Envision Math Games for K-12

Here are a variety of games that let students have fun while honing their math skills. Many of these activities are great "warm-ups" for the beginning of class, because they capture the students' attention, turn the focus to math, and create a positive frame of mind, prior to starting the lesson.

Elementary School:

Math Bingo

This exercise helps elementary students practice addition, subtraction, multiplication and division (customizable for your grade level).

Create 4x4 grids (16 squares total), resembling Bingo cards, for each student. (If your students are old enough, have them create the grids themselves with rulers, on blank pieces of paper.) Each student starts with a blank grid. Then, instruct them to fill in the squares of the grid with numbers between 0 and 30, in any order, using a total of 16 different numbers, and each number only once.

Once each student has their grid completed, it's time to begin the game. Call out a grade-appropriate problem, without revealing the answer; for example: "23 + 6 = …?" or "90 divided by 5 = …?" The students will calculate the answer themselves, and then look for that number on their cards. If the answer is there, the student will mark an X across that square (crossing out the number).

Continue to provide math problems, each with a different answer (equaling 30 or less). Be sure to keep track of the answers. The first student to have X's in every square on his/her card will shout out "Bingo" (or "Eureka," or any word you select). Check the student's card against your own list of correct answers and, assuming no errors, declare a winner.

Find Ten

This math game is similar to Concentration, so it will hone memory and spatial skills as well as reinforcing simple addition.

For this game, you'll need decks of cards with face cards removed. Aces = 1. Mix the cards up and arrange them face down in front of pairs or small teams of students. The objective is for the students to find sums of ten by turning over pairs of cards. Taking turns, players turn over two cards. If the sum is ten, the player takes the cards and plays again. If the sum is greater or less than ten, the player returns the cards to their face-down position and it is now the other student's turn.

The game is over when no more tens can be made. The player or team with the most cards in their pile wins.

(Courtesy of Washington Mathematics)

Middle School:

Mental Math
This activity is especially great as a class warm-up. Since you will tailor it for your students' level and area of focus, it can actually work for any grade level.

The concept is extremely simple: Call out a string of math problems for the students to calculate in their heads. For example, you might say, "Start with 5. Double it. Add 7. Subtract 9. Now multiply that by 3. Divide by 6. Multiply by 4. Raise your hand when you know the answer." Over the course of the year you can increase the speed and complexity, and include fractions, square roots, or other intriguing math challenges.

What's My Number?
This game teaches students to use systematic, organized reasoning. Tell the students you're thinking of a number between 1 and 100. Their task is to calculate your number, using no more than seven "yes or no" questions. They can win only by determining your number exactly, within their seven-question limit. If a student asks, "Is it ___?" and is wrong, the whole class loses. Therefore, guessing is not advisable.

The students should be able to deduce that the best strategy is to ask questions that eliminate 50% of the possible answers. For example, if they ask, "Is the number less than 51?" they've cut the field of possibilities in half, whether the answer is yes or no. An alternative approach would be to ask, "Is it an odd number?"

Keep a running record on the board as the students ask their seven questions. Once they have narrowed their choices down to two remaining numbers, they must phrase their remaining question carefully (guessing has a 50% chance of failure). For example, if the remaining options are 51 and 53, they could ask, "Can we eliminate 51?" or, "Does your number end in a 1?" Your answer will lead them definitively to the correct answer.

When students have mastered this challenge, ask them to figure out the minimum number of questions required to determine a number between 1 and 1000. Surprisingly, only three more questions are needed, for a total of ten.

(Courtesy of Washington Mathematics)

High School:

The Biggest Piece of Brownie

This game comes with a reward, as well as good practice for the type of word problem students may see on the SATs.

Materials Required:

- Ruler
- Piece of string cut to 16 inches
- Print-outs of the table below
- Large tray of brownies

The object of this game is for each student to calculate the largest possible area, given a set perimeter length. Your brownie perimeter is 16 inches. Each student will determine the size of his/her piece of brownie, given the restrictions of that perimeter.

Tell the students they will each be able to cut a rectangular piece of brownie, as long as its perimeter is the exact length of your 16" string.

You can then ask them to figure out their individual strategies, or help them by handing out the calculation tool (table) you see below. If they fill out the table with all the various options, they will arrive at the optimal answer. The objective, of course, in order to score the biggest piece of brownie, is to arrive at the largest possible number in the 4th column.

Here is the table with two options filled in:

Length: Long Side "x"	Length: Short Side "y"	Perimeter "2x + 2y"	Area of Brownie "x times y"
7 inches	1 inch	16 inches	7 sq. inches
6 inches	2 inches	16 inches	12 sq. inches
		16 inches	
		16 inches	

The students should realize that the area gets bigger as x and y get closer together. Ultimately, they should conclude that the area is maximized when the short and long sides are equal in length, making a square. Now they can enjoy the fruits of their calculations.

On the SAT test, a similar challenge might look like this:
“Farmer Joe wants to build a rectangular pen for his goats. He has 100 feet of fence, and wants as much roaming room as possible for the goats inside. What is the maximum area he can make?”

Solution:
We now know that we need to make a square. Therefore, the answer is:

25 x 4 = 100; so each side of the pen should be 25 feet long.
The area will be 25 x 25 = 625 sq. feet.

(Courtesy of Education.com)

XBOX Xponential
For this game you’ll want to use the online tools provided by Mathalicious. Many of the students will engage quickly, since the challenge focuses on video games and processor speed.

In 1965, Gordon Moore, computer scientist and Intel co-founder, predicted that computer processor speeds would double every two years. Twelve years later, the first modern video game console, the Atari 2600, was released. The objective of this challenge is for students to write an exponential function based on the Atari 2600 and Moore's Law, researching other consoles to determine whether Moore was correct.

See the details on the Mathalicious site, located at: http://www.mathalicious.com/lessons/xbox-xponential