



## Brown Math Enrichment - Where is the Magic - Puzzles and Logic

Unit Focus
<p>Problem solving and mathematical reasoning are important part of mathematics for middle school students. In this unit students will investigate and analyze the logic and math behind puzzles by making conjectures, collecting evidence and forming arguments. They will look for patterns in their work and create clear explanations for their solutions. They will learn to justify what they do and communicate their results using the language of mathematics. Throughout the unit, students will create their own puzzles, communicating the logic and mathematics within the puzzle.</p>
<p>Problem solving involves knowing what you can do when you are 'stuck.' Students will be encouraged to take risks and learn from mistakes and explore alternative strategies.</p>
<p>For the culminating activity will be research other mathematical puzzles of their interests and create one their own to share.</p>

### STAGE 1: DESIRED RESULTS – KEY UNDERSTANDINGS

ESTABLISHED GOALS	TRANSFER	
<p><b>Common Core Standards</b> <i>Mathematics: 6</i> <i>2000322 Mathematical Practices</i></p> <ul style="list-style-type: none"> <li>• CCSS.MATH.MP.3 Construct viable arguments and critique the reasoning of others.</li> <li>• CCSS.MATH.MP.8 Look for and express regularity in repeated reasoning.</li> <li>• CCSS.MATH.MP.7 Look for and make use of structure.</li> <li>• CCSS.MATH.MP.1 Make sense of problems and persevere in solving them.</li> </ul> <p><b>Student Growth and Development 21st Century Capacities Matrix</b> <i>Critical Thinking</i></p> <ul style="list-style-type: none"> <li>• Analyzing: Students will be able to examine information/data/evidence to make inferences and identify possible underlying assumptions, patterns, and relationships.</li> <li>• Synthesizing: Students will be able to thoughtfully combine information/data/evidence, concepts, texts, and disciplines to draw conclusions, create solutions, and/or verify generalizations for a given purpose.</li> </ul>	<p>T1 represent and interpret patterns in numbers, data and objects.</p> <p>T2 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution.</p>	
	MEANING	
	UNDERSTANDINGS	ESSENTIAL QUESTIONS
	<p>U1 Effective problem solvers work to make sense of the problem before trying to solve it.</p>	<p>Q1 What makes a puzzle good?</p>
	<p>U2 Mathematicians overcome obstacles by employing strategies and learn from success and failure.</p>	<p>Q2 How do I decide if my answer makes sense and if not, what do I do?</p>
	<p>U3 Mathematicians can describe patterns, relations, and/or functions to access strategies to solve problems.</p>	<p>Q3 How can understanding a pattern help me?</p>
		<p>Q4 What can I do when I am stuck?</p>
	ACQUISITION OF KNOWLEDGE AND SKILL	
	KNOWLEDGE	SKILLS
	<p>K1 They will know how to solve logic problems.</p>	<p>S1 Students will be skilled at using charts to solve problems.</p>
<p>K2 Will know how to read a number in a base other than 10.</p>	<p>S2 Students will be skilled at working backwards to solve a problem.</p>	
<p>K3 Students will know there are often different levels of difficulty of the same type of problem and doing easier puzzles can build skills and confidence for doing harder puzzles.</p>		
<p>K4 Students will know that some puzzles can be solved using deductive reasoning.</p>		