

Number Designs – Counting Centers

Strand: Number and Number Sense

Topic: Construct sets to represent a given number

Primary SOL: K.1 The student will:
a) tell how many are in a given set of 20 or fewer objects by counting orally; and
b) read, write, and represent numbers from 0 through 20.

Related SOL: K.3a, K.4a, K.4b

Materials

- Toothpicks
- Glue
- Connecting cubes
- Tiles
- Paper squares that match the tiles
- Pattern blocks
- Paper copies of pattern blocks
- Geoboards
- Bingo markers or dot stickers
- Squares of paper that will fit between the nails on the geoboards
- 6" x 9" pieces of construction paper to place at each center
- Numeral Cards 0–20 (attached)
- Examples of number designs for each center (attached)

Vocabulary

number, numeral, set, zero (0), one (1), two (2), three (3), four (4), five (5), six (6), seven (7), eight (8), nine (9), ten (10), eleven (11), twelve (12), thirteen (13), fourteen (14), fifteen (15), sixteen (16), seventeen (17), eighteen (18), nineteen (19), twenty (20)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

Note: The size of the numbers that students work with will increase throughout the year until students can confidently and accurately count 20 (or more) objects. Students should not be expected to count objects greater than the highest number that they can correctly produce in the rote counting sequence. Because student readiness levels are different, students may be working on counting experiences with differing ranges of numbers.

Note: Students will explore one number for one or more days. When they have had sufficient practice with that number, they will explore the next number, using the same learning centers. Although everyone will begin using the same number when the centers are first introduced, some students may be ready to move to the next number sooner than others.

1. Set up the five learning centers described in steps 2–3 around the classroom to provide varied opportunities for counting out a specified number of objects (e.g., toothpicks, tiles, pattern blocks, bingo markers, and Geoboards). Be sure that you have a way to

communicate to students what number they will be working on based on student readiness levels. You may keep a chart posted in the classroom of what numbers students are working on or provide index cards for each student with their working number written on the index card.

2. Demonstrate creating number designs using one of the materials, such as the toothpicks, as follows.
3. For the number 4, arrange four toothpicks in a design and show it to the students. Distribute four toothpicks and a sheet of 6" x 9" dark construction paper to each student. Have each student make a design with four toothpicks. Talk about the different designs, pointing out all of the different designs the students made. Invite children to describe their designs: *Tell me about your design. How do you know you have four toothpicks?* Make note of students who are already beginning to describe their designs in parts. Allow the students time to continue exploring the number 4 by making as many designs as they can. (Students can reuse the same toothpicks for each design, or you can provide each child with a bag of toothpicks so that they can make and display multiple designs.) After students have created many different designs, have them choose one design to record on their paper by gluing the toothpicks to the paper.
4. Once students are familiar with creating designs for the given number, introduce the other centers. (See the attached sample designs for each center.) Model how to use the materials at each center, including the need to count out the required number of items for making each design. Students will move through the centers to explore the same number, using different materials. It is not necessary for every student to go to each center on a given day. Listed below are the materials and recording activities for the other centers:
 - Tile Center: Place ceramic tiles or colored tiles on the table. Remind students that when they arrange the given number of tiles, every tile must touch a corner or at least part of the side of another tile. Provide precut paper tiles for students to glue to 6" x 9" construction paper to record their arrangements, or have students trace around the ceramic tiles and then color their tracings.
 - Pattern Block Center: Provide pattern blocks in different shapes. Have students arrange a given number of blocks into several designs. Remind students that each block should touch another block. Provide cut-out pattern block shapes for students to glue to 6" x 9" construction paper, or have students trace their pattern block designs and color their tracings.
 - Bingo Marker Center: Using bingo markers (or dot stickers), have students use the selected number of dots to create a picture or design.
 - Geoboard Center: Provide Geoboards and squares of paper that fit between the nails on the Geoboard. Have the students use a given number of paper squares to make different arrangements on the Geoboard. Students may then glue the paper squares in the same arrangement onto a piece of dark construction paper that is the same size as the Geoboard.
5. As students work at the centers, consider the following: *Is the student consistently and accurately representing the given number? Is the student having difficulty counting out*

the materials that represent the given number? Is the student working confidently or do they check and recheck their work several times to see whether they have the correct number? Let these questions help you decide who needs more practice in counting out a certain quantity and who is ready to move on to a larger quantity. *When you ask the student to prove that there are four, do they count to prove that there are four, or are they subitizing (seeing four without counting) or using knowledge of parts that make up the whole?* Keeping a checklist to document your observations can be helpful.

6. Once students have had a chance to visit several of the centers, come back together whole group. Call on shoulder partners to share the number designs they made with each other. Repeat the process, mixing up the pairs of students. Invite a few students to stand in front of the class and explain their design.

Assessment

- **Questions**
 - How did you decide how to make your toothpick design? How do you know there are four toothpicks?
 - (Show the students two recording sheets for the same number showing that number with the same manipulative and a different arrangement or with different manipulatives.) How are these designs the same? How are they different? (Repeat with designs from other materials and numbers.)
- **Journal/writing prompts**
 - Draw four dogs. Then draw four bones. Will there be a bone for each dog? How can you show that will happen?
 - (Direct students to put a predetermined number [up to 20] of stickers on a page.) “Show how you count the stickers.”
- **Other Assessments (include informal assessment ideas)**
 - Observe students in each of the centers. Ask questions relating to the designs they create. *How can you prove you have four dots? How is this design like that design? How are they different?* Use a checklist or anecdotal notes to help you document observations.
 - Ask a student to show you a specified number of objects. Then tell the student you changed your mind and you want a different amount. Repeat this several times, observing for accuracy, confidence, and consistency. Also note whether the student counts from one each time or counts on or back to create the newly asked for set. Counting on or back indicates a higher level of reasoning.

Extensions and Connections (for all students)

- Have students fold a 12” x 18” piece of newsprint into eight boxes. Demonstrate as needed. As they move through the centers, have them create designs in each of the eight boxes with the materials to represent the number they are working on. Students can glue the designs down or use pencils or crayons to draw the designs as a record.
- Once students have investigated several numbers, give students a set of number cards containing only numbers that have been explored. Using a 12” x 18” sheet of newsprint

that has been folded into the desired number of sections, students turn over a number card in each section. Then, using whatever materials they have, they make a design to represent each of the numbers in each section. Designs can be recorded by gluing or drawing, but this is not essential.




















- Have the students create booklets from their recording sheets to represent the numbers.
- Create a class book from student recording sheets to represent the numbers.
- Save some of the students created designs to use for number talks. Display a card to the class for about 3 seconds. Ask students to tell how many objects they saw. Follow up by asking students to describe the design. Show the card again to allow students to verify and revise their ideas.
- If students have had instruction in numeral formation, have students write the numeral on each design.
- Begin to encourage students who are ready to describe their designs in parts to encourage part-part-whole thinking.
- Lead students in creating a picture chart of classroom items to count and record. The chart might include items such as desks, chairs, flags, computers, trash cans, and pencil sharpeners.

Strategies for Differentiation





















- Adjust the number. Each student should work with a number appropriate to his or her readiness level.
- For students who have difficulty writing numerals, allow them to match a numeral card to their design.
- Allow students to use a number path to help with numeral identification.
- For students requiring additional support with mobility and performance of the tasks in each counting center (i.e., counting, patterning, grouping, recording, writing), assign a peer buddy or classroom aide to assist with any switch-activated devices and to give visual or occupational support as needed.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

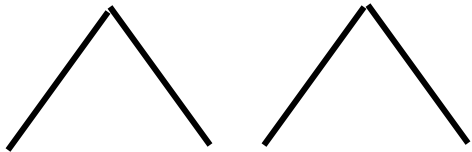
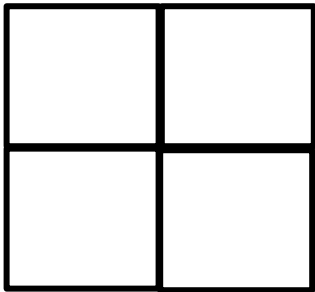
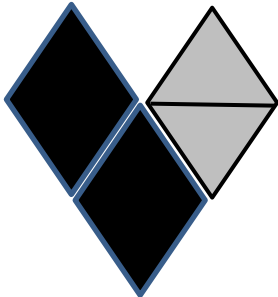
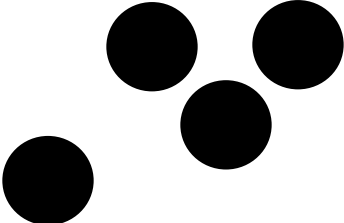
Numeral Cards 0–20

0	1 	2 	3 	4 
5 	6 	7 	8 	9 
10 	11 	12 	13 	14 
15 	16 	17 	18 	19 

Numeral Cards 0–20

20 	20 	20 	20 	20 
20 	20 	20 	20 	20 
20 	20 	20 	20 	20 
20 	20 	20 	20 	20 

Number Design Center Examples

<p>Toothpick Design Center</p> <p>Creating Design for 4</p> 	<p>Tile Center</p> <p>Creating Design for 4</p> 
<p>Pattern Block Center</p> <p>Creating Design for 4</p> 	<p>Bingo Marker Center</p> <p>Creating Design for 4</p> 
<p>Geoboard Center</p> <p>Creating Design for 4</p> 