**Perceptual Subitizing**

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| In this lesson**,** students will identify how many manipulatives are in a given arrangement without counting each individual object (focus on 1-5). Students will understand the relationship between numbers and quantities, and will explain this relationship as they determine “how many” are in a set. *Perceptual subitizing: instantly recognizing “how many” in a set* |

**NC Mathematics Standard(s):**

**Count to tell the number of objects.**

* 1. **C.4** Understand the relationship between numbers and quantities.
		+ When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object (one-to-one correspondence).
		+ Recognize that the last number name tells the number of objects counted regardless of their arrangement (cardinality).
		+ State the number of objects in a group, of up to 5 objects, without counting the objects (perceptual subitizing).

**Additional/Supporting Standards:**

 **K.CC.5** Count to answer “How many?” in the following situations:

* Given a number from 1–20, count out that many objects.
* Given up to 20 objects, name the next successive number when an object is added, recognizing the quantity is one more/greater.
* Given 20 objects arranged in a line, a rectangular array, and a circle, identify how many.
* Given 10 objects in a scattered arrangement, identify how many.

**Standards for Mathematical Practice:**

1. Make sense of problems and persevere in solving them.

3. Construct viable arguments and critique the reasoning of others.

1. Attend to precision.
2. Look for and make use of structure.
3. Look for and express regularity in repeated reasoning.

**Student Outcomes:**

* I can understand the relationship between number and quantities.
* I can explain relationships between numbers and sets of objects.
* I can identify how many manipulatives are in a given arrangement (without using one-to- one; with a focus on 1-5).

**Materials:**

* Blackline master subitizing cards (1 set for teacher and 1 set per pair)
* Set of 5 counters per pair
* 1 paper plate per pair

**Advance Preparation**:

Materials Preparation:

* Pre-copy and pre-cut subitizing cards for each pair/teacher
* Gather and bag sets of 5 counters per pair
* Gather 1 plate per pair

Thinking Preparation:

* Students will need to have had prior experiences with K.CC.5 in order to answer how many.
* Review standards for mathematical practice and select those that you will focus on during this lesson.
* Teachers should keep in mind subitizing cards should initially be introduced starting at the lowest number and moving up.
* Anticipate misconceptions as listed below.

**Directions:**

1. Gather students on the carpet.
2. Teacher will begin by displaying one subitizing card on the board, SMART board or by holding up the card.
3. Leave the card on the board and encourage students to share how they know how many are there (I counted by ones, etc.).
4. Introduce student to the idea that they are going to try to remember/create a mental image of the dots on the card to determine the quantity.
5. Begin by flashing students with the “one card” for 5 seconds. Tell students that when they have an answer they should hold up a quiet thumb (or other quiet signal) to indicate that they are ready to share. Teacher will call on 3 to 4 students to share their thinking and any strategies that they used (I counted by ones, I have seen it on a dice, I saw 2 and 1 more and I know that that is 3).
6. Repeat process for subitizing cards 2-5, staying in numerical order. Repeat process using cards 1-5 to increase fluency.
7. Pair students and give each pair a set of subitizing cards.
	* Designate a partner 1 and a partner 2.
	* Have partner 1 “5-second flash” the subitizing cards to partner 2.
	* Partner 2 then identifies the quantity.
	* Partner 1 and Partner 2 then count to confirm how many were on the card.
	* Continue with all the cards.

Partners switch roles and continue.

1. After 3 to 5 minutes have students clean up and return to the carpet.
2. Tell students that they are going to practice building the subitizing cards. Give each pair the bagged counters, paper plates, and subitizing cards.

\* Teacher note: model if needed, however students can also use this time to develop their own internalizations of how to build the number).

1. Students return to their work spaces. Place materials on the table and turn the subitizing cards face down.
	* Partner 2 closes their eyes while Partner 1 selects a subitizing card, and builds the same arrangement using the counters.
	* Partner 1 then covers the arrangement with the plate and tells Partner 2 they are ready.
	* Partner 1 removes the plate; gives Partner 2 “5 seconds” to determine the quantity; and then Partner 1 recovers the set.
	* Partner 2 shares their thinking and both Partner 1 and Partner 2 recount to confirm their thinking.
	* Repeat for all numbers and then partners switch roles.
* Teacher note: while students are identifying subitizing cards, the teacher is monitoring and making notes of students’ abilities and strategies.
	+ Is the student able to identify the card before double checking with one to one?
	+ Does the student need use one to one correspondence in order to correctly identify the quantity on the card?

While observing identify students who can share when the class is brought back together. Decide on order for students to share based on strategies that were used by the student.

1. Students clean up and return to the carpet. Preselected students can share how they built the quantity represented on the subitizing card. Teacher will use questions below to facilitate as students discuss their representations.

**Questions to Pose:**

Before:

* How many do you see? How do you know?
* What can you do to figure out how many there are?

During:

* What can you tell me about the card?
* When you look at this card, what do you see? How do you see the number? (ex: 5 is 4 dots and 1 more, etc.)

After:

* What did you notice about the cards?
* Which cards could you identify more quickly?
* How did you know how many were on the card?

**Possible Misconceptions/Suggestions:**

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| **Misconceptions** | **Suggestions** |
| Students are unable to identify the amount of dots on the card. | Encourage students to count using one to one correspondence until they are more fluent. |

**Special Notes:**

* Students will need multiple opportunities to practice using subitizing cards to increase their fluency.
* This lesson can be repeated with different arrangements of the original subitizing cards. However amounts should not exceed 5.
* Students should not use different arrangements until they have are fluent with the original structure.

**Solutions:** All answers should be 5 or less.