Make Your Math Super Powered: Use Games, Challenges, and Puzzles

Where's the fun? Learn a Math Workshop model by participating in one and explore fun no-cost/low-cost games and puzzles that you can easily bring into your classroom. Learn how the games and activities support the CCSS.

Engaged, happy learners + Standards for Math practice = Super Powered Math

Agenda
- Warm Up
- Goals
  - To learn about the CC Math Practices and how they are imbued in games and enrichment activities
  - To experience a Math Workshop Model
- Mini Lesson
- Center Work
- Reflection
- Closure

Zeno Contact
Manuela Crowley
Director of Math Education
Zeno
manuelacr@zenomath.org

Website Information
Groupmaker Excel Program
Expand your Card Pack
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We believe that with the self-confidence and skills gained by experiencing math in unique ways, a person's possibilities are infinite. Our games re-frame math as fun and relevant so that all kids, adults, and families can build math confidence and lifetime skills!

Common Core Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Pentominoes

What Happens

Students will construct the 12* different shaped pentominoes in groups of two and record their results on centimeter graph paper. The students' work focuses on:

- Spatial problem solving
- Shape recognition
- Geometric relationships
- Puzzle-solving
- Cooperative Learning
- Geometric constructions

Grouping

Intro can be given to the whole class (25 – 30 students). It can be taught in a 30 – 40 minute time slot. Students will work in pairs for collecting their data. The full group will meet again to discuss results.

Materials

- Fraction squares (bucket per table)
- Centimeter graph paper
- Pentomino sets (one per student) *optional*
- Pentomino puzzle cards *optional*
- Centimeter graph paper overheads *optional*
- Overhead/projector, whiteboard, or poster paper

Activity

Discovery

- Distribute fraction squares
- Tell students that today we will be working with squares to construct different shapes
- Take two squares. With full edges touching how many different shapes can you make? Show examples on the overhead of full edges touching. Rotations and flips of the same shape do not count as another shape.
- Have students come to the overhead to demo their results. (Answer: 1 shape). These are called dominoes

- With 3 squares? (Answer: 2 shapes. No rotations or flips). These are called triominoes.

- With 4 squares? (Answer: 5 shapes. No rotations or flips). These are called tetraminoes.

Task
- Tell students "Today we will be constructing Pentominoes."
- "Does anyone know what a Pentomino is?"
- Pentominoes are shapes that can be made from 5 squares, in any configuration with full edges touching. Pentominoes are the geometric shapes that are formed by joining 5 squares edge to edge.
- Have students make educated guesses on the possible number of pentominoes
- Explain to students:" Today we are going to construct our own set of Pentominoes using these fraction squares on your tables. With your partner I want you to make as many shapes as possible that follow these two rules":
    - You must use five squares
    - The squares must be joined edge to edge
    * Do not tell students there are 12 Pentominoes. Let them discover this themselves.

Please record your results on cm graph paper
- Illustrate one pentomino on the projector and how to record it on graph paper
- Pair students (random pairing works best)
- Distribute centimeter graph paper

Allow children to work for an extended period of time generating pentominoes. Circulate the room making sure that students are working together, following the rules, recording their data. Judge the difficulty of the project and join pairs if necessary. Allow them to struggle with this for a while before combining pairs.

Conclusion
- Review and compare student results
- Students record missing solutions
- Illustrate solutions on the overhead
- Label the pieces

Optional
- Distribute pentomino sets to each pair of students
- Have students match puzzle pieces with their solutions
- Students record missing solutions
- Illustrate solutions on the overhead
- Label the pieces

Extension
- Hexominoes
- Can you find a pattern among the number of solutions for each square you add to the problem?
    - 1 square – 1 solution
    - 2 squares – 1 solution
    - 3 squares – 2 solutions
    - 4 squares – 5 solutions
    - 5 squares – 12 solutions
    - 6 squares – 35 solutions

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Get to 100 (STRAND: Number Sense-Addition):

This game requires a deck of cards (face cards removed) for each group of players. Groups can be two or more. Each student is dealt 5 cards. Students are allowed to use the numbers on those cards to create any numbers they can to add up to as close to 100 as possible. Each student plays 5 times (or however many times they decide) and tries to have his or her total score equal 0. See below for examples:

1st hand: 2, 3, 5, 5, 7

75 + 25 + 3 = 103   Score +3

2nd hand: 1, 9, 6, 2, 3

91 + 6 + 2 + 3 = 102   Score +3 +2 = +5

At this point a student would try to get a total score on the next hand to be less than 100, preferably a 95 so that the score for the hand would be –5 and the total score would be 0. VARIATION: Use only four cards to make 50.

GET TO 100

PLAYER 1: _____ PLAYER 2: _____	CARDS	EQUATION	SUM	ROUND SCORE
ROUND 1				
ROUND 2				
ROUND 3				
ROUND 4				
ROUND 5				
TOTAL				

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Game Instruction: KenKen

Fill in the grid with digits so as not to repeat a digit in any row or column and so that the digits within each heavily outlined box or boxes (called a cage) will produce the target number shown in that cage by using the operation (addition, subtraction, multiplication, or division) shown by the symbol after the numeral.

For single box cages, simply enter the number that is shown in the corner.

So, for example, the notation 6+ means that the numbers in the cage should add up to 6 and the notation 48X means that by multiplying the numbers in the cage, you will get 48.

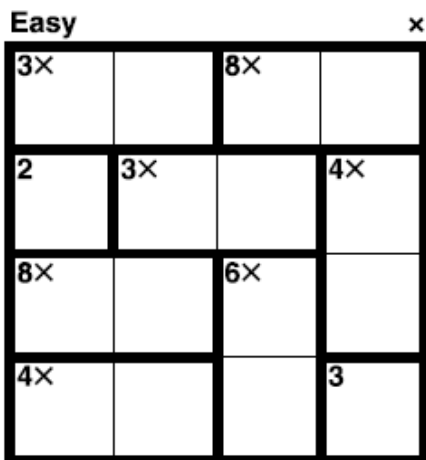A 4X4 grid will use the digits 1-4. A 5X5 grid will use 1-5. A 6X6 grid will use 1-6, and so on.

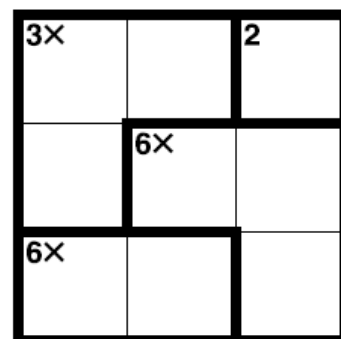For more KenKen of all sizes and difficulty levels, visit
http://www.kenkenpuzzle.com/teachers/classroom

For tips and hints on solving puzzles, visit www.kenken.com/solvingtips

math powered
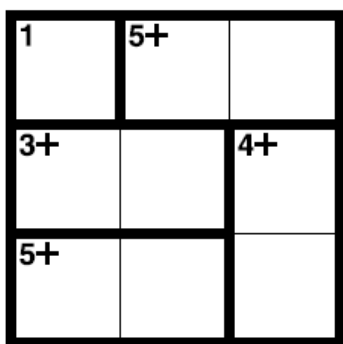
Zeno's mission is to increase children's competence and confidence in math by utilizing fun and engaging activities. We serve early learners and elementary school aged children in communities with the greatest need.

Why math matters: In Washington State, nearly 50% of children arrive at kindergarten without the math skills typical of their age group. For students in communities with economic disadvantage, the inequities are even more significant. This creates an opportunity gap that is leaving some students behind. If we can step in and encourage a love for math early in a child's life, everything can change.

Enriching Early Learning

MathWays for Early Learning gives families and care givers of preschoolers the tools and training to encourage early math exploration. Through a combination of modeling, coaching and age-appropriate materials, this program gives kids the opportunity to arrive at kindergarten ready to succeed.

Engaging Family Activities

Our MathFest, Math + Science Mashup, and Family Math Night programs help families develop the tools and confidence they need to support their kids in math, improving student learning inside and outside the classroom.

Transforming Elementary Math

The Mathematician-In-Residence program aims to increase student outcomes by facilitating professional learning designed to empower elementary teachers to create a positive and effective learning environment for their students.