

Babushka Squares

By: Courtney Scott

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Warm Up Activity: Sudoku

	1		5	2	
				3	
		4	1		
		1	2		
	5				
	6	2		1	

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Daily Sudoku for Kids: Thu 19-Jan-2017

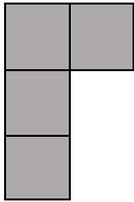
medium

1	7		8					9
		6		1				7
					7		5	
		4	9		5			8
	8			6			9	
9			4		3	5		
	5		7					
7				9		6		
8					6		2	1

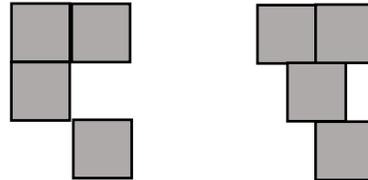
Babushka Squares:

Adam wants to play one of his favorite games, Babushka Squares. In this game, several squares are glued together along their edges. You cannot glue the squares just at their vertices or shift the edges. The edges must be matched up perfectly. For example,

This is correct:

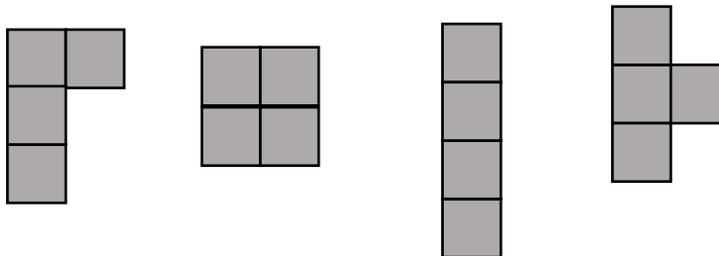


These are not correct:

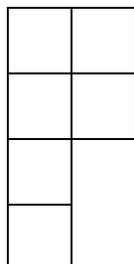


Circle where the mistakes are in the incorrect examples above.

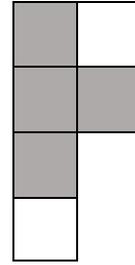
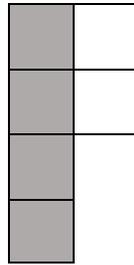
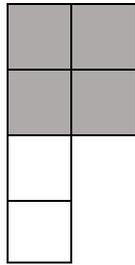
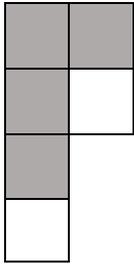
Before Adam plays the real game, he decides to practice. He glues 4 squares together in different ways. He makes these shapes below using 4 squares for each of the shapes:



Then he tries to make a “box” for these shapes that will fit all the different shapes using the smallest possible number of squares. He can do this by laying the different shapes on top of each other. There could be multiple possible boxes that fit all the shapes. One possible box (consisting of 6 squares) is shown below:

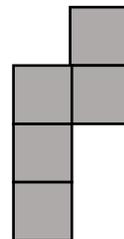
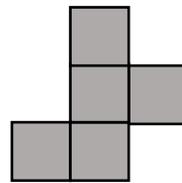
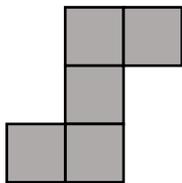
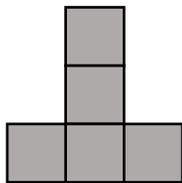
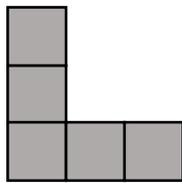
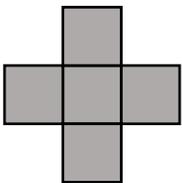
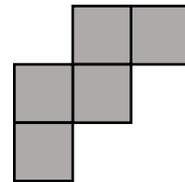
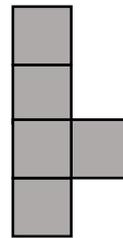
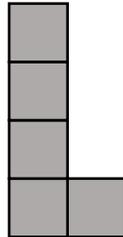
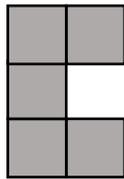
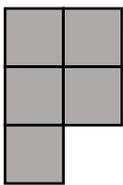


You can see that each shape fits into the “box” that Adam made:

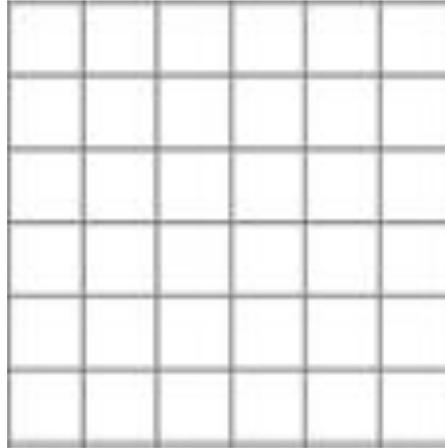


1. Could you make a *rectangular* box with the smallest possible number of squares for the same 4 shapes? Draw it!

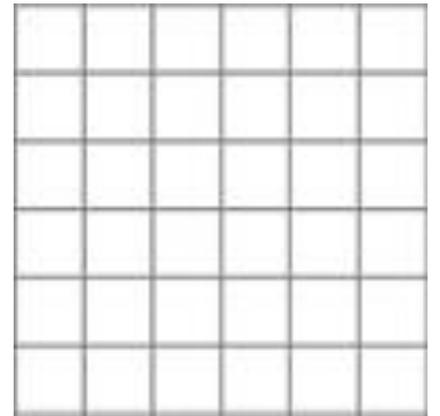
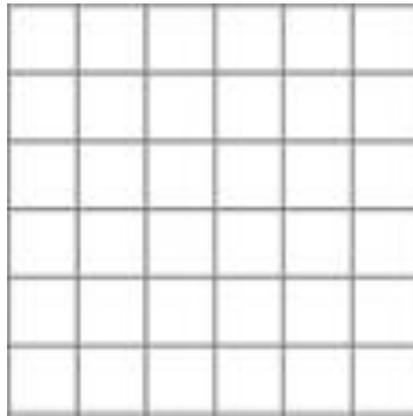
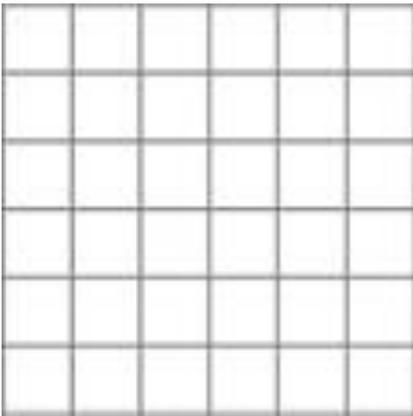
2. Now it is time for the game! Adam decides to glue 5 squares together in 12 different ways. He then asks his sister, Isabella, to build a wooden box to carry them in.



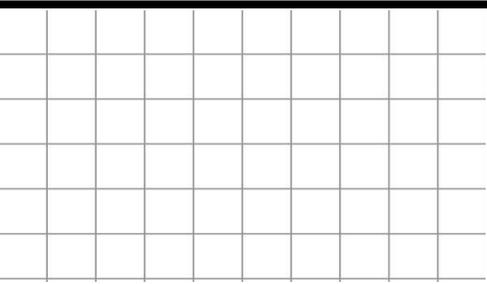
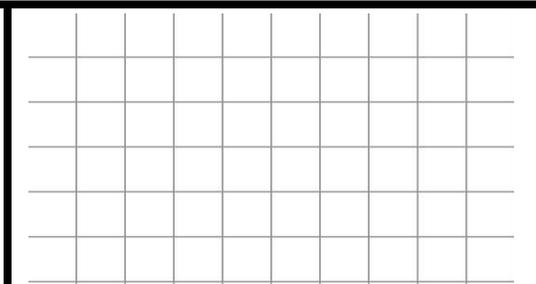
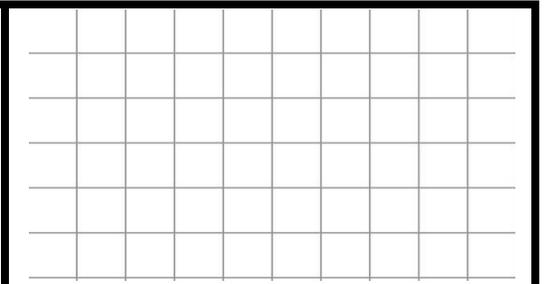
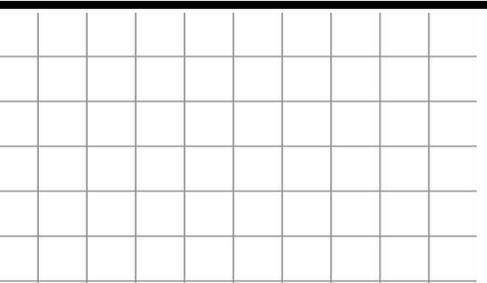
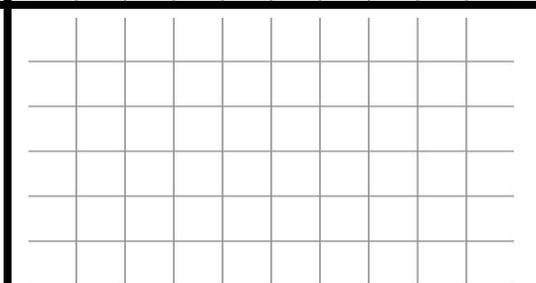
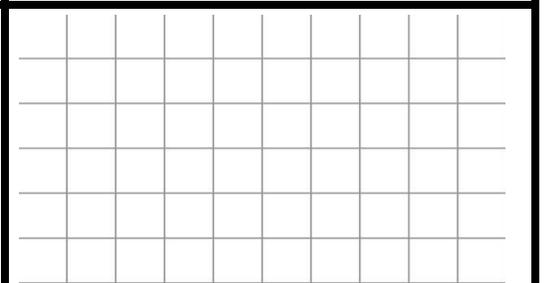
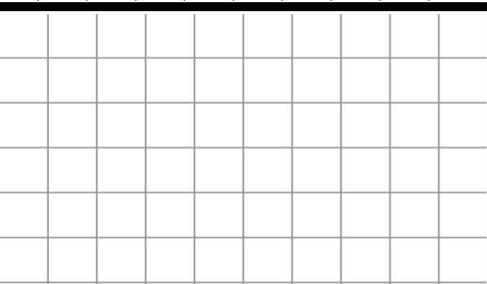
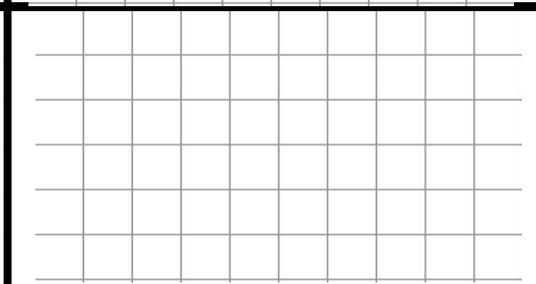
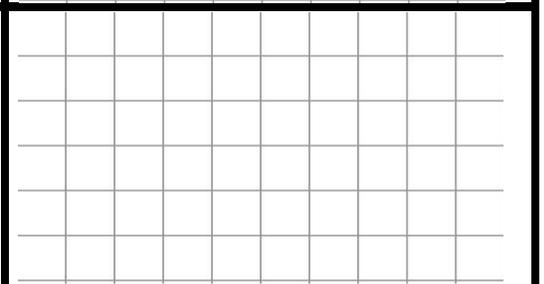
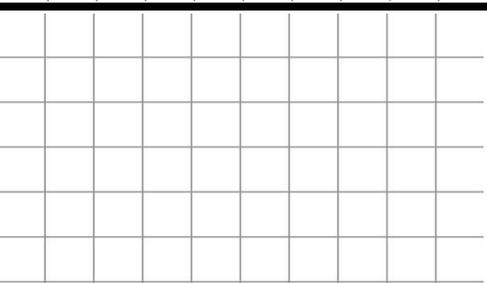
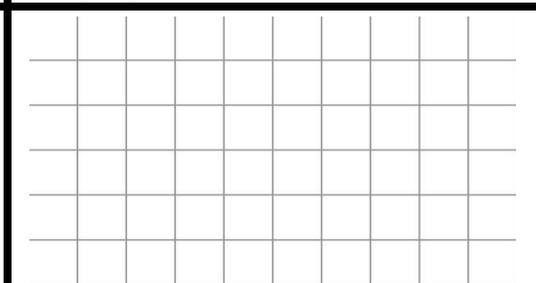
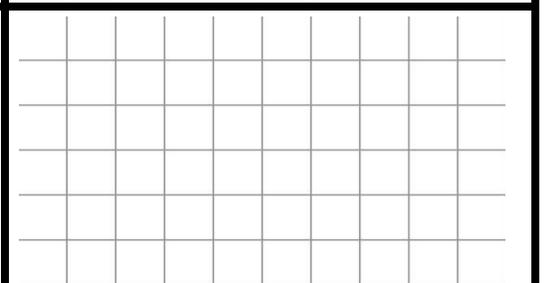
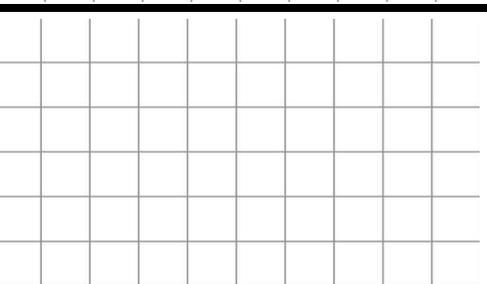
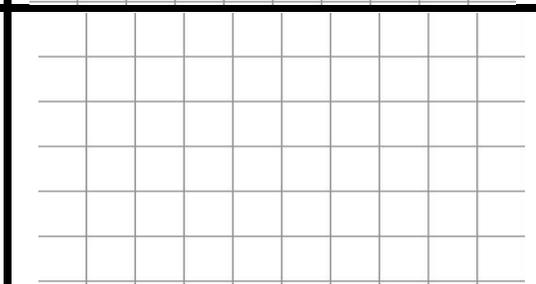
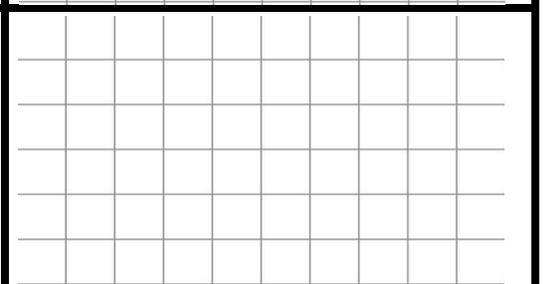
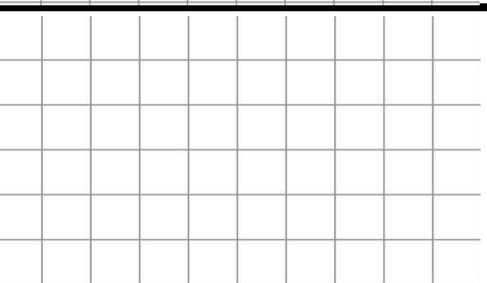
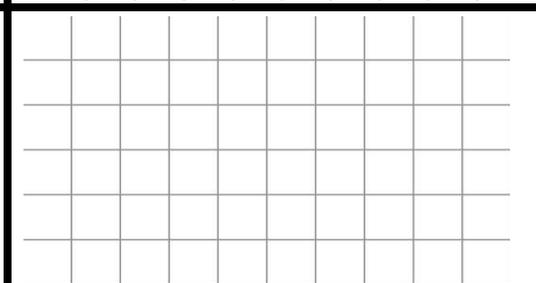
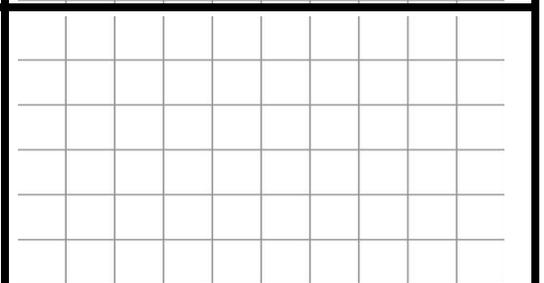
- a. Can you find a box with the smallest number of squares that could fit all of Adam's 12 shapes? Use your post-it notes to create your box on the table. Then put the shapes on the top of your box to see if they fit.
- b. What does your box look like? Draw it! How many squares does it have in it?



- c. Adam's big sister, Isabella, is very smart and she creates 11 different boxes that could hold all 12 of Adam's shapes. Wow! Can you create 3 more different boxes? What do they look like? Do they have the same number of squares as your first box?

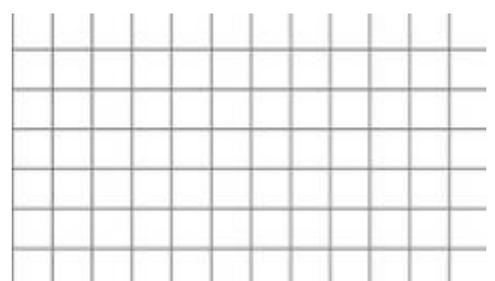
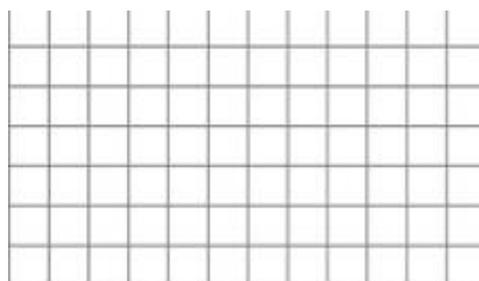
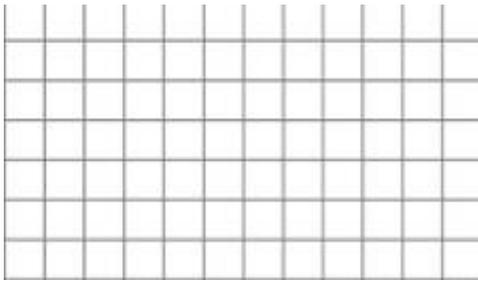
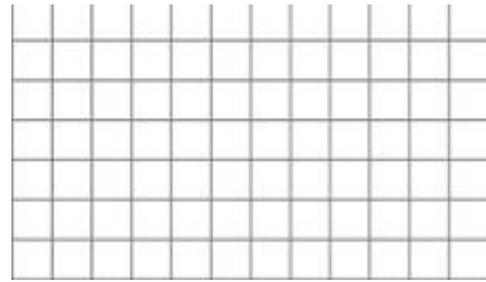
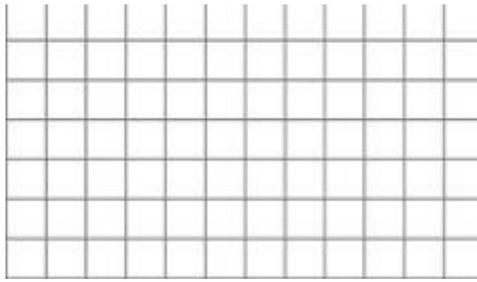


3. Adam was shocked that his sister made 11 boxes for his 12 shapes so quickly and easily. He thought it would be a challenge!! So, Adam decides to make more shapes, but this time they are made up of 7 little squares each. Can you draw all of the different shapes that Adam can make with 7 little squares? Draw your shapes on the next page.

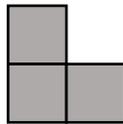
		
		
		
		
		
		

(You do not have to fill all the boxes)

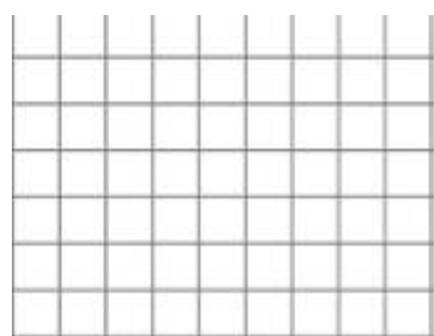
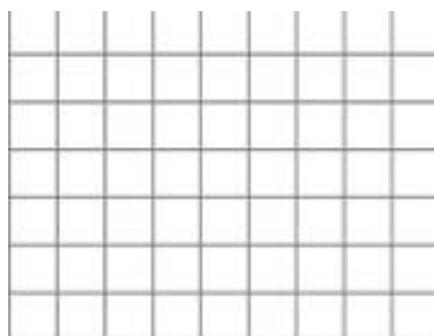
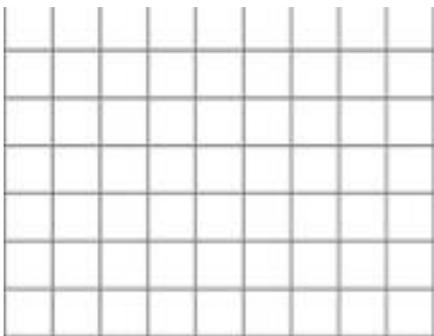
a. Can you find 5 different containers that would fit all of your 7 shapes?



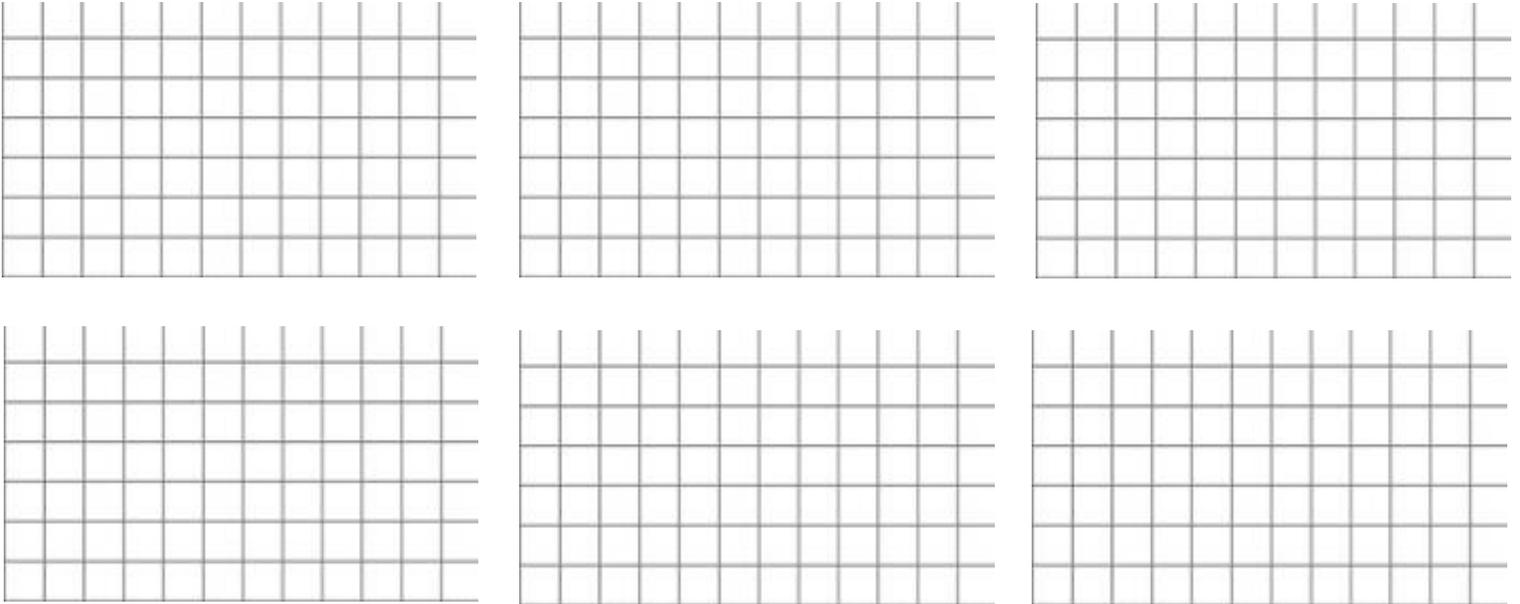
4. Adam wants to keep playing the game but this time he wants his whole family to be involved! This time he makes two shapes with 3 squares each.



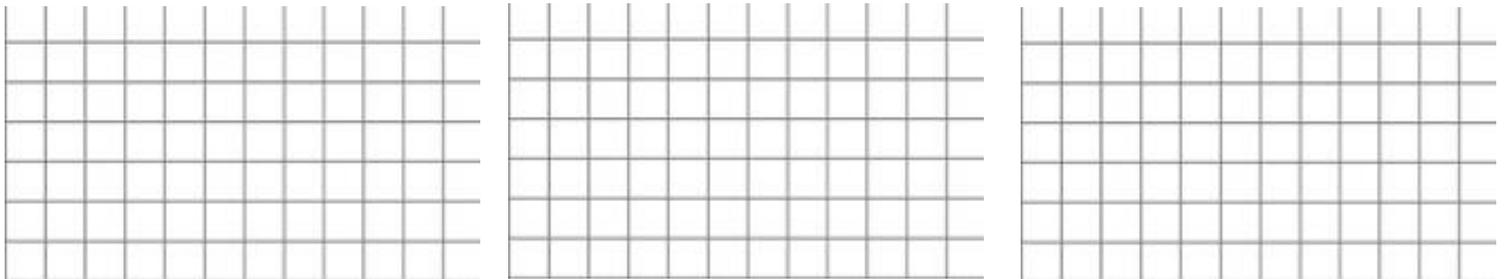
a. Then, he asks Isabella to create containers to fit his two shapes. Can you find all of those containers? How many squares does each container have?



- b. When Isabella is done, Adam asks his mom to create containers to fit all of Isabella's containers. Can you find all of the Mother's containers? How many squares does each container have?



- c. When mother is done, Adam asks his dad to create containers to fit all of his Mother's containers. Can you find all of the Father's containers? How many squares does each container have?



- d. Will you be able to fit the whole family's shapes into one container? Describe the nesting effect. Make the container as small as possible.

Extension Problem:

Now Adam is playing with 4 cube blocks. He decides to see how many different shapes he can make out of 4 blocks. Then he gets an idea! He says, "If my sister can make containers for my 2D shapes, I bet she can make containers for my 3D shapes!" He then asks Isabella if she can make a container that would fit all of his shapes made by his 4 blocks.

Make all possible 3D shapes out of 4 blocks. Then create a 3D container that would fit these. Use the blocks to help you find your answer and then describe/draw your answer below.