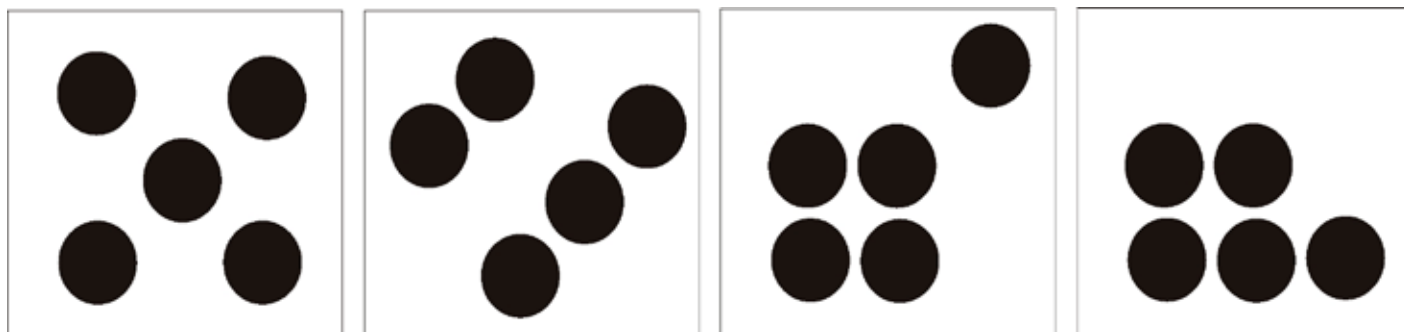


Strengthening Number Sense

For the visual & tactile learner, use dot cards to practice learning how many each number is. For instance, if you steer a child away from counting up to add, she will begin to rely on her strong visual sense to understand the “how many” of each number as well as to learn the combinations of numbers that equal each target number. These dot cards show various ways to arrange five dots so that not only will a child have practice just glancing and guessing “how many,” but also a strongly visual learner will begin to absorb that 5 can be made of different combinations of numbers. If you encourage your child to rely on her visual strengths, she will be much farther ahead than if you sit her down to do math the old way, which is to count up, count on her fingers, or just write the answers to problems written on paper. SO BO-ring! I call the practice of learning via images, Visual Imprinting.



Visual Imprinting Sets the Background for Success in Math

Our goal in visual imprinting activities is to connect abstract concepts to a visual image that is meaningful to your child. Visual imprinting just happens; it is a subconscious form of learning. You could call it “learning through the back door.” Visual imprinting occurs any time we see a complete picture or a specific part of a picture in our minds. Even though the idea of visual imprinting is elusive and hard to describe, we can deliberately take advantage of it in our teaching. If we can embed concepts we want a child to learn within a visual or a pattern, learning will happen unconsciously.

There are many methods out there for bringing kids up to speed in computation, but the most fun and the most effortless involve visual games. Let’s make some dot cards, making that process into a craft, and then play games with the cards. If your child is having fun, he will not even know he’s learning!

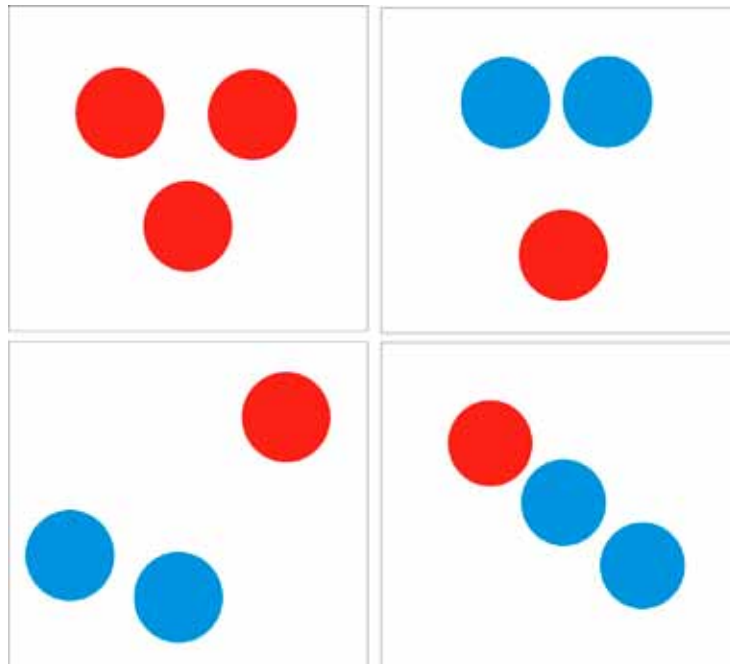
Making Math [dot cards] – A Multisensory Activity

What you need:

- A small stack of sturdy, square blank cards. Ideally they would be between 3½ and 4 inches on a side. Make them bigger if you’d like to.
- Tempera paint in bright colors
- Wet sponge on a plate
- Paper towels
- Old newspapers
- A place to let the cards dry

Making the Dot Cards

1. Start with one number first – say the number 3.
2. Make several dot cards using a variety of arrangements and color combinations.
3. The child will dip her fingertip into the paint and then press her fingertip carefully onto the card, making sure to only make the number of dots you planned to make.
4. First card can have dots of the same color.
5. Second card could have one dot the same as the first card, but then the remaining two dots in a new color.
6. Name your cards according to what the pattern reminds you of. See examples below.



The first card just has three red dots. The second card has one red and two blue. It reminds me of a bear face. The bear has a red nose and blue eyes! In the third card, the bear is looking over his shoulder to see who is behind him. The third card can be a slide or stepping stones in the garden, or whatever else you fancy. Even if you do not stress that 3 red dots and zero other dots makes three, or that two blue dots plus one red dot make three, the child is storing up the visuals in his mind to serve as a reference point later. In addition to the visual, the child is feeling the squishy paint, smelling the tart aroma, and is seeing the color on his fingertips. It would be a powerful multisensory experience if you had your child dip three fingertips at one time in the paint because he would feel the three, see the three fingertips coated in paint, and then he'd feel and see himself transferring the color from his fingertips to the card stock.

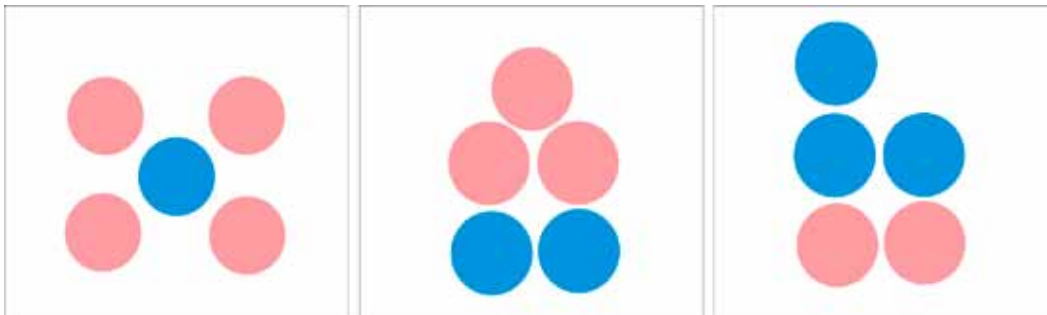
Making More Patterns



When you make dot cards for fours, play with the arrangement of dots. The first card reminds me of a child sitting down reading a blue book. The third card looks so much like a footprint to me. The middle card could be anything. To me, it looks like sets of twins walking, as viewed by a bird flying over their heads.

Note that I have shown $3+1$, $2+2$, and $1+3$. Use the first and last dot cards to explore the fact that no matter how you arrange the dots, 3 dots and 1 dot will always equal four.

One more set



Fives are fun. Card one is a box with a blue belly button. Card two can either be a house, or a sitting bear with blue shoes. Card three could be a baby chair with pink feet. Note that in my cards, I've covered both combinations of numbers that equal five. Once again, two cards show the same combination of numbers ($3+2$ and $2+3$), both equaling 5.

When you have made your dot cards through the number 10, lay them out in a safe place to dry.

Games Using Math Dot Cards

Let's play some games using the dot cards that are now beautifully dry and ready to use.

Introducing the Games

My own preference when using math cards with beginners (four and five year olds) was to choose dot cards that only went up to 3. The instructions were that I would toss a card on the table and the children were to quickly say how many dots. The one rule was that they were not to count the dots, but just look and guess how many. If you have more than one child playing with you, let the kids take turns answering. Go through your stack a couple of times.

The next time you meet, add cards for number 4. Talk briefly about four and the dot arrangements on the four cards, and then shuffle the cards into the stack. Play the toss game again. Add another number each day until you have all the numbers to 10 in your stack. The following games should be modeled for the children first, and then they can play independently. If you are playing with one child, no problem!

Dot Card Flash

Pair up with your child or divide your group into pairs. One child will display a card and the partner will call out how many dots he sees. Remember, no counting allowed!

War

Again, this game is played in twos. Each player has a stack of dot cards held face-down. At the signal, "1-2-3-WAR!" players lay a card down, face up, saying the number of dots on their cards. The player who played the higher number gets both cards. The object of the game is to win all the cards.

War Variation

Before players lay down their cards, each says a number aloud. When cards are played, if that number shows up in the cards played, the person who chose that number takes the cards. If neither number shows up, cards go to the center pile. The next person to correctly call a number that is played gets all the cards in the center stack. For example, player 1 calls out "7" and player 2 says "5." Both players lay down a dot card. The cards played are 3 and 4. Because the played cards do not match the numbers called, both cards go into the center pile and new numbers are called. The next time, player 1 calls out "8" and player 2 calls out "5," and then both players lay down a card. Cards played are 5 and 7. Player 2 gets both cards. If by chance both players call numbers that match the played cards, each player gets the card she called.

Go Fish

You will need two sets of dot cards for this game. Shuffle the stacks and deal five cards to each player. The player who goes first will look at the dot cards in his hand and will ask the second player for a card to match one he is holding. For instance, if player 1 is to go first and she has dot cards 3, 7, 1, and 9, she will ask player 2 for one of those cards. If player 2 has one, he must surrender that card to player 1 who will place the matching cards face down beside her. Player 2 then asks for a card. If the requested card is not in his partner's hand, she will say, "go fish" and the requesting player will draw a new card from the center stack. The game ends when the one player is out of cards. The player holding the highest number of pairs wins the game.

Follow Up

After your child has become very familiar with the dot patterns on the cards and has mastered the ability to name the numbers without counting the dots, it will be time to utilize her visual number sense in computation.

Visual Imprinting for Computation

The goal of these activities is for children to develop such a rich visual background for computation that they will "see" the answers in their heads in the form of visuals when confronted with abstract problems on a page. When playing the games, however, the process of laying a visual background is passive. The focus will be on the game, and during the game, visual images will be building in the child's memory.

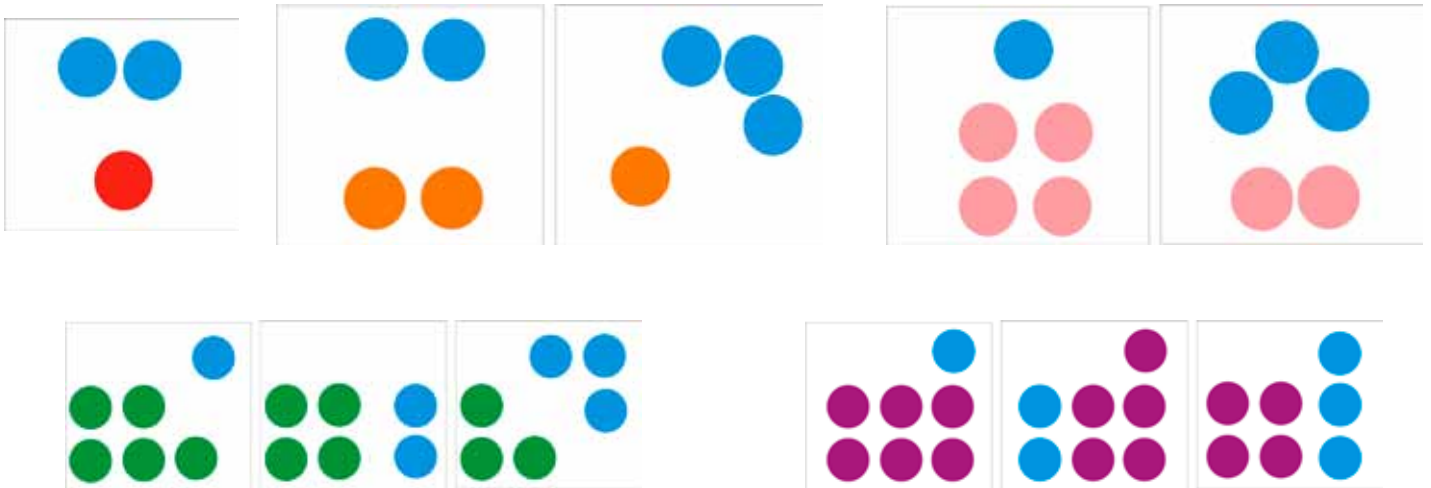
Introductory Game

Give the children blank squares of paper and a crayon or marker. Tell them you are going to play a different sort of memory game. You will show them a dot card, they will give it a good look, then you will hide the card and they will draw on a blank card what they remember seeing on your dot card.

Procedure

- Show the children a card.
- Let them take a good look at it, then put the card back into your stack.
- Ask the children to shut their eyes and “see” the card in their imagination. Can they see the pattern of dots? Great!
- Now ask them to open their eyes and draw the same pattern on a blank card.
- When they have completed this task, show them your card and compare yours to theirs.

Computation Imprinting



For these games it will be best to have two identical sets of cards – two copies of each dot pattern.

Explore the dot patterns before you begin. Pay particular attention to how many different combinations of numbers that each number has. You can only make a three from $2+1$. (We are ignoring $0 +$ the number for now). Four is made of two combinations of numbers, as is five. Six and seven have three possible number combinations, while 8 and 9 have four. Over time, the children will learn that if you divide a number in half, it will have that same number of possible combinations. Odd numbers can be divided in half but will always have one extra “odd” number that cannot be paired up. I think there is value in creating dot cards that have two colors like the ones in the illustrations. The color will help the children as they form visual memories. It is likely the children will forever more associate pink and blue with five, and orange and blue with four, however!

Go Fish

The first several times you play Go Fish, play it like you did before, using the total number of dots on the card when asking for a card. When the child has played this way a few times, switch. This time when you play Go Fish, instead of saying “Do you have a 5?” you will say, “Do you have a $1+4=5$?” or “Do you have a $5+1=6$.”

Memory

Similarly, when playing Memory, at first when you make pairs, say the total number of dots on the cards. After a few times playing that way, switch. Rather than calling out the total number, you will say, “ $6+1=7$,” or “ $2+3=5$.”

More Resources:

Addition & Subtraction

http://www.child-1st.com/miva/merchant.mvc?Screen=PROD&Store_Code=CPL&Product_Code=KF01&Category_Code=M

Building Visual Memory for Number Relationships

http://child-1st.typepad.com/my_weblog/2009/11/building-visual-memory-for-number-relationships.html