

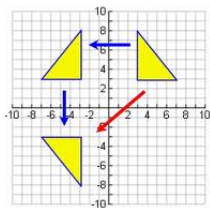
How to apply Sudoku to education

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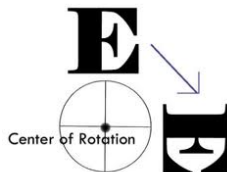
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In what ways can the game Sudoku be applied to education?

- teaching higher level thought
- teaching geometry
- teaching matrices



(a) Reflections



(b) Rotations

Figure : Geometric Transformations

What is Sudoku?

Sudoku is a game in which there is a 9 by 9 grid separated into 9 3 by 3 cells. In the game, the player must insert the numbers 1-9 so that there are no repeated numbers in any row, column or cell.

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

Motivation

The motivation behind this is to encourage middle and high school students to look at numbers differently and without so much “fear.”

Sudoku can be used to implement curriculum in middle to high school classrooms to encourage students to think about numbers differently and with a more open mind.

Sudoku can be used to teach transformations in geometry, as there are “essentially equivalent” Sudoku boards which are transformations of other boards. Such as flipped across axes or rotated.

Sudoku can also be used to teach beginning lessons on matrices, mainly a very rudimentary introduction as to what a matrix is.



How does this help?

This research will provide the enhancements needed to be used to implement within a mathematics curriculum to teach students higher level thought, geometry and matrices in order to help them be more successful in applying mathematics to real world problems and on standardized tests. Teachers will also be trained as to the best uses for the interactive activities and projects that can be implemented.

“What makes Taking Sudoku Seriously unique is the math. Because math isn’t addition and subtraction; math is a creative act. Math is human enterprise. Math is about playing around with puzzles and thoughts, in a particular way. Math is about conjectures and proofs. Math is hard, but math is fun (thinking about it, things that are really easy are rarely fun - do you have fun tying your shoes? Difficulty is essential).”

How will I do this?

In order to do this, I will create the materials for a two step process.

Step 1

The first step of the process will be to create all materials needed to host a two to three hour seminar for all teachers who would be implementing the curriculum enhancements. Within this seminar, I would describe what all of the materials are, how they will be useful to the teachers and students and how they should be implemented.



Step 2



The second step will be to make all of the materials needed for the enhancements available to the teachers for their usage. This would include any worksheets and project plans and when the best time to use them within the curriculum would be.

A Sample Worksheet

Name: _____

Complete the Sudoku puzzles to follow.

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

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

When you look at the puzzles can you identify any similarities? _____

Look closely and see if you can identify any rotations of symmetry.

Worksheet Solution

The solutions for the puzzles are:

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

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

When you look at the puzzle you may notice that the numbers are the same if you turn the board.

There is a 90° rotation

A Sample Project Plan

After completing the prior worksheet along with similar ones which illustrate reflections and other rotations, ask students to create a way to show that when multiple transformations are performed, the result is one of the original transformations of the puzzle. The question posed is:

What is the outcome when multiple transformations are performed on a geometric figure? How did looking at Sudoku boards that are essentially the same show this?

Who will benefit from this?

These additions to curriculum will benefit the students, as it will allow them to learn mathematics slightly differently than they are used to. It will benefit teachers, as it will give them new opportunities to teach math in different ways. It will also benefit school districts, as they will be doing better on federal and statewide standardized testing, so they will have the opportunity to receive more funding.



Questions or Comments

