

ATOMIC 2017

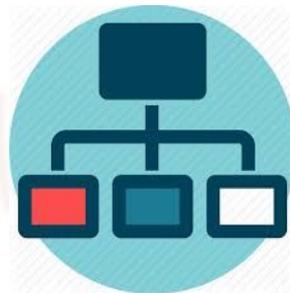
Gamification of the Math Classroom

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Overview



- *Session Goal and Essential Questions*
- *What is Gamification?*
- *Grid Games: Game Structures and Discourse*
- *Taking it Back to the Classroom*

Session Resources: www.ckingeducation.com under “Resources/Workshops”

Session Goal

Use game structures to promote engagement, collaboration and discourse, while deepening conceptual understanding.



Essential Questions

1. *Why bother to play games in the classroom?*
2. *How can we adapt lessons to include game structures?*



Concept of Gamification

Gamification is the concept of applying game mechanics and game design techniques to engage and motivate people to achieve their goals. Games are a part of the process of gamification.

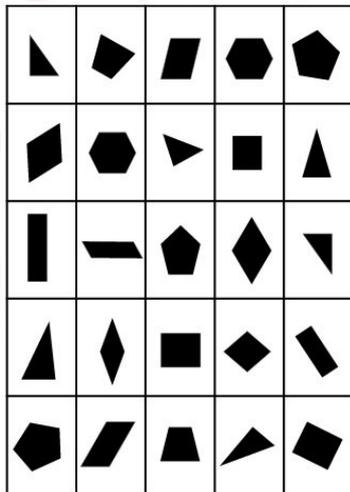
Principles of Gamification

- *Game structures are adaptable and can increase in difficulty over time.*
- *Improvement and progress on skills are noted over time and are connected to time, effort and perseverance.*
- *Discourse and conversation are essential to de-stigmatize failure and promote deeper understanding through acknowledgement of misconceptions or errors.*
- *Reward behaviors, not results.*
- *Winning can be a byproduct of the work, but learning is the goal.*

What are Grid Games?

Grid games are games that are played on a rectangular matrix using rows and columns. Play is based on use of the game structure, the content of the grid game and the mathematical concept being addressed.

8	88	80	24	16
24	32	72	64	48
80	8	16	8	80
48	64	72	32	24
16	24	80	88	8



$3\frac{1}{2}$	$4\frac{1}{4}$	$6\frac{7}{8}$	$9\frac{1}{4}$	$2\frac{1}{4}$
$1\frac{3}{4}$	$5\frac{5}{8}$	$7\frac{3}{8}$	$10\frac{5}{8}$	$3\frac{1}{2}$
$4\frac{1}{2}$	$7\frac{1}{4}$	$2\frac{7}{8}$	$9\frac{1}{4}$	$5\frac{5}{8}$
$10\frac{3}{4}$	$5\frac{5}{8}$	$3\frac{3}{8}$	$1\frac{5}{8}$	$6\frac{1}{4}$
$8\frac{1}{4}$	$1\frac{3}{8}$	$2\frac{5}{8}$	$9\frac{7}{8}$	$5\frac{1}{2}$

Top 3 Features of Grid Games

1. *Adaptable to many conceptual areas and grade levels*
2. *Relatively easy to learn the structures*
3. *Quick setup and easily accessible materials*

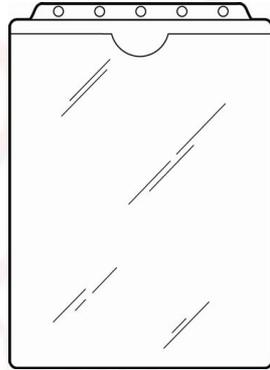
Featured Games

Game	Aim
Connect It	Get 4 or 5 in a row, either horizontally, vertically or diagonally. Similar to Connect 4.
Claim It	Claim an area by following specific criteria. Similar to Blokus.
Clue It	Partners give clues to get a cell. Similar to Pictionary or Charades.
Capture It	Capture an area by counting or performing an operation.

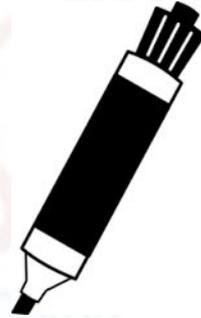
Materials Needed



Neon Colored
Cardstock



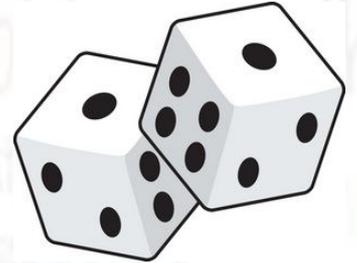
Sheet
Protectors



Dry Erase
Markers



Cards



Dice

Reminders for Students

Reminders for Students:

1. *The goal is to practice and apply the math you are learning.*
2. **You are cheating if you don't explain your thinking.**
3. *Use precise math language.*
4. *Look for patterns to build understanding.*

125	136	147	158	169
645	565	485	365	245
198	201	397	403	596
128	256	512	148	303
829	459	139	789	629

Connect IT!

Grade	Goal of the Game	Talk Prompt	Materials
K	Students have to tell how many are in a configuration.	"I picked _____. I can make _____ by..."	Single-Digit
1	Tell 10 More/10 Less of the number given.	"My number is _____. Ten more is _____."	Double-Digit
2	Tell 101 more/101 less of the number given. Teacher needs to model first example.	"My picked _____. One hundred one less is _____. I figured that out by..."	Triple-Digit

Connect IT!

Grade	Goal of the Game	Materials
3	<i>Mentally add triple-digit numbers to a constant.</i>	<i>Triple-Digit, Card (as constant)</i>
4	<i>Multiply the amount by 11. Teacher should model how to multiply by 10 first, then by 1 to get the partial products, then combine the sums. For example, 23×11 can be seen as 23×10 and 23×1 or $230 + 23$, equalling 253.</i>	<i>Double-Digit</i>
5	<i>Convert measurements with a given measurement system and show thinking in a ratio table.</i>	<i>Single-Digit</i>

Claim IT!

<i>Grade</i>	<i>Goal of the Game</i>	<i>Materials</i>
<i>K</i>	Decompose numbers. For example, if selecting a 6, the student can say that 6 has a 5 and a 1 in it. Use game mat with single-digit numbers.	Single-digit Mat
<i>1</i>	Decompose numbers 11 - 19. For example, if selecting a 16, the student can say that 16 is a 10 and 6. Use game mat with teen numbers.	Teen Numbers
<i>2</i>	Decompose triple-digit numbers. For example, if selecting a 124, the student can say that the number is made up of 1 hundred, 2 tens, 4 ones. Use game mat with triple-digit numbers.	Triple-Digit Mat

Claim IT!

<i>Grade</i>	<i>Goal of the Game</i>	<i>Materials</i>
3	Decompose triple-digit numbers. For example, if selecting a 124, the student can say that the number is made up of 1 hundred, 2 tens, 4 ones. Use game mat with triple-digit numbers.	Triple-digit Mat
4	Round to the nearest 100. For example, if selecting a 824, the student can say that the number rounds to 800 when rounding to the hundred place and prove on number line. Use game mat with triple-digit numbers.	Triple-digit Mat
5	Divide by 2 mentally. For example, if selecting a 84, the student can say that 84 divided by 2 is 42 and prove using mental math or with base-ten blocks. Use game mat with even numbers.	Double-Digit Mat

Clue IT!

<i>Grade</i>	<i>Goal of the Game</i>	<i>Materials</i>
K	Describe/give clues about shapes.	<i>Shapes cards</i>
1	Describe/give clues about sums or differences within 20.	<i>Teen-numbers Mat</i>
2	Describe/give clues about double-digit numbers.	<i>Double-Digit Mat</i>

Clue IT!

<i>Grade</i>	<i>Goal of the Game</i>	<i>Materials</i>
3	Describe/give clues about fractions (wholes, halves, thirds, fourths, sixths and eighths).	<i>Fractions-Mat</i>
4	Describe/give clues about geometric figures.	<i>Shapes Mat</i>
5	Use precise math language to discuss and evaluate numerical expressions.	<i>Expressions Mat</i>

Capture IT!

<i>Grade</i>	<i>Goal of the Game</i>	<i>Materials</i>
K	Roll 1 dice to determine area to capture.	1 inch graph paper
1	Roll 3 dice. Add the amounts to determine area to capture.	2 cm graph paper
2	Use 2 cards and find the difference on a number line. Capture the difference.	2 cm graph paper

Capture IT!

<i>Grade</i>	<i>Goal of the Game</i>	<i>Materials</i>
3	Roll 2 dice or select 2 cards, multiply the amounts to determine the area to capture. Make an array to show that amount. Labels the array using a multiplication equation.	<i>Dice or Cards, 2 cm graph paper</i>
4	Rolls 2 dice to make a fraction less than one. Make an equivalent fraction to that amount. Define your whole on the grid and shade that amount in.	<i>Dice, graph paper</i>
5	Capture the quotient. (Dividends are predetermined and listed. Divisors are rolled.)	<i>List of dividends, dice</i>

Ponder This

Tips for Successful Classroom Games (Aldridge & Badham, 1993):

1. *Make sure the game matches the mathematical objective;*
2. *Use games for specific purposes, not just time-fillers;*
3. *Keep the number of players from two to four, so that turns come around quickly;*
4. *The game should have enough of an element of chance so that it allows weaker students to feel that they have a chance of winning;*
5. *Keep the game completion time short;*
6. *Use five or six 'basic' game structures so the children become familiar with the rules - vary the mathematics rather than the rules;*
7. *Send an established game home with a child for homework; and*
8. *Invite children to create their own board games or variations of known games.*

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Ponder This

“Playing games encourages strategic mathematical thinking as students find different strategies for solving problems and deepen their understanding of numbers.” - Kathy Rutherford, NCTM, 2015

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Scaffolding

- Give sentence frames and structures for discussion
- Co-create sentence frames with students and terms to use
- Collaboratively define terms and have students determine what to say

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Essential Questions

1. *Why bother to play games in the classroom?*
2. *How can we adapt lessons to include game structures?*

Back-to-Back, Face-to-Face:

3 things you enjoyed

2 things you are learned

1 thing you are committed to doing

Thank You!

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