

Game Up Your Math!

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Dr. Kathleen Offenholley, Kathleenoffenholley@yahoo.com or koffenholley@bmcc.cuny.edu
Professor of Mathematics, Borough of Manhattan Community College (BMCC)

Links to downloads and instructions for the digital games: <https://mathgamesforstem.wordpress.com/>

More on Education and Game-Based Learning at the CUNY Games Network:
<https://games.common.gc.cuny.edu/>

Kathleen's blog on game-based learning in undergraduate mathematics:
<https://mathgames.common.gc.cuny.edu/>

Further reading on games-based learning:

Keith Devlin, *Mathematics Education for a New Era*

James Gee, *What Video Games Have to Teach Us About Learning and Literacy*

David Shaffer, *How Computer Games Help Children Learn.*

Articles

Crocco, F., Offenholley, K., and Hernandez, C (2016) A Proof-of-Concept Study of Game-Based Learning in Education, Simulation and Gaming 47:4. 402-422.

Offenholley, K., Gellert, L., Kotelawala, U. (2015) Digital Games for Future Math Teachers: Transforming Undergraduate Education, Journal of Game-Supported Interactive Learning 2015; 1(1): 1-14

Offenholley, K. (2012). Gaming Your Mathematics Course: The Theory and Practice of Games for Learning, The Journal of Humanistic Mathematics, Vol. 2 (2)

The games we played or saw today – more detail at <https://mathgames.common.gc.cuny.edu/>

The Coin Game

- Real coins in an envelope, with a word problem on the outside
- If students solve the problem correctly *using algebra*, they keep the money and move on to the next envelope.
- Every member of the group must have the problem worked out before the group is allowed to open the envelope.
- Bonus round: make up your own problem with some of the coins – if your problem is solvable, you double your money

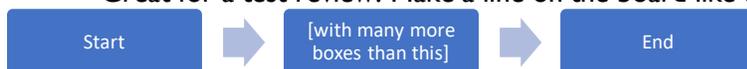
Paper Tear-ups

One person multiplies two binomials, tears off the answer and gives the answer to the other person to factor. Or similarly, one person writes an exponential problem and its equivalent logarithm, omitting a part of it, gives to the other person to solve. Or one person writes the derivative, and the other person has to come up with the original equation. You may want to have people creating problems in teams, to make sure the problems are correct.

Variation – collect all the problems and answers, tape the problems on one side of the board, the answers on the other, and have students try to match them (they should try to disguise their handwriting!)

The Finish Line

Great for a test review! Make a line on the board like this:



Every time a group gets 4 correct on the test review, they roll a die to advance along the line. This is less time intensive than creating your own PowerPoint Jeopardy, and just as fun.

Powerpoint Jeopardy

Versions of this are all over the internet, just do a web search for “powerpoint jeopardy.” You can place your own questions into the slides.

Mad Math (or Math Libs), a version of Mad Libs for math

- Students fill in the words and numbers, not knowing the story or problems they are creating.
- Can be used in any class where you would like students to create a few problems to do, while laughing a lot!
- Do it yourself Mad-Libs can be found all over the internet, if you want a different story, but you are welcome to use the one I gave you. A copy of the story is found on my blog.

The Game of Set

You can get the card deck, or you can play online: <https://www.setgame.com/set/puzzle>

Spread of a Rumor

	Do you know the rumor?
Round 0	
Round 1	
Round 2	
Round 3	
Etc.	

If there is a **yes** on this card, you know the rumor.

Each round, show this card to two people. If you see a **yes**, now you know the rumor! Now you can write **yes** on your card for this round and all the next rounds.

- Game play is started by passing everyone a card. One student's card, you have secretly written a yes in round 0.
- In each round, students mingle and show their card to one other person, *secretly* writing a yes on their card if they see another card that has a yes on it.
- Stop once at least 5 rounds have been played (depending on classroom size – you want everyone or nearly everyone to know the rumor).
- Have people raise their hands for the total who knew the rumor in round 0 (should be just one), the total in round 2, etc.
- The number of people who know the rumor in each round should *roughly* double, so it is roughly exponential growth (toward the end, as most of the class knows the rumor, the growth will slow down, since it is actually logistic growth).
- The growth can be compared to the spread of a virus, population growth, “viral” internet news, etc.

The NSF Sponsored Games

xPonum is available in the App Store for iPad (search for xPonum) or as a free PC or Mac download at

<https://mathgamesforstem.wordpress.com/>

- ▶ **xPonum** is a puzzle game in which players collect gems using a beam of energy.
- ▶ **Game play emphasizes exploration**, so that players experience mathematics as being about trying out ideas, not just about already having the answer.
- ▶ At the basic level, in the first world, players use slope and intercepts and must find points along the line, using the slider to shift the line. This level can be played in an introductory algebra class.
- ▶ At later levels, players explore shifts in parabolas, cubic and trigonometric functions, which are suitable as pre-calculus topics.



Project Sampson is available in the App Store for iPad (search for Sampson) or as a free PC or Mac download at <https://mathgamesforstem.wordpress.com/>

- ▶ **Project Sampson** is an adventure and resource management game for middle school math on up to College Algebra.
- ▶ It is designed to give players an appreciation for when linear equations are used, and for how *Geographic Information Systems* are used in disaster preparedness.
- ▶ Players fly to locations across the world to save the planet from disasters, using the energy of the ship to slow down the rate of damage done (the slope) based on how many turns (x) until the disaster hits.



Algebots will be available in the App store for iPad & iPhone soon, but meanwhile, you can download it free for PC or Mac <https://mathgamesforstem.wordpress.com/>

- ▶ Algebots is an equation-solving puzzle game, with little robots who cheer when you get the steps right, and fall asleep if you don't move them around.
- ▶ Equations range from basic to advanced, including absolute value, systems and radical equations.
- ▶ The game emphasizes that solving is about “undoing” – applying the inverse function – to both sides of the equality or inequality.
- ▶ Begin with Basic Equations, easy, which is where you should always start when first playing this game!

