Math Games in the Curriculum By Bob Hazen

"Dad, after my birthday party is over, the guys want to play that math game you showed them yesterday. Can we do that?"

Yes, this was an actual remark from one of my sons. Positive responses like this is why I recommend to parents and teachers that they include mathematical games and activities as a specific part of their mathematics education. I specifically recommend not making games an afterthought or a reward, something used "when there's nothing else to do." Carefully selected mathematical games - incorporated as a regular part of a child's mathematical experience - can have several benefits.

- Games are fun! Games help foster a positive, enjoyable attitude about mathematics. In math, as in much of life, attitude is extremely important.
- Games provide context for mathematics. The word context comes from a Latin word meaning "weave together." Exposure to substantive, enjoyable math games can help "weave together" in a child's mind how various facts and concepts are related.
- Games provide motivation - kids simply want to play these kinds of games. A wise teacher capitalizes on that desire whenever possible.
- Games provide variety. Is there a place for flash cards, drill sheets, rules, vocabulary memorization, and so forth? Absolutely. Games simply provide another avenue for gaining familiarity, practice, and mastery of important mathematical facts and concepts.

We want our children to memorize certain things. But it is too easy to forget the three crucial components of memorization: repetition, repetition, and repetition. Most adults grew up with that repetition coming in the form of flash cards and drill-and-practice worksheets. But math games and activities incorporate important dynamics that support memorization: variety, motivation, context, and fun. Quality, enjoyable math games and activities are too important and powerful to leave out of a curriculum.

Note well what I am not saying. I'm not saying let's dumb math down by trying to make everything fun and sweet. I'm not saying don't use flash cards or drill sheets. I'm not saying don't memorize basic facts or math formulas.

Few people stand for discipline and hard work more than I do. At the same time, I know that younger children often have a lower limit of how much work they can do, and so for my time and money, games provide

another means of instruction. Games provide an added means of reaching those goals that we want our children to have - familiarity, fluency, recall, and understanding.

Some Favorite Games

My recommended games and activities fall into several categories. Let's look at some quantitative math games that deal with number sense, basic fact practice, and operation sense.

One of the best quantitative math activities for ages 3-9 are skip count songs. Skip counting is learning how to count in multiples of numbers: 3, 6, 9, 12, 15, 18 . . . or 7, 14, 21, 28, 35, 42 . . . Skip counting is not multiplication, although it establishes a solid foundation for addition, multiplication, and division, all at the same time.

When our boys were younger (ages 2 to 7), we played the skip count cassette tape often throughout the day - at lunch, during playtime, in the car, at bedtime, and so forth. The catchy tunes quickly became embedded their minds, carrying with them sequences like "8, 16, 24, 32, 40, 48 . . . ." We used the skip count songs as a background or secondary activity for ou boys to listen to while they played with toys, did art work, or took baths. I this way, adding skip count songs to our curriculum was almost effortless (the tapes were so well liked) and didn't add much time to "school."

Other activities that develop number sense are good old-fashioned dice or card games, such as Yahtzee, Cribbage, and Rummy. I realize that some oppose dice/card activities as a whole, but I can only say that these kinds of games have not led to abuses such as wasting time or gambling but have fostered laughter, togetherness, and learning. Classic card games like Rummy and Cribbage or commercial games like Yahtzee provide multiple opportunities for children to practice counting and simple addition.

Board games like Monopoly, Parcheesi, and Chutes & Ladders are also good for providing lots of counting opportunities. Some board games that use dice can be modified so as to use not just the sum of the two rolled dice but also (at the option of the roller) perhaps the difference of the two or even their product. For example, a roll of a 6 and a 2 could yield a move of 8 (6 + 2) or a move of 4 (6 - 2) or a move of 12 (6 x 2). (The decision of which choices will be available during the game should be done before the game starts, of course.) Simply having options on rolling a 5 and a 3 encourages number sense and planning: should I move 8 (from 5 + 3) or 2 (from 5 - 3) or 15 (from 5 x 3)?

One of my favorite types of game is what I call math-target games. In these games, the goal is to use all of (usually) four numbers in any order, along with any operation signs (+, -, x, ÷) to make a math expression equal to a certain fifth number, the target amount. Commercial games like "24"

and "Crypto" are excellent variations on this idea, but this game can also be played with a regular deck of cards. After shuffling the deck, lay the first four cards face up, with a fifth card face up off to the right. Let's say I dealt cards of 10, 7, 3, 6, with a 5 on the right. We want to use all of the first four numbers in any order, along with any operation sign (+, -, x, ÷) to make a math expression equal to the target card of 5 on the right. With this first set of numbers, for example, one solution is "3 x 7 - 10 - 6," which equals "21 - 10 - 6," which is equal to the target card of 5. Sometimes, there is more than one solution, as in this case: using the same first four numbers, "(6 ÷ 3) + 10 - 7" equals "2 + 10 - 7," which also equals the target goal of 5.

Of course, there are times when no solution is possible for certain combinations of cards. But before players can reach this conclusion, a substantial amount of number crunching will have occurred. Even the impossible playing card combinations promote learning.

For beginners and for younger children, solutions should be given orally. Written solutions are more challenging, since they sometimes require parentheses and knowledge of what operation to do first when there are no parentheses.

How old should children be before they are weaned off games? Perhaps never! I do recommend that as long as they still enjoy a game and want to keep playing it, then try to incorporate it into their school schedule. They may keep playing it even into adulthood. Having said that, it should be obvious that games like Chutes & Ladders will probably no longer hold the sustained interest of a sixth grader. Most children will wean themselves from certain games as they grow up, while keeping others that they still find enjoyable and challenging.

Math games provide variety, motivation, context, and fun - that's too much of a good thing to miss. Make a place for math games in your child's schooling.