

Little Wranglers

A hypothetical version of the Math Wrangle for Pre middle Schoolers
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Traditional Math Wrangle

- Takes place between teams of Middle school or High School Students
- Two Teams of three consider a problem set of 8 problems for about an hour before the competition begins.
- Teams take turns challenging each other to solve problems on the list.
- A team can bounce back the challenge for extra points.
- The challenged team presents a solution and then the challenger can rebut any mistakes or omissions.
- Judges assign points.

Why to Modify for little kids?

- Little ones may not feel as comfortable presenting proofs or explanations of solutions.
- They won't be as good at listening to their opponents explanations.
- Solutions of traditional problems or even easier problems might be completely wrong and therefore awkward for judges to critique.

A proposed solution is to play games where winning strategies substitute for explanations

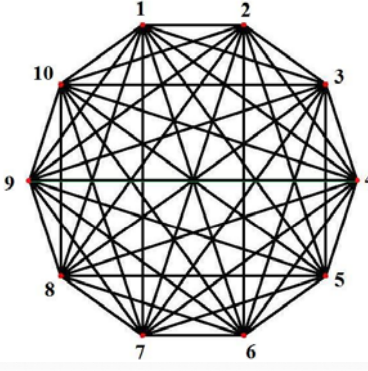
Creativity and a respectful sense of alternative thinking is welcome!

Proposed Framework

- The traditional problem set is to be replaced by a collection of games involving any or all of arithmetic, logic, geometry, probability or any other accessible topic.
- Usually the rules of these games involve a distinct advantage for the challenged versus the role played by the challenger. Realizing this is a key to the competition.
- The secret then is to determine a winning or at least good strategy that the challenged can put into practice to beat their opponent.

Teachable moments are there for the judges!

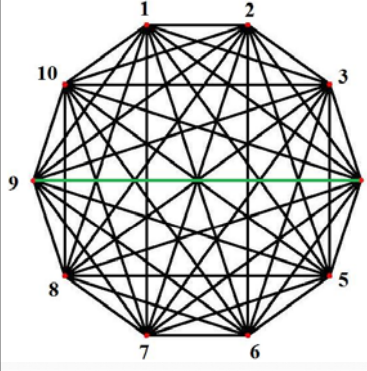
The example games shown here are what the players will see. They are not the best or optimal solutions - they are examples as to how the games are to be played.



Arithmetic on Graphs

CHALLENGED:

- Pick an edge to this graph
- There will be two numbers on either end of the edge
- For each number take the product of the number and 11 minus the number.
- Add the results from these two calculations.
- The Challenger will then pick another edge and do the same calculation.
- The team with the larger result is the winner.



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$$9(11-9)+4(11-4)=9(2)+(4)(7)=46$$

Inspired by Yahtzee

Dice Game

- The challenger in this game will go first.
- Roll 5 dice – hold any of these 5 out.
- Roll the remaining dice and again hold any of the 5.
- Roll the remaining die one last time.
- Compute the product of the die.
- The challenged then repeats the process (knowing what score the challenger had).
- The highest product wins.

Dice Game

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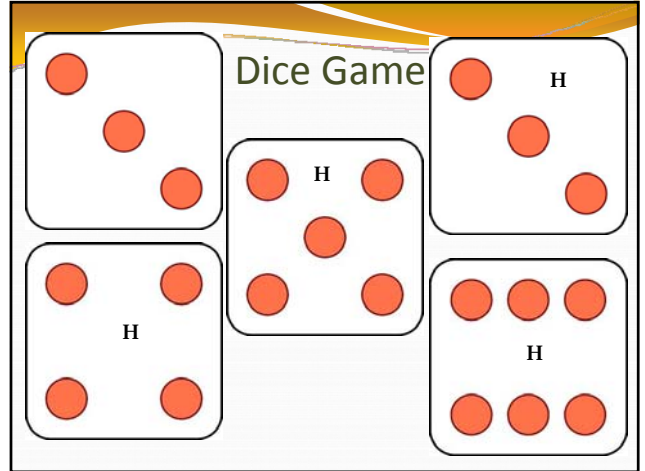
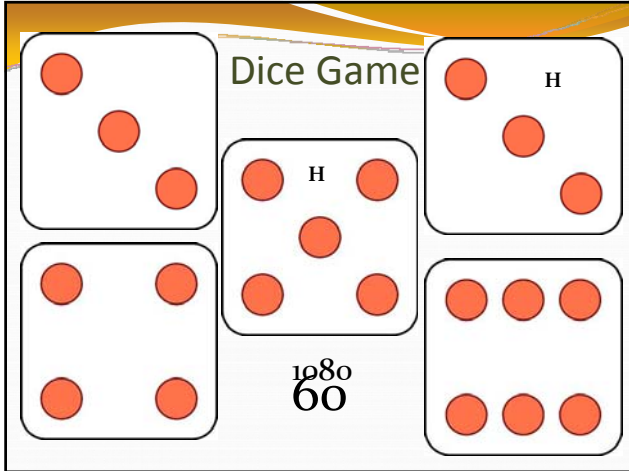
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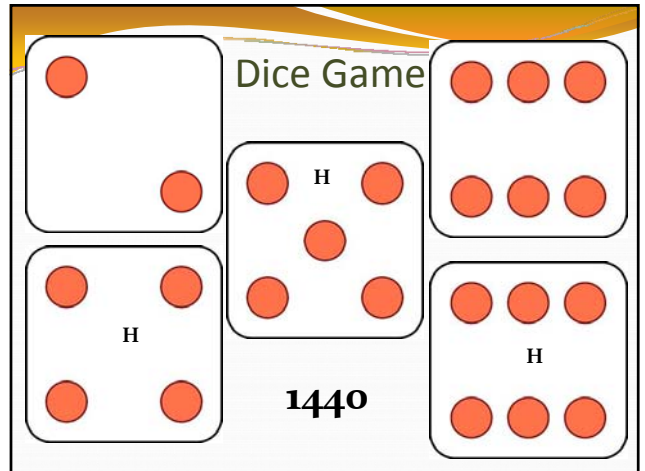
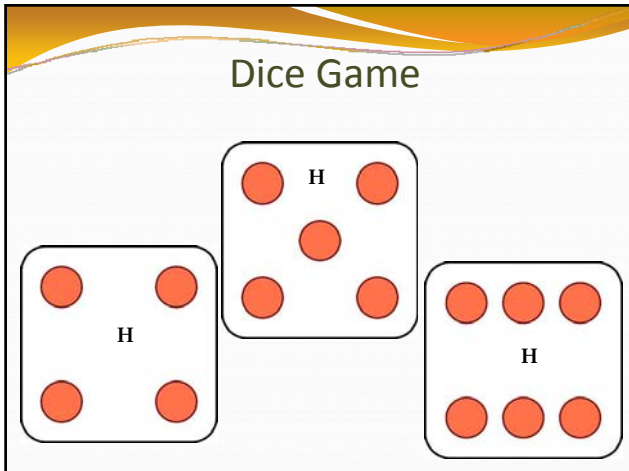
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60

The first roll is a 60
 and then we hold the 3 and 5 and roll again.
 In the first box is the results of the
 second roll.



These are the holds before the
 last roll.



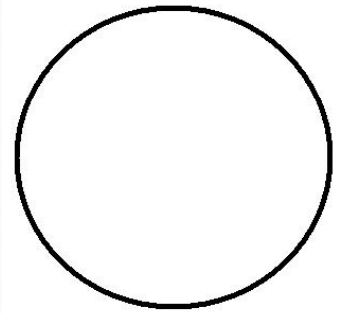
The last roll

Inspired by
Bob and Ellen Kaplan
Carving up a Disc

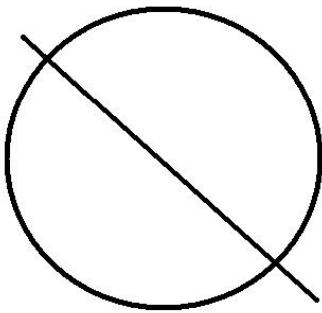
The challenged should do the following:

- Start with a Disc
- Cross the disc with two lines and either a third line or a circle or oval.
- Count the number of distinct regions formed inside the disc.
- If the challenger can do the same construction and produce more regions then they should do so. Otherwise they should state that the challenged got the maximum number.

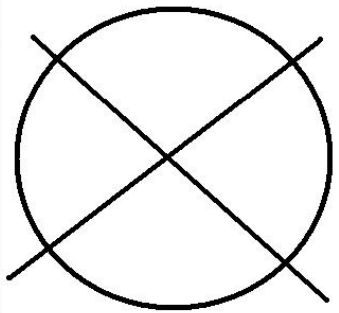
Example Carving



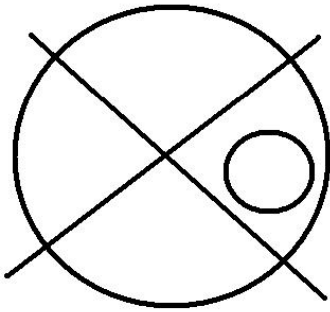
Example Carving



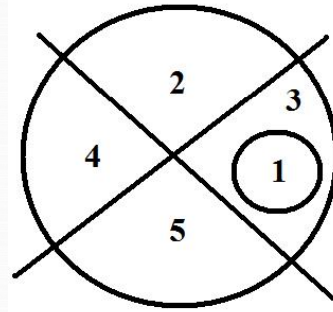
Example Carving



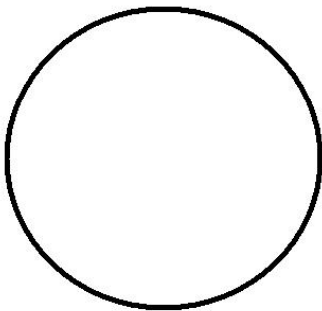
Example Carving



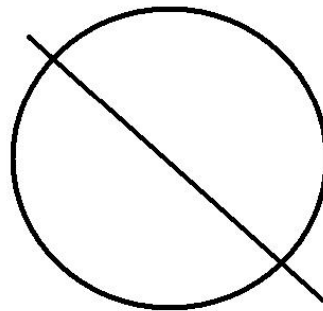
Example Carving #1



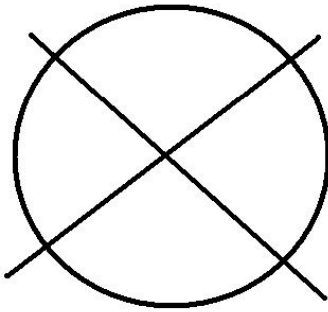
Example Carving #2



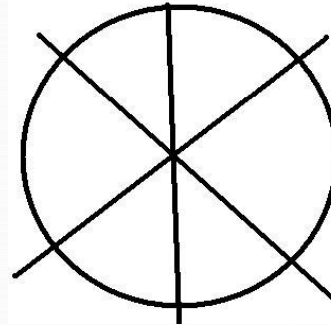
Example Carving #2



Example Carving #2

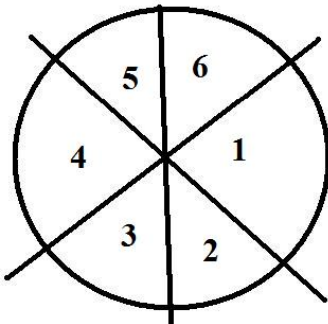


Example Carving #2

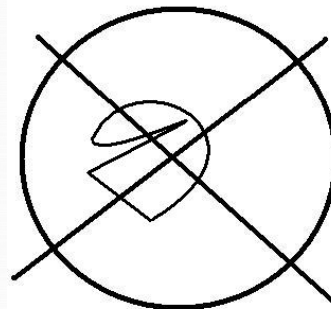


Games for little wranglers should be played as explained in the rules but players should also be ready to respectfully request modifications.

Example Carving #2



What if we bend the rules?



Matrix Games















19	8	11	25	7
12	1	4	18	0
16	5	8	22	4
21	10	13	27	9
14	3	6	20	2

- ### Matrix Games - Rules
- The Challenged picks any square in the matrix and records the number A there.
 - The row and the column of A are removed from play.
 - A second number is chosen called B.
 - The row and column of B are removed from play.
 - Continue choosing C,D, and finally E which is forced.
 - The challenged computes $A+B+C+D+E$
 - The Challenger repeats the above procedure on a new copy of the matrix. The highest total wins.





















After 4 and 25 are selected

After all selections are made - one in each row and column.

Matrix Games

			25	
		4		
16	5			4
21	10			9
14	3			2

Matrix Games

			25	
		4		
	5			
21				
				2

Matrix Games

4				25	
25			4		
21		5			
5	21				
+ 2					2
57					

Matrix Games - Remark

- This matrix is thanks to Martin Gardner
- Since it is in fact a partial addition table scrambled in a certain way the answer will always be 57.
- In this case the challenged team can earn more points by claiming that this game is fixed – i.e. that teams will always score the same.
- If this is not noticed by the challenged team and then the challenger then it gives the judges a teachable moment and the participants can take something home to wonder about why this is the case.

Many Thanks to Harold Reiter Competitive KenKen

- We Start with a Ken Ken Puzzle.
- The challenged team will go first.
- On Each turn the object is to fill in a valid arithmetic region that keeps the solution valid.
- The goal is not to complete the puzzle but rather to make the last legal move.
- So you want to make a move in which everything checks out but is such that your opponent cannot continue.

○ Challenged

○ Challenger

**RED
WINS**

3-	2÷	2	4+
4	1	3	4+
1	2	4+	2÷
6x	4+	1	2
4+	4+	4	4

The move chronology is as follows: Red goes first in the upper left of column 1 with 4 and 1. Then green plays the 1 and 2 in row 1. This causes the 4 green no symbol squares to be knocked out of play. Red then plays the 2 and 4 in the bottom of the 4th column. This puts three more red squares out of play. Finally, Green plays in the single 2 cell (could have also played in the +4 cell) but either way red has one final move and wins.

In summary

- Games to make kids think!!!
- A Huge variety so they don't know what to expect.
- Time to prepare and play these games with their team mates before hand (Judges are there to clarify the rules if needed)
- Things are not always as they seem!!!
- Respectful "cheating" and questions for the judges are allowed.
- The Judges must capitalize on teachable moments.