EXPLORATIONS in Math

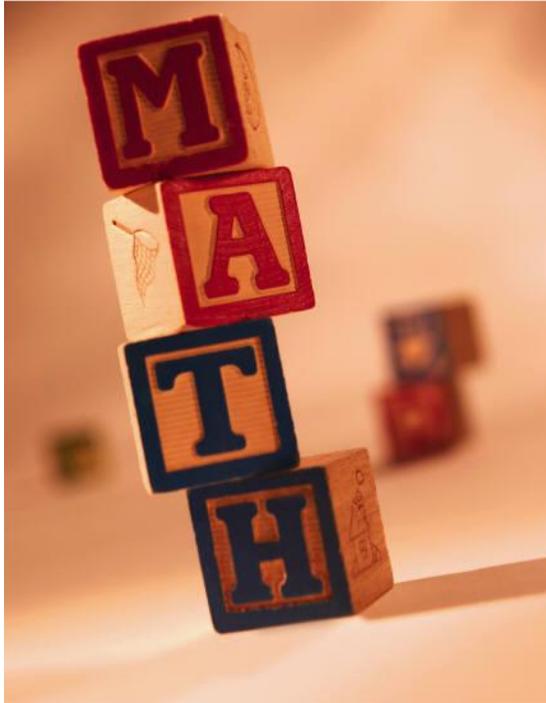Helping Elementary Students Succeed in Math

TEACHING TIPS & GAMES

**BEST PRACTICES,
MATH GAMES & ACTIVITIES
FOR SKILL BUILDING**

CONTACT: info@eimath.org
WEBSITE:
http://explorationsinmath.org/

Explorations in Math turns math into a lifelong adventure. By building a culture in elementary schools that showcases math as fun, engaging, and relevant, we unleash every child's ability to conquer math in his or her own way. And that's simply fabulous to see!

Vision

Explorations in Math envisions a culture in which all elementary students succeed in math so they can better succeed in life.

Mission

Explorations in Math is a non-profit organization with a mission to build a sustainable math culture in elementary school communities.

Goals

Our goals are to:

1. create confidence and excitement for math in young children,
2. start early in the educational lives of children, and
3. involve the entire school community including teachers and parents

CONTACT: info@eimath.org
WEBSITE: http://explorationsinmath.org/

EXPLORATIONS in Math
Helping Elementary Students Succeed in Math

The games included in this packet are proven favorites. We have used them many times in the classroom at all grade levels and we often play along with our students. Play the games with your students, rather than having them play by themselves. When you show your enthusiasm for math, it builds children's confidence. Apply some of the listed **Best Practices** as you play.

When played at the beginning of a math period, many of the games and activities that follow serve three important purposes:

- they get students' attention
- they focus students on math
- the game/activity puts students in a positive frame of mind prior to starting the math lesson.

Examples of Best Practices for Producing Confident Mathematicians

1) **Frequently tell students that a wrong answer is OK** because it tells you three good things about them:
   - **1**- they're paying attention
   - **2**- they're thinking
   - **3**- they're trying

2) **Refer to students as "Mathematicians".** Help them envision themselves as math scholars and maybe spark the idea that they might one day have a career in math.

3) **Encourage students to work together and help one another with their math**. (Groups of two or three work well.) A lot of good teaching and learning take place when students work cooperatively.

4) **Allow more wait time than usual.** After asking a question, say "*I will wait for 8 (or however many) of you to raise your hand*." Learning stops when the answer is given so let students know you will give them plenty of time to think and not avoid solving the problem for themselves.

5) **Don't automatically validate a child's answer.** Instead, ask the group to do so: "Raise your hand if you agree." If the answer was wrong, ask "Who has a different answer?"

6) **Participation in group learning games should be voluntary.** Remind students that they are not required to play but they do have to pay attention. This reduces anxiety and makes for a "safer" environment for a lot of kids. It also empowers them by letting them make decisions.

7) **Instead of saying,** "Raise your hand *if* you know the answer," change it to "Raise your hand **when** you know the answer." That one word communicates a lot to students!

8) **The most important questions you can ask a child:** "Why do you think so?", "Tell me more about how you solved that." or "How did you get that answer? "

9) **Focus on relevant math vocabulary** and use it throughout the course of the session. Explain to children that using power words lets people know that you know what you are talking about.

![Explorations in Math — Helping Elementary Students Succeed in Math](logo)

PRIMARY SKILL-BUILDING GAMES & ACTIVITIES

Addition Bingo (STRAND: Number Sense-Addition):
Use a standard deck of cards with tens and face cards removed (aces = 1).Pass out 4x4 grids to students (16 squares total). (Or, have students fold a piece of paper twice the hot dog way and twice the hamburger way.) Instruct students to put down any numbers from 0 to 20 in each of the squares. The same number cannot be used more than once. The instructor calls out addition problems pulling two cards from the deck but does not say the answer. If the student has the answer on his or her card, the student marks out the box or places a marker on the number until there is a bingo. The instructor should write down the answers to the problems to make sure the winning students answered correctly.

Cross the Line (STRAND: Number Sense-computation):

Students line up facing the teacher. The teacher says, "Cross the line if_____." If the students agree, they cross the line to the other side. If they do not agree, they stay put. For example, if the teacher says, "Cross the line if one plus one equals three," students have to decide whether to cross or stay put. Any student who crosses when she shouldn't (or fails to cross when she should) sits down. Continue until one person is left. As students are eliminated, make problems more challenging.

Hokey Pokey with Shapes (STRAND: Geometry):
Cut out basic shapes and laminate them (to use each year). Students hold the shapes in one hand. Then, instead of singing put your "right hand in" students sing put the "red square in" or whatever shape and color it is.

I'm Out! (STRAND: Number Sense-Subtraction):

This is a two-player game that requires a deck of cards (all face cards removed) and 15 markers (beans, paper clips, etc.) per player. Place the deck between players and each player takes a card from the top of the deck. Both players turn over their card and find the difference between the two numbers. The player with the lower number pays the difference in markers to the other player. The game ends when all cards have been played or when one player has all the markers.

EXAMPLE: Player #1 turns up a 3 and player #2 a 5. Player one pays two markers (5 – 3 = 2) to player two.

Play continues until one player is out of markers and announces "I'm out!"

VARIATIONS: More than two may play but on each turn only the players with the highest and lowest cards pay markers on that turn.

Stop or Go (STRAND: Number Sense-Addition):

For 2 or more students, one six-sided die needed for each group of players. The object of the game is to be the first player to reach a designated number of points (25, 50, or 100). Player #1 rolls the die. If a 1 is rolled, the player scores nothing and it's the next player's turn. If player #1 rolls other than a 1, the number is added to the player's score. Player #1 continues until a 1 is rolled and play switches to player #2.

VARIATIONS:

1) Have students tally each number as it's rolled and ask them to draw probability conclusions when the activity is over.

2) Have students keep track of how many times each number is rolled and see if the number 1 fits the probability prediction of 1/6.

Math Go Fish (STRAND: Number Sense-Addition):

Use a standard deck of cards with tens and face cards removed (aces = 1). Deal five cards to each player then take out one card from the deck and set it aside without looking at it. The remaining cards are placed face down in a "draw" pile. If a player has any two cards that add to 10 (e.g.: 3 + 7), s/he lays the pair on the table, face up. Once all players have laid down all their "10" pairs, the first player asks any other player for a card that would complete a "10" pair in his/her hand. If the other player has the requested card, s/he must hand it over and the first player may continue asking for cards, from the same person or anyone else. If the player doesn't have the requested card, s/he says, "Go fish!" and the first player takes the top card from the "draw" pile. If a player runs out of cards, s/he draws a new one at the beginning of a new turn and continues play. When all the cards are matched up, there will be one card without a pair (it will be the match for the card removed from the deck at the beginning of the game). The person who winds up with the card that is the match for the card that was removed from the deck at the beginning of the game is the winner.

Find Ten (STRAND: Number Sense-Addition: Finding Tens):

This math game is similar to Concentration. In this game, children try to make a ten by turning over combinations of cards that total ten. You'll need a deck of cards with face cards and tens removed (aces = 1). Mix up the cards and place six rows of six cards face down between two players. (Three can also play or four in teams of two.) 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 than ten, the cards are replaced face down and that player's turn is over. The game is over when no more tens can be made. The player with the most combinations of ten wins.

![Explorations in Math — Helping Elementary Students Succeed in Math]

PRIMARY/INTERMEDIATE SKILL-BUILDING GAMES & ACTIVITIES

The difficulty of these games can be adjusted by changing the range of numbers used or the targets attempted. Suitability for different ages will be impacted by students' math abilities.

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.

Fingers (STRAND: Number Sense-Computational Fluency):

Students compete in groups of two for multiplication and subtraction but larger groups are okay for addition. For addition, students hold one or two hands behind their back and extend anything from 0 to 10 fingers. They reveal the number of fingers at a signal. Whoever correctly states the sum of the fingers first wins the round. (For an added challenge, three players participate.)

For subtraction two players can extend any number of fingers on one or two hands. The first to state the difference wins the round.
For multiplication two players can extend any number of fingers on one or two hands. The first to state the product wins the round.

Mental Math I (STRAND: Number Sense-Computational Fluency):
Great warm-up activity! Teacher needs to tailor the level of difficulty to the grade/ability level of the class. For older students you might say, "Start with 5. Double it; Add 7; Subtract 9; Times 3; Divided by 6; Times 4; Raise your hand when you know the answer." Over time you can increase the speed and the complexity, sometimes including fractions or factorials. For younger students use only addition and subtraction.

Mental Math II (STRAND: Number Sense-Computational Fluency):
First round: tell the kids, "I'll say a number, you double it." Start with easy numbers (4, 8, 13), work up to harder ones (45, 63, 79). Zero and 1/2 are good ones also. Second round: "I'll say a number, you double it and add one (or ten, or . . .)." Third round: "I'll say a number, you double it and subtract one (or however many). You can also reverse it: "Add one, then double it or subtract one, then double it."

Mental Math III (STRAND: Number Sense-Computational Fluency):
Similar to Mental Math I, above, except the leader gives the answer and students make up a problem to fit it. For example: "The answer is 16 – give me two numbers." After several responses, "Give me three numbers," then, "three numbers and two different operations," then, "four numbers," then "four numbers with three operations" and so on. The next day, change the answer number.

Mental Math IV (STRAND: Number Sense-Computational Fluency):
Start by asking two students to each give you a number between 1 and 9 (but not 0), which you write on the board. The task is for students in the class to create various problems using those two numbers and any combination of operations. After the two-number warm-up, ask students to give you 3 numbers between 1 and 9 and then create more problems. This is an opportunity to talk about grouping, exponents, and order of operations.

![Explorations in Math — Helping Elementary Students Succeed in Math](logo)

Mental Math V (STRAND: Number Sense-Computational Fluency):

This is a pre-algebra mental math activity suitable for all grades. A student gives you an input number which you write on the board. You perform an operation on it and write the output number. Students are to figure out what your rule is. The rule can be simple or challenging. Examples:

- add 2 (or any number)   • minus 1 times 2
- times 3   • plus 5 times 2
- times 2 plus 2   • 1/10
- minus 8 (or any number)

What Are My Numbers? (STRAND: Number Sense-Computational. Fluency):

Write the following on the board or overhead:

+	=		×	=
−	=		÷	=

Think of two numbers whose sum, difference, product and quotient you write after the equal signs. For example, if the 2 numbers you think of are 2 and 6, then the sum = 8, the difference = 4, the product = 12, and the quotient = 3. (If the numbers don't divide evenly, let kids know.) Students use the answers to determine your two numbers. Be sure to use and emphasize the math terminology – we call them "Power Words". For primary students all you need is addition and subtraction. As the year advances, make the problems more difficult.

Around the World (STRAND: Number Sense-Add/Sub/Mult/Div):

You'll need flash cards for the basic facts you're working on. Pick one student to start the game. She picks any other student to stand behind. You then show them a flash card problem. The first student to answer correctly gets the card and moves on to the next student. Take only the first answer given. If it is wrong, that student does not get a second try. Instead, the other student gets to answer. In case of a tie, go to the next card. I usually allow 5-10 seconds, depending on the level of difficulty. Any student who goes "around the world" (beats everyone else in the class) automatically wins the game. Otherwise, the student with the most cards is the winner. Participation should be voluntary.

EXPLORATIONS in Math
Helping Elementary Students Succeed in Math

What's My Number? (STRAND: Mathematical Reasoning):

This game is about students learning to be systematic, methodical and organized in their reasoning. Tell the students you're thinking of a number between 1 and 100. Their task is to determine what your number is using no more than seven "yes or no" questions. As soon as a student asks, "Is it ___?" the game is over, right or wrong.

It's always possible to determine the number in seven steps by asking questions that eliminate half of all remaining numbers. So, the first question could be "Is the number greater than 50?" (Or "is the number less than 50?"). Whether yes or no, half the numbers have been eliminated. Another opening question could be, "Is it an odd number?" Again, half the numbers are eliminated. Keep a running record on the board or overhead. The hardest question is the last one. If students have narrowed their choices down to two numbers, they don't have to ask "Is it ___?". There are questions they can ask to determine the number: If the remaining numbers, for example are 51 and 53 a student could ask, "Can we eliminate 51?" Whether yes or no, they now know the number you selected. Another possible question is: "Does your number end in a 1?"

EXTENSION: When students have mastered this, ask them to figure out the maximum number of questions to ask to determine a number between 1-1000. Surprisingly, only three more questions are needed.

The Place Value Game (STRAND: Number Sense-Place Value):

You'll need a deck of cards with all the 10s and the face cards removed. All other cards are face value, aces being 1. You can begin with a 5-digit game. (You can increase or decrease the number of digits depending on grade and ability levels.) Ask students to write the following on a piece of paper:

10 Th	Th	H	T	O
___	___	___	___	___

Next, you're going to show the class one card (number/digit) at a time. The object of the game is to make the greatest number possible using those digits. Once they've written the number on their paper, it can't be erased, moved or changed in any way. Erasures disqualify a student. The game is partly luck and partly strategy. An added benefit: it's one that everyone can win.

VARIATIONS:
- Put the tens back in and use them for zeros.
- Have students make the least number possible.

Buzz (STRAND: Number Sense: Multiplication):

This is one of the most popular games for kids. Have the class stand. Start with anyone in the class and have students count off, starting with one. The rules are simple: no one can say any number that is a multiple of 7 or has a 7 in it. Thus, 14, 35 and 63 are taboo, as are 17, 27, 37, etc. Instead of these numbers, the student says "Buzz!". If a student loses track of where the class is in counting, says the wrong number, says "Buzz!" at the wrong time or fails to say "Buzz!", that student sits down. The last student standing wins. This is a good game for learning multiples of 7. The fun really starts when counting reaches the 70s!

VARIATION: Same game, played with a different buzz number.

Bizz-Buzz (STRAND: Number Sense- Multiplication):

This is played just like **Buzz** , with 7s and multiples of 7 requiring the player to say "Buzz!". The game is changed (and made much more challenging!) by adding 3 into the game. Instead of saying any number with a 3 (i.e. 3, 24, 63, etc.) or any multiple of 3 (i.e. 9, 21, 42, etc.), the player says "Bizz!". In addition, for any number with a both a 3 and a 7 (i.e. 37) or that is a multiple of 3 and 7 (i.e. 21), the player must say, "Bizz-Buzz!".

Cooperative Buzz (STRAND: Number Sense- Multiplication):

In this game, the whole class will either win or lose. Begin by asking all students to stand. The teacher chooses a number (i.e. 7) and explains that any number with a 7 in it or that is a factor of 7 is "taboo" and should not be spoken aloud. Instead, when presented with one of the taboo numbers, the student should sit down. The goal of the game is to get everyone in class to sit down (meaning no one has made a mistake). The teacher asks students to begin counting from the number one. Each individual student says a number. Rather than saying their "taboo" numbers, the students who "have" the number 7, 14, 17, 21, 28, etc. should sit down. If a student sits down on a wrong number, or if one fails to sit down when s/he should, then the game starts over with that student replacing the teacher in the front of the room. That student gets to pick the number that will be the "taboo" for the round. The teacher can offer an incentive for each time the class wins.

![Explorations in Math - Helping Elementary Students Succeed in Math]

Salute (STRAND: Number Sense-Addition/Multiplication):

The game can be played in groups of three or four. Again, it's going to involve addition or multiplication depending on your child's age abilities. This game doesn't work for division or subtraction. Each group will need a deck of cards with face cards removed (aces = 1). One player is the judge. Players can rotate after every turn or after a game. Let's say the game is addition. The judge gives each player a card, face down. When the judge says "Salute!" each player, _without looking at his/her card_, puts it up to their forehead so the judge and the other player can see it. The judge then announces the sum (using the proper word-sum) of the two numbers. The first player to correctly announce his/her own number wins the two cards. The other player must say their number also. The game winner is the one with the most cards. For example, if player A sees that Player B has a 7 and the judge announces the sum as 13, Player A knows that her card is a 6 and says so. Salute works the same way for multiplication. To make the addition game more challenging, play with four players. The judge announces the sum and each player has to look at two other numbers before deciding what his/hers is. Each player should be asked to state his/her number.

Math Facts Race (STRAND: Number Sense-Add/Mult):

Arrange the class into two or more teams and draw a grid on the board for each team. The grid need only be 4 x 4 or 5 x 5 and the teacher can write in the numbers that the class needs to work on. For example, across the top the numbers might be 4, 5, 7, and 9 and down the side 3, 6, 2, 8.

When the chart is set, say "Go!" One person on each team races to the board and fills in any square on the math facts grid. For example, if you are reinforcing addition facts, the student writes the number 6 in the square at which the 4 column and the 2 row meet (4 + 2 = 6).

Emphasize that it is important for all members of a team to watch what their teammates write. If any student on either team sees a mistake made by a teammate during the game, he or she can use his/her turn to correct that error.

If you make this a "quiet game," it will hold down the "ooooo's" that are sure to signal an error. It will also further emphasize the importance of team members paying close attention to one another.

The first team to fill in all the squares on their grid is the winning team _if_ all the answers on their chart are correct.

Twenty-five (STRAND: Number Sense-Add/Sub):

This is a game for two or more players. You'll need a deck of cards, with the face cards removed (ace = 1) for each group of players. Before playing the game, review the number pairs that add to 10. Then have the students look for ways to use this knowledge to help them add and subtract faster. Deal out all the cards, an equal number to each player. The cards are left face down in a pile in front of each player.

The first player turns over the top card and places it face up in the center of the play area announcing the number. The next player turns over a card, adds the number to the card already played, says the sum out loud, and places the card on top of the previously played card. The next player turns over a card and adds the number to the sum of the first two cards. Play continues in this way until someone has a card that, when added, will give a sum greater than 25. When that happens, the player must *subtract* rather than add. Play continues until someone gets a sum of exactly 25. The player, who gets a sum of exactly 25, wins that round and goes first in the next round.

Challenge the Calculator (STRAND: Number Sense-Computational Fluency):

Player #1 uses a calculator, player #2 uses brainpower. Two cards are shown. Player #2 tries to find the product of the two numbers (sum for primary) before Player #1 is able to do the same problem on the calculator. Note: Two polyhedral dice can be used instead of cards. 10 sided dice can be used for addition facts to 20 or for multiplication facts to 100).

Balloon Game (STRAND: Number Sense-Computational Fluency):

This is a cooperative game. Put students in groups of 4-5 (or a number of your own choosing). Give each group a balloon. The group has to keep the balloon in the air but when it touches a part of someone's body, they have to either count or keep a sum going. For example, the first student says '2', the next to touch the balloon might say '+ 3 = 5', followed by '+ 4 = 9' and so on. Students can mix addition and subtraction problems. For young children, simple counting or skip counting can be used.

What's My Rule? (STRAND: Mathematical/Logical Reasoning):

Draw a large circle on the board. All the numbers you write inside the circle follow a certain rule; none of the numbers outside the circle follow the rule. As you add numbers inside and out, students try to determine the rule. The easiest example is evens in the circle, odds outside the circle. Other possibilities include factors of 12; multiples of 4; divisible by 3 or 5 or . . . ; primes and composites; two-digits in the circle, one- and three-digits outside; numbers less than 20, numbers greater than 20; regular quadrilaterals in, irregular quadrilaterals out. Or try a trick question on the kids: only numbers written with straight lines (1, 4, 7) in the circle, only numbers with curved lines (0, 3, 6, 8) out; this means you can't use 2, 5 or 9 because they have both straight and curved lines. This game can also be easily adapted to other subject areas.

More possibilities:
- fractions (even vs. odd denominators; lowest terms vs. not in lowest terms
- numbers that end in ____
- starting with 1 (or even ½), numbers in the circle double
- numbers with ____ in the tens place
- numbers in the circle have a number in the tens place one more (or one less) than the number in the ones place (i.e.: 32, 98, 76, or 23, 45, 67; to make it more challenging, try 1098, 5432)
- numbers in the circle have digits that add to a certain total (57, 183, 48)
- numbers in the circle increase (or decrease) a set amount each time
- fractions (less than ½ outside the circle, greater than ½ inside the circle; ½ and fractions equivalent to ½ can't be placed in or out, a clue for students)
- large numbers with consecutive digits inside them in the circle (e.g.: 1034588 and 267814 inside)
 quadrilaterals inside the circle; all other polygons outside the circle
 polygons inside the circle; non-polygons outside the circle

Squeeze Play (STRAND: Number Sense-Computational Fluency)

You will need a set of cards, 0-9 (queens can be used for 0) for each player. Each player takes six cards and makes two three-digit numbers. The idea is to get as great a range between the two numbers as possible. After the players have made their numbers, three more cards are turned over. The first card is the hundreds' place. The second is the tens' place and the third is the ones' place. Players score a point if the final three-digit number falls between the first two numbers they made. More cards can be used to build larger numbers.

BUG (STRAND: Number Sense-Computational Fluency)

This game works for both primary (with addition) and intermediate (with multiplication). You can either make a simple game board to copy whenever you want to play the game or you can have the students draw a game board on a piece of paper. (See below.) To play: Students start by standing. The teacher rolls two dice, and tells the class the numbers. Students then add or multiply them and enter the answer in the "B" column. At this point, each student needs to decide whether to keep playing in round one or to sit down. If she chooses to sit, she keeps all her round 1 points but can't play again until round 2. If she chooses to stand, she keeps playing and adding to her total. However, if a 1 is rolled on either die; all students who are still standing lose all of their points for that round. Everyone records their points and the game moves to round 2, the "U" column. Game continues until the end of the third round, when students add all their points.

B	U	G

![Explorations in Math — Helping Elementary Students Succeed in Math]

INTERMEDIATE SKILL-BUILDING GAMES & ACTIVITIES

Twelve and You're Out! (STRAND: Logical Reasoning)

This is a great game where you really have to think. It sounds simple, but . . .

1. Put everyone in groups of between 2 to 4 players.
2. The first player says either "1", "1, 2" or "1, 2, 3"
3. The next player continues on and can say an additional one, two or three numbers. (e.g., if the first person says "1, 2", the second person can say either "3" or "3, 4" or "3, 4, 5"
4. Continue around the group until one person is forced to say "12". They are now out.
5. Start again from step 2.

VARIATION: Make the number something other than 12.

EXTENSION ACTIVITY: Ask students to discover the optimal strategy for winning a two-player game. (Answer: first player counts 1-2-3, then, no matter what the second player does, first player can stop counting on 7. After that, victory is assured!)

Twinks (STRAND: Number Sense-Computational Fluency)):

This game requires a deck of cards with all face cards removed (aces = 1). Two to six people may play but this works best with four players. Player #1 lays out four cards face up. The first player to find a combination equaling 12 (using 2, 3, or all 4 cards) calls "Twinks" and takes all the cards in the combination plus any cards in the underneath piles. If no combinations are found, the subsequent player lays out four more cards on top of the already established piles. Anytime a combination is found, additional cards are laid out in all four piles. All four number operations may be used. If someone calls "Twinks" incorrectly and is challenged, that player forfeits all cards to the challenger.

EXAMPLE: Player one turns over an 8 a 4, a 2 and a 5. Player three calls "Twinks" and says eight multiplied by two minus four equals twelve and collects all three cards (plus any cards that may be under those piles). The player with the most cards at the end of the game is the winner.

Digit Place Game (STRAND: Mathematical Reasoning):

The goal of this game is for students to use logical reasoning to deduce a secret three-digit (or, more difficult, a four-digit) number. The teacher (or leader) writes down a three-digit number but doesn't disclose it. Students take turns guessing the number. With each guess, the teacher gives one of the following clues:

- place – correct digit and in the correct place
- digit – correct digit but in the wrong place
- nothing – no digits are correct (but ask students what valuable information this provides)

As students get more information about the number, they start making educated, rather than random, guesses.

Color Square Game: (STRAND: Logical Reasoning)

Introduce this game with a 3x3 grid using three colors and three of each color. (Subsequent games can use grids of a larger size. A 4x4 grid uses four each of four colors and so on.) Ahead of time, prepare a "key" grid with each of the nine squares colored (or use letters to represent colors). All the squares of one color are linked together along one full edge (i.e.: they can't be separated nor can they be linked only diagonally). Label the rows/columns 1-2-3. A student asks for information for any row or column. For example, a student asks for row one.

1	G	G	B
2	G	R	B
3	R	R	B

1 blue, 2 green

The teacher then writes the number of times each color appears in row one (see above). Students continue to ask for information and deduce the color of each square. Challenge your students with a 4x4 (4 colors, 4 of each), 5x5, even a 6x6 grid.

MULTIPLICATION   BINGO

Choose 25 of the following products. Write one in each of the 25 boxes above.
Choose from these products: 0,1,2,3,4,5,6,7,8,9,10,12,14,15,16,18,
20,21,24,25,27,28,30,32,35,36,40,42,45,48,49,54,56,63,64,72,81
Use a standard deck of cards with the face cards removed. (aces = 1; queens = 0).
Draw two cards from the deck to create a multiplication problem. Call out the
problem. Continue drawing cards and calling out the problems one at a time until
someone has a Bingo.

VARIATION: Use some of the other Bingo possibilities: 4 corners, letter T, frame,
letter X, etc.

High/Low Fractions (STRAND: Number Sense-Fractions):

Use a standard deck of cards with tens and face cards removed (aces = 1). Divide the deck equally between the two players. Players place their decks face down. Each player flips over the top two cards, placing the lower number over the higher number to create a fraction. The greater fraction takes all four cards. In case of a tie, the procedure is repeated and the winner takes all eight cards. When one or both players run out of cards, they will both shuffle in the cards they won and continue playing. Play continues until one player has all the cards.

VARIATION: Players can create improper fractions by placing the higher number on top.

Number Tic-Tac-Toe (STRAND: Number Sense/Math. Reasoning):

Students play in pairs. Each pair makes a standard tic-tac-toe grid. Instead of using Xs and Os, however, students use the numbers 0 through 9 (or 0 through 12 for a greater challenge). Each number can be used only once during a game. The object of the game is to complete any row, column or diagonal so that two of the three numbers add up to the third. (The order of the numbers does not matter; for example 9 – 12 – 3 where 9+3=12.) The first move may NOT be in the center. (The first player will always win if allowed to place their number in the center.) Second and subsequent moves, however, can be anywhere on the grid.

Finding A Set (STRAND: Number Sense):

Groups of 2, 3, or 4 can play this game. You will need a set of numbered cards (1-100) for each group. One student places 12 cards face up (3x4 grid). The first student to play looks for three cards that form a match. If the remaining players agree that the cards are a match, three new cards are dealt face up and the next player looks for a match of three cards. If no match can be found, place three more cards face up, for a total of 15. If a match is found, do not replace those cards – try to keep the total to 12 cards. A match could be: 3 prime numbers; 3 multiples of a number; 3 factors of a number; three powers of a number (e.g.: 2, 4, 8 or 9, 27, 81) or triplets of a number. For younger children, use matches of 2.

![Explorations in Math — Helping Elementary Students Succeed in Math]

Triplets (STRAND: Logical Reasoning):

Played just like tic-tac-toe except both players use Xs (or Os). Use the regular tic-tac-toe grid (9 squares) to start with, moving to larger grids (4x4, 5x5) as kids get better at the game. (NOTE: In the 9 square games, the first move may not be in the center square; the first player will always win if allowed to place their symbol in the center, the same as Number Tic-Tac-Toe, above.)

EXTENSION: There are a different _maximum_ number of moves for each level of the game (4x4, 5x5, 6x6 grids, etc.). 1) Ask students to find that number for each level. 2) Ask them to show numerically (i.e., with a number sentence) the rule for each level. Here are some examples:

size of grid	number sentence	max # of moves
3 x 3	(3 x 3) – 4 =	5
4 x 4	(4 x 4) – 6 =	10
5 x 5	(5 x 5) – 8 =	17

Aim For Zero (STRAND: Number Sense):

This is a subtraction game for two or more players. Each player writes the number 150 (or whatever they decide) at the top of a piece of paper. The first player can subtract any number from 1 - 10 from 150 and write the difference. The second player then does the same, choosing any number between 1 and _up to 10 more than the number the first player selected_ and subtracting that number from the new difference. For example, the first player subtracts 8 from 150, leaving 142. The second player can subtract any number from 1 to 18 from 142. Play continues with each player subtracting any number from 1 up to 10 more than the number subtracted by the other player. The winner is the first to reach zero.

EXAMPLE:

Turn 1: Draw 4 and 5	Subtract 45 or 54	250 – 45 = 205
Turn 2: Draw 0 and 6	Subtract 6 or 60	205 – 60 = 145

And so on.

EXPLORATIONS in Math
Helping Elementary Students Succeed in Math

Dados (Spanish for "dice") (STRAND: Probability):

This is a game for two players. Two dice are needed. Players decide who will be Player A and who will be Player B. Player A rolls the two dice. If the sum rolled is 2, 3, 4, 10, 11, or 12, Player A gets one point, Player B gets zero points. If the two dice total 5, 6, 7, 8, or 9, Player B gets one point, Player A gets zero points. The first player to 10 points wins. Ask students to predict who is most likely to win (see if they notice that one player has six numbers, the other only five).

After students have played, ask them the following:

1) How many players with 5, 6, 7, 8, and 9 won? (Should be a majority.)

2) Is the game fair? Why, or why not? (No. 5, 6, 7, 8, and 9 have 24 ways to score a point; the other sums have only 12 ways.)

3) Do the results (who won/who lost) support the answer to question 2? (Should be yes.)

4) Ask students how they might change the game to make it fair. (Suggestions could include alternating who is A and who is B; players take turns picking the numbers that will give them points; one player takes odds, the other, evens.)

Subtraction Pole Vault (STRAND: Number Sense):

This game can be played solo or with two or more players. You'll need a calculator (to verify answers), paper and a deck of cards with 10s, Jacks, Kings removed. (aces = 1, Queens = 0). The object is to get as close to 0 as possible (without going below 0), after five subtractions from a target number.

Shuffle the cards, place the deck face down. The target number is 250 (or whatever the teacher or players decide on). Players take turns doing the following:

• Player 1 turns over the top two cards and makes a two-digit number. Subtract this number from 250 on scratch paper. Check the answer on the calculator. Player 2 then does the same on their turn.

• Play continues with each player turning over the next two cards to make a two-digit number. They then subtract the number from their result in step one.

•Do this three more times.

• Whoever is closest to 0 (without going below) after five rounds, wins.

Fast Facts (STRAND: Number Sense):

This game is for 2-4 players. They will need a deck of cards 0 - 9 (ace = 1, queen = 0).The dealer places five cards face up on the table. One more card, the target number, is turned face up. Each player then tries to use addition, subtraction, multiplication and/or division to combine all five cards to equal the target number. Each card must be used and may be used only once. The target number is not used in the calculations. The first player with a correct solution takes all six cards and six more cards are laid out. (This game is similar to the commercially produced Krypto©.)

VARIATIONS:
• Younger students can use fewer than all five cards to make the target number.
• Turn up two target cards to make a two-digit number.