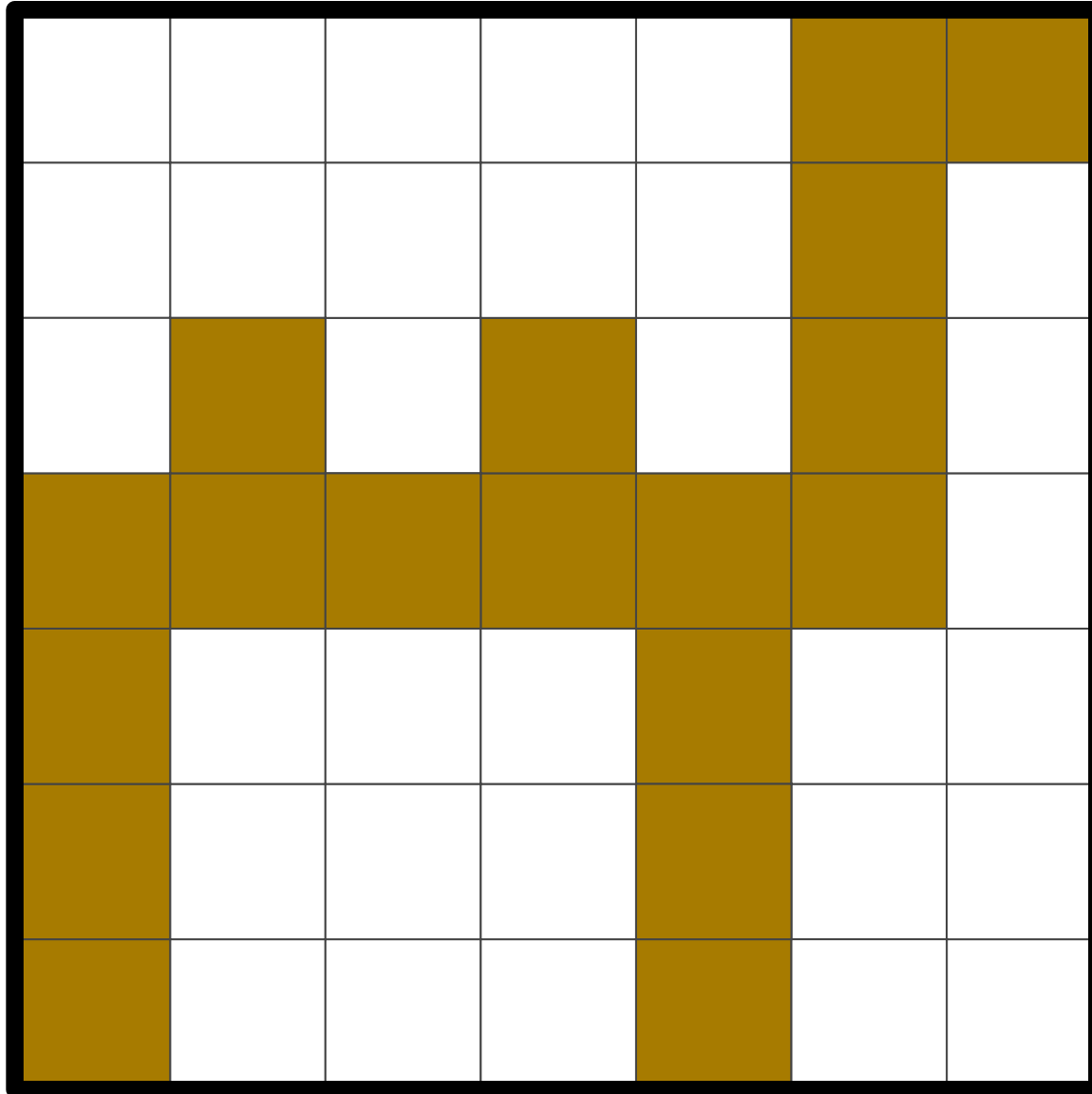
Piranha



1/2

1/3

camel

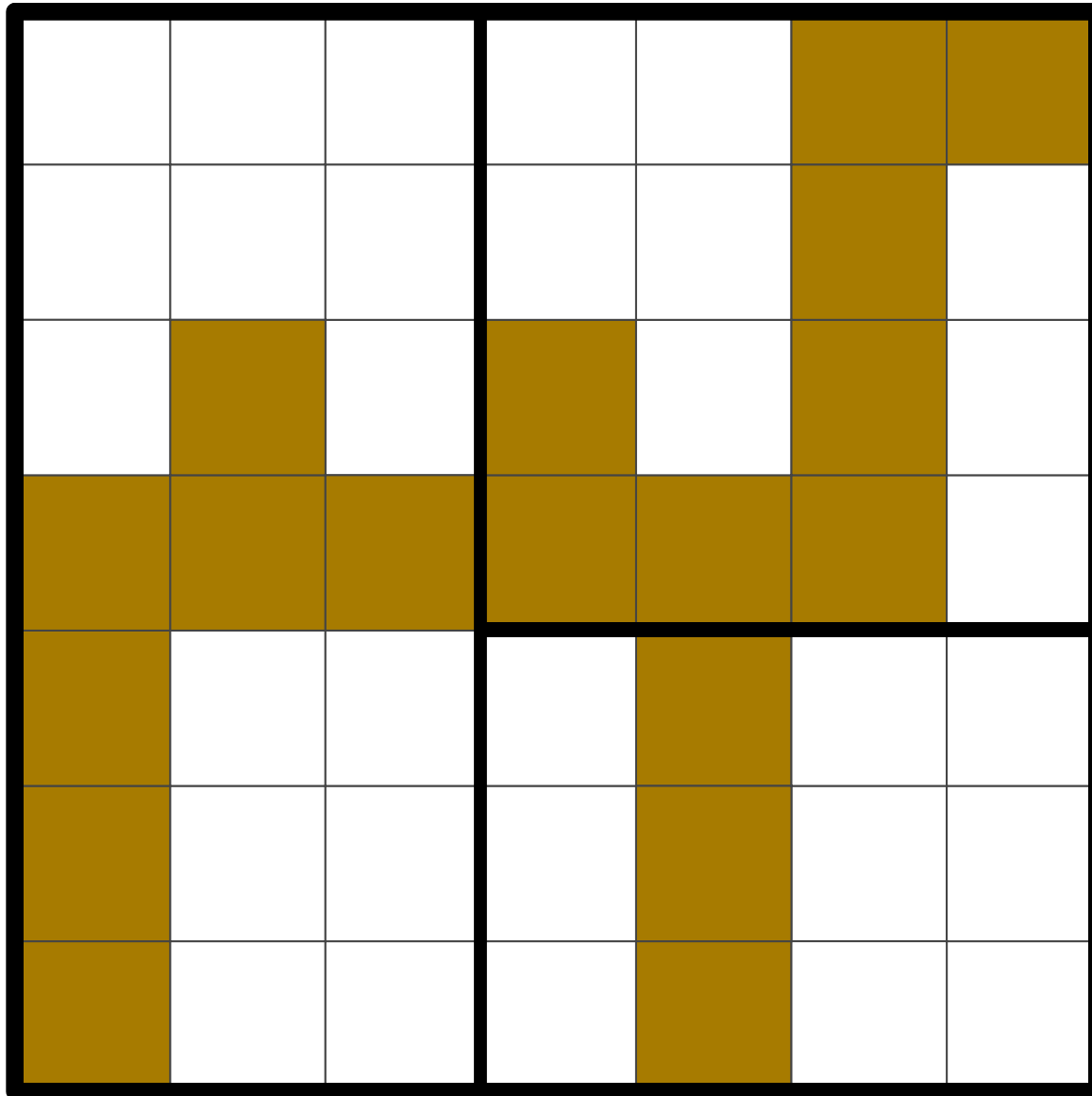


1/2

1/3

1/4

camel

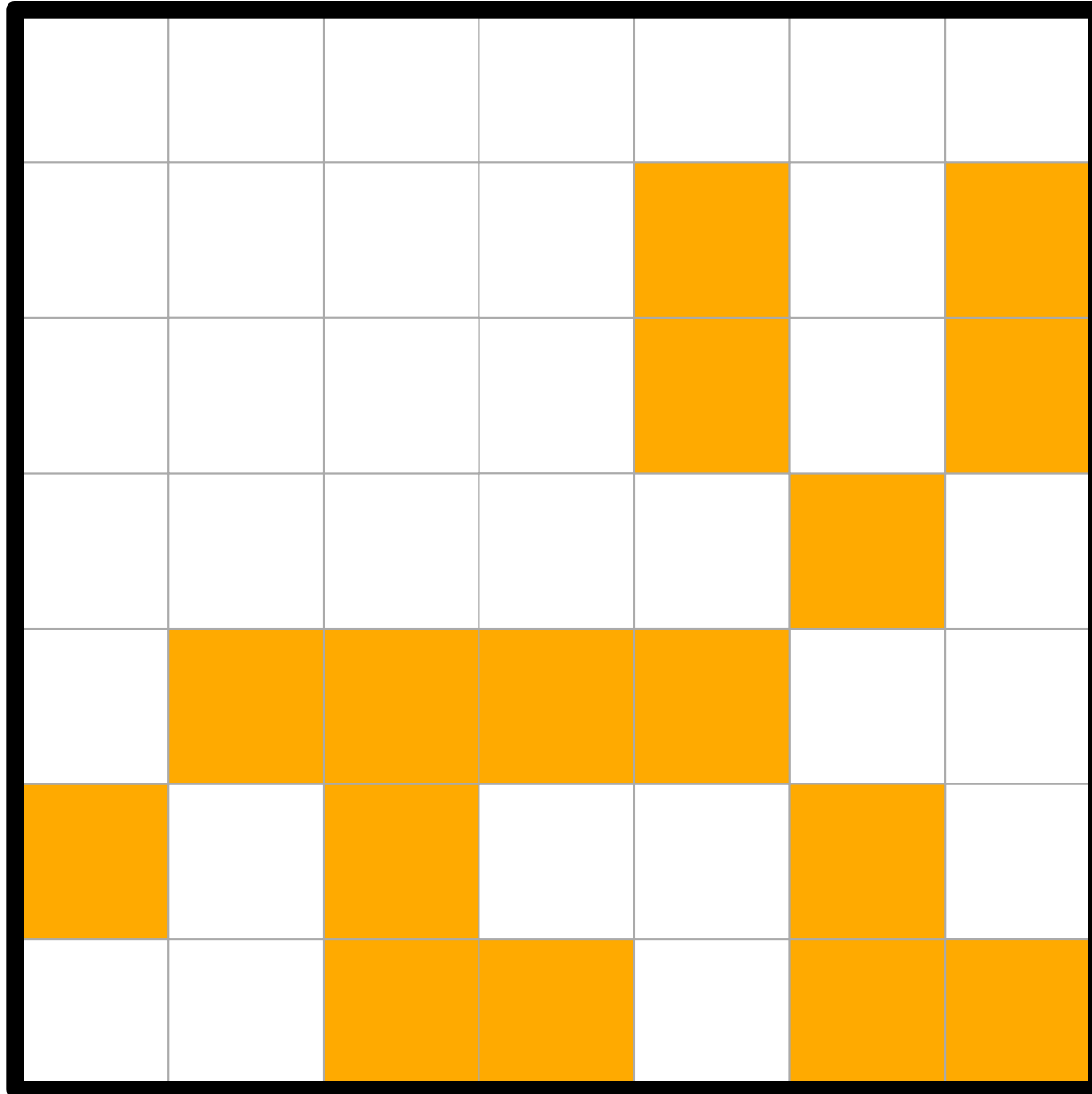


1/2

1/3

1/4

RABBIT

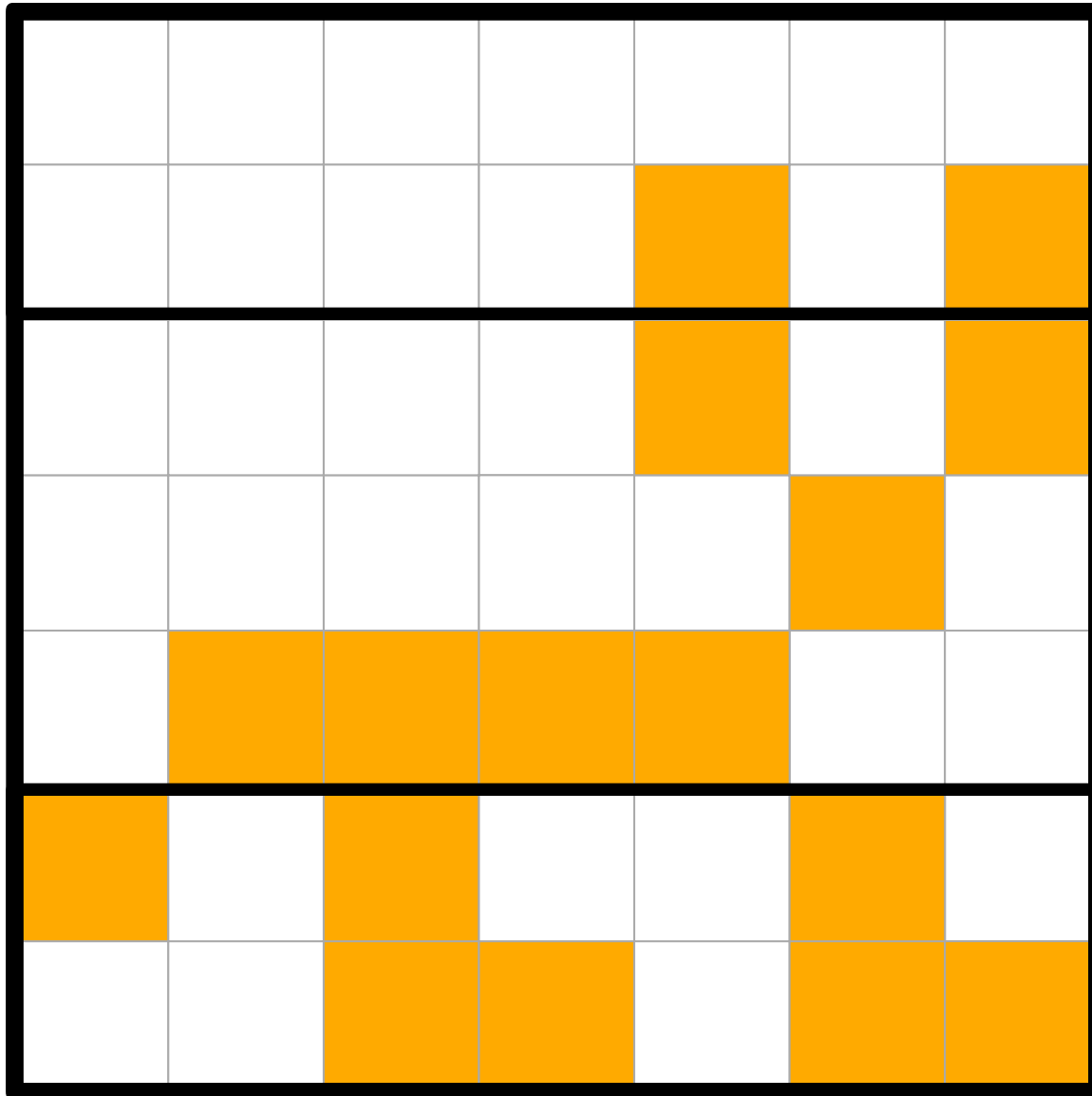


1/2

1/3

1/7

RABBIT

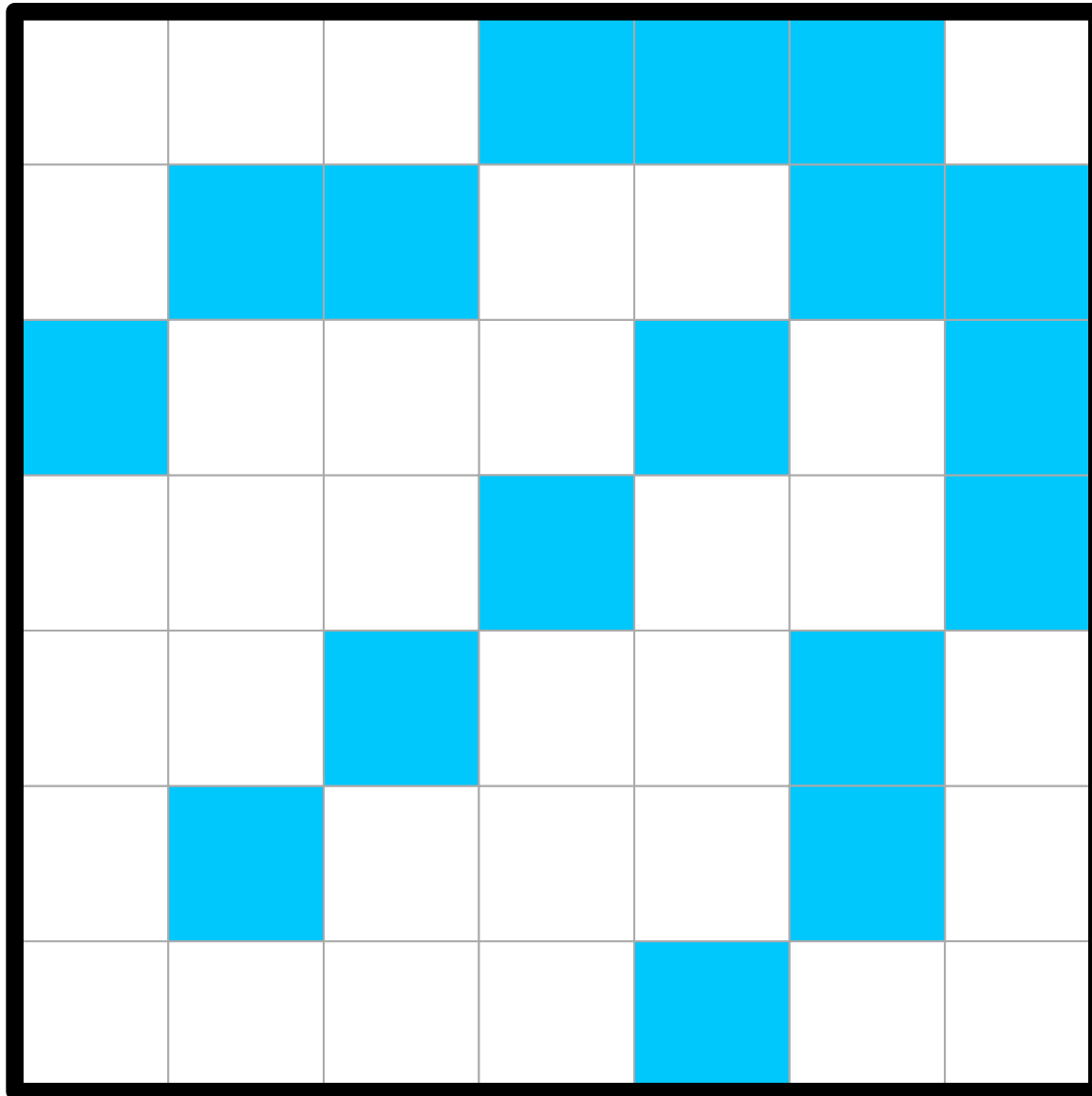


1/2

1/3

1/7

Jellyfish

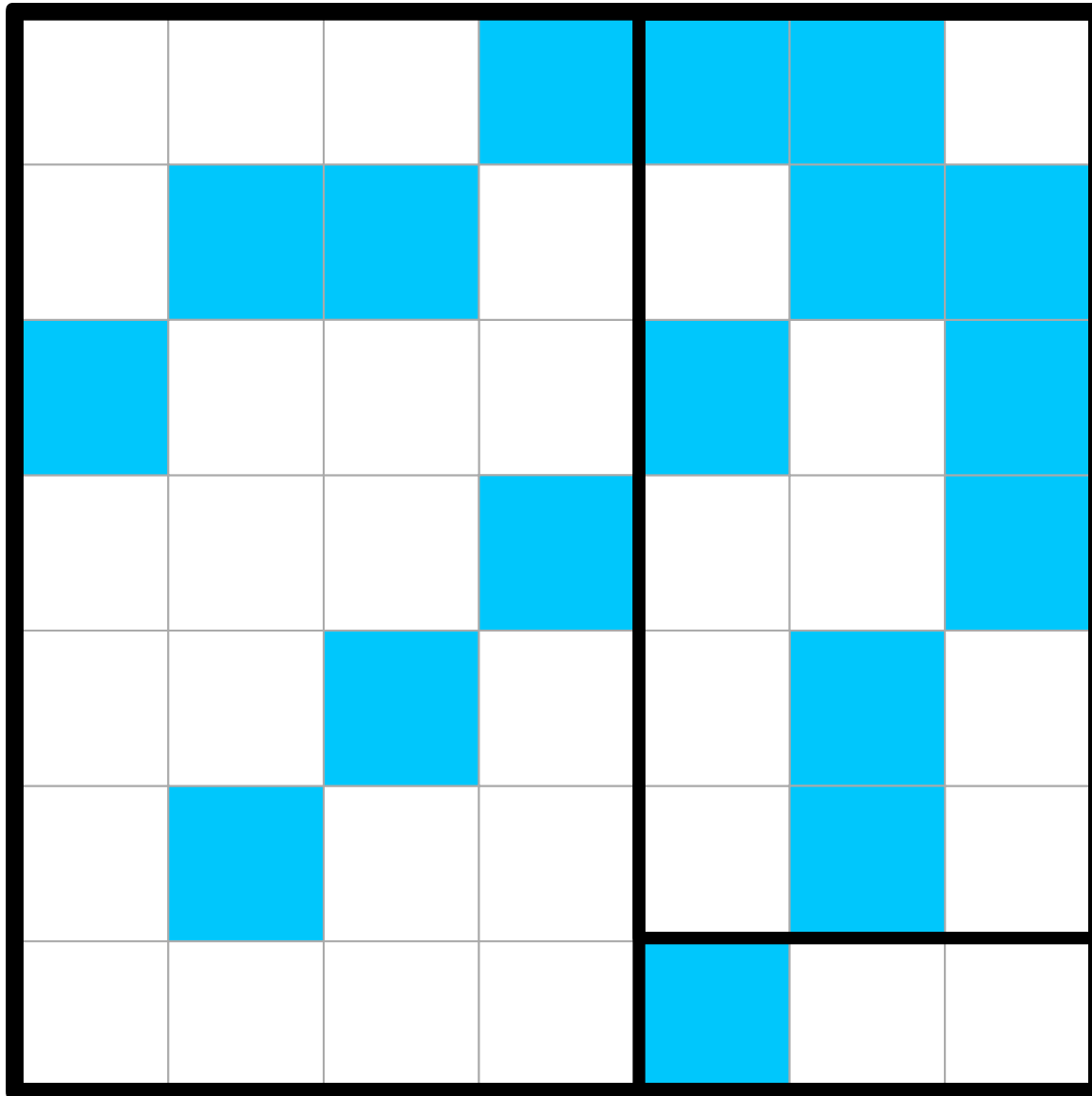


1/2

1/3

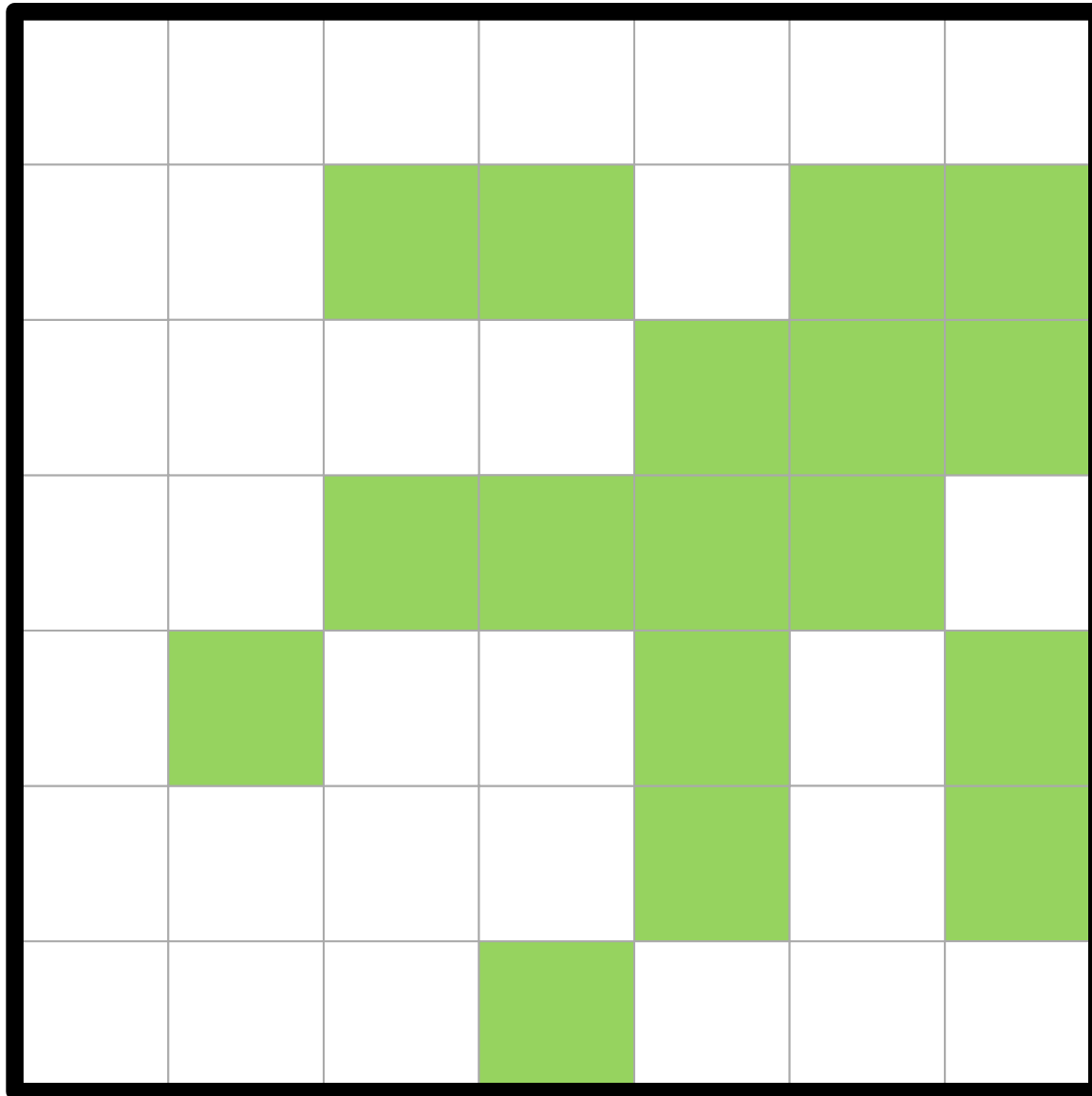
1/4

Jellyfish



$1/2$
 $1/3$
 $1/4$

Frog

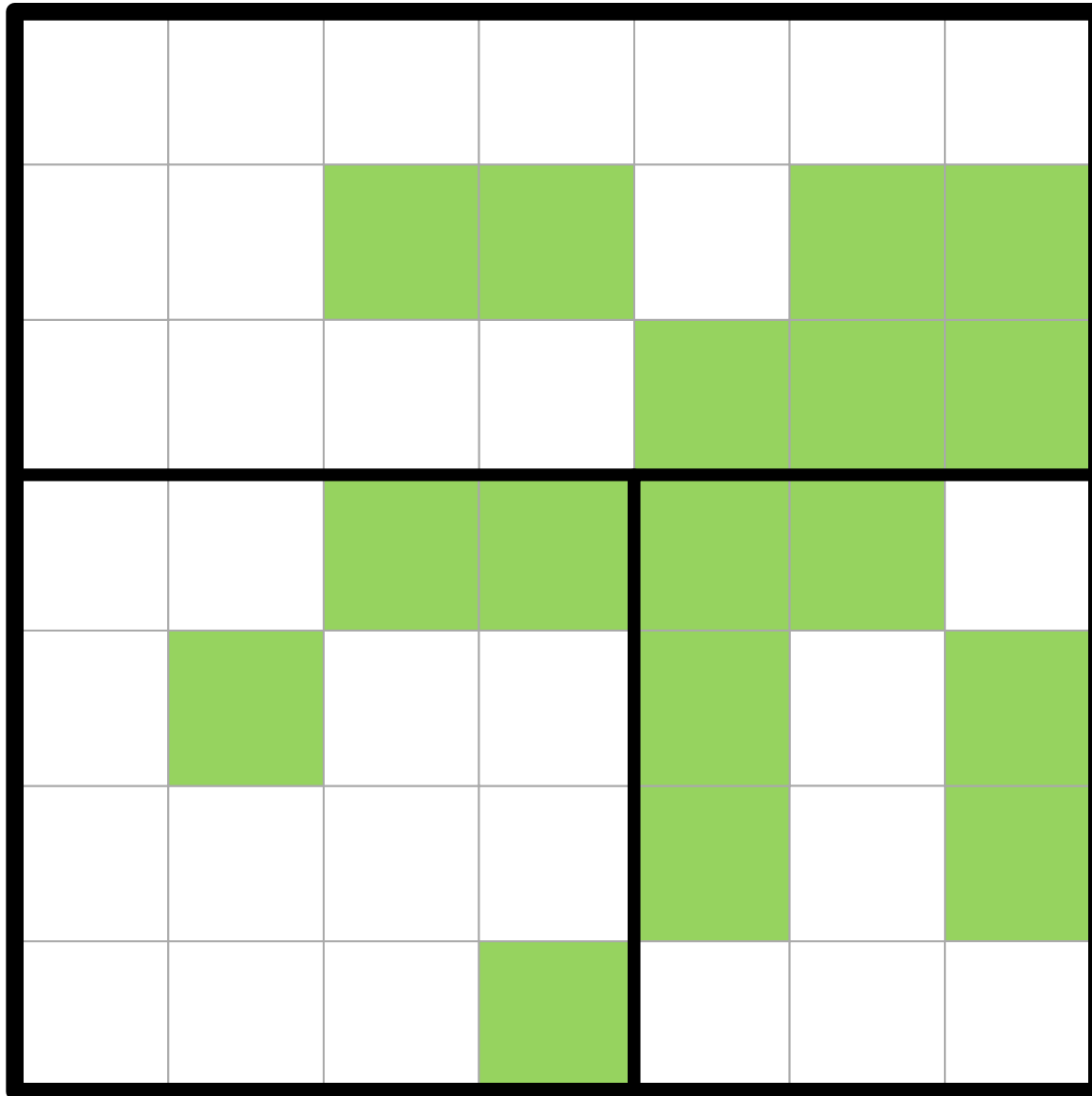


1/2

1/3

1/4

Frog

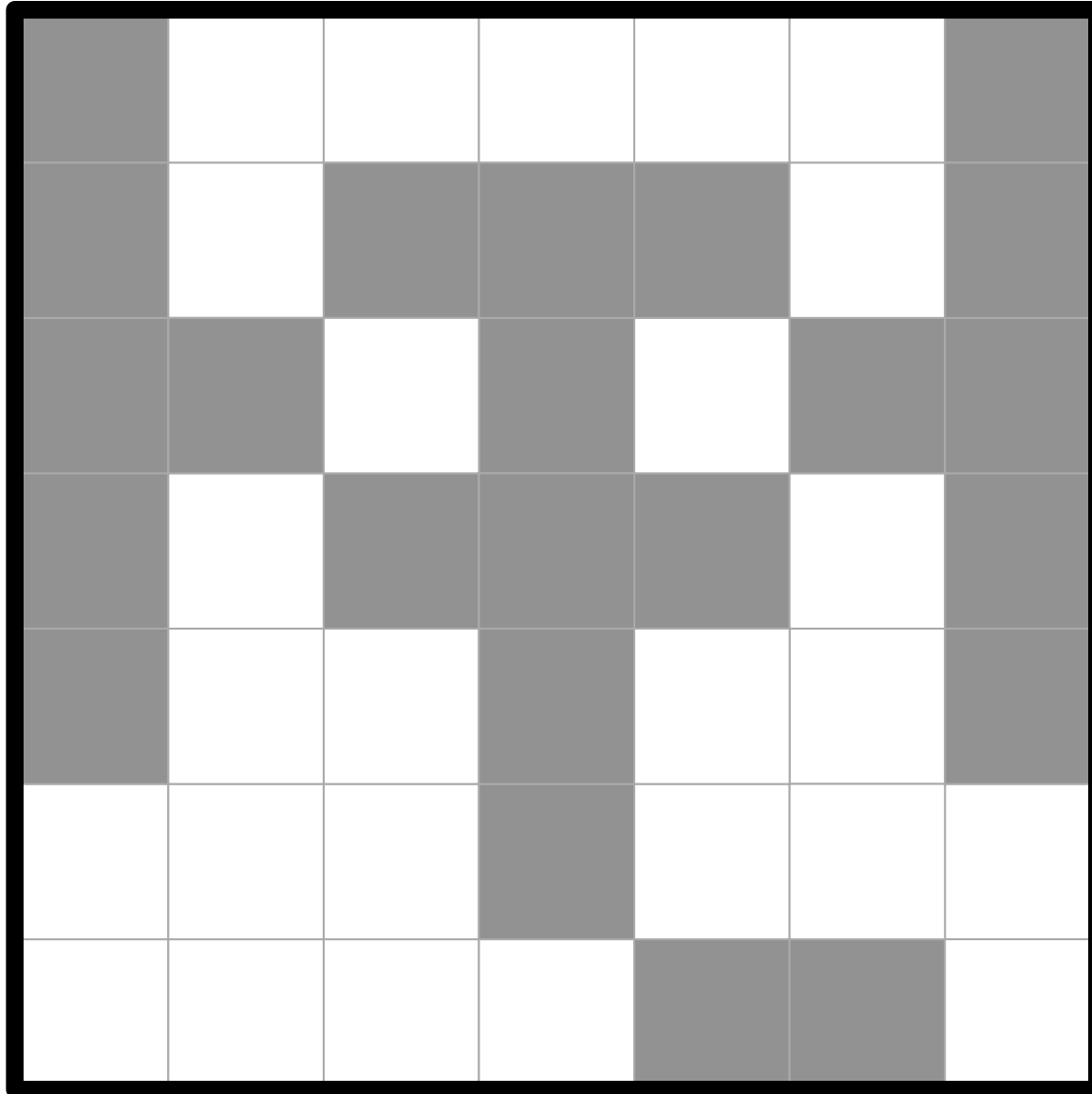


$1/2$

$1/3$

$1/4$

Elephant

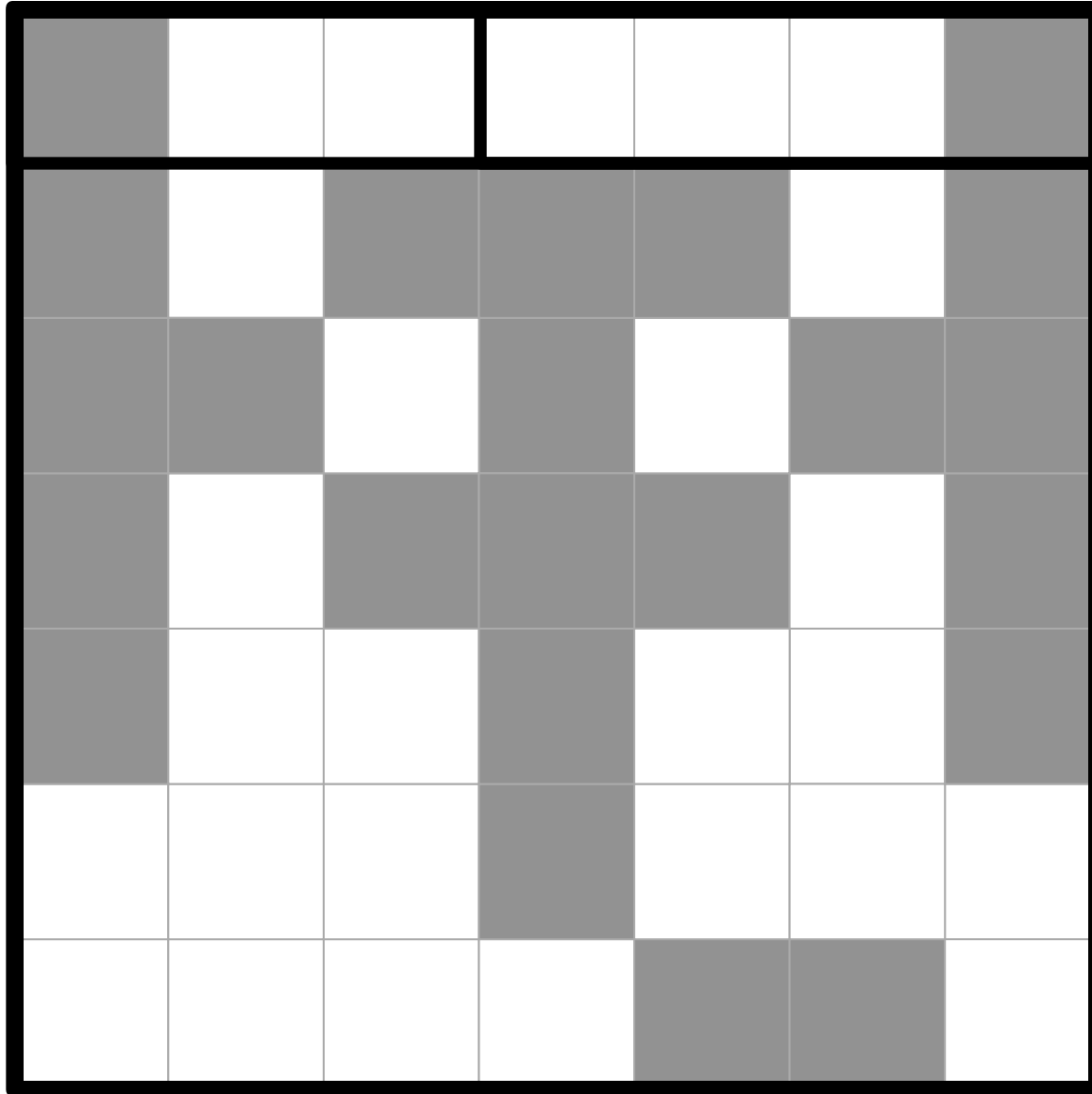


1/2

1/3

1/4

Elephant

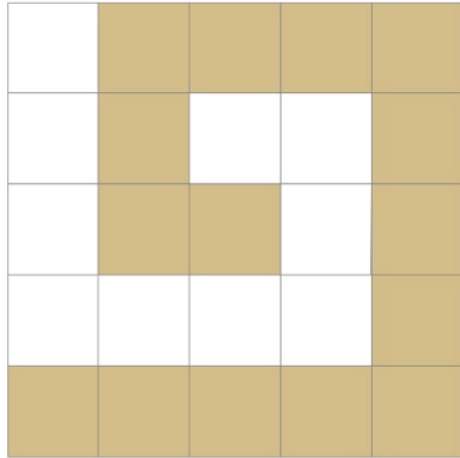


1/2

1/3

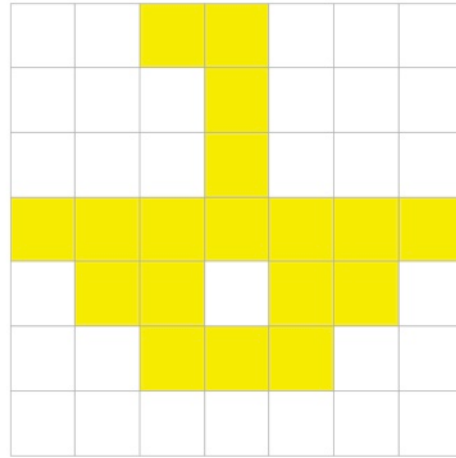
1/4

Spiral



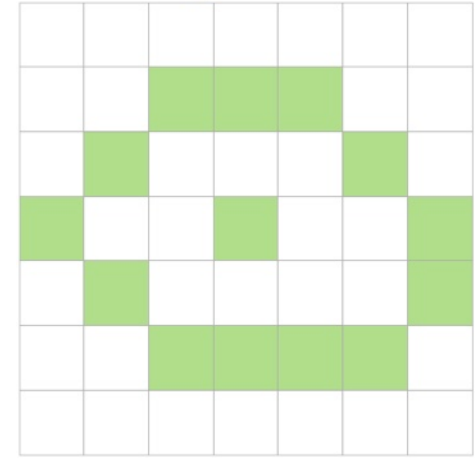
1/2
2/3

Yellow Submarine



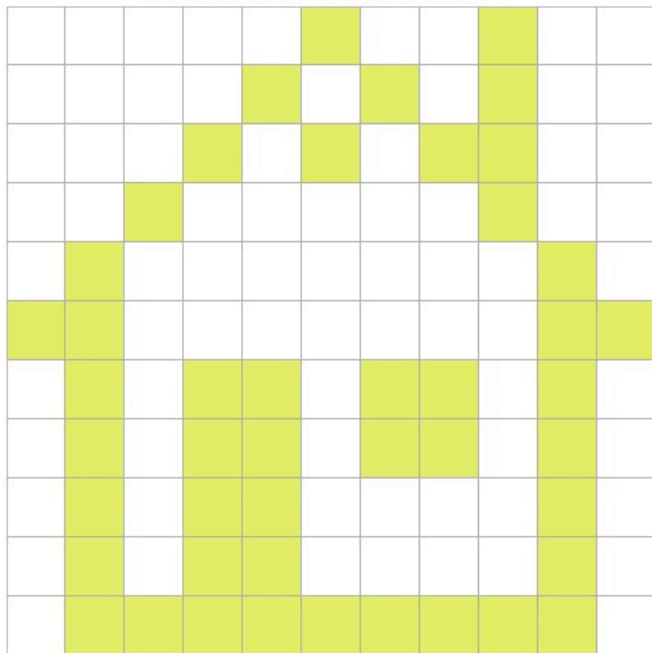
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1/3
1/4

Eyeball



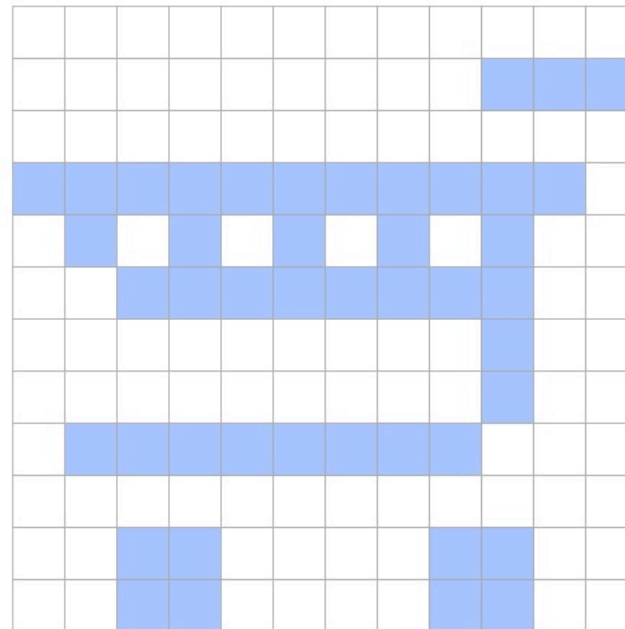
1/7
1/4
1/3

House number 11



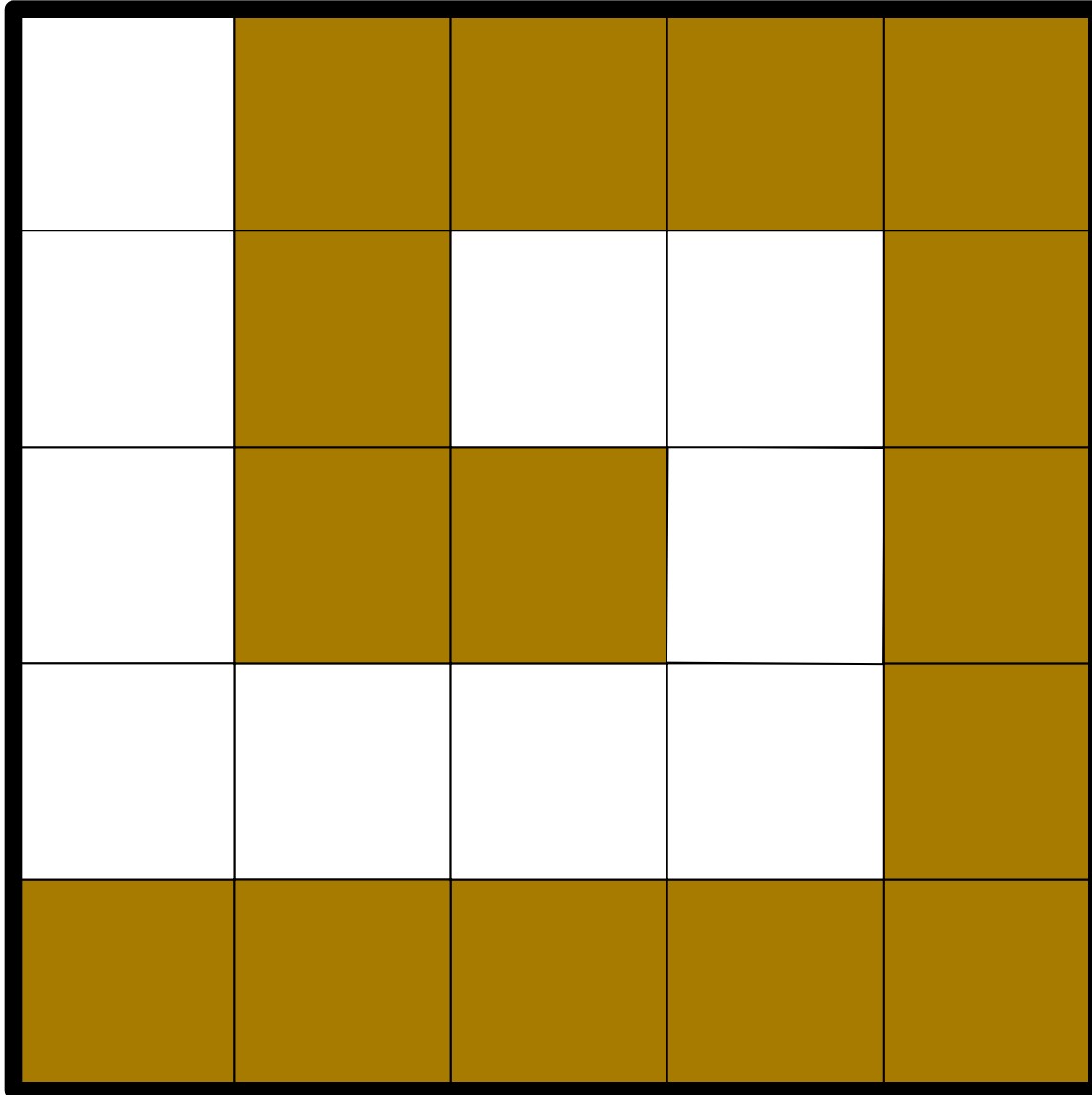
3/11
11/20
11/28
11/33

Shopping Cart



1/21
1/8
1/4
1/3
6/7

Spiral



1/2

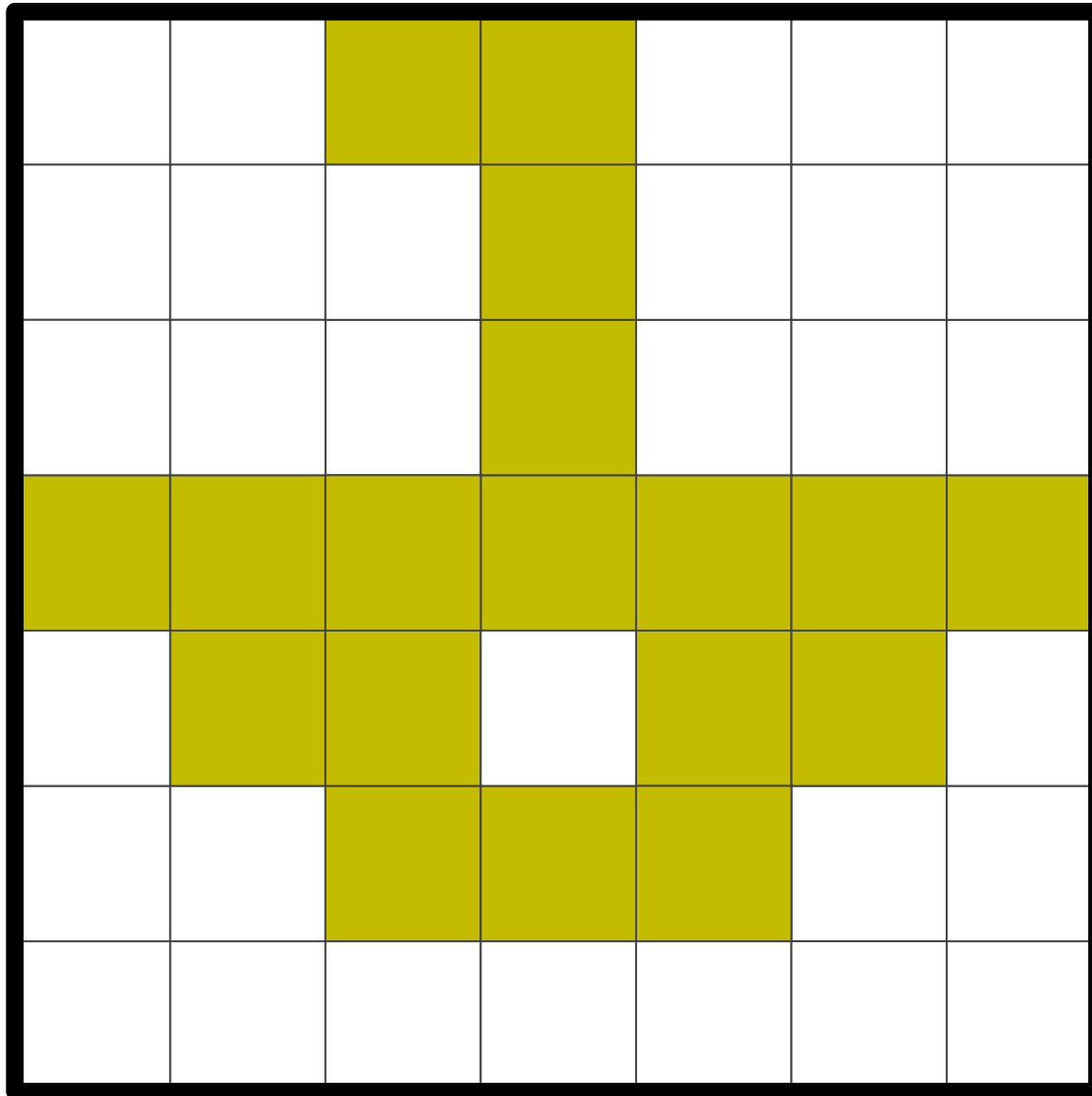
2/3

Spiral

$1/2$

$2/3$

Yellow Submarine

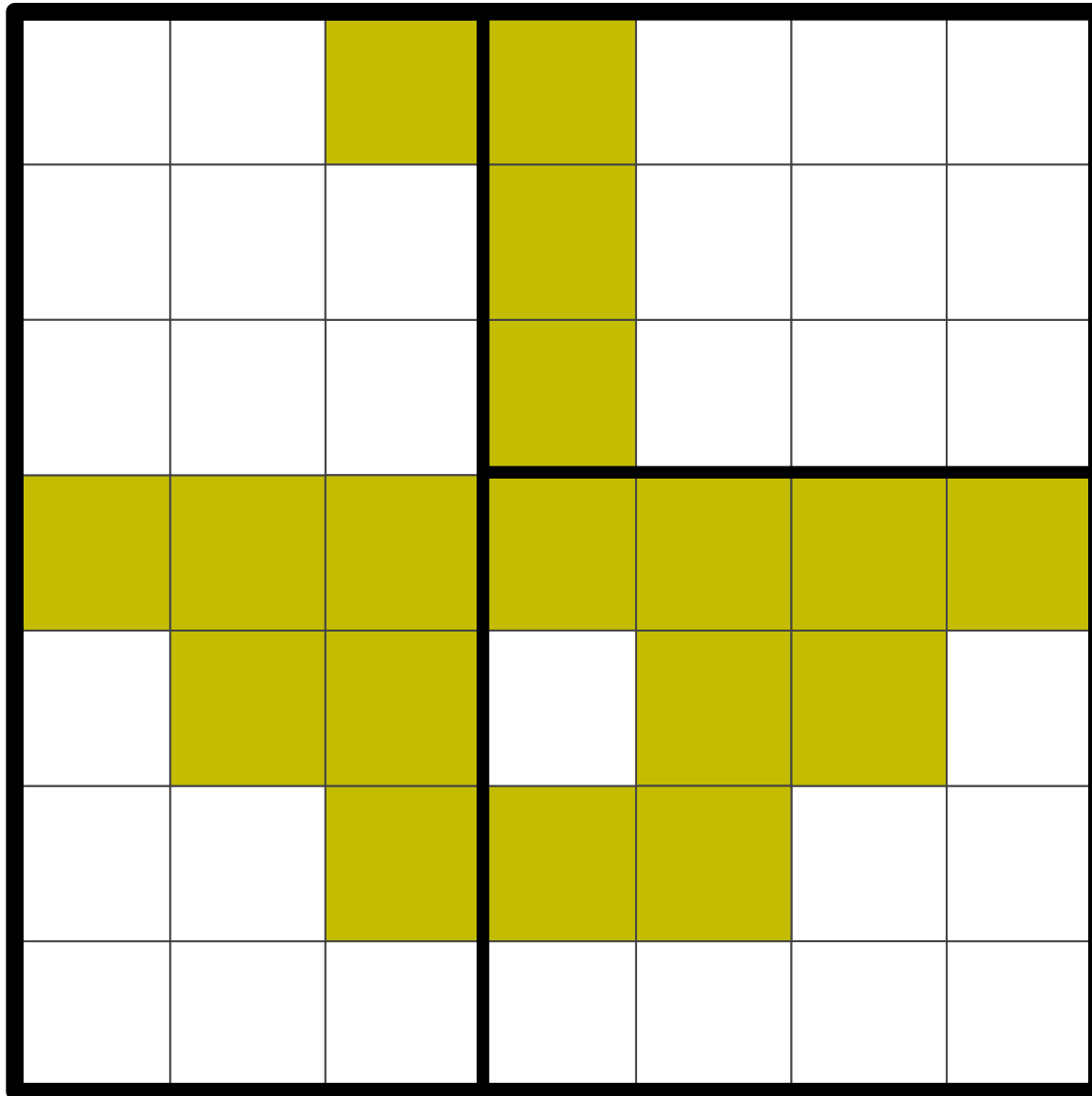


1/2

1/3

1/4

Yellow Submarine

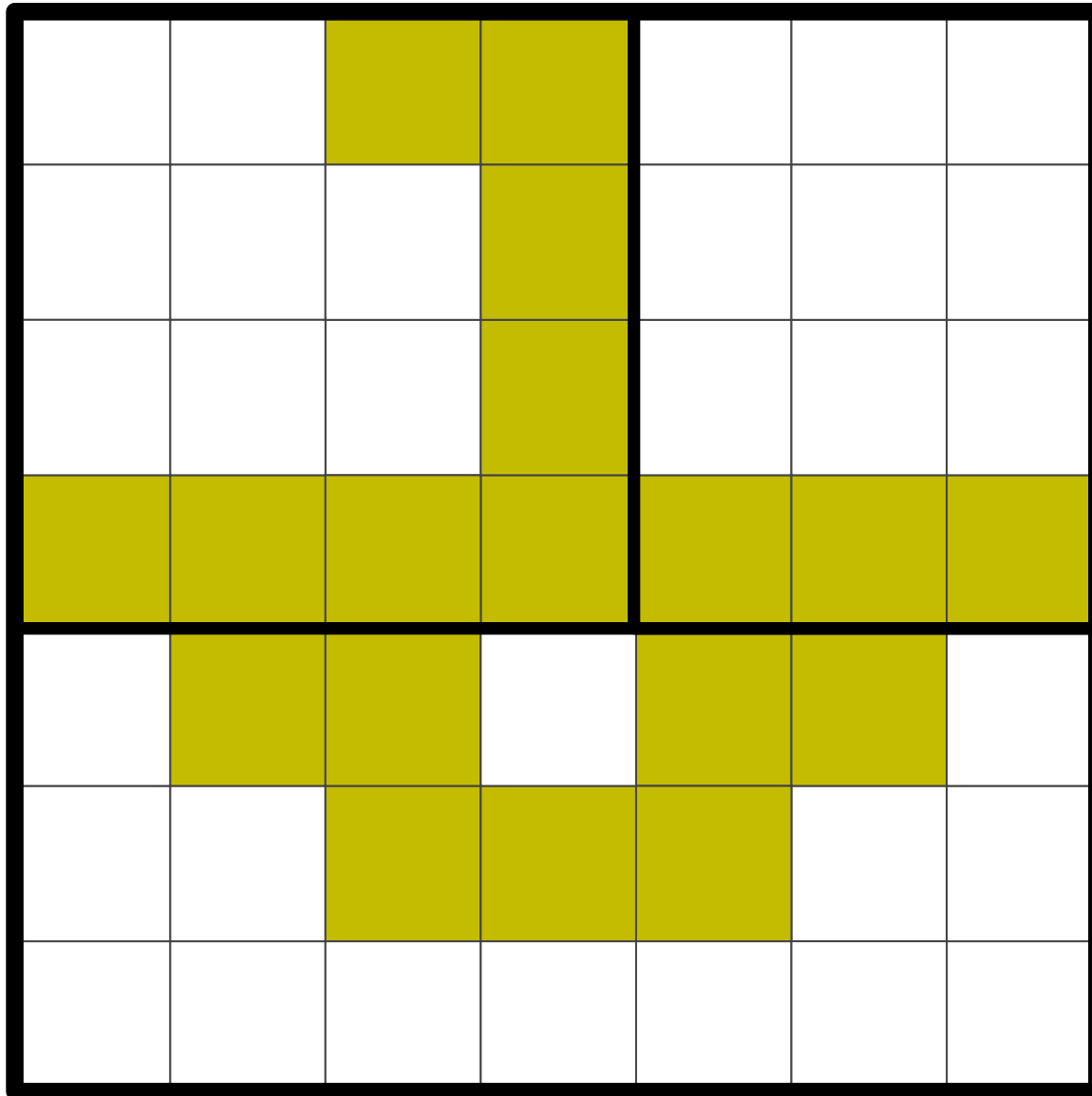


1/2

1/3

1/4

Yellow Submarine

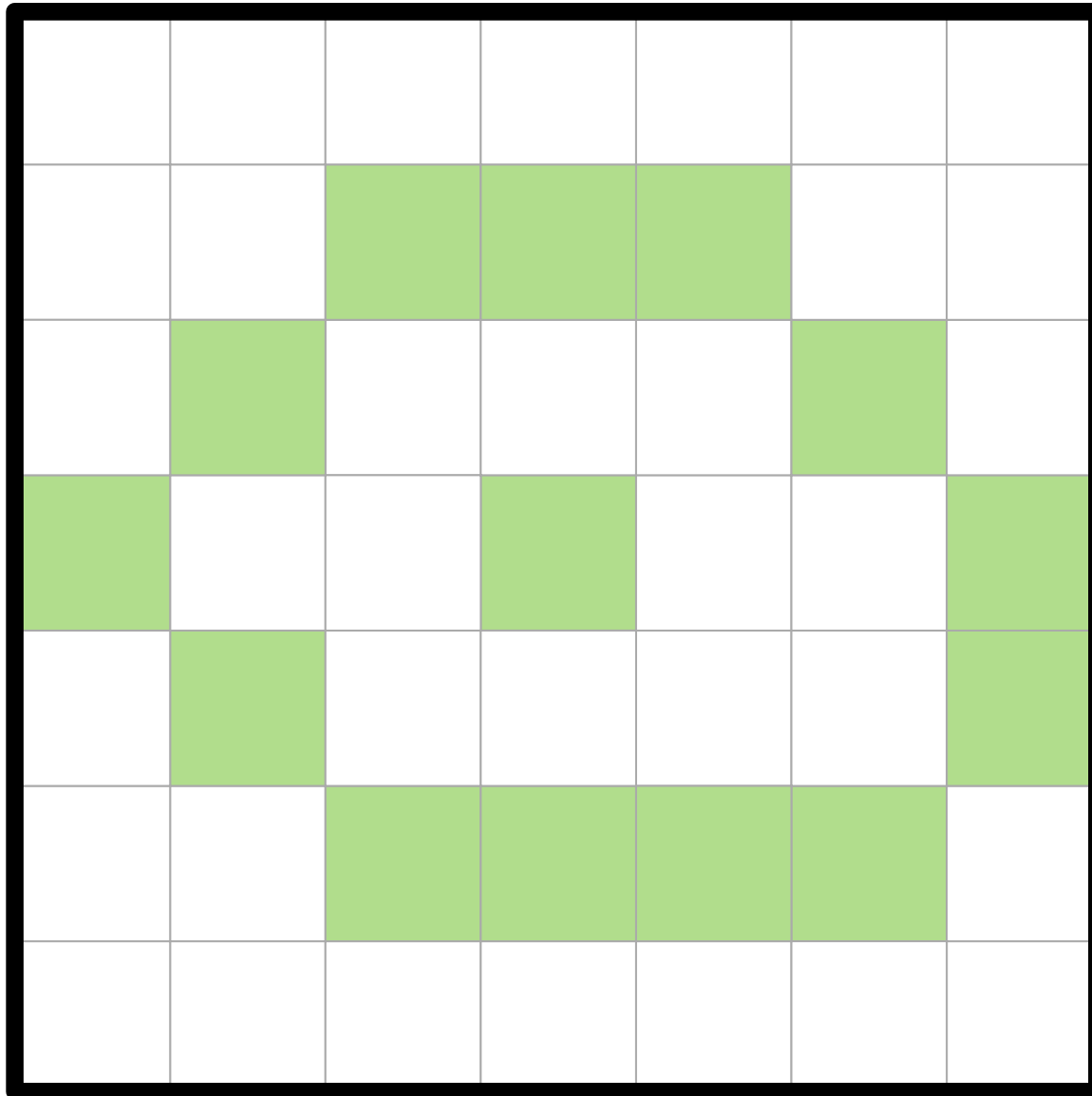


1/2

1/3

1/4

EYEBALL

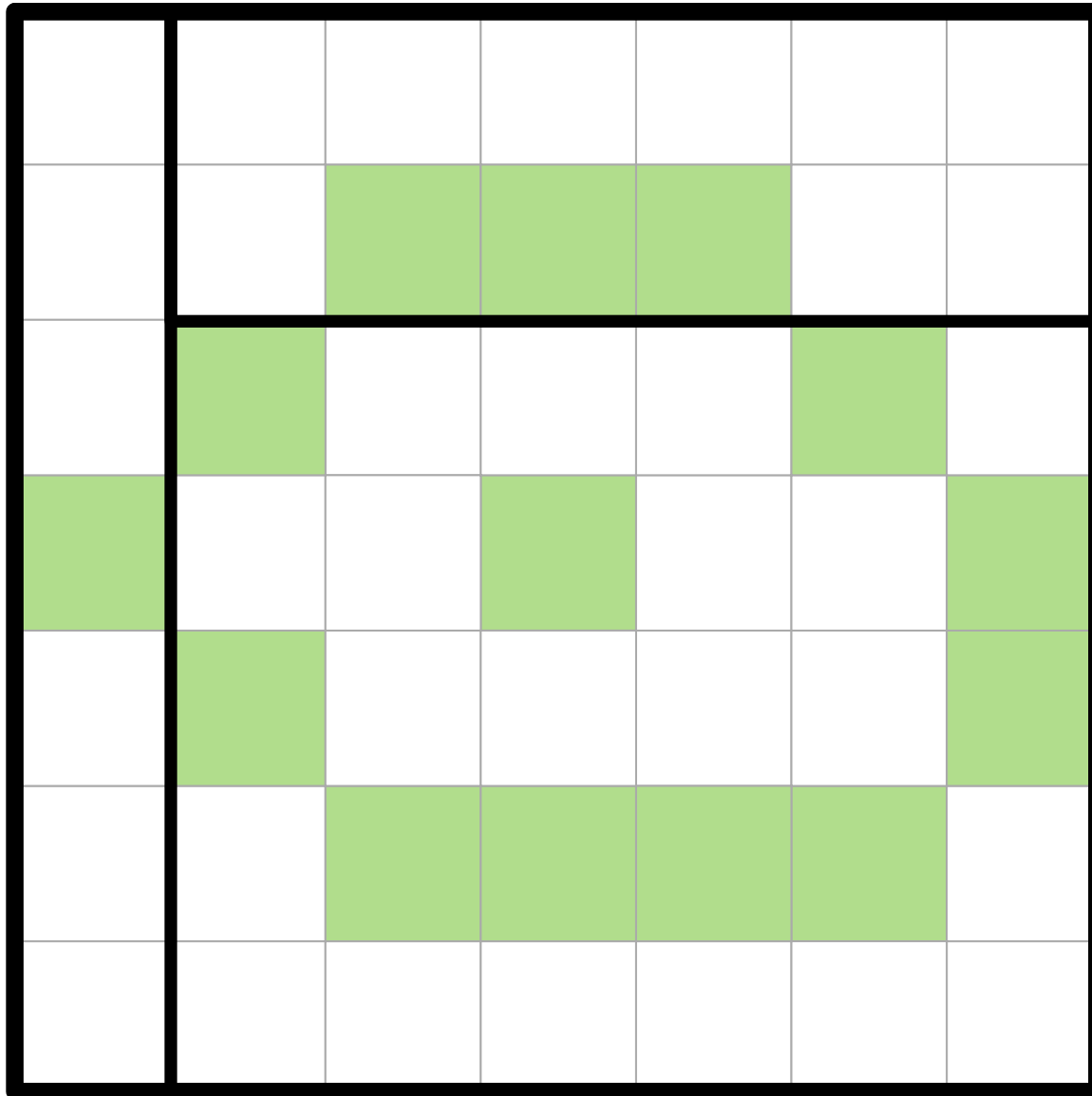


1/7

1/4

1/3

EYEBALL

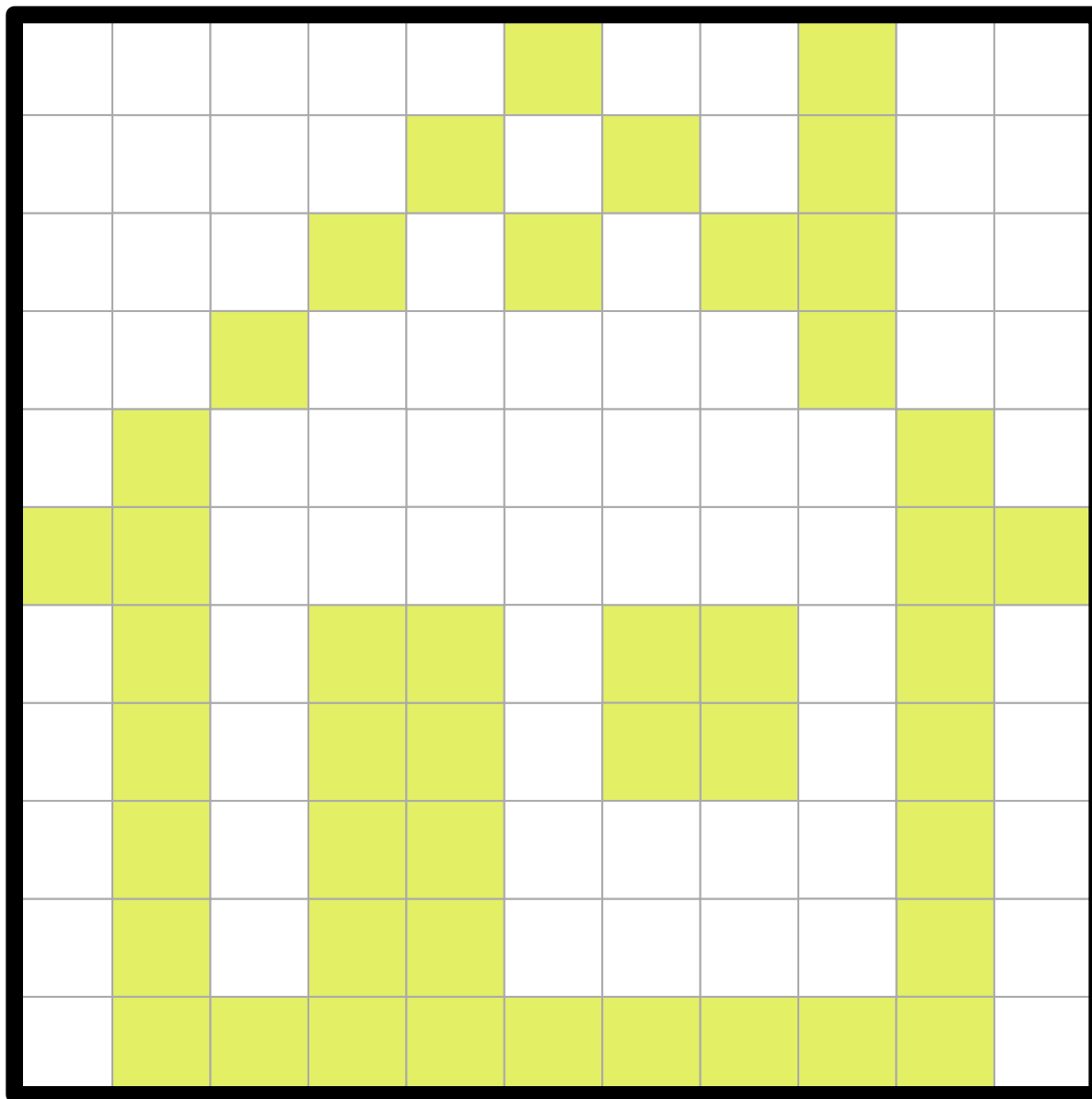


1/7

1/4

1/3

House number 11



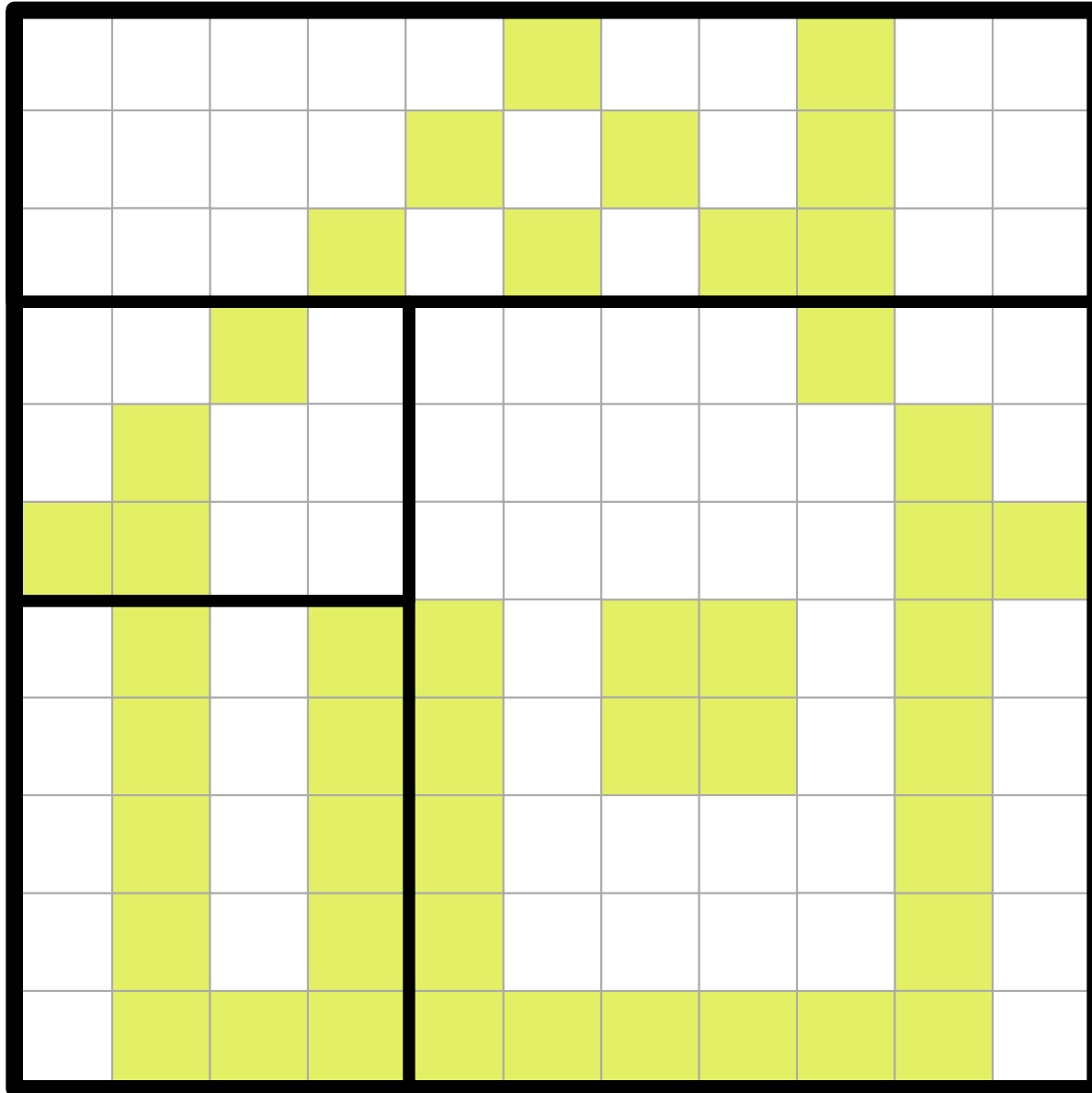
3/11

11/20

11/28

11/33

House number 11



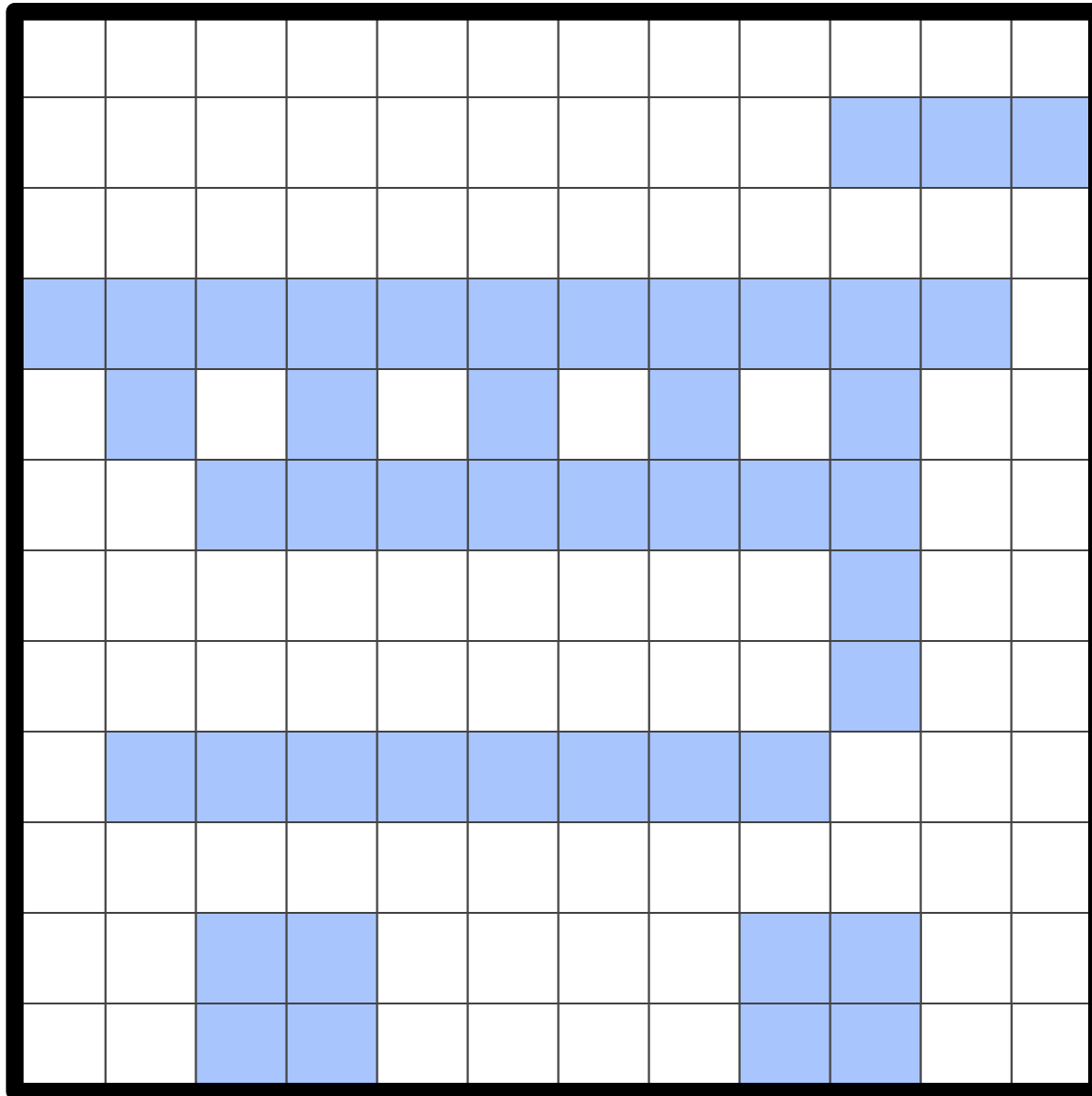
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11/20

11/28

11/33

Shopping Cart



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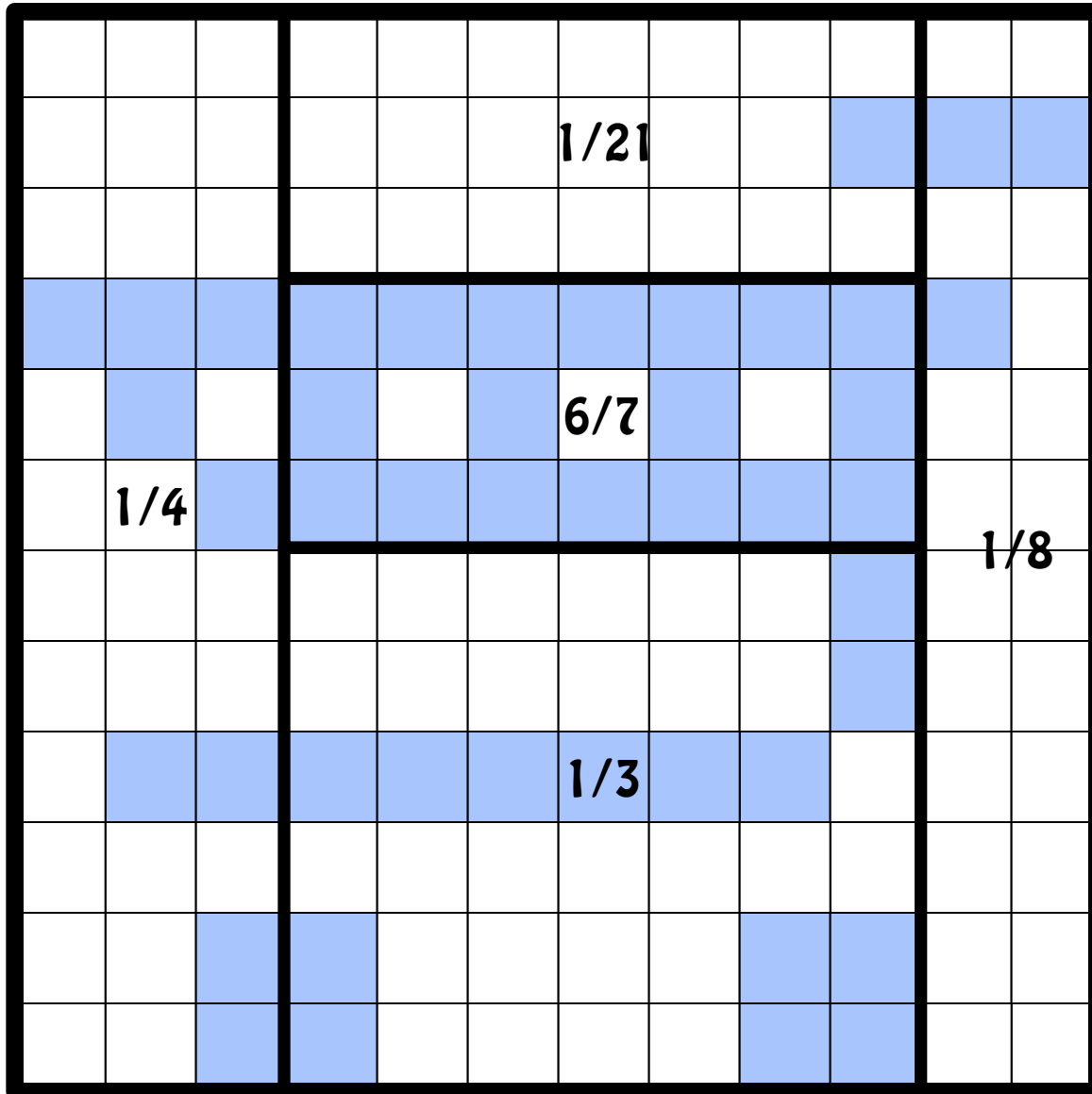
1/8

1/4

1/3

6/7

Shopping Cart



1/21

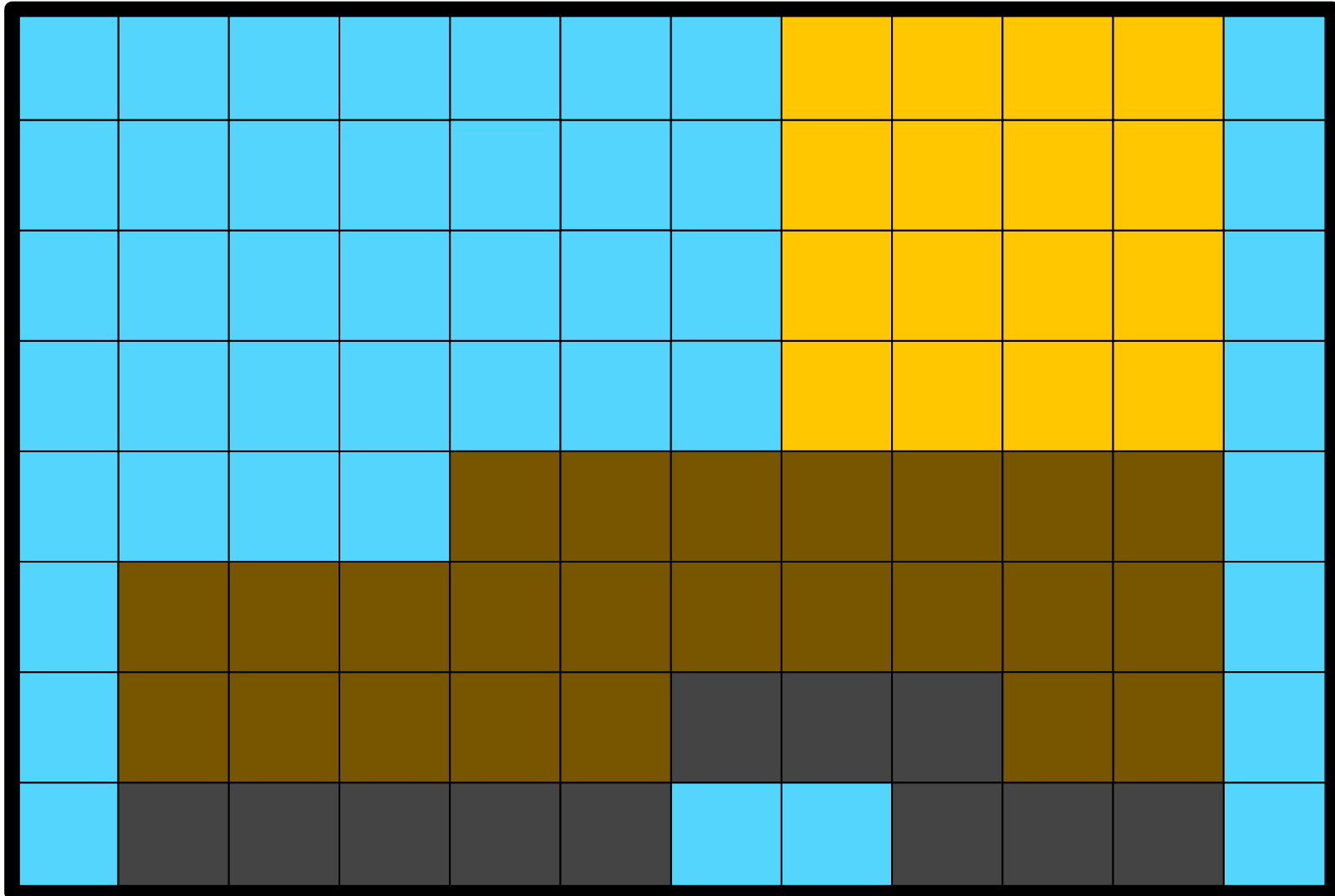
1/8

1/4

1/3

6/7

Uncomfortable Clog

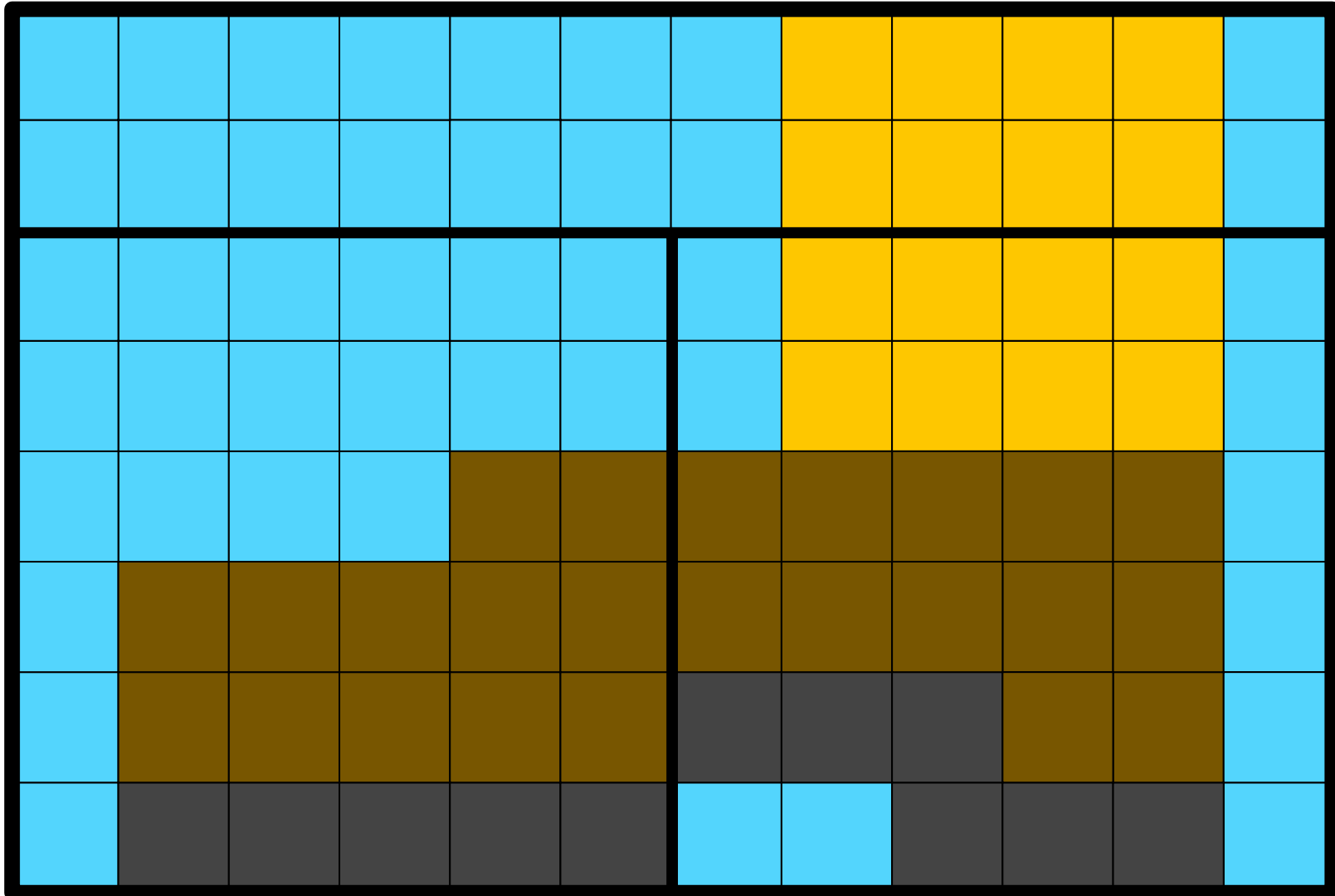


1/3

1/3

1/3

Uncomfortable Clog

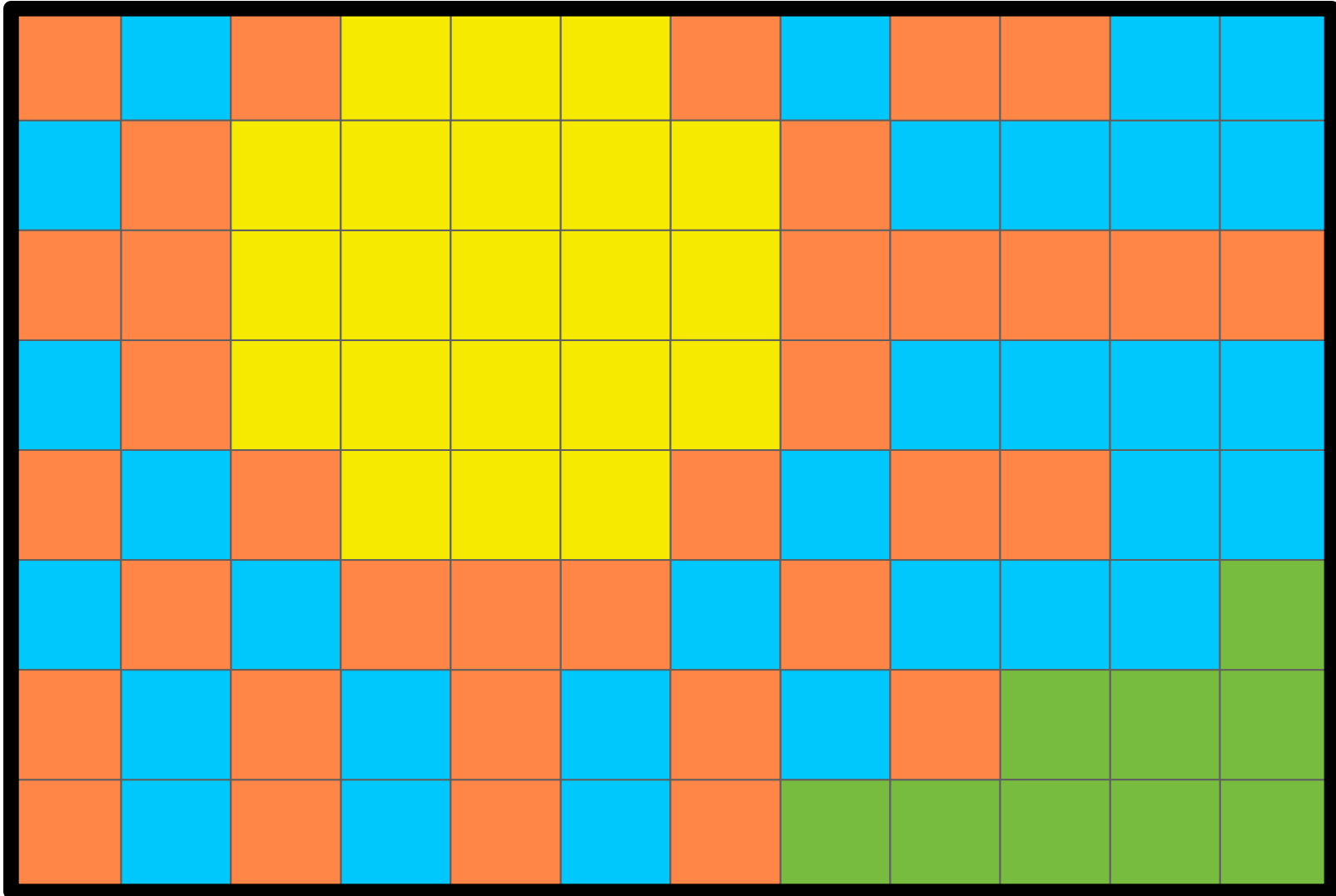


$\frac{1}{3}$

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$\frac{1}{3}$

SUNRISE

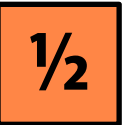
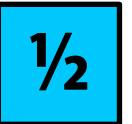
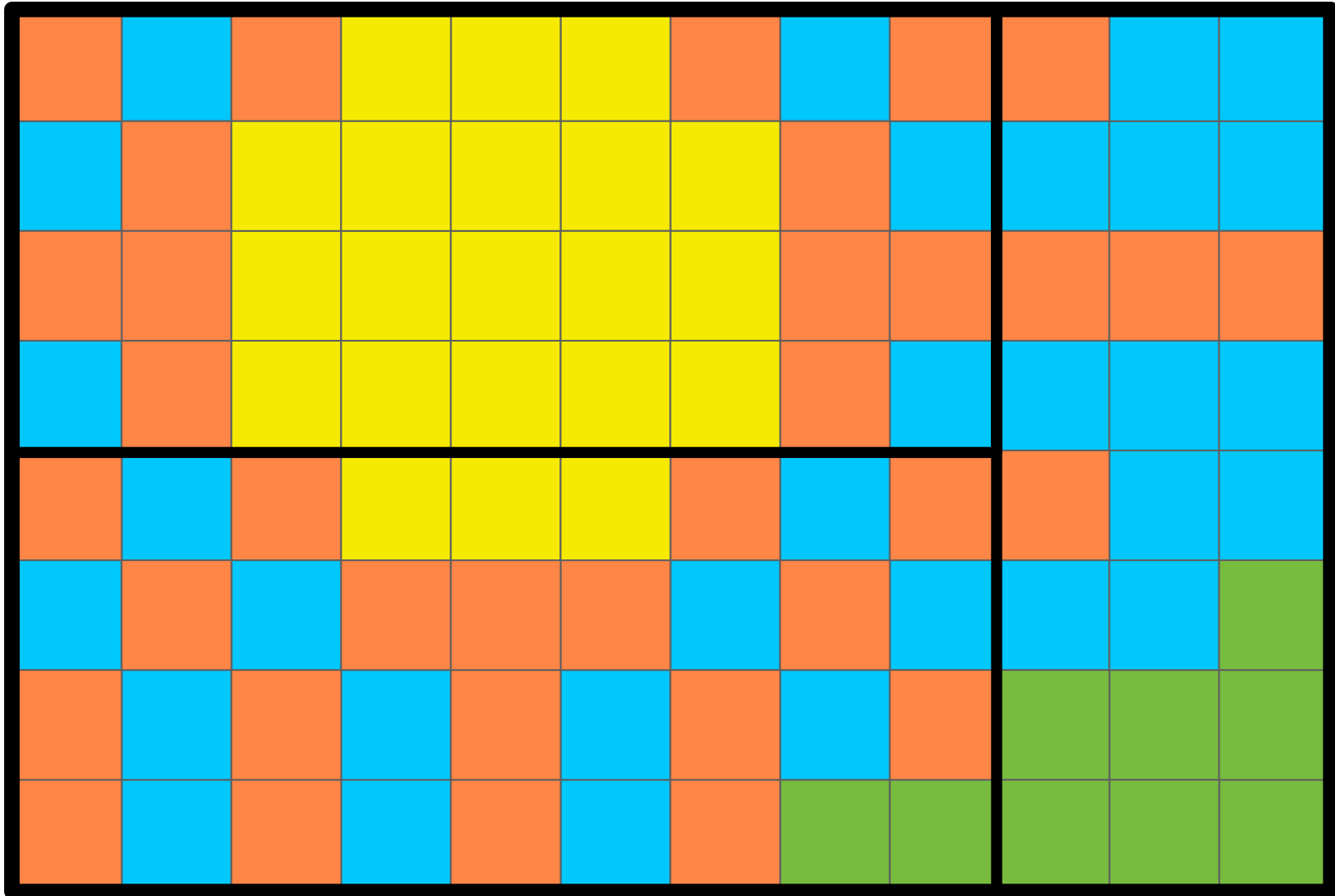


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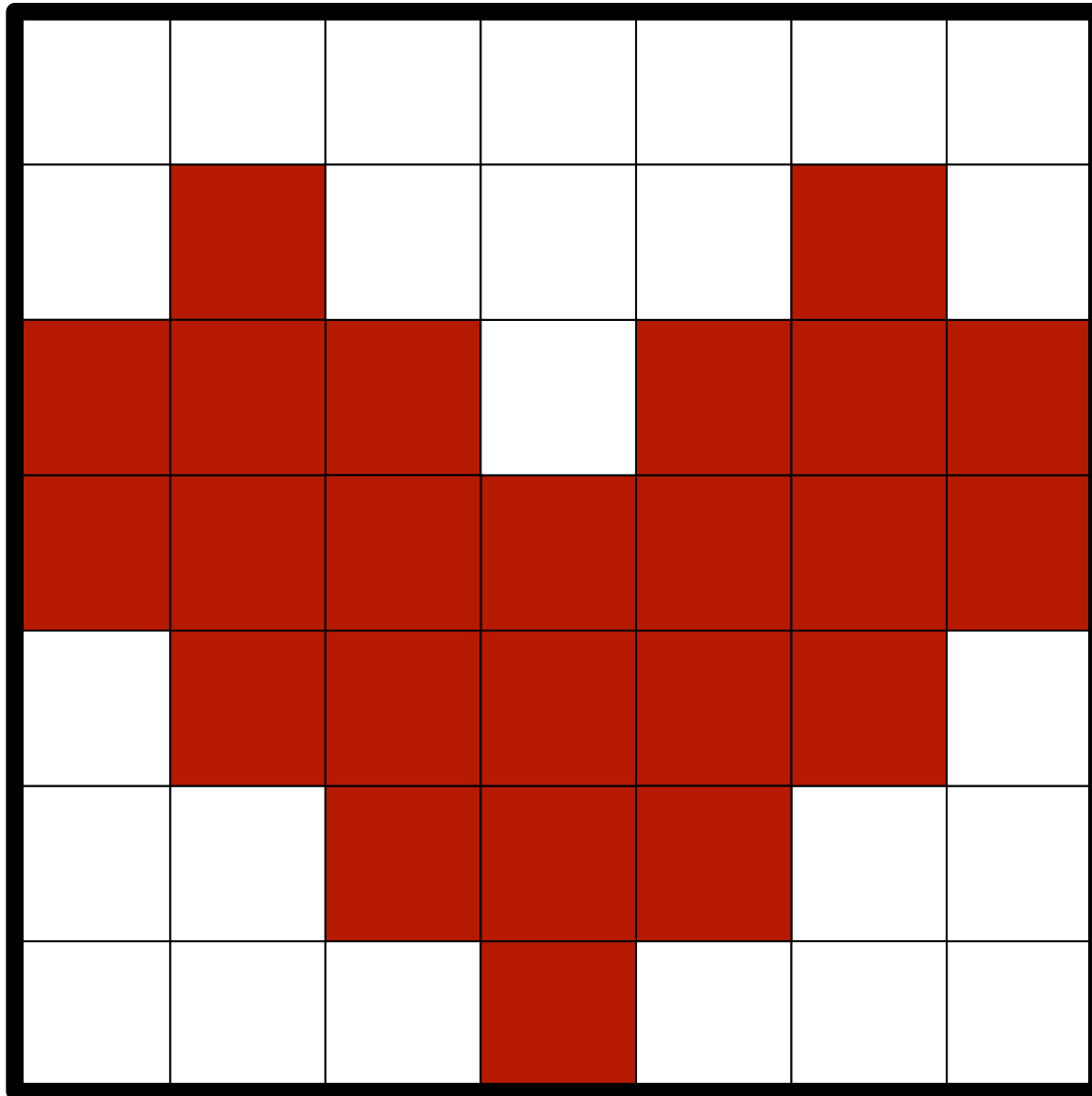
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$\frac{1}{2}$

SUNRISE



Broken Heart



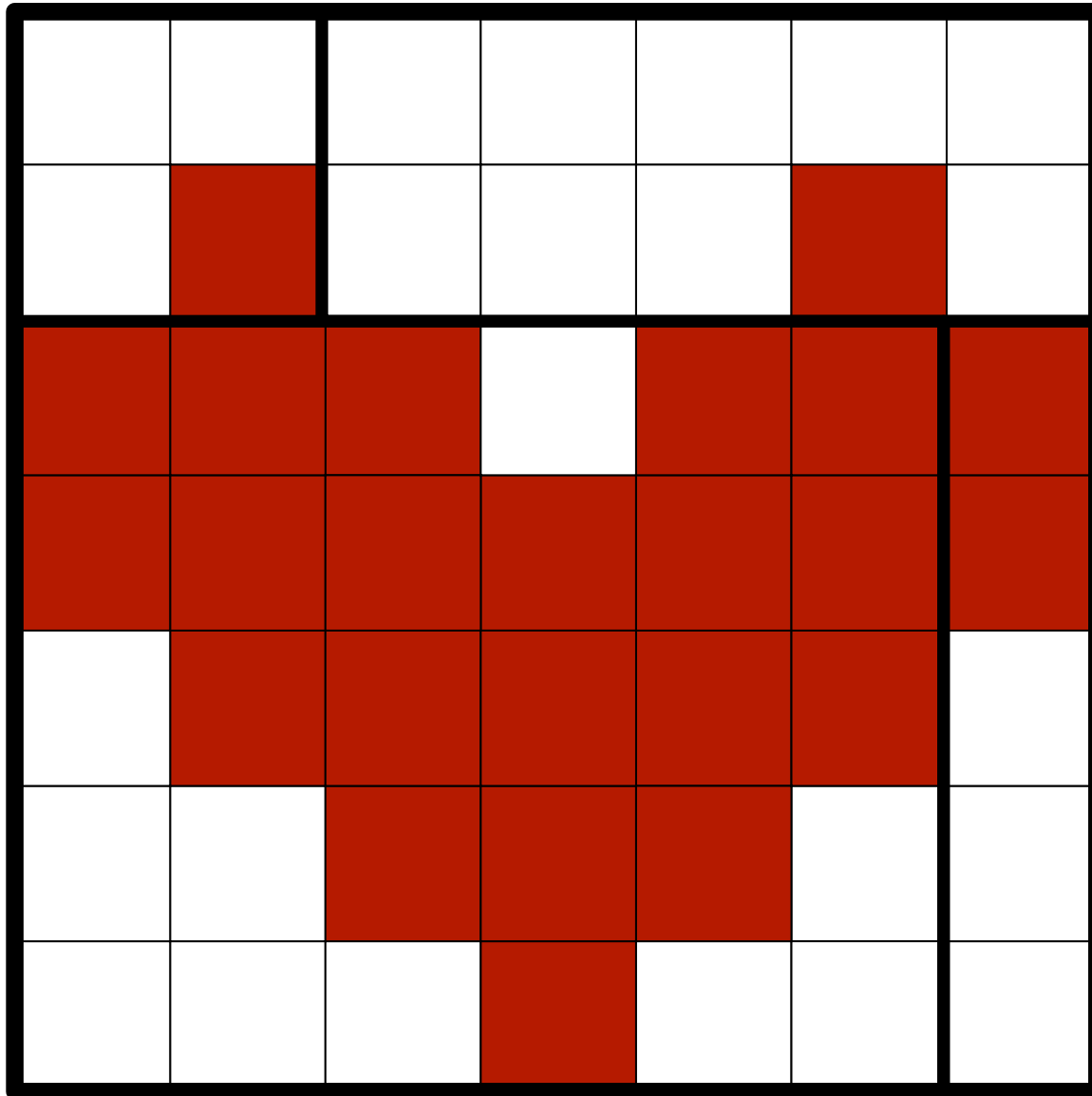
$1/10$

$1/4$

$2/5$

$2/3$

Broken Heart



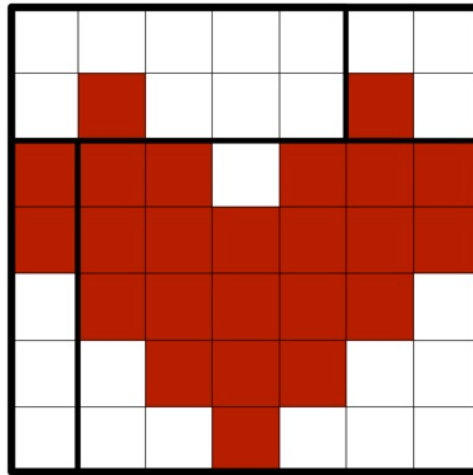
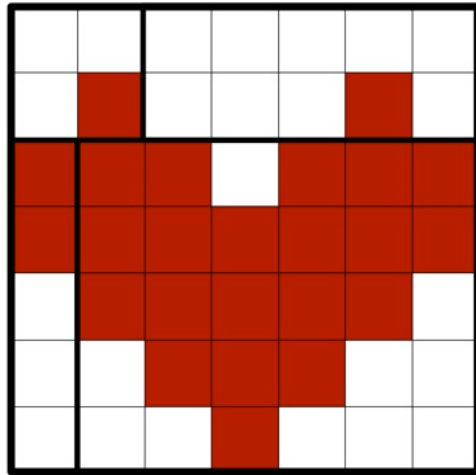
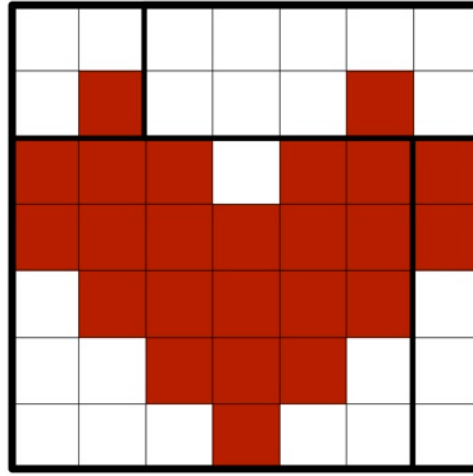
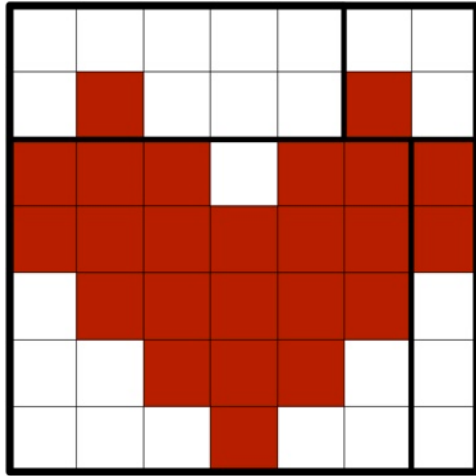
1/10

1/4

2/5

2/3

Broken Heart



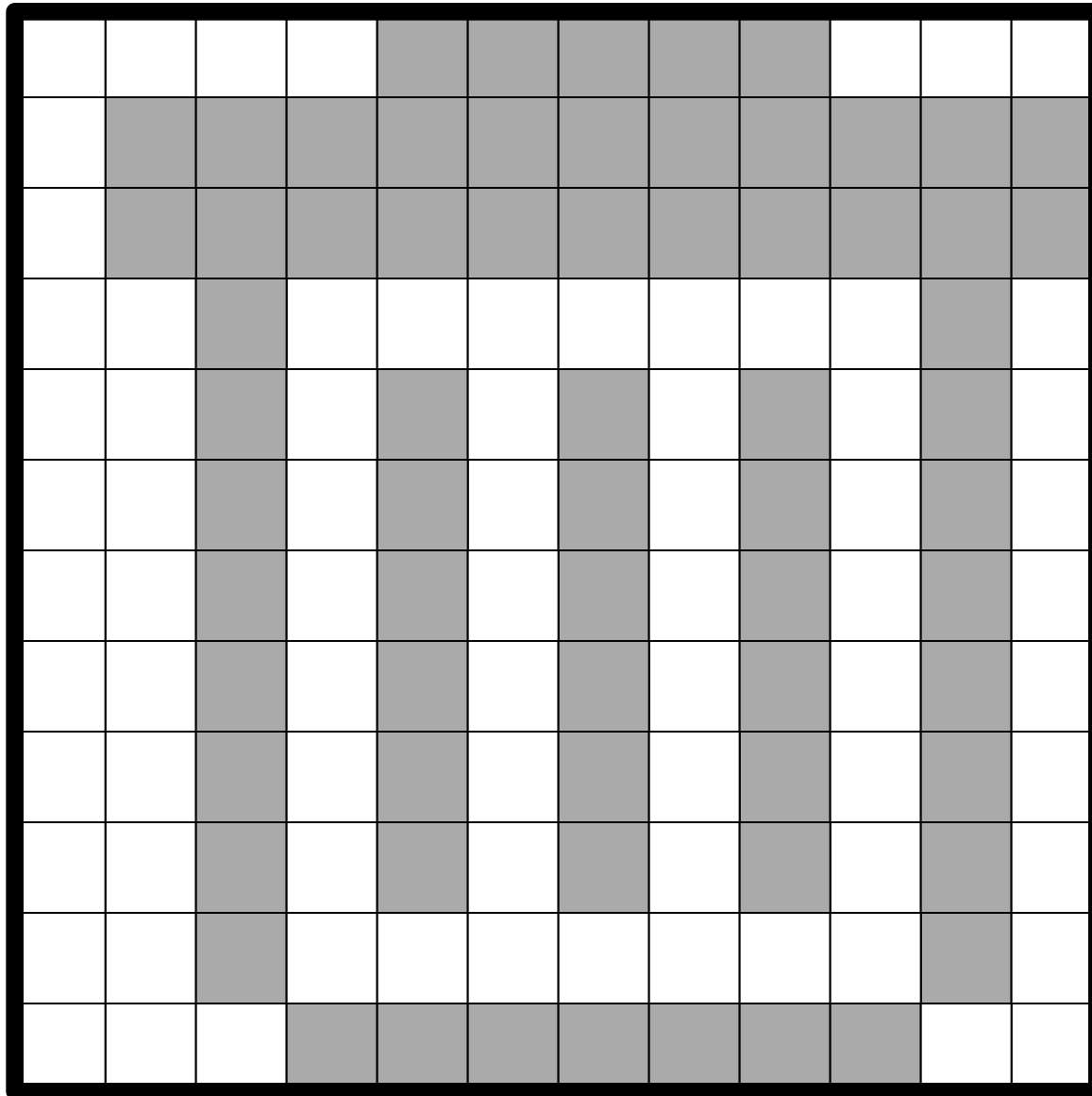
1/10

1/4

2/5

2/3

Garbage Can



1/2

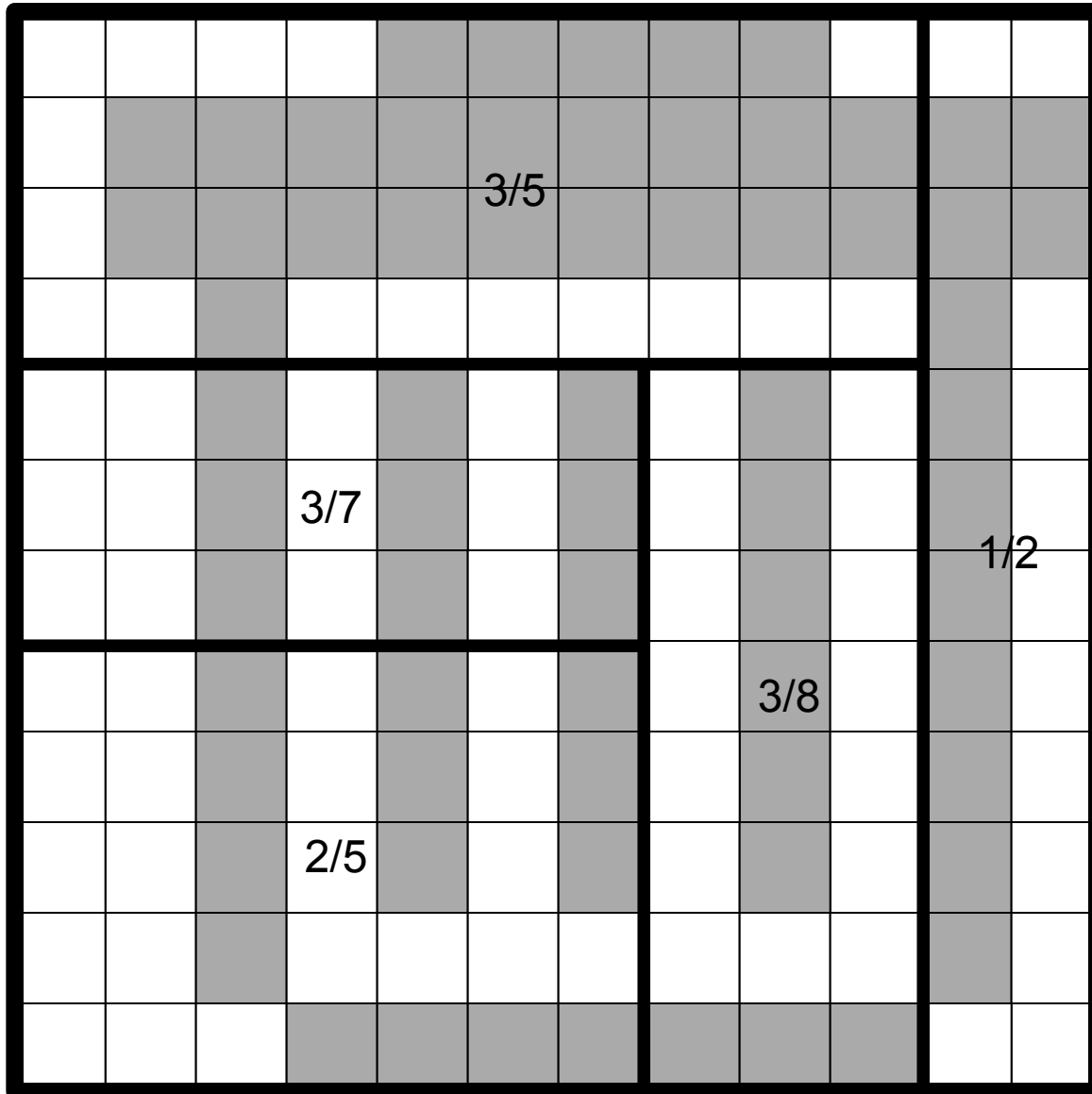
2/5

3/5

3/7

3/8

Garbage Can



1/2

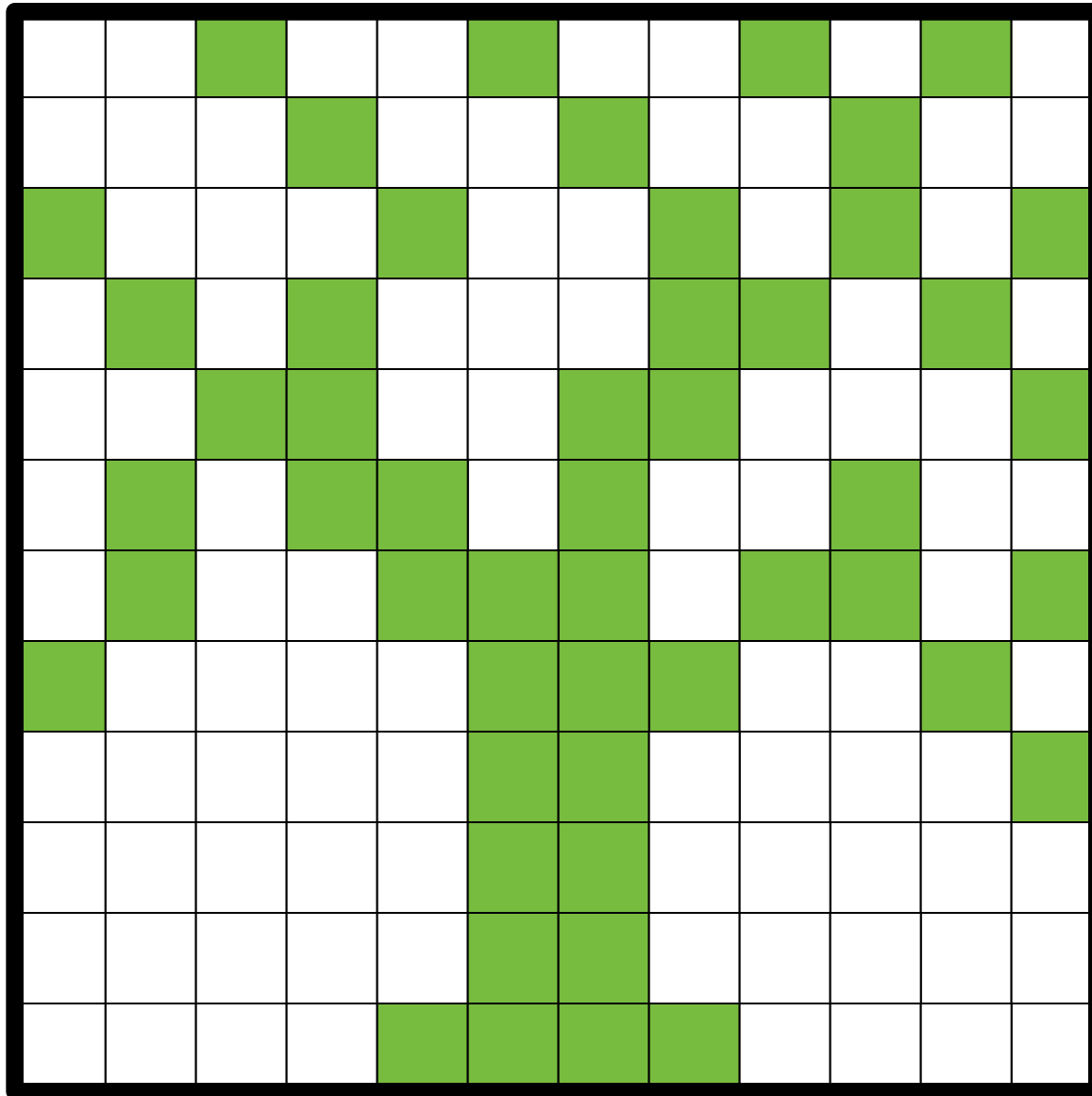
2/5

3/5

3/7

3/8

Fractured tree



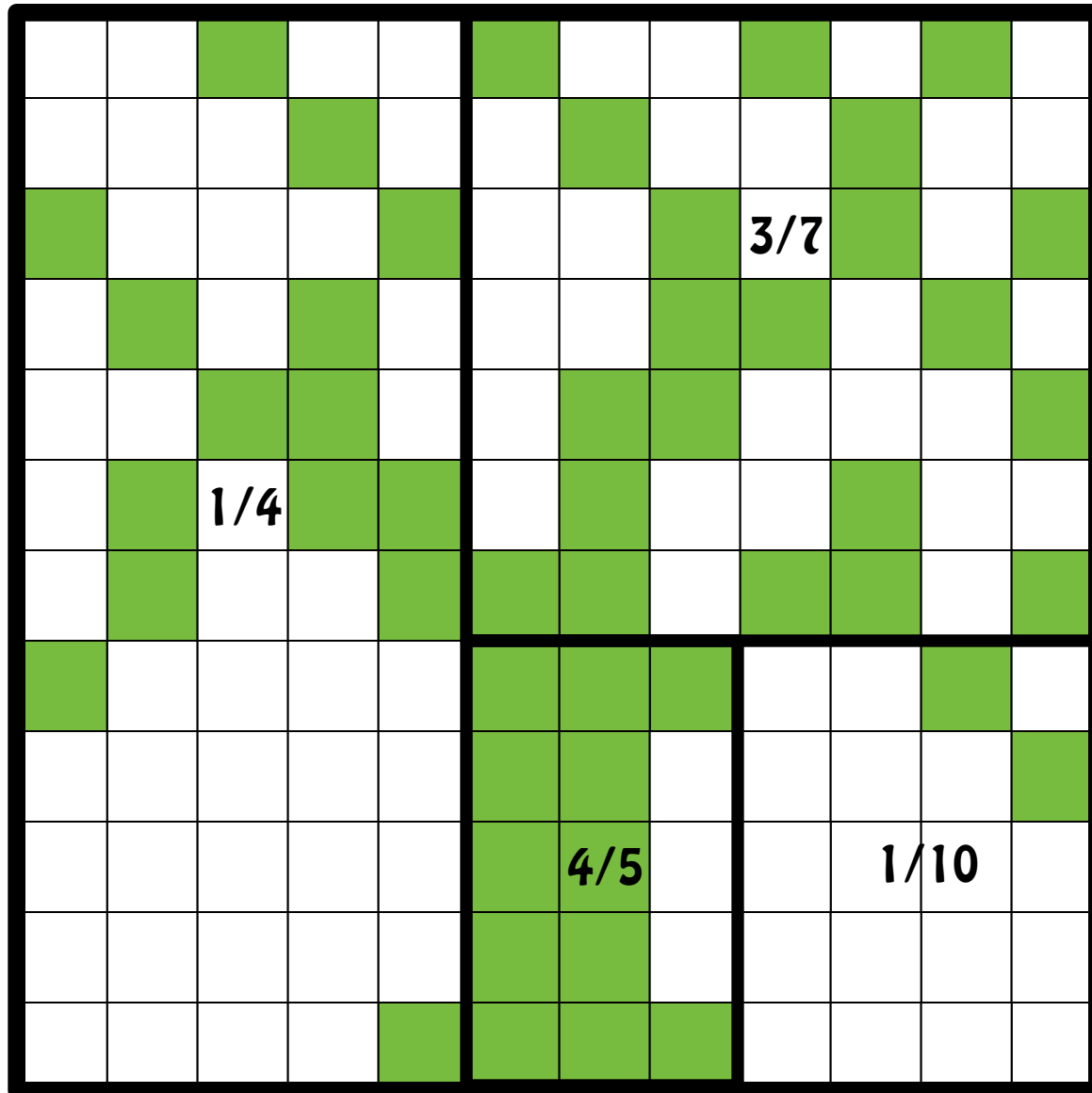
1/10

1/4

3/7

4/5

Fractured tree



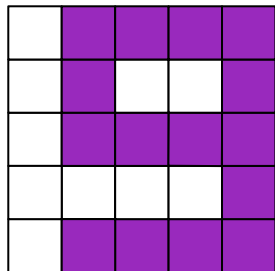
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$1/4$

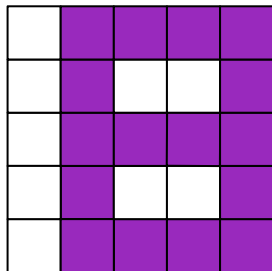
$3/7$

$4/5$

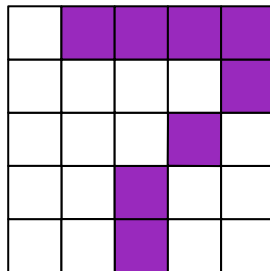
Blast-Off



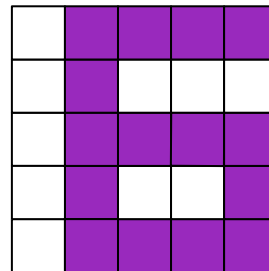
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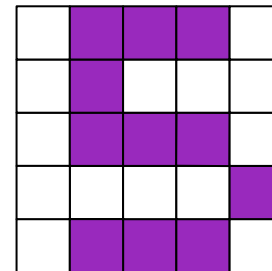
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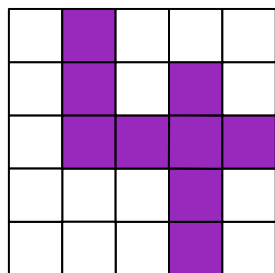
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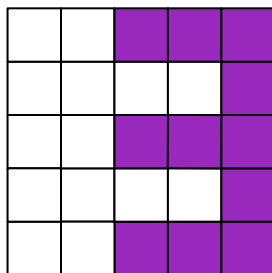
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 $\frac{2}{3}$
 $\frac{2}{3}$



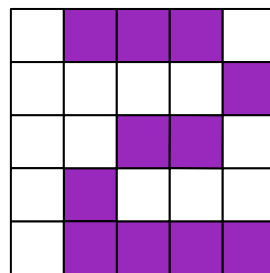
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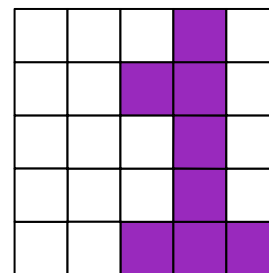
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 $\frac{1}{5}$



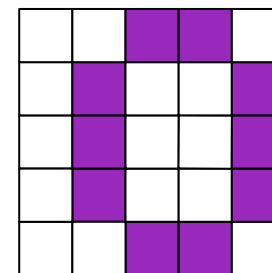
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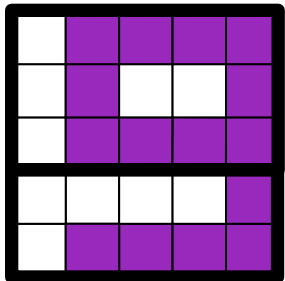
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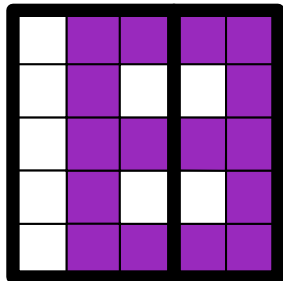
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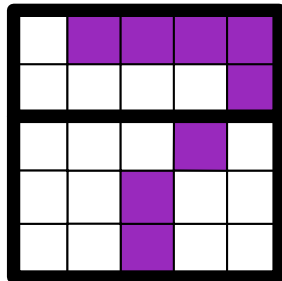
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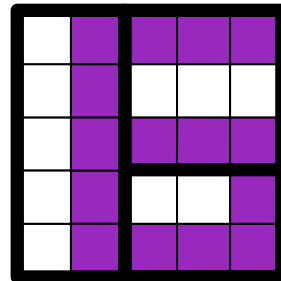
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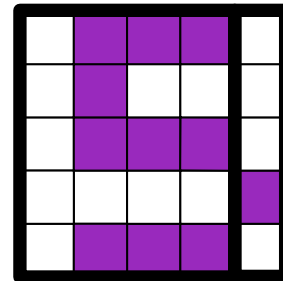
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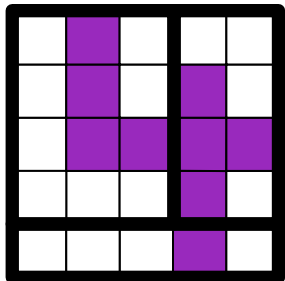
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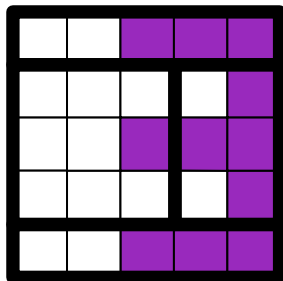
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 $2/3$



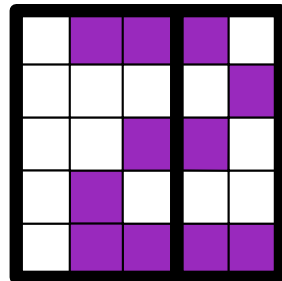
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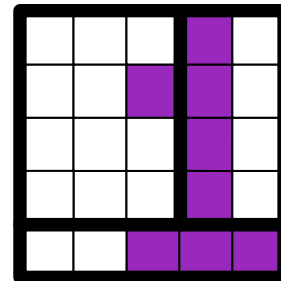
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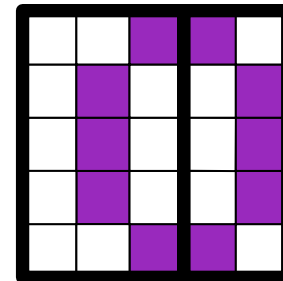
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 $3/5$
 $2/3$



$1/2$
 $2/5$



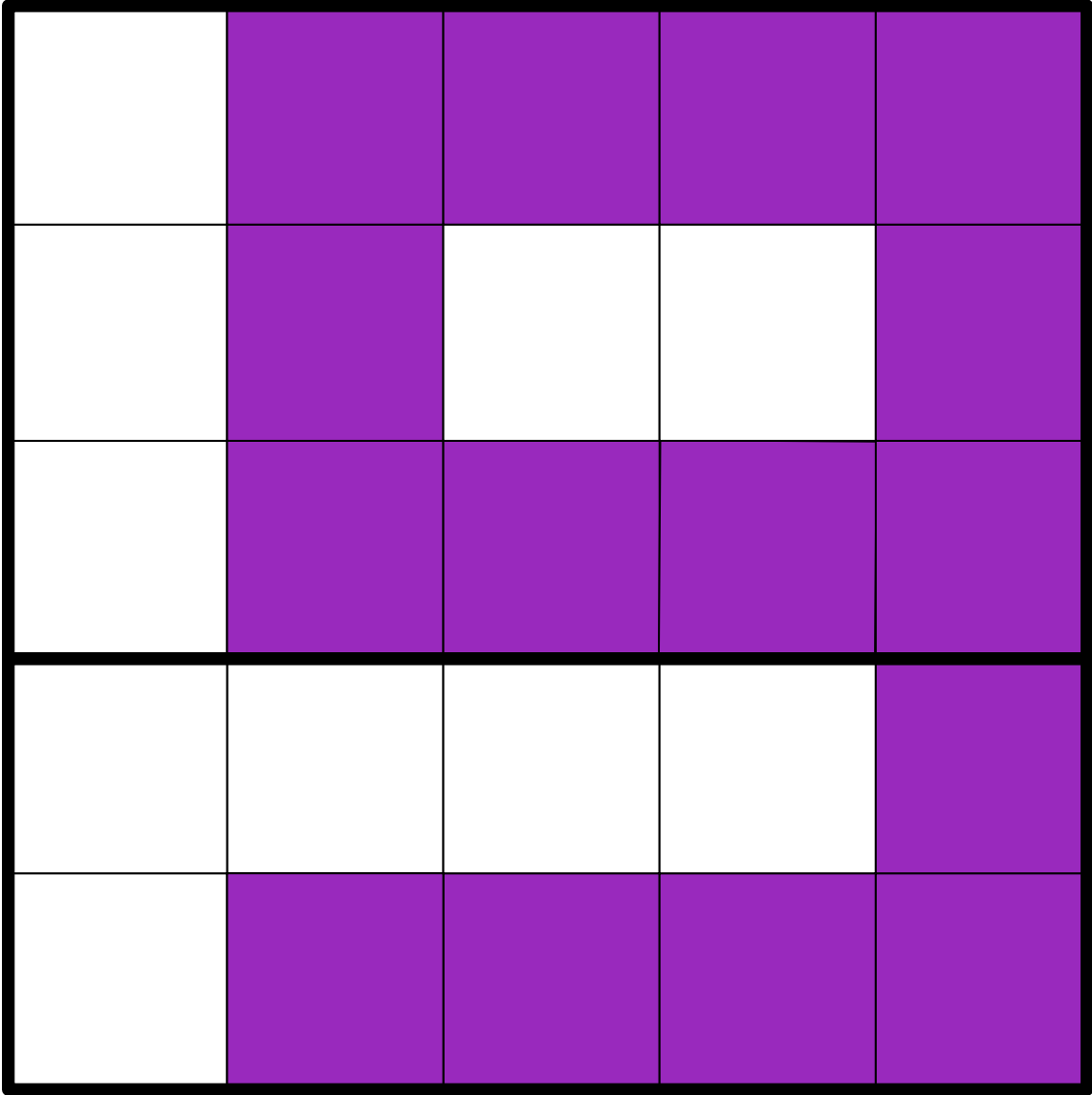
$1/12$
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 $3/5$



$1/2$
 $1/3$

Blast-Off

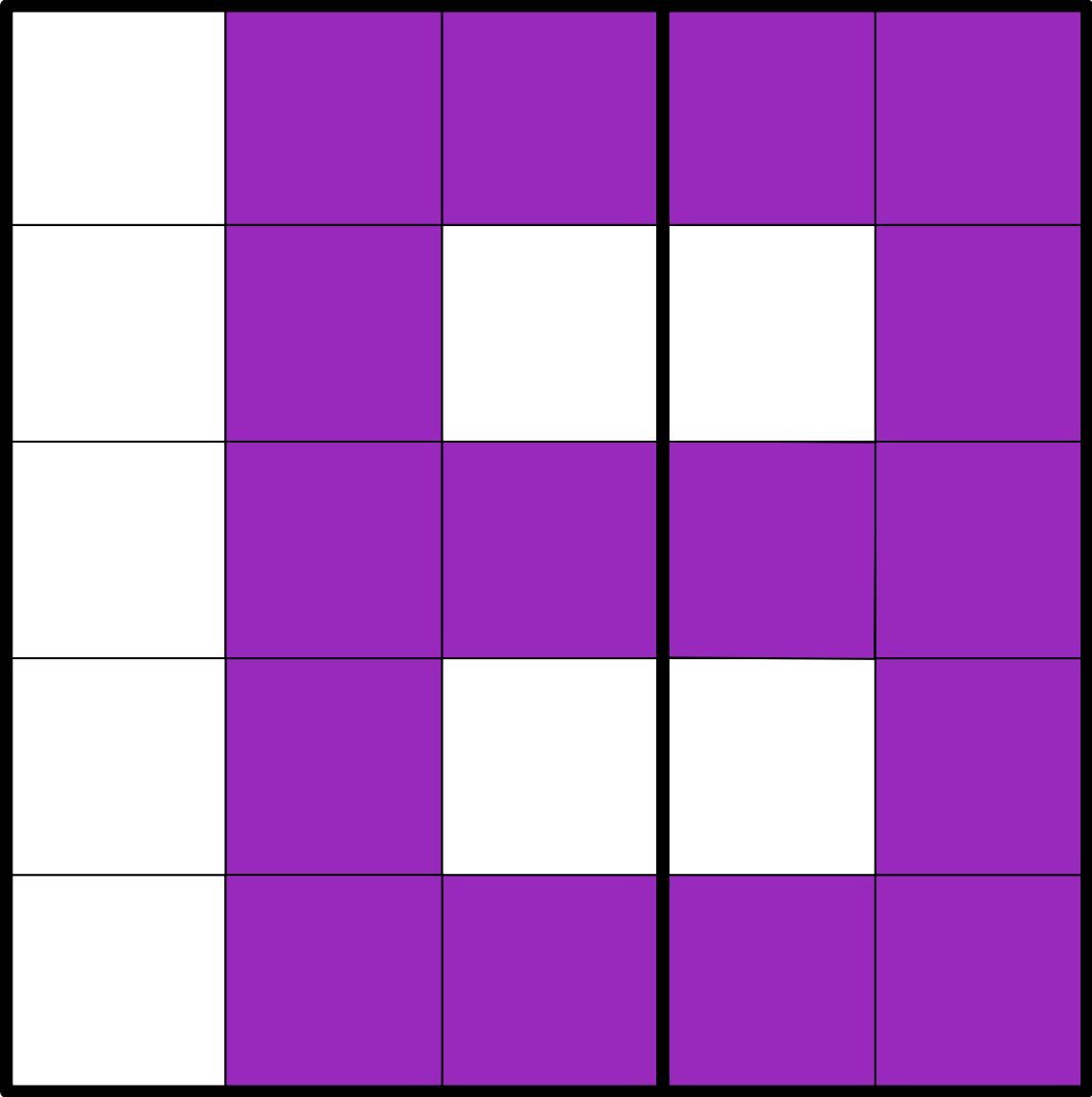
Fraction 9



1/2

2/3

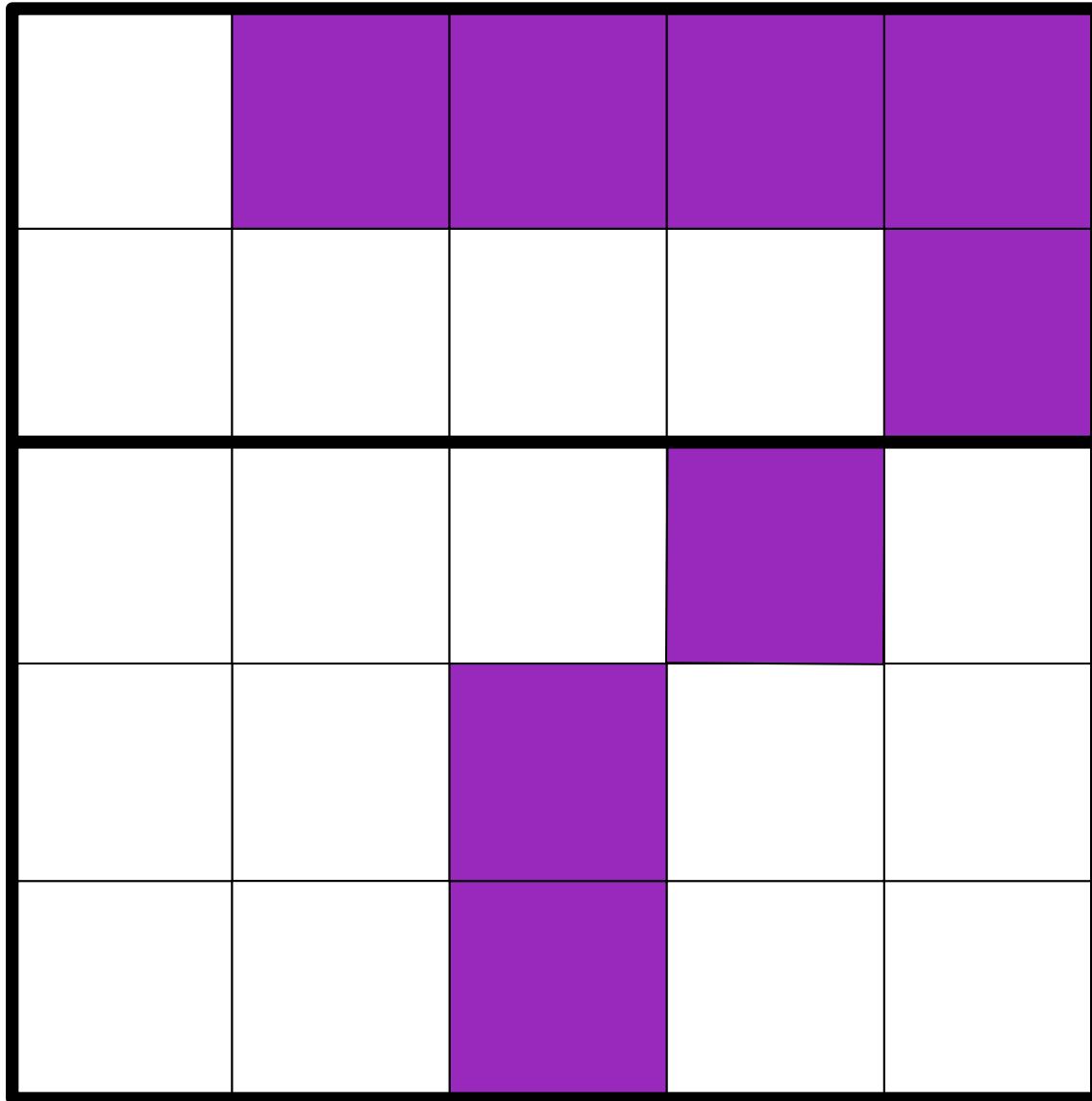
Fraction 8



8/10

8/15

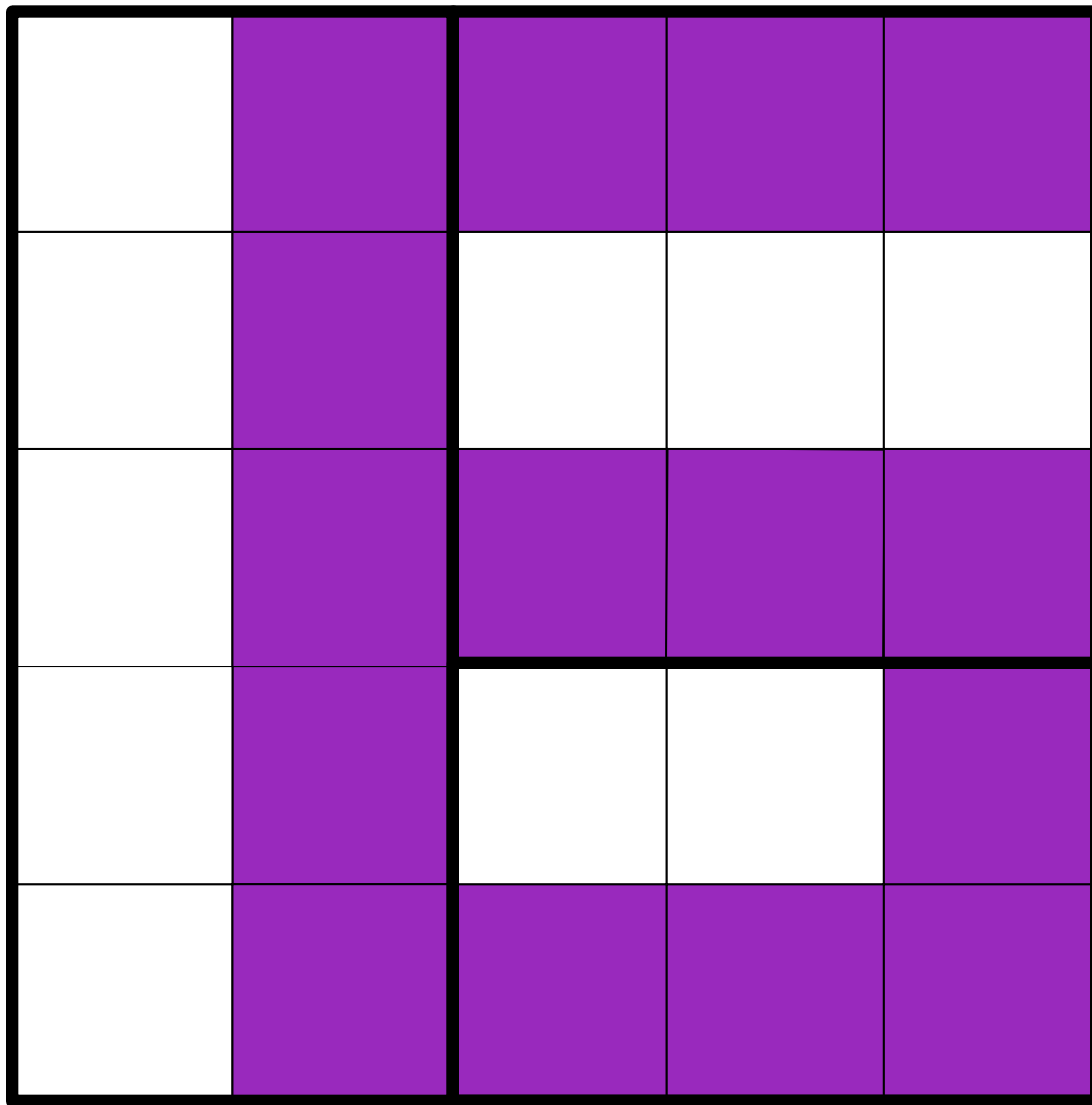
Fraction Seven



1/2

1/5

Fraction Six

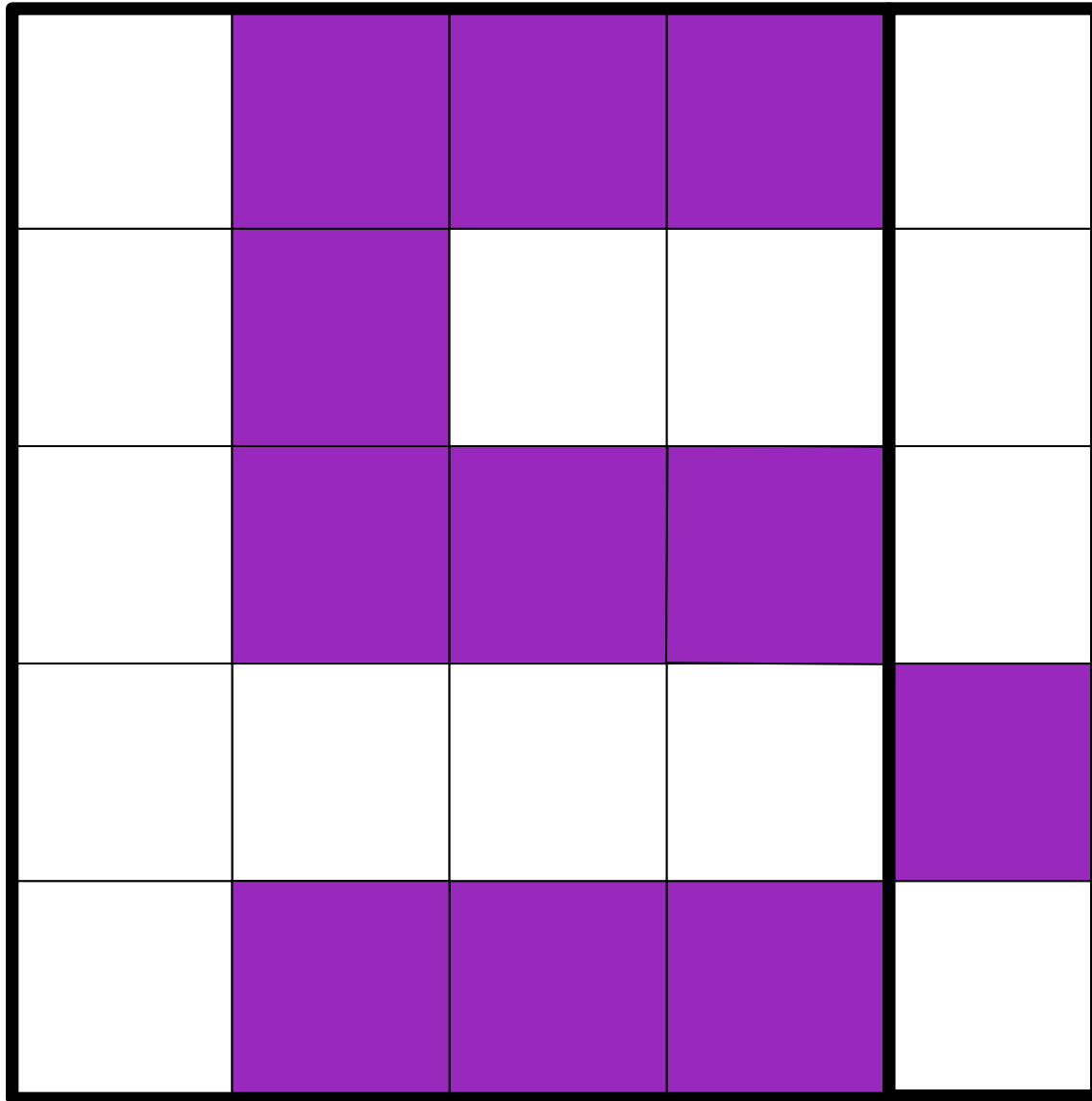


1/2

2/3

2/3

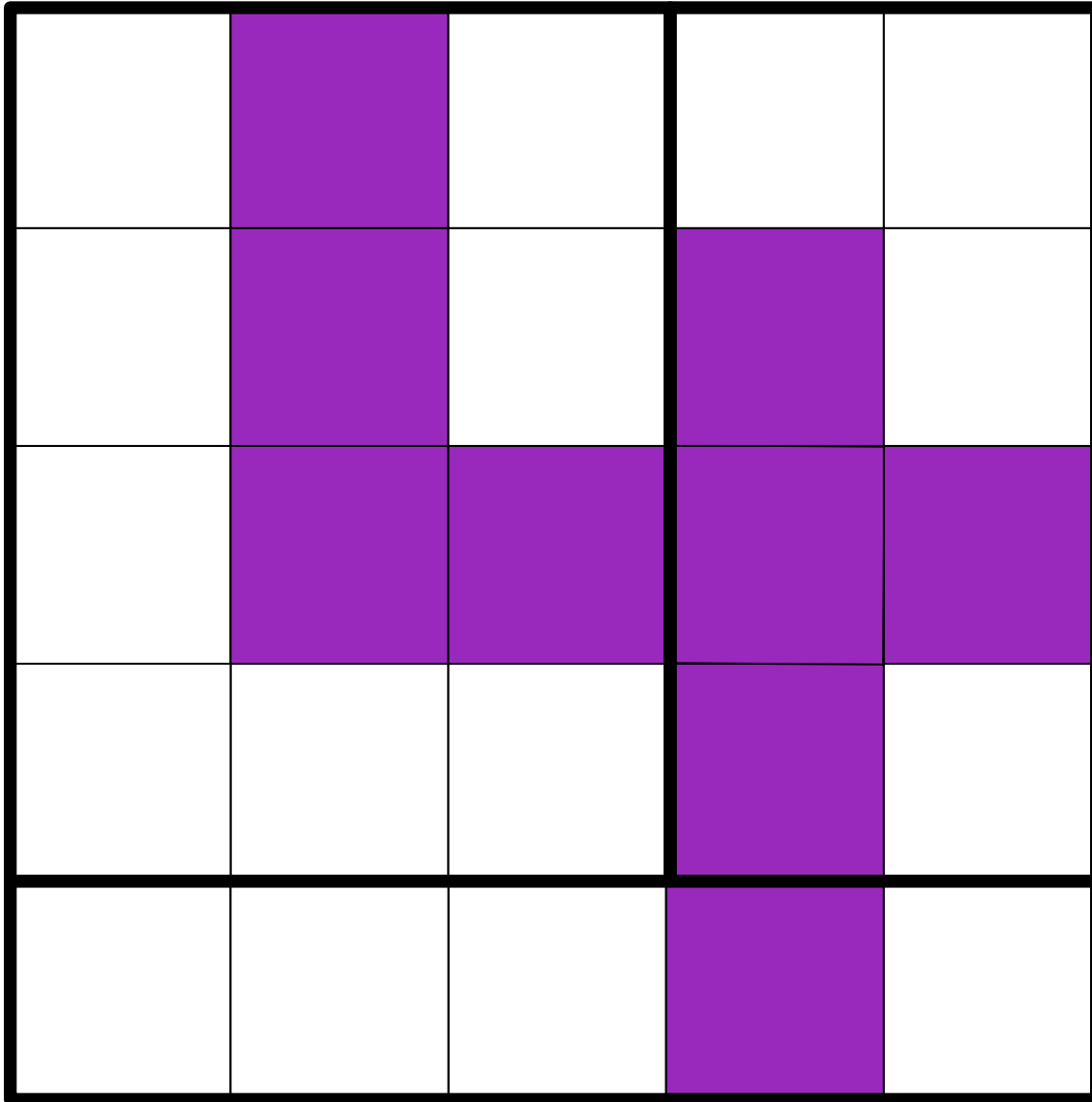
Fraction Five



1/2

1/5

Fraction four

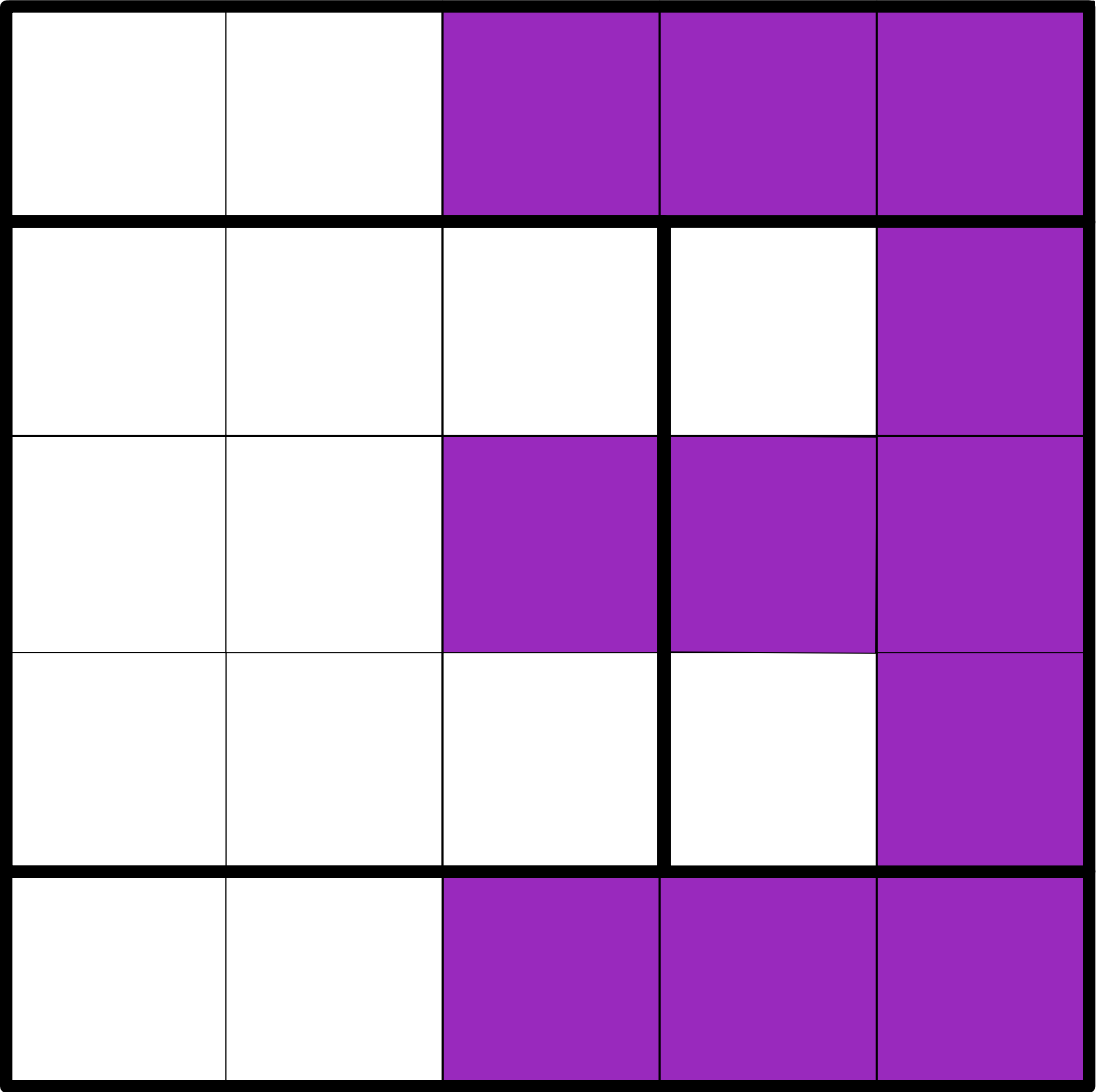


1/2

1/3

1/5

Fraction 3



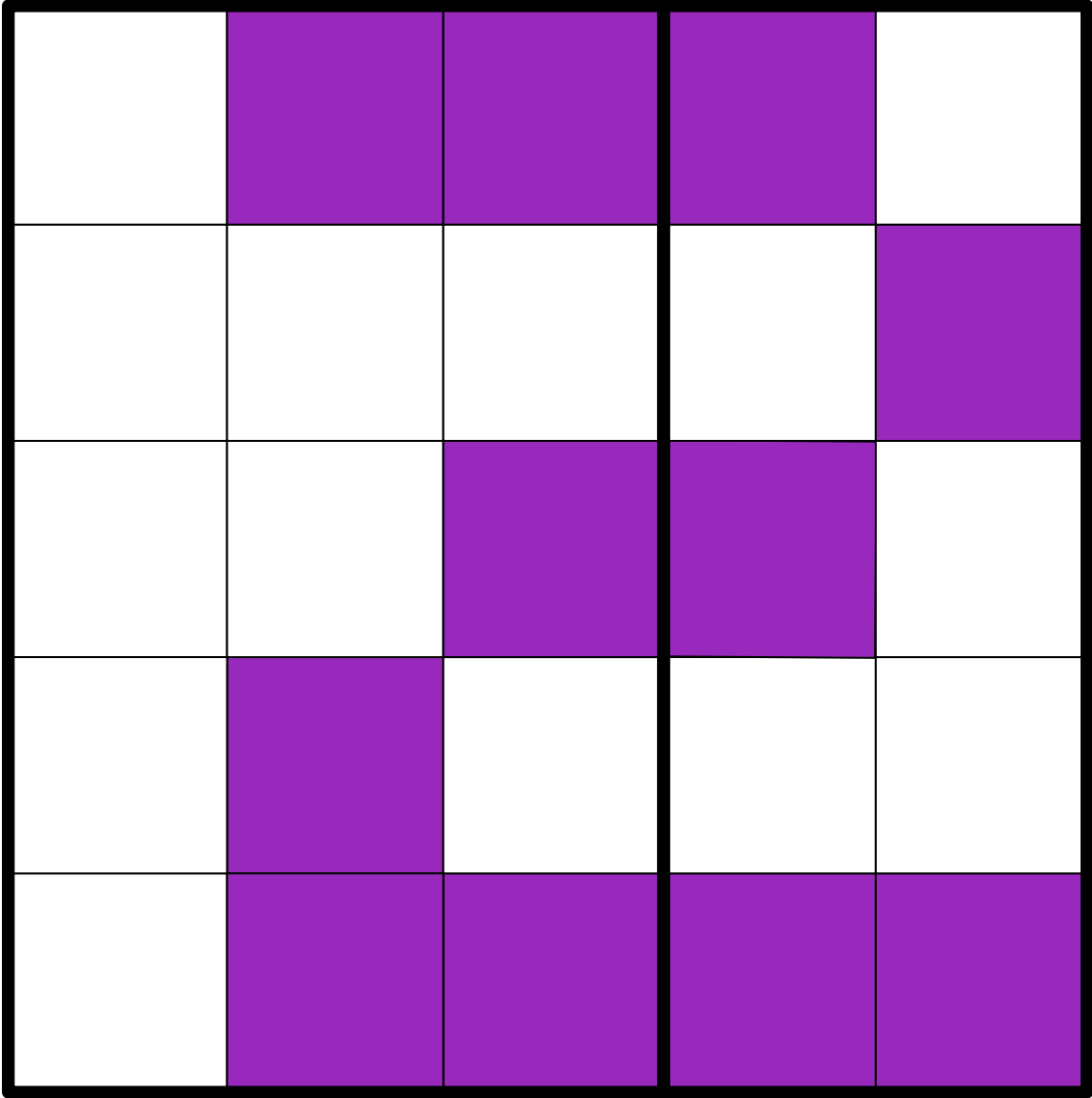
1/9

3/5

3/5

2/3

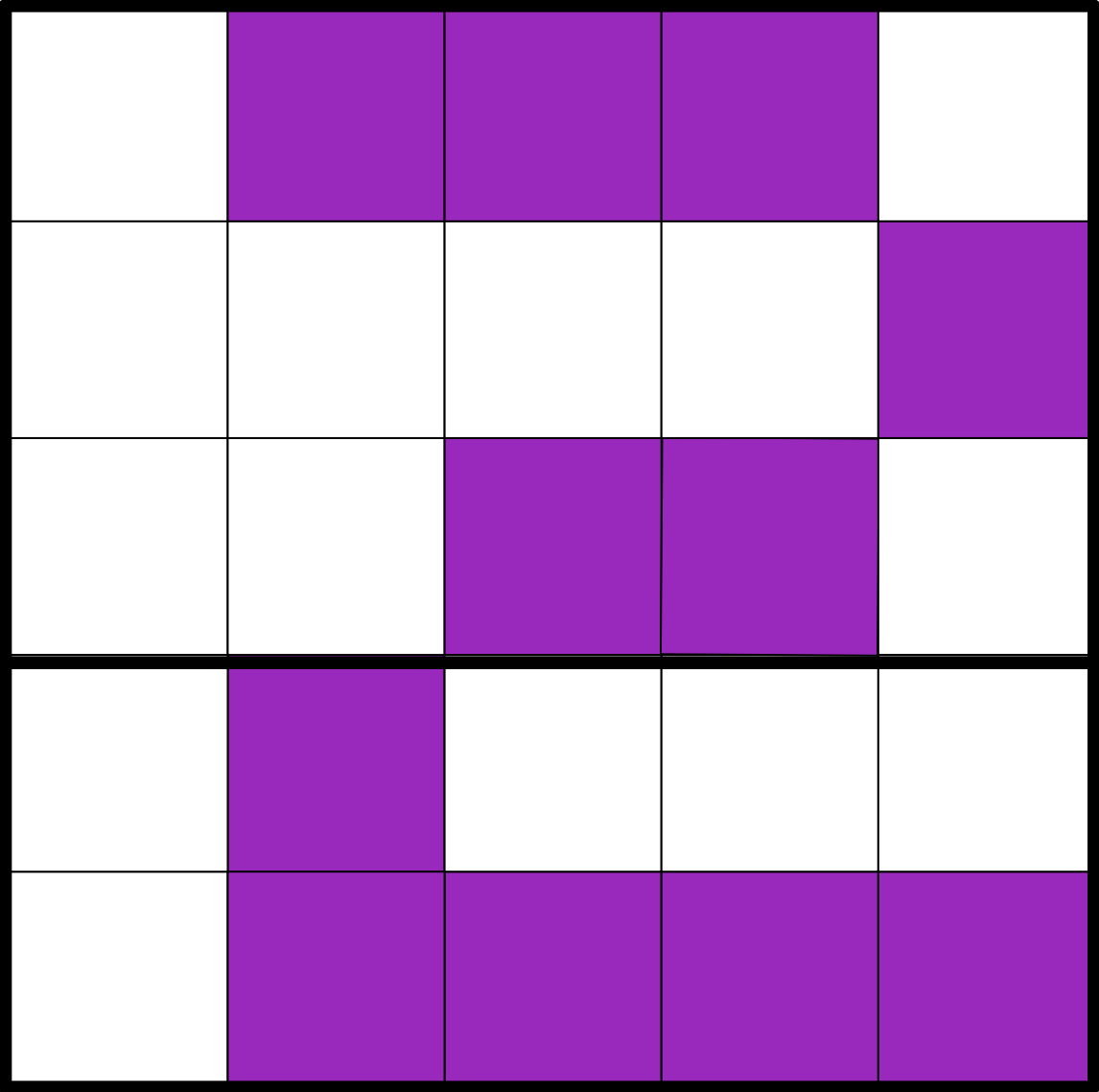
Fraction 2



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$\frac{2}{5}$

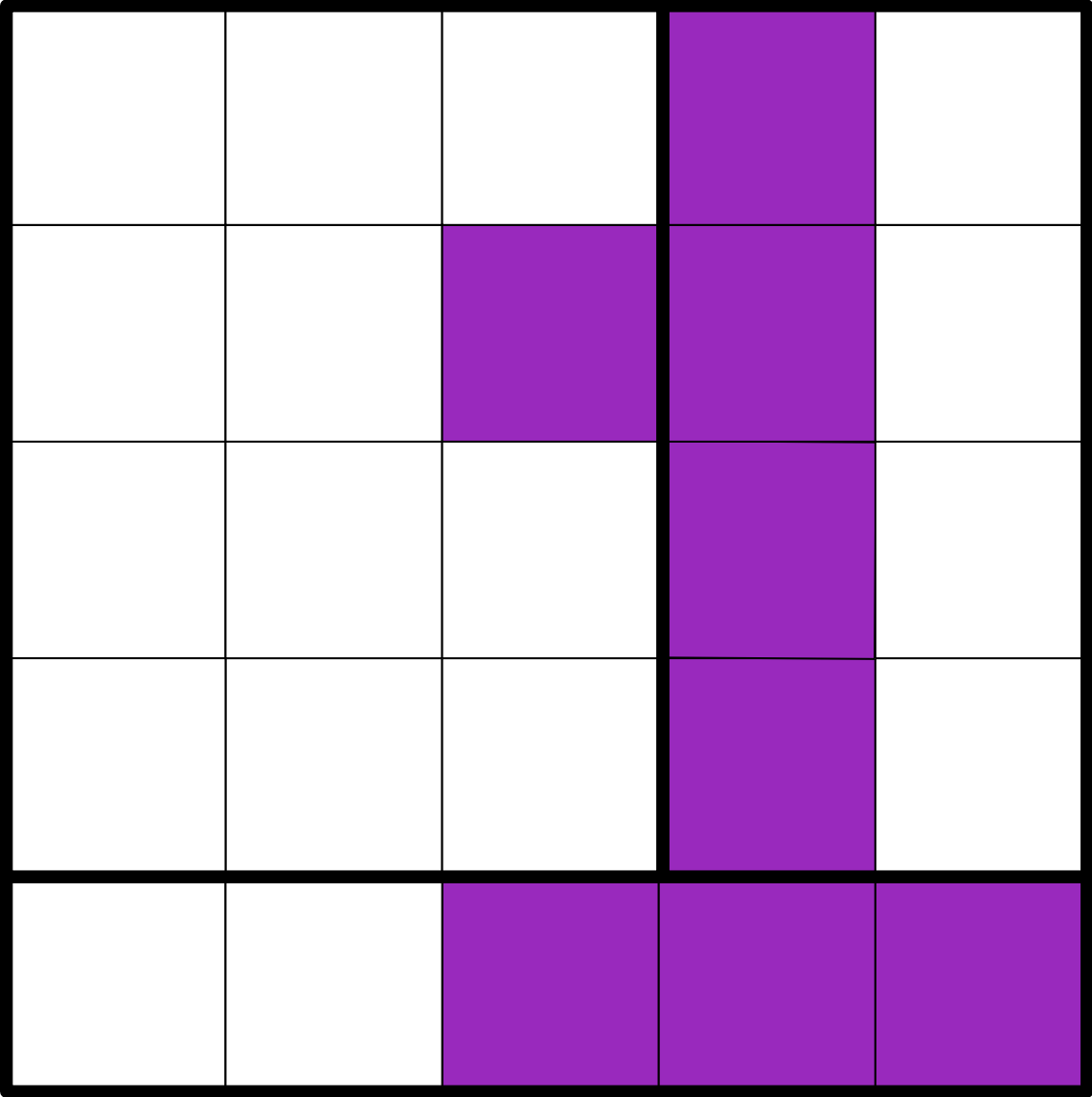
Fraction 2



1/2

2/5

Fraction 1

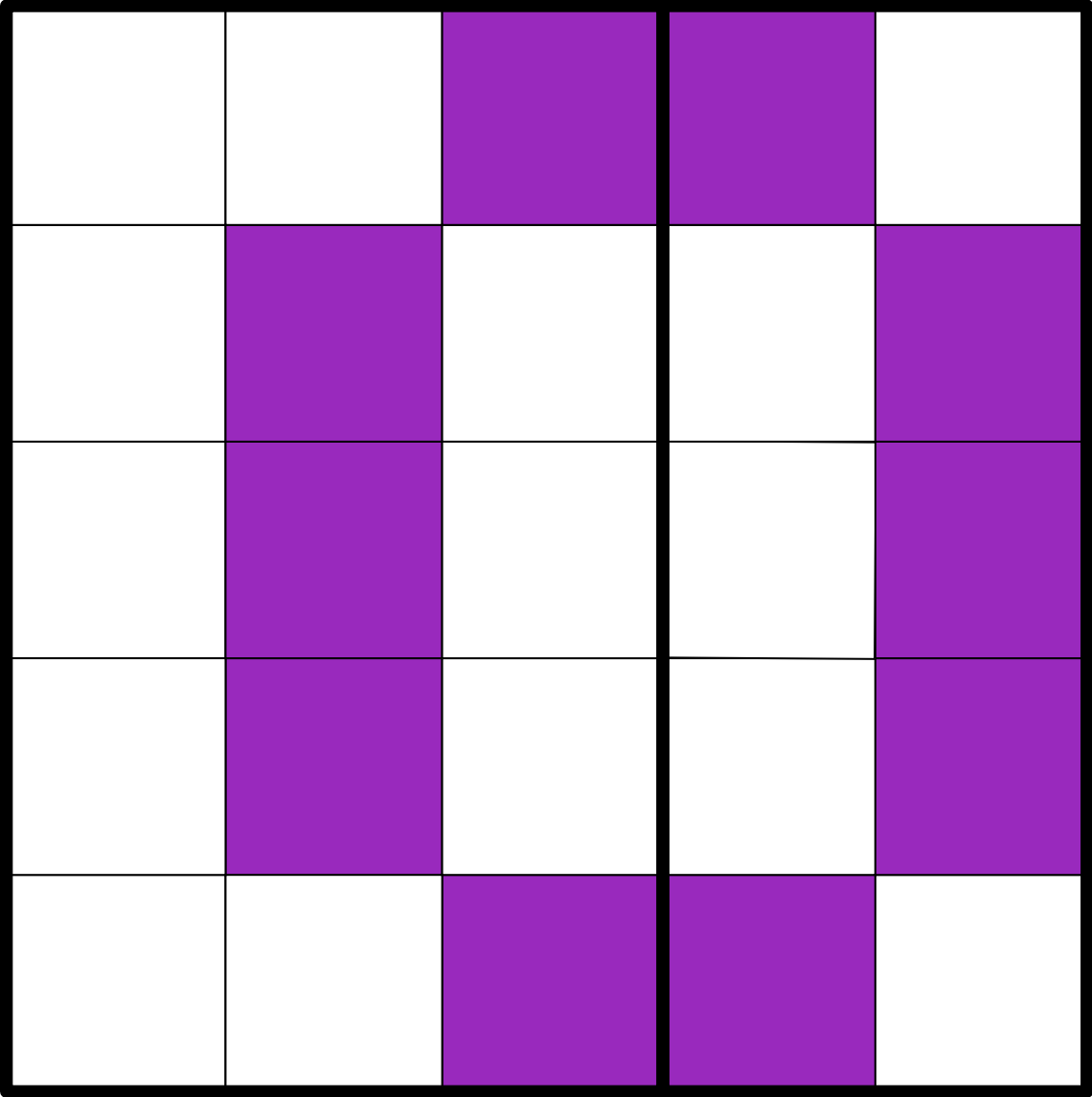


1/12

1/2

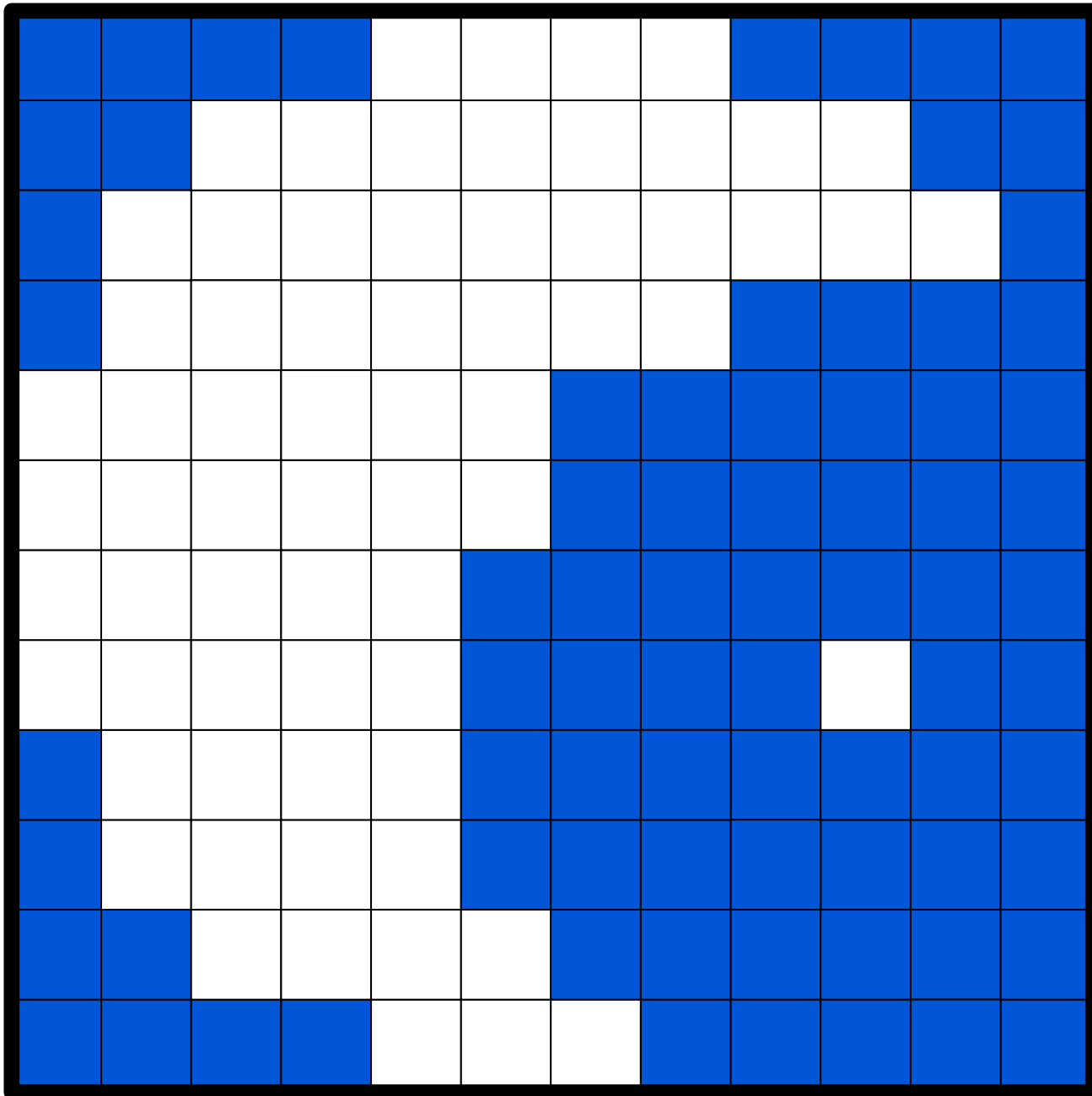
3/5

Fraction 0



1/2

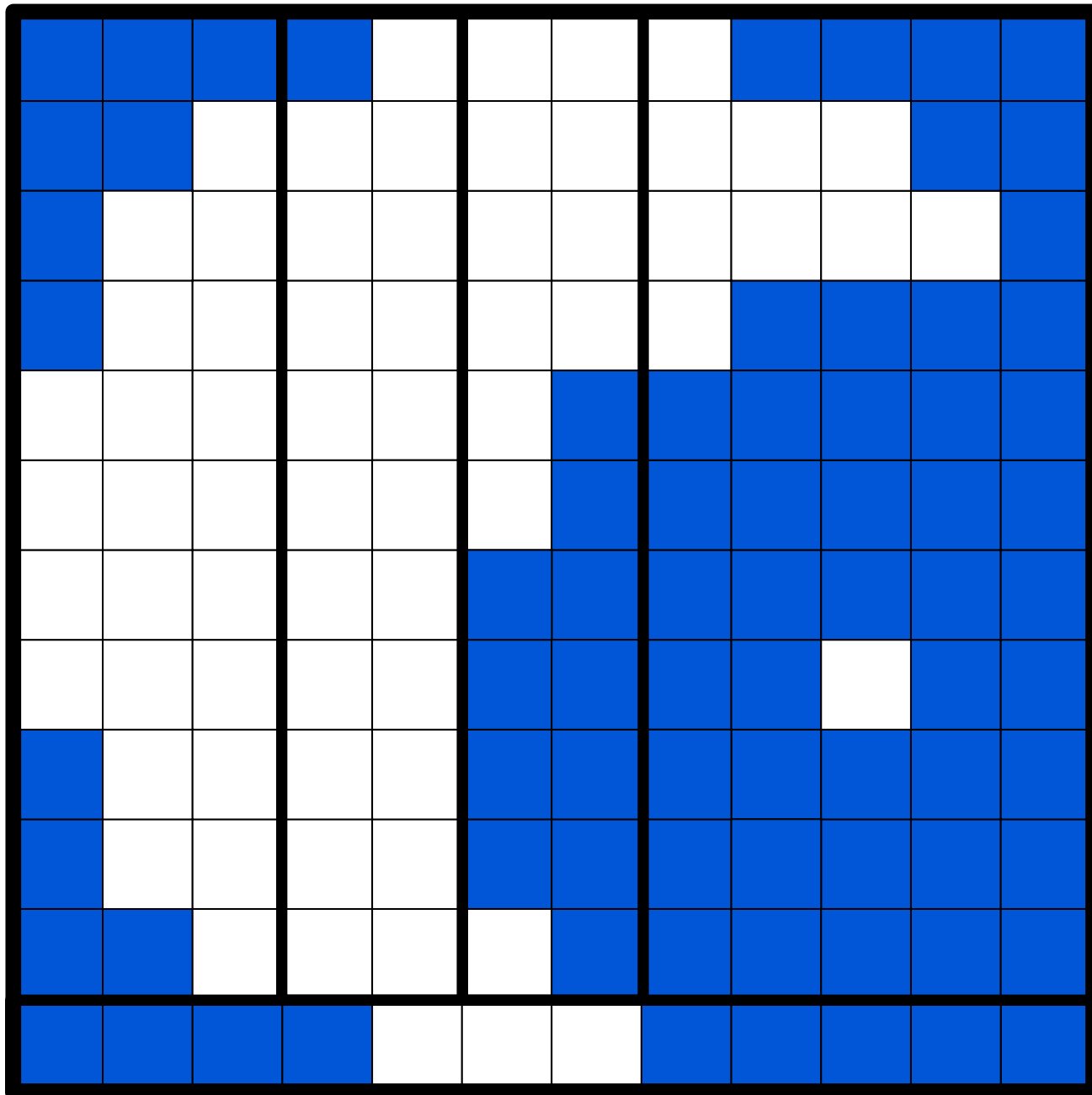
1/3



**IMPOSSIBLE
STAR**

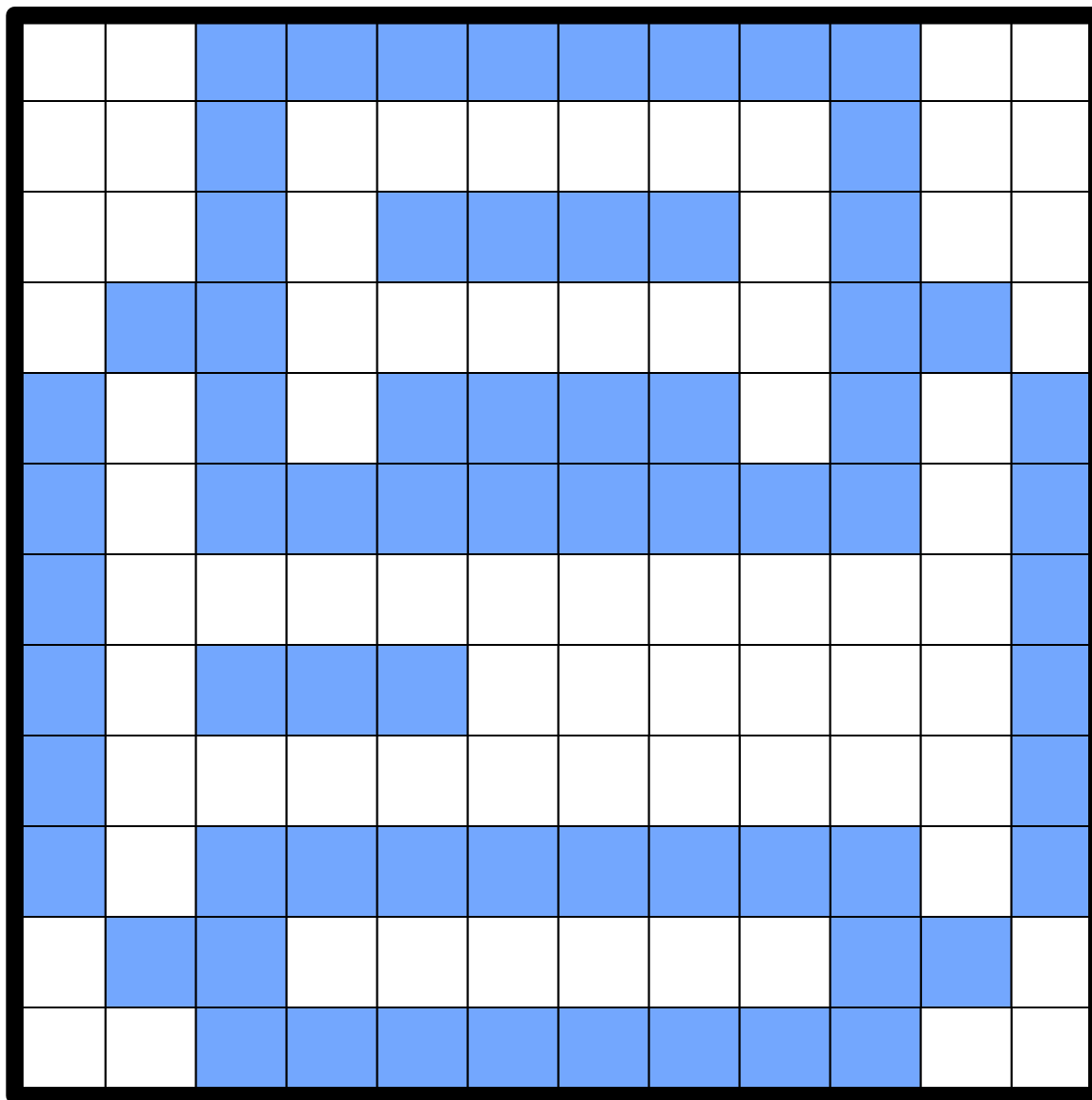
- 1/2
- 1/3
- 3/4
- 1/22
- 9/11

**IMPOSSIBLE
STAR**



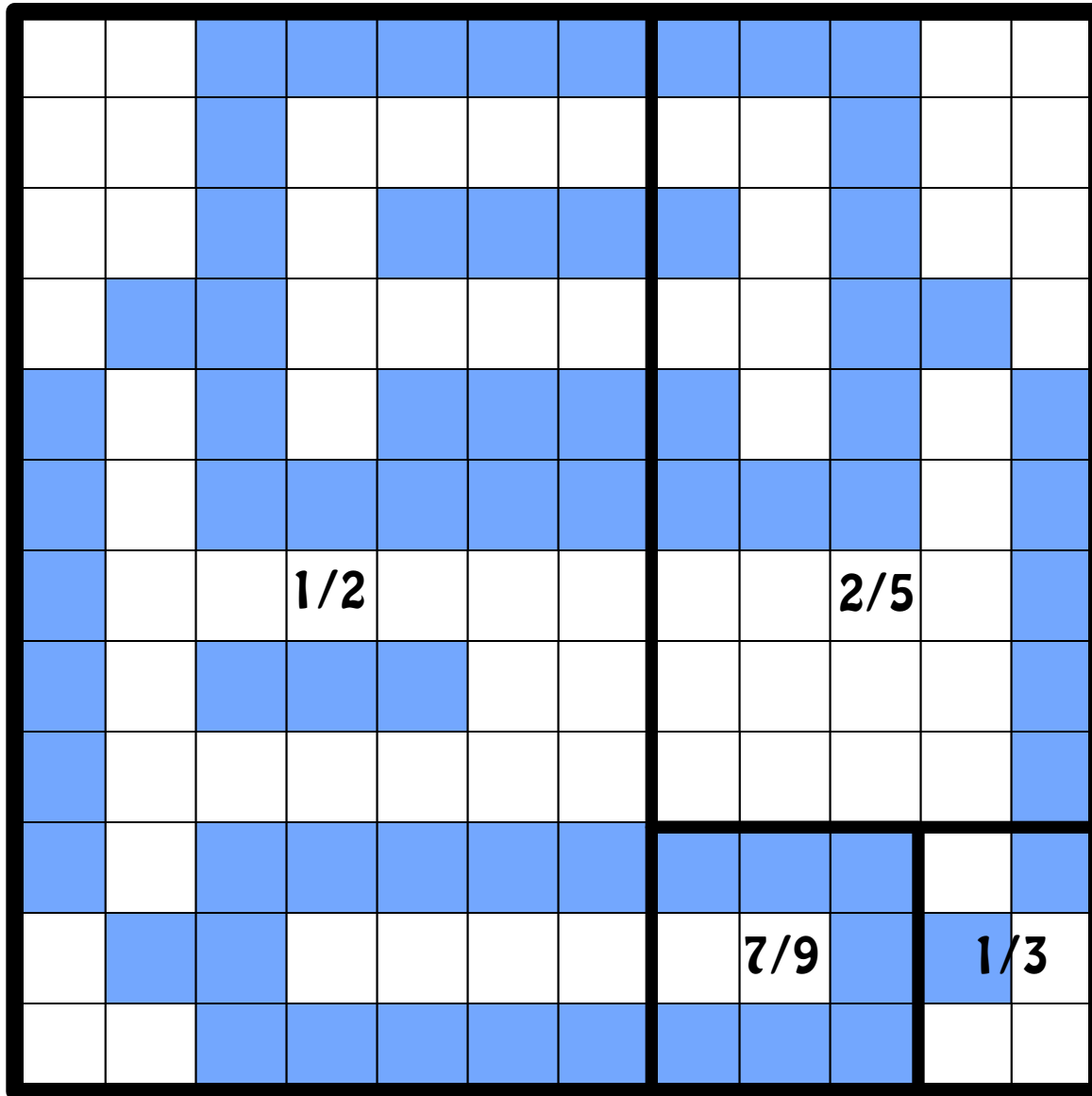
- 1/2 ■
- 1/3 ■
- 3/4 ■
- 1/22 ■
- 9/11 ■

ROBO

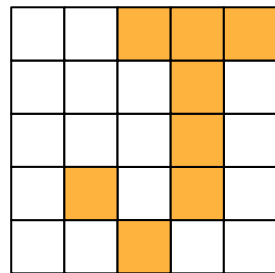
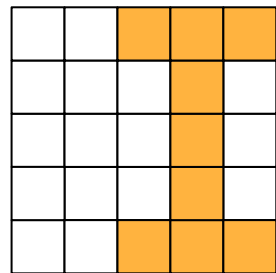
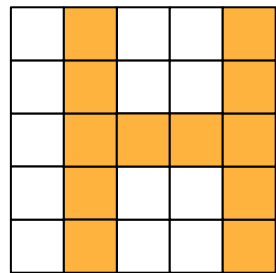
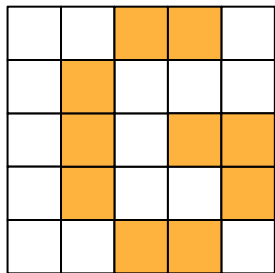
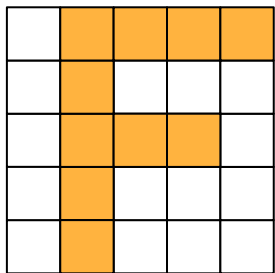
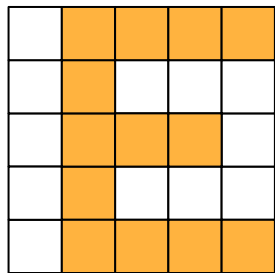
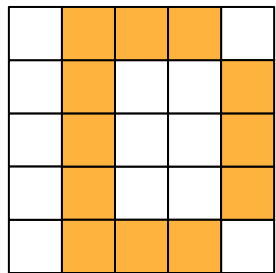
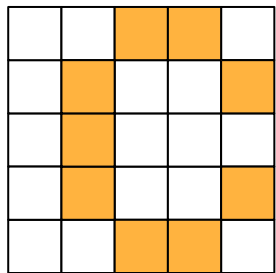
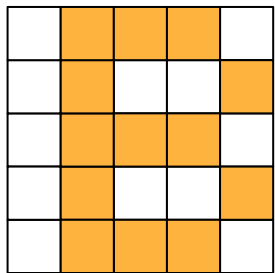
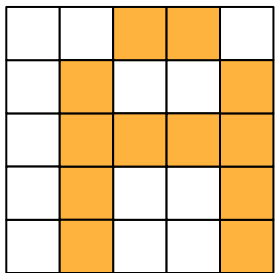


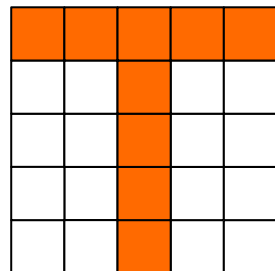
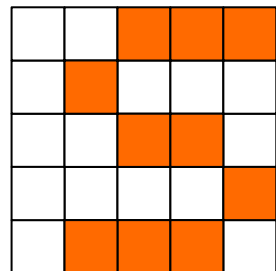
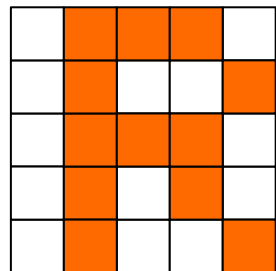
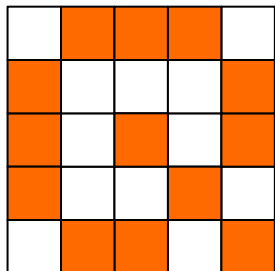
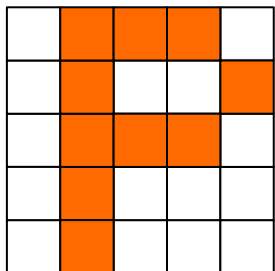
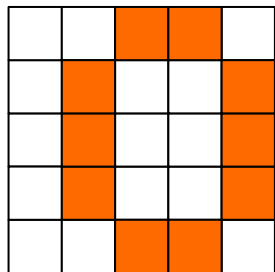
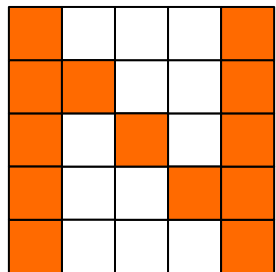
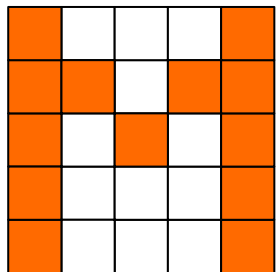
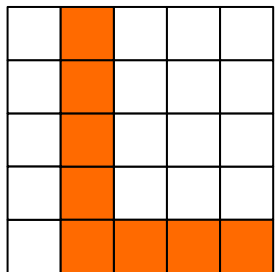
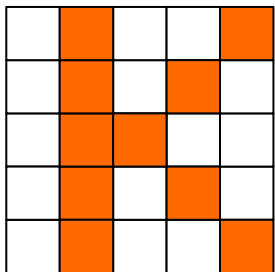
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- 2/5 ■
- 1/2 ■
- 7/9 ■

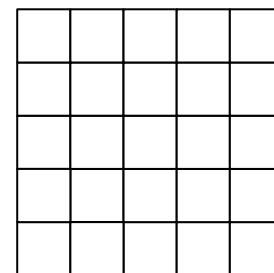
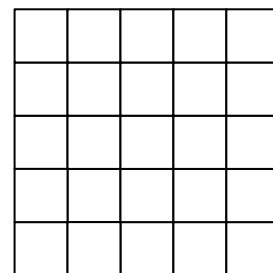
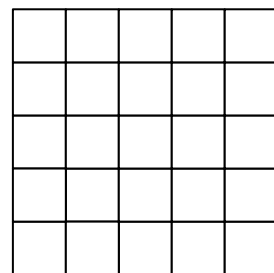
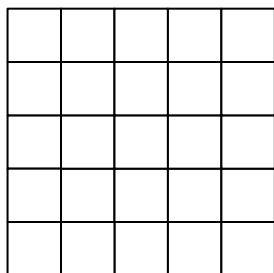
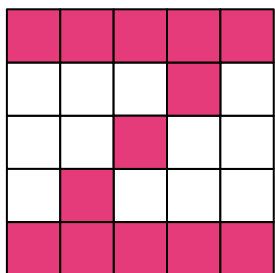
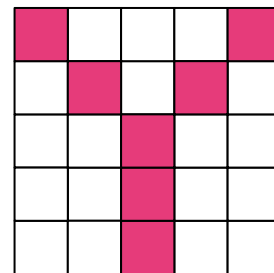
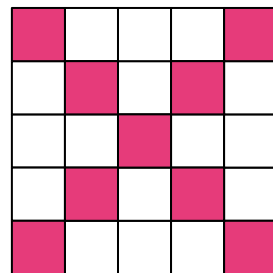
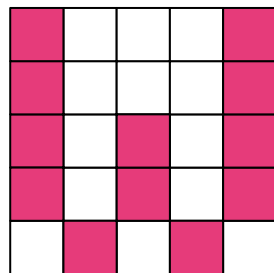
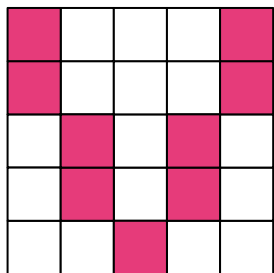
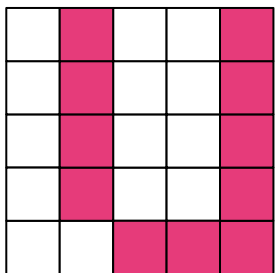
ROBO



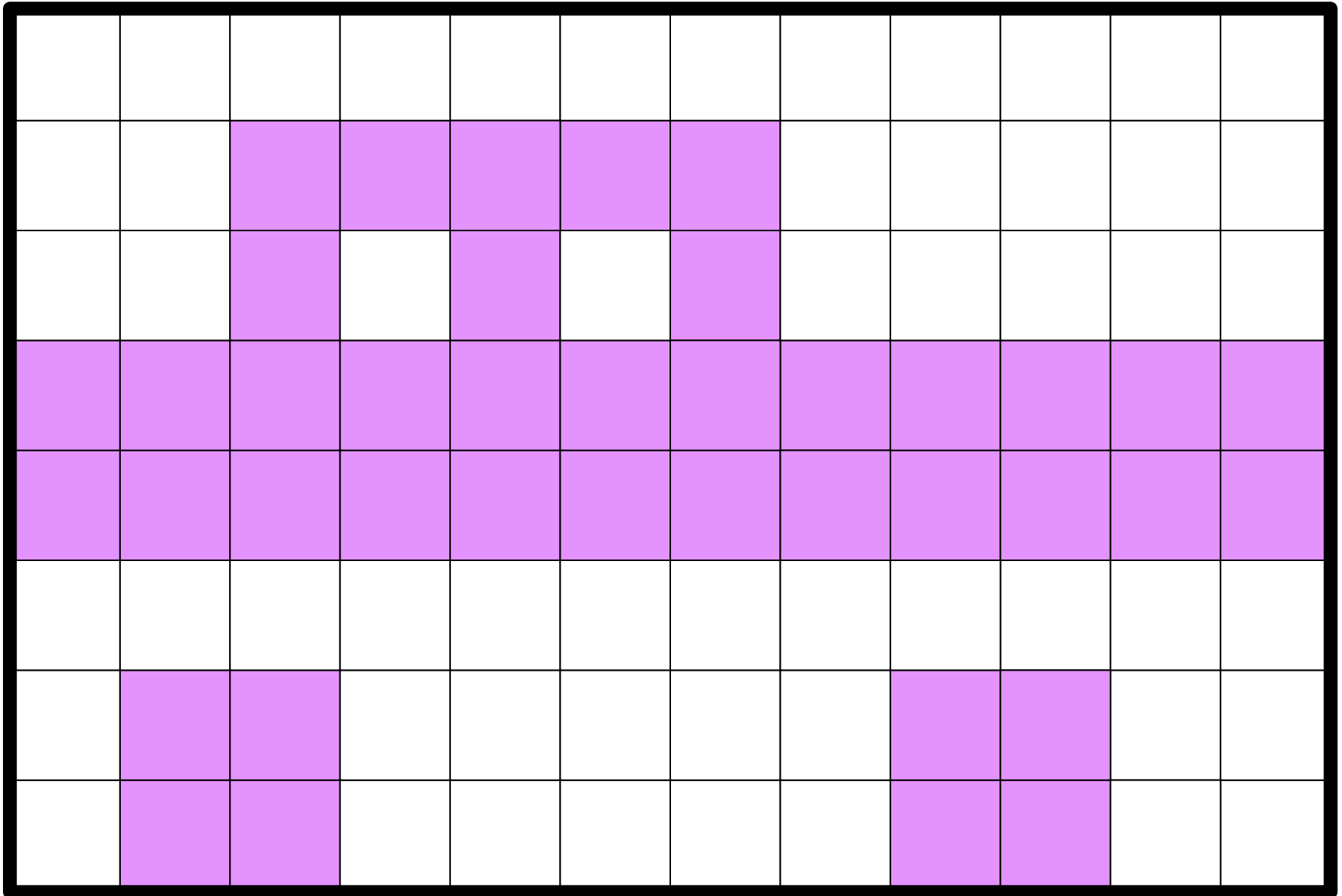
- 1/3 ■
- 2/5 ■
- 1/2 ■
- 7/9 ■



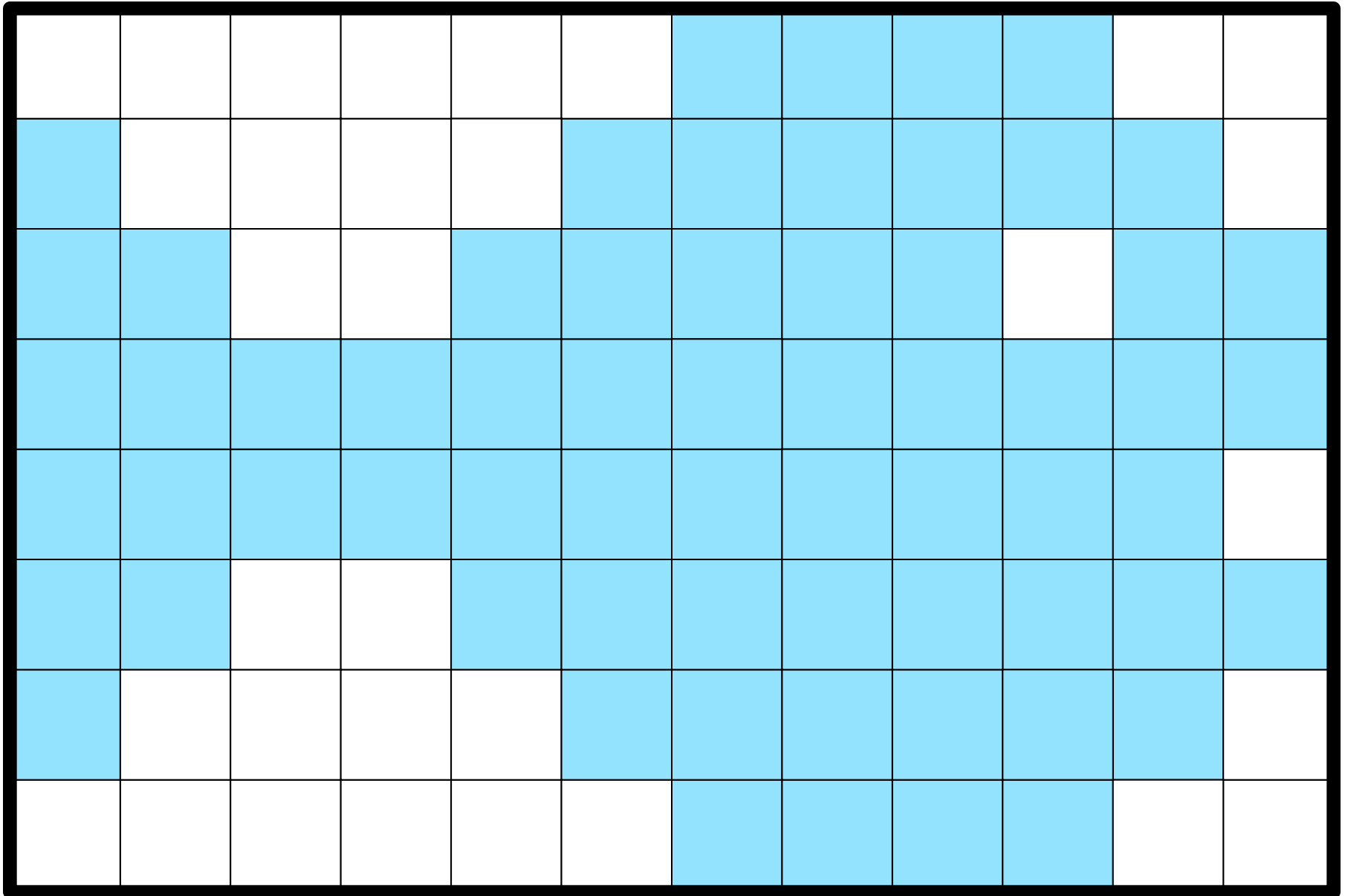




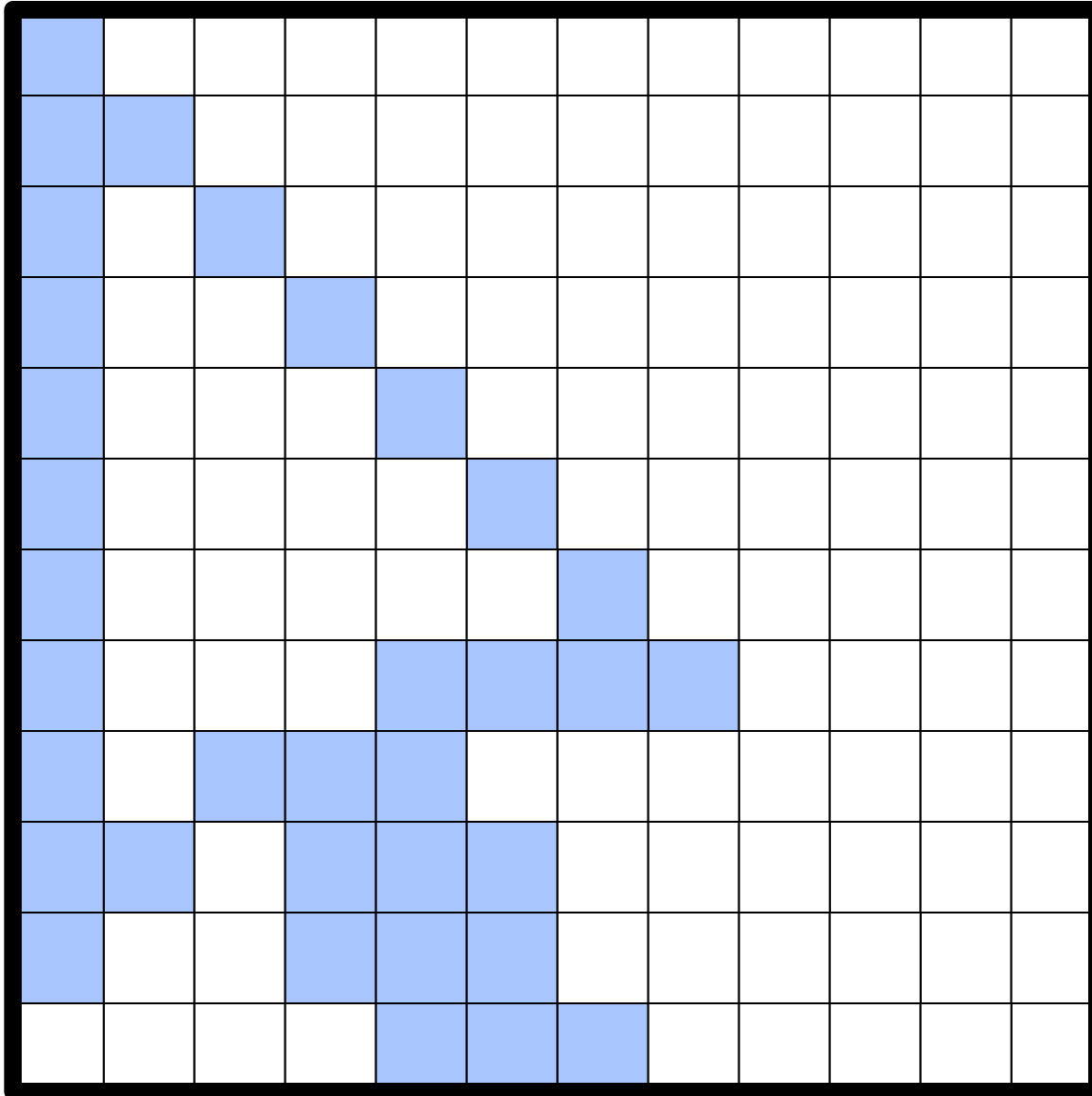
Pick-Up Truck



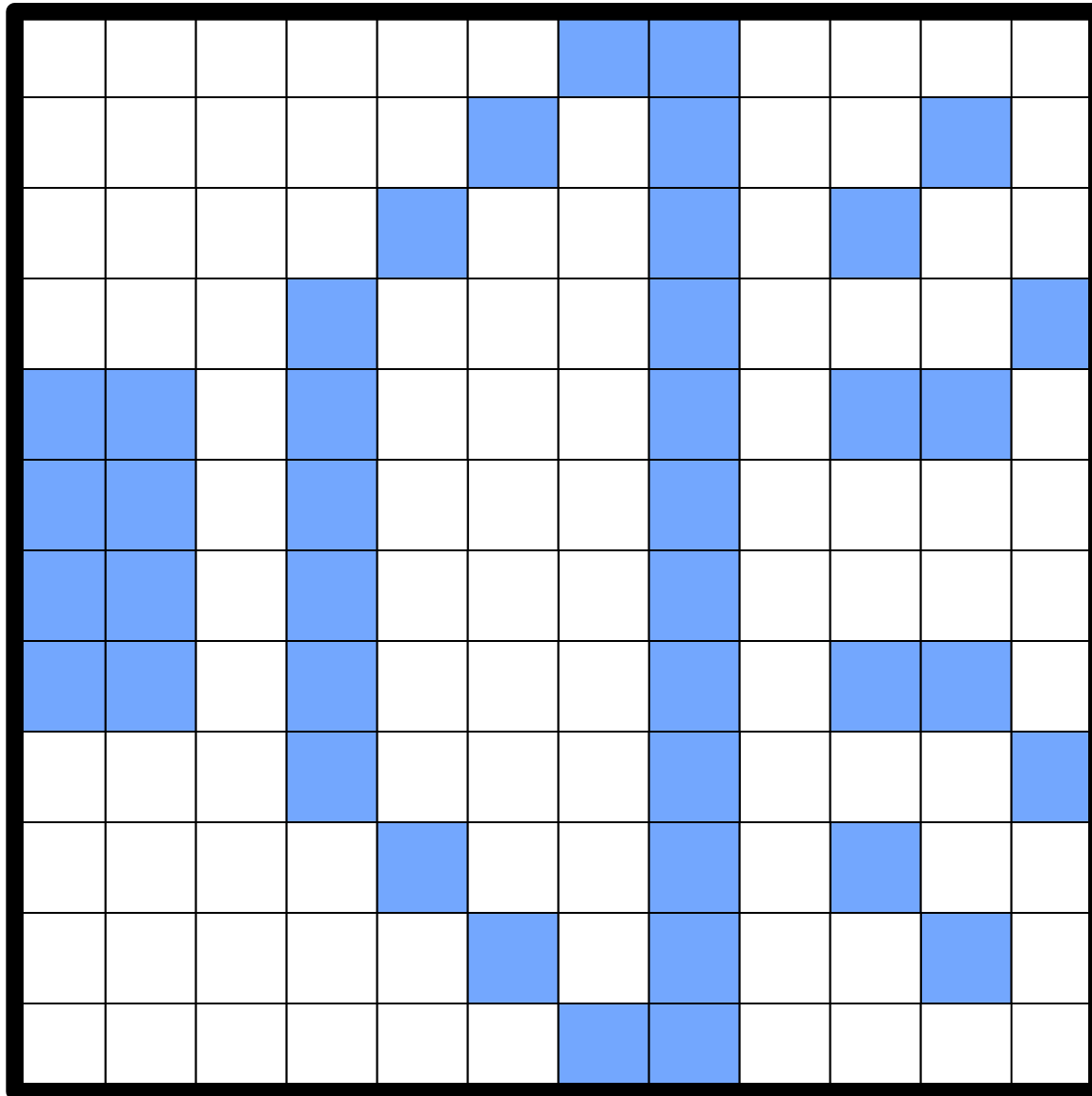
Pufferfish

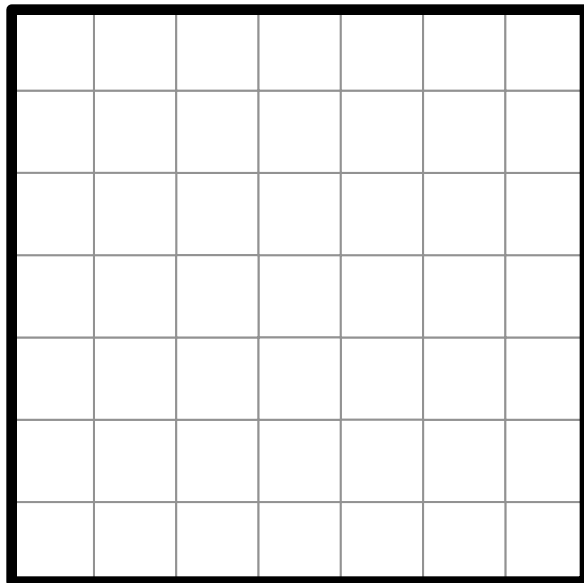
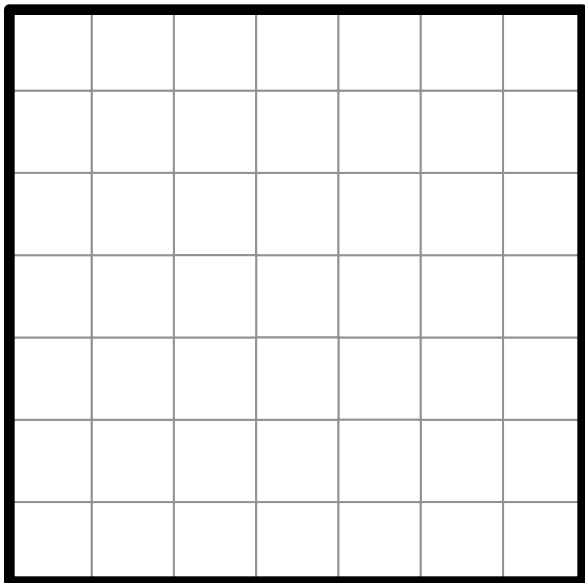
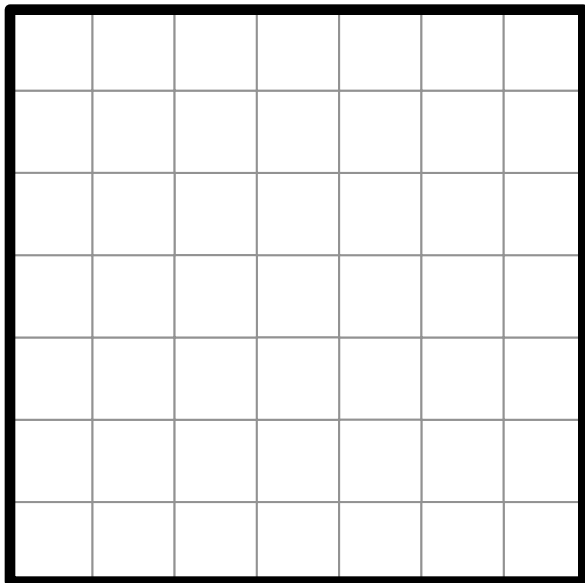
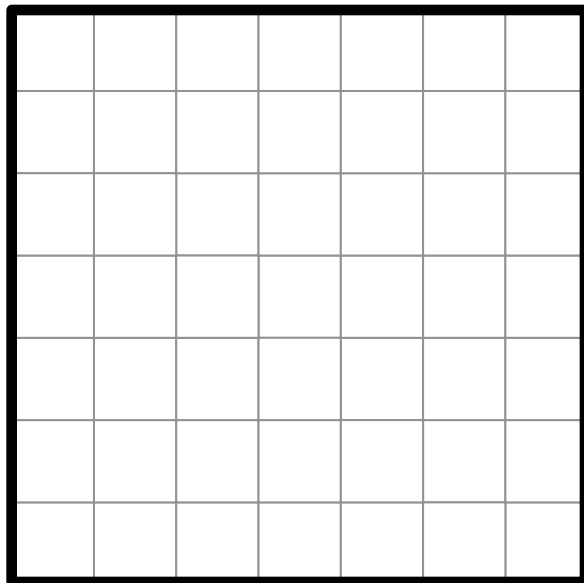
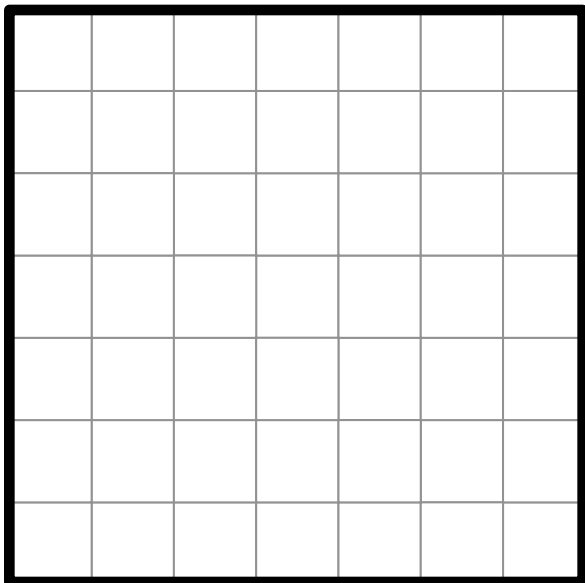
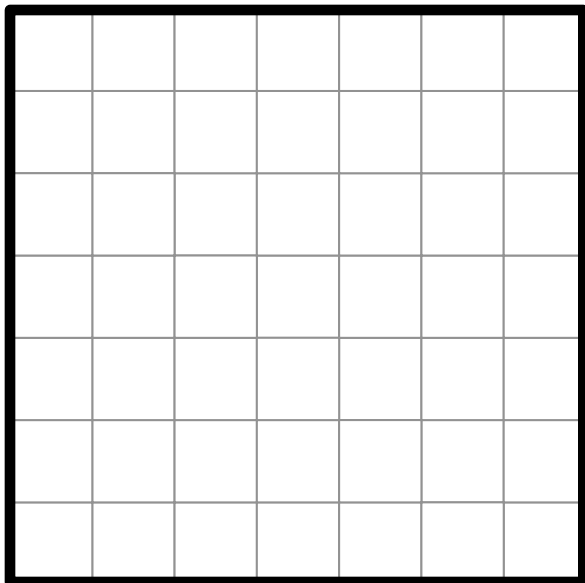


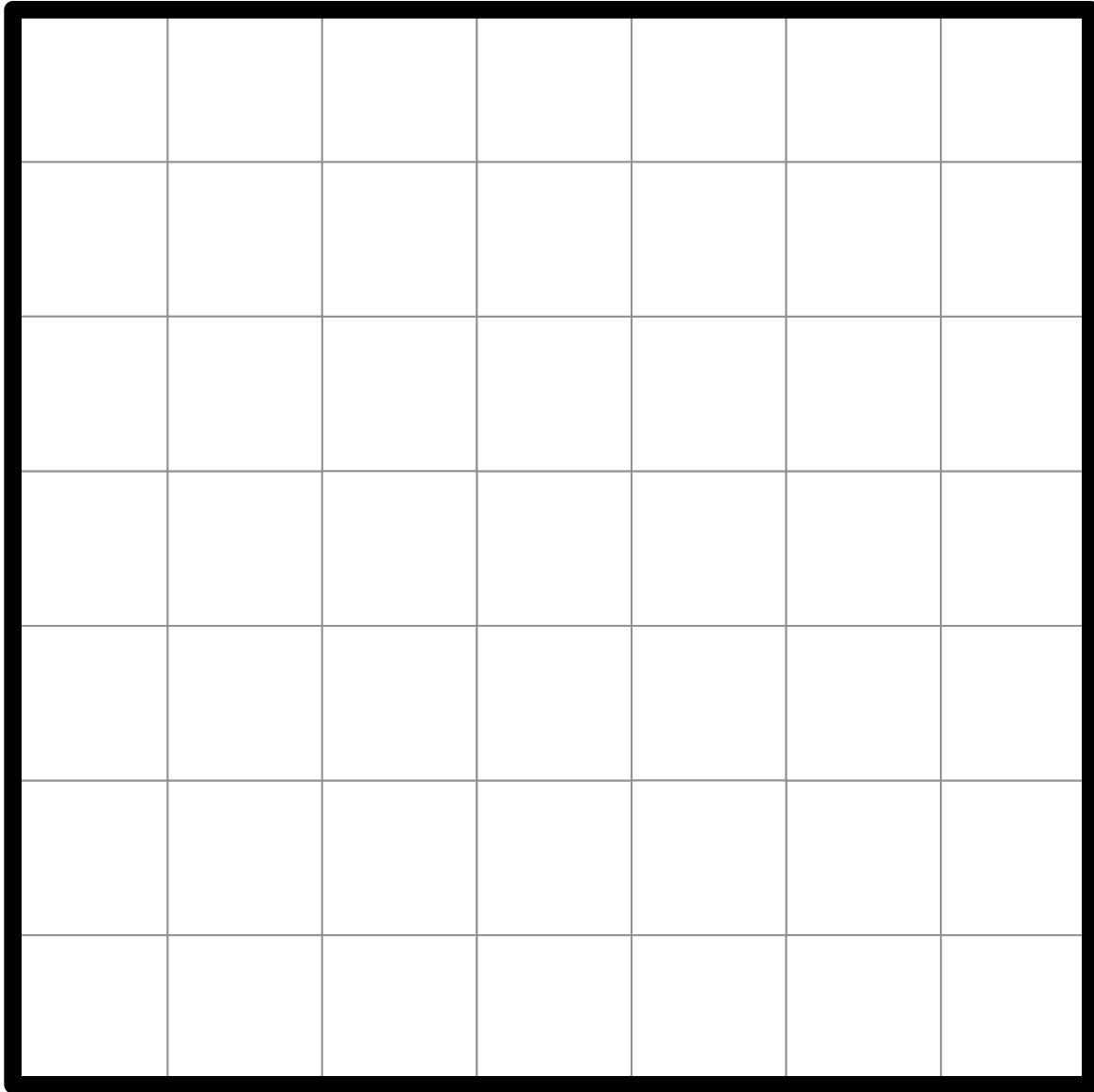
POINTER

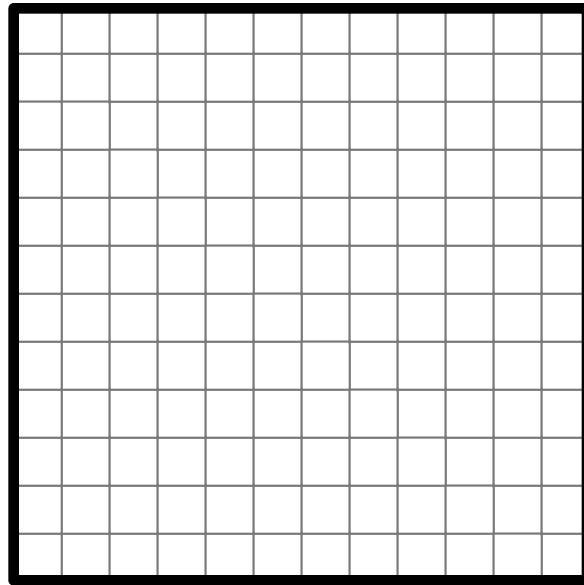
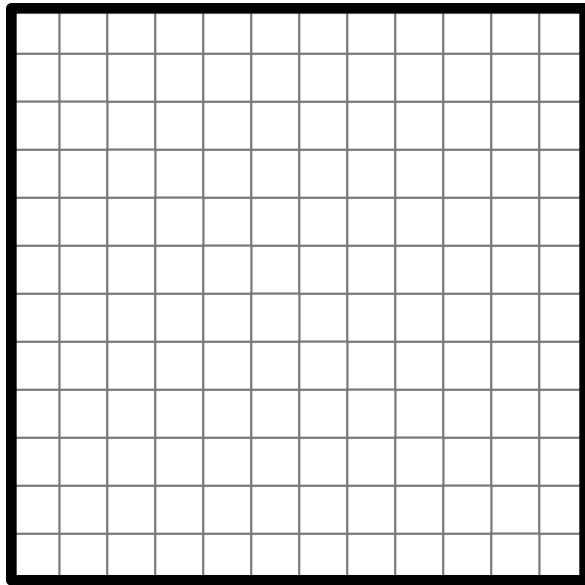
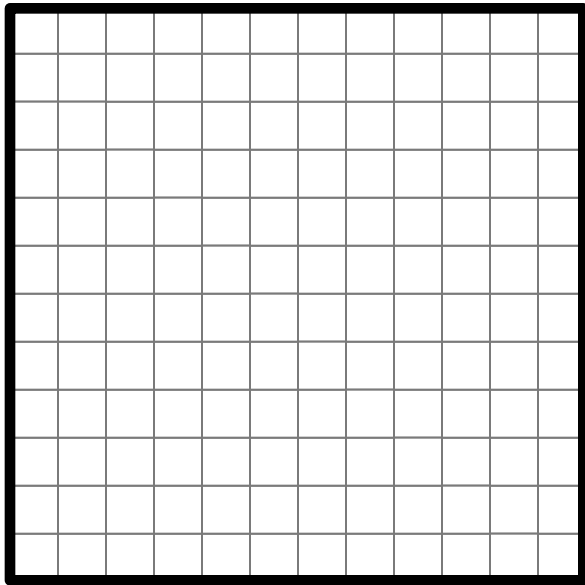
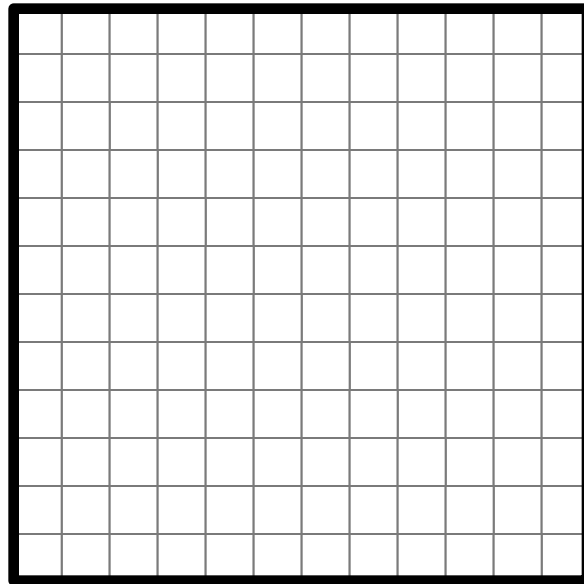
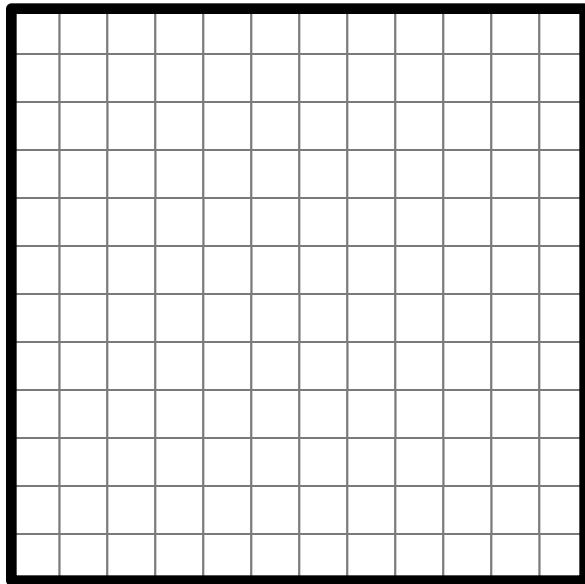
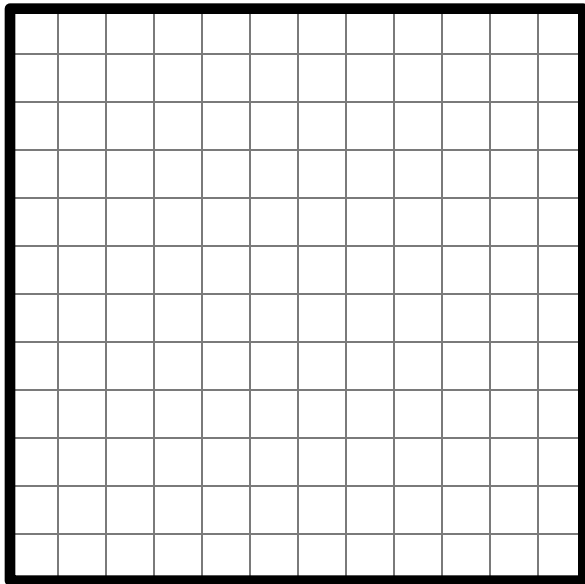


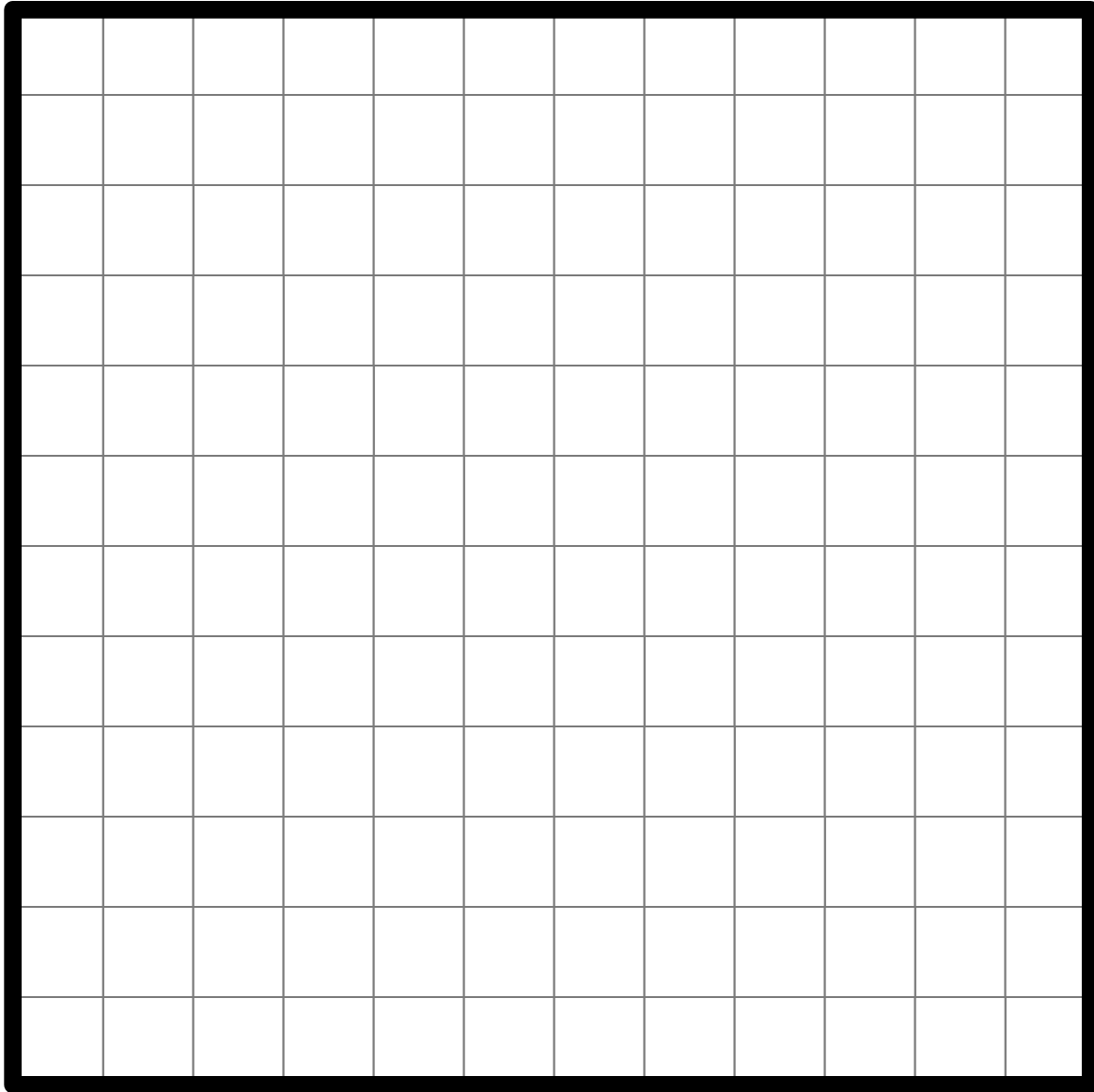
Loud Music

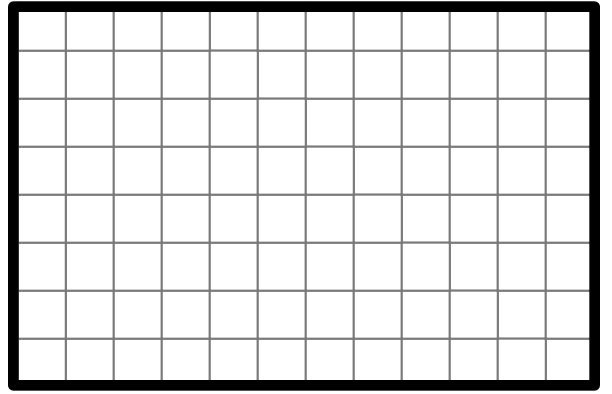
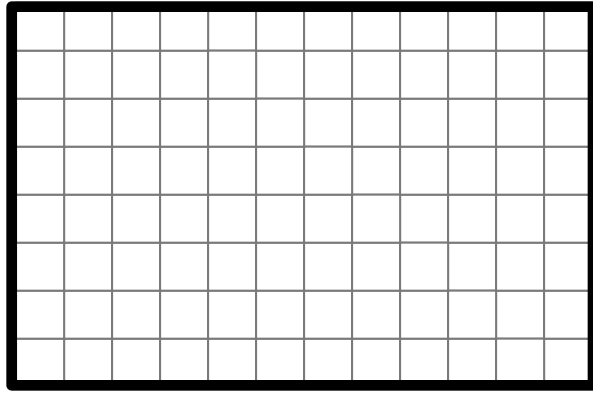
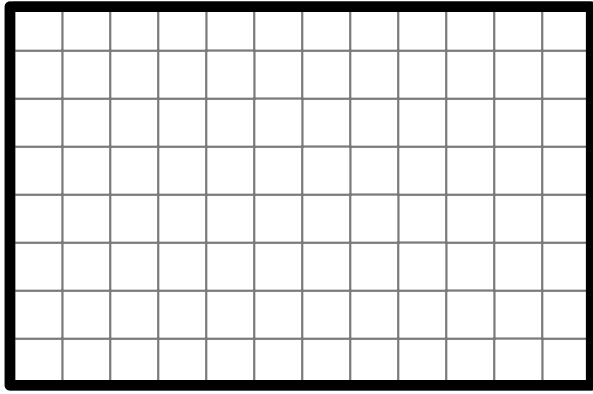
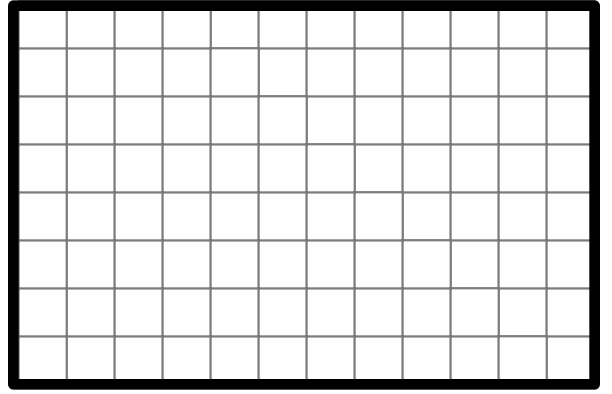
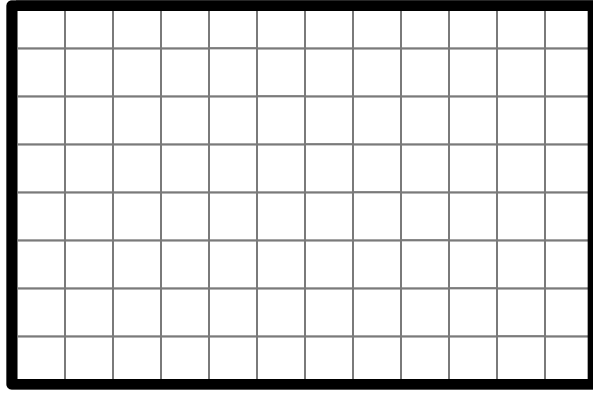
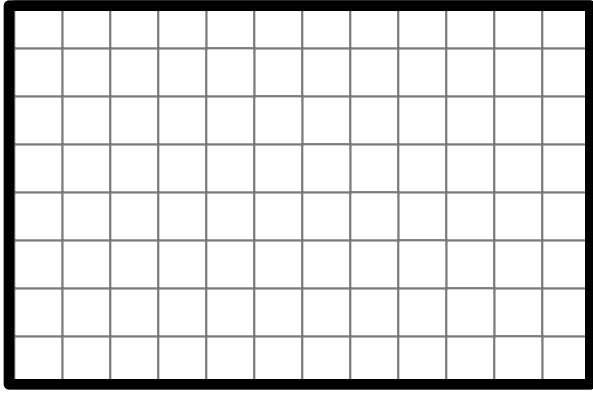
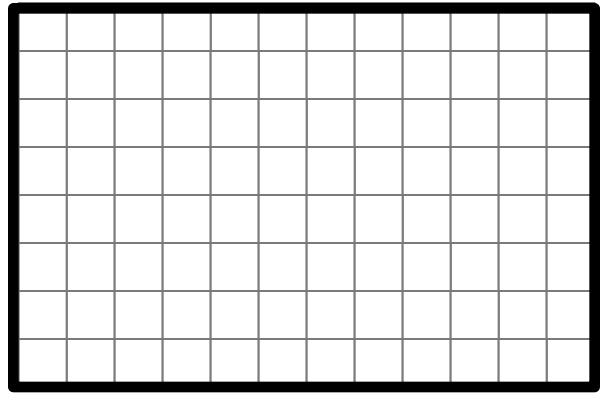
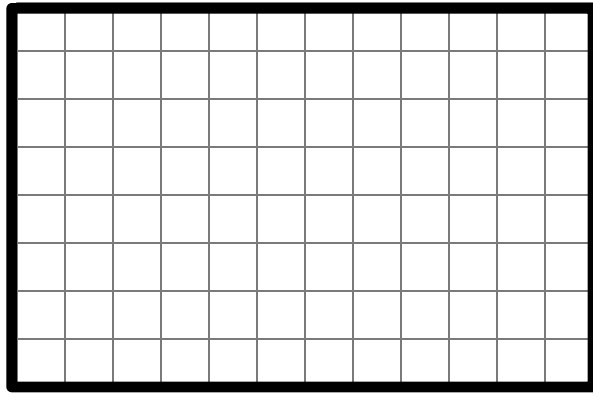
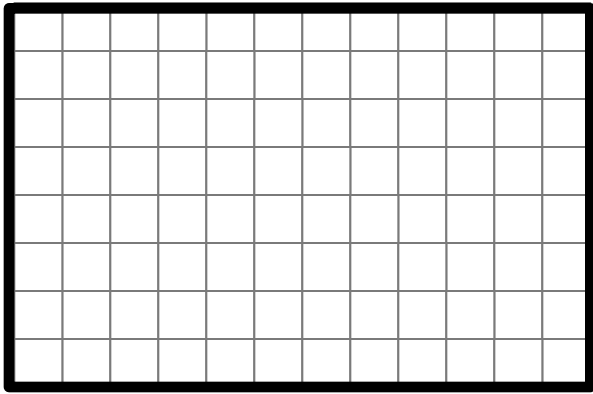


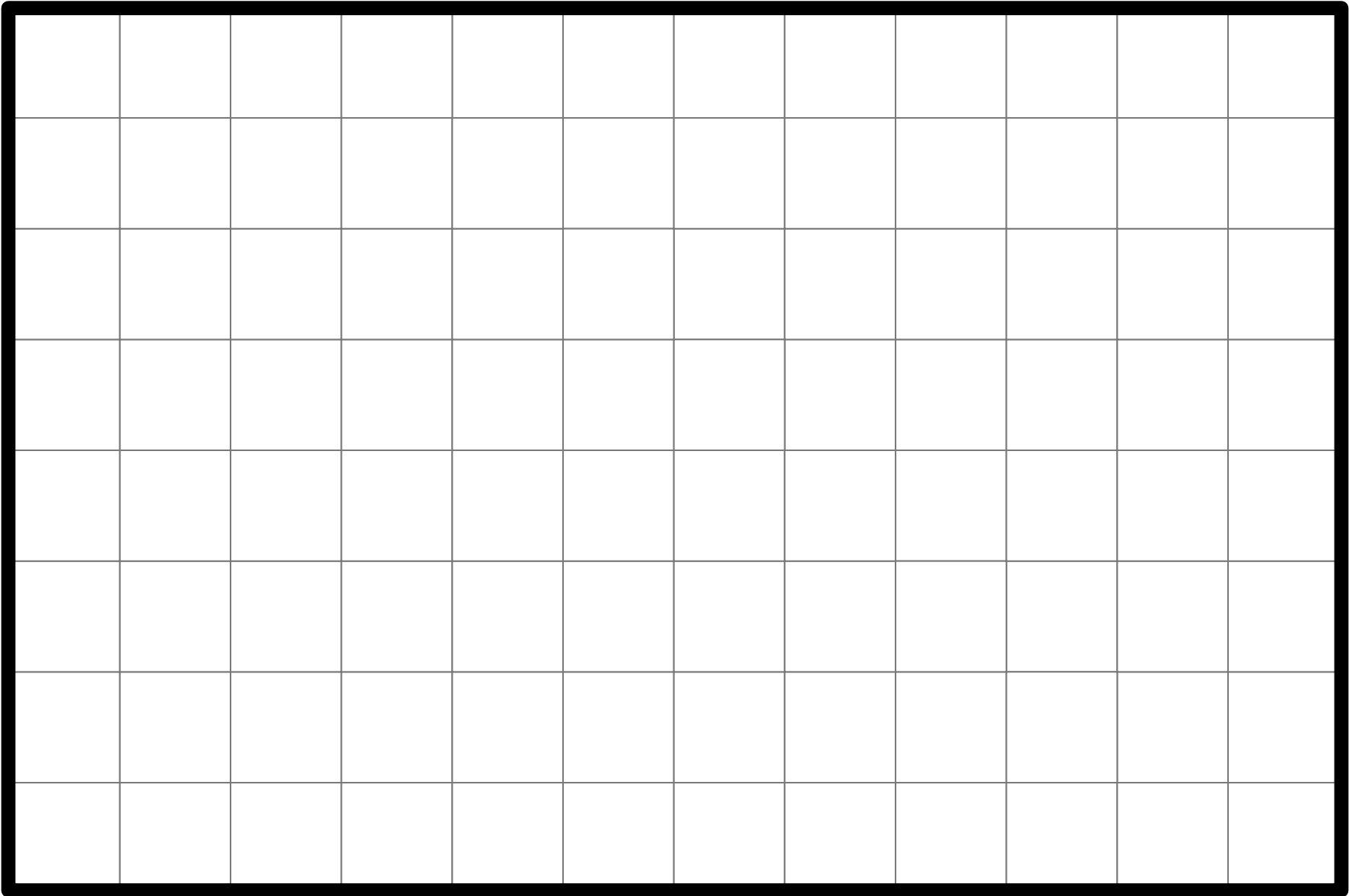












Put Your Students in a Pickle!

I'm a father of two elementary school children, a mathematician, and designer of puzzles and board games. Students call me Dr. Pickle. There is nothing I enjoy more than stumping students and having them stump me.

I founded MathPickle.com in 2010 to inject new ideas into the classroom. MathPickle's primary objective is to get thirteen curricular unsolved problems into classrooms worldwide - one for each grade K-12. A conference in November 2013 established the thirteen unsolved problems. To aid with the dissemination of these awesome problems, MathPickle is looking at setting up a \$1,000,000 reward for each - the prize money to be split between the person who solves the problem and their most inspirational K-12 educator.

MathPickle is also developing a range of curricular puzzles like the ones you'll find at TpT. These help teachers them with their number one challenge:

“How to engage the spectrum of student ability?”

Whenever an elementary school teacher wants to teach addition, she will invariably face 20% of students who already know how to add and another 20% who are struggling with last year's curriculum. How can she engage the top students without losing the bottom students? How can she engage the bottom students without boring the top students?

One solution: Parents of top students often ask that their child be allowed to accelerate through the curriculum. This exacerbates the problem for future teachers, and sets up a failure-impooverished education experience for the bright student.

A wiser approach is to use curricular puzzles, games and mini-competitions to simultaneously teach curriculum to the students who need it, and to deflect top students into tough problem solving activities. This is never time wasted, because problem solving is the primary reason we teach mathematics.

The experience of mathematics should be profound and beautiful. Too much of the regular K-12 mathematics experience is trite and true. Children deserve tough, beautiful puzzles.

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