

Number Sense Activities

Note: when using actual playing cards for activities it is often helpful to white-out the two extra symbols that are in the corners of the cards near the numeral. For students who are still counting each object on the card instead of looking at the numeral they will count all the hearts, spades, etc. that are on the card, not knowing that the ones next to the numeral aren't part of the set.

*Activities we did in MTI class.

***In the Cup** – cards with the numbers 1 to 7, a die, a paper cup, and some counters. First player turns over the top number card and places the indicated number of counters in the cup. The card is placed next to the cup as a reminder of how many are there. The second child rolls the die and places that many counters next to the cup. Together they decide how many counters in all. A record sheet with columns for “In the Cup,” “On the Side,” and “In All” is an option. The largest number in the card deck can be adjusted if needed. *Encourages students to count on by not recounting the amount in the cup, however some student may still need to dump out the counters in the cup and combine them with the ones on the side. This strategy should be permitted and as children continue to play they will eventually count on as that strategy becomes meaningful to them.* (Van de Walle)

Dot Pattern Activities – use the templates (or build the templates on paper plates using peel-off dots) for these activities:

Make the Pattern: provide each student with about ten counters and a piece of construction paper as a mat. Hold up a dot pattern for about 3 seconds and have the children make the pattern they saw using the counters on the mat. “How many dots did you see? How did you see them?” Spend time discussing the configuration of the pattern and how children saw how many dots there were.

Overhead Pattern: print the templates on overhead transparency flash one pattern for about 3 seconds. Have a blank transparency over the dot pattern and ask students to come up and show how they figured out the number of dots. Encourage them to circle the groupings they saw in the pattern.

Dot Pattern Dominoes: rearrange the templates to build dot-pattern dominoes that have a different number of dots on each end. Play dominoes in the usual way, matching the end but the pattern doesn't have to match it just needs to be the same number of dots.

Variation: instead of matching ends, a new domino can be added if it has an end that is one less than the end on the board (or two less, one more, two more).

***Which of these is not like the other?** show several pattern cards, all but one of which have the same number. Children have to find the one card that does not belong.

Pattern Flashcards: hold up a dot pattern for 1-3 seconds. "How many? How did you see it?" Include lots of easy patterns to build up their confidence. This can also be done with partners as a workstation activity.

Quick Images: have two students stand on opposite sides of an overhead projector. One student holds a pack of pattern cards printed on transparency paper. The student places one of the cards on the projector and the other student takes it off as fast as she or he can. Then the members of the class, along with the teacher, race to announce the number of dots.

These activities encourage children to see the pattern and recognize how many without having to count each dot separately. When first doing these activities many children may still count each individual dot, but more exposure and other children sharing how they saw groups will help students move away from counting. (Van de Walle, Fosnot & Dolk, and Clements)

Fill the Chutes - create a simple game board with four "chutes." Each consists of a column of about twelve 1-inch squares with a star at the top. Children take turns rolling a die and collecting the indicated number of counters. They then place these counters in one of the chutes. The object is to fill all of the chutes with counters. As an option, require that the chutes be filled exactly. For example, a roll of 5 cannot be used to fill a chute with four spaces. (Van deWalle) *This activity is another way to practice subitizing with the numbers on the die and with recognizing how many more spaces they need to fill in a chute.*

Counting on with counters – give each child 10-12 small counters that the children line up left to right on their desks. Tell them to count four counters and push them under their left hands. Then say, "Point to your hand. How many are there?" (Four.) "So let's count like this: Four (pointing to their hand), five, six...." Repeat with other numbers in their hand. *Encourages student to "hold" a number. This activity helps students who are still direct modeling by showing them that once you count that first set you can hold it in your brain and count on from there.* (Van de Walle)

Piggy Bank – Forty cards, ten of each card type: one, two, three, and four dots. The object is to find two cards that equal five when their numbers of dots are added together. The cards are dealt to two players, who keep their respective stacks facedown. The players take turns turning over the top card on their stacks. If the student cannot make a sum of five with the card she has just turned over and one in the discard pile, the card that has just been turned over must also be discarded, faceup, in the middle of the table. When a player is able to make a sum of five with a pair of cards, the player can keep the cards in her “piggy bank.” Game ends when all pairs of five have been found. *Helps children see the relationship of numbers to five and to start to see part-part-whole relationships.* (Kamii 2008) Alternate version is to use the same deck of cards but play it as a Memory game. Lay all the cards out face down and play just like Memory but instead of finding cards that match, the goal is to find cards that add up to five.

***Make Ten Go Fish** – This game is played just like Go Fish but instead of matching cards, you want to make pairs that add up to ten. Out of a deck of cards, use only Ace through Nine and deal out five to each player. On each player’s turn they can lay down any Ten Pairs they have in their hand, then they ask any player for a number they need (example: I have an Ace so I ask another player if they have a nine). If that player has the nine they give it to the player who asked, if not they say “Go Fish” and the other player draws from the leftover deck of cards. Play ends when one player has gotten rid of all the cards in their hand. *This game develops the relationships of numbers to the number ten. If one player asks the others for an eight, the other players will know what card that player has if they know the relationship of eight to ten.* (Fosnot & Dolk)

***Five-Frame Tell-About** – Explain that only one counter is permitted in each section of the five-frame. No other counters are allowed on the five-frame mat. Have the children show 3 on their five-frame. “What can you tell us about 3 from looking at your mat?” After hearing from several children, try other numbers from 0 to 5. Children may place their counters on the five-frame in any manner. What they observe will differ a great deal from child to child. For example, with four counters, a child with two on each end may say, “It has a space in the middle” or “It’s two and two.” There are no wrong answers. Focus attention on how many more counters are needed to make 5 or how far away from 5 a number is. Then try numbers between 5 and 10. The rule of one counter per section still holds. Numbers greater than 5 are shown with a full five-frame and additional counters on the mat but not in the frame. In discussion, focus attention on these larger numbers as 5 and some more: “Eight is five and three more.” *This activity helps prepare children for using the ten-frame, but also helps build the relationships of numbers to the number five.* (Van de Walle)

Ten-Frame Activities – use the ten frame template for these activities:

***Ten-Frame Tell About:** play the same as five frame version to begin with but soon introduce the rule for showing the numbers: *Always fill the top row first, starting on the left, the same way you read. When the top row is full, counters can be placed in the bottom row, also from the left.* This produces the standard way to show numbers in the ten-frame.

Crazy Mixed-Up Numbers: all children make their ten-frame show the same number. The teacher then calls out random numbers between 0 and 10. Children have to change their ten frame to reflect the new number. “How did you decide how to change your ten-frame?” Some children will wipe off the entire frame and start over with each new number. Variation: have the children tell before changing their ten-frames how many more counters need to be added or removed. For example, the frame shows 6 and the teacher calls out 4, the children would respond, “Minus two” and then change their ten-frame accordingly.

Ten-Frame Flash: show the ten-frame for 1-3 seconds and have the students tell what the number is. After doing the foundation work with ten-frames, speed is an important part as it encourages children to look for the groups and relationships instead of relying on counting. Variations: say the number of empty spaces on the card instead of the number of dots, saying one more than the number of dots (or two more, and also less than), saying the “ten fact” (six and four make ten.”

Working with the ten-frames helps students see the relationships to the benchmark number ten. Understanding this relationship is essential to helping students get to the derived fact stage. (Van de Walle)

Part-Part-Whole Activities - basic idea of part-part-whole activities is to focus on a single number for the entire activity, but investigating all the ways you can partition it. Either children build the designated quantity in two or more parts, using a wide variety of materials and formats, or else they start with the full amount and separate it into two or more parts. When children do these activities, have them say or read the parts aloud or write them down on paper. Writing can be in the form of drawings, numbers written in blanks (____ and ____), or addition equations if these have been introduced ($3 + 5 = 8$):

Build it in parts: provide children with one type of material, such as connecting cubes(make sure to have children connect the cubes so they can see the two parts along with the whole). The task is to see how many different combinations for a particular number they can make using two parts (you can allow for more than two parts if you wish). Each different combination can be displayed on a small mat.

Other materials you can use – two-color counters such as lima beans spray painted on one side, squares of colored paper, color in rows of squares on grid paper, etc. Remember to always have them read or write the number sentence that is created.

***Two out of Three:** Make lists of three numbers, two of which total the whole that children are focusing on. Children select the two numbers that make the whole, have them explain how they know which two make the whole. Example list for the number 6:

2---3---4

5---0---1

3---3---4

4---2---1

2---5---1

Part-Part-Whole activities encourage children to see numbers as the sum of their parts, not as discrete objects. Six isn't just six items, it is 4 and 2, 5 and 1, etc. (Van de Walle)

Missing Part Activities - missing part activities require some way for a part to be hidden or unknown.

Covered Parts: working with a target number, place that many counters out for all the children to see. Place all of them under a cup and then pull some out into view. (This amount could be none, all, or any amount in between.) Then ask the class how many are hidden. For example if the target number for the day is 6 and 4 are showing, the class should say "2" or the number sentence "Four and two make six." Using the same number of counters pull out different amounts into view each time.

I Wish I Had: hold out a bar of cubes or a dot pattern showing less than the target number for the day. If the target number is 8, say "I wish I had 8." The children respond with the part that is needed to make 8.

***Missing-Part Cards:** for each number 4 to 10 (or higher if you want), make missing-part cards on strips of 3x9 tagboard. Each card has a numeral for the whole and two dot sets with one set covered by a flap. For the number 8, you need nine cards with the visible part ranging from 0 to 8 dots. Students say the missing part or the number sentence, i.e. "Five and three is eight" for a card showing five dots and hiding three.

Missing-Part activities are an important variation of the Part-Part-Whole activities as it has children reflect on the combinations for a number. It is also a big stepping stone for subtraction concepts. With a whole of 7 but with only 4 showing, the child can later learn to write "7-4=3." (Van de Walle)

Shake Those Beans – this is a part-part-whole activity using lima beans that are two colored. These are the directions for combinations of five, but can be adapted for other numbers. Do this first with the whole class. Student shakes 5 lima beans and "rolls" them onto the table. A combination of blue and white will be seen. Decide which combination applies and write it above the one listed in the last row. Note the commutative property can be applied with the 2 colors (4 blue and 1 white or 1 blue and 4 white). Continue to shake, roll, and record until one column is filled to the top. Occasionally students may want to play "blackout." (sample record sheet provided below)

***Roll & Record** – you will need two dot cubes and a record sheet (sample below). Students roll the two cubes and add the numbers. On the recording sheet, write the number sentence for each roll in the box above the sum for that roll. The game is over when one column is full. Variations: play with one dot cube and one number cube or play with two number cubes. *For younger students you can have them color in the square above the sum instead of writing the number sentence, but it is an important part of the activity and I would introduce that part of the activity as soon as students are ready.*

References

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Fosnot, C. T. & Dolk, M. (2002). *Young mathematicians at work: Constructing number sense, addition and subtraction*. Portsmouth, NH: Heinemann

Kamii, C. & Rummelsburg, J. "Arithmetic for First Graders Lacking Number Concepts." *Teaching Children Mathematics* (March 2008): 389-394.

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Shake Those Beans 5

0 + 5	1 + 4	2 + 3	3 + 2	4 + 1	5 + 0

Roll and Record

2	3	4	5	6	7	8	9	10	11	12