CONSTRUCTING TASK: Skip-Counting Patterns

STANDARDS FOR MATHEMATICAL CONTENT

MCC3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.

STANDADS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Multiplication facts should be mastered by relating them to existing knowledge. It is essential for students to understand the commutative property. For example, 2 x 7 is related to the fact double seven. However, the same relationship applies to 7 x 2 that most think about as 2+2+2+2+2+2+2. Many of the facts are easier to master in one order, but should always be learned with its turn around. Van de Walle indentifies the following patterns; doubles, fives facts, zeros and ones, and nifty nines. These rules cover 75 of the 100 facts. (Teaching Student Centered Mathematics, Van de Walle, John, A., p.88-89)

This activity provides opportunities for the students to make sense of the many patterns in our base-ten system and how it is full of patterns. It helps with multiplication and division as well as providing time to search for patterns.

ESSENTIAL QUESTIONS

- How can multiplication products be displayed on a 1-100 chart?
- How can you describe various patterns, (i.e. with words, as a visual pattern on a 1-100 chart, or using mathematical notations)?

MATERIALS

- "Skip-Counting Patterns, Directions" student sheet
- "Skip-Counting Patterns, 1-100 Chart" student sheet (Students can cut apart the 1-100 charts to create a small booklet.)
- A large 1-100 chart that can be used for class discussion
- Highlighters, crayons, colored pencils, or markers for each student

GROUPING

Individual Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

In this task, students create patterns on a1-100 chart by skip counting with each number 2 through 10. Students do this by coloring in each number on which they land. Afterwards, students look for patterns on their charts and discuss how the patterns identified inform their understanding of our base-ten system.

Comments

One way to introduce this task is by asking students to identify patterns on the 1-100 chart. Examples of student observations may include:

- All of the numbers in the first column end in a 1 (also noticing the other columns and the observation that the last digits remain the same.)
- All of the numbers in the last column are the ones we say when we count by 10s.
- When you start in the top left corner and go down diagonally the one's digit goes up by 1 and so does the tens digit.

During this task, students will highlight or mark all numbers they land on when skip-counting by 2s, 3s, 4s, 5s, 6s, 7s, 8s, 9s, and 10s. Students will use a clean 1-100 chart for each number and start on the number by which they are counting (e.g. when counting by 2s, they will start on 2). Once they finish highlighting a 1-100 chart, students should discuss with a partner or partners any patterns they notice. Once students have completed skip-counting by the numbers 2-10, initiate a class discussion about the patterns students observed. Create a class list of student observations. As an example, student observations of patterns when counting by 2s on the 1-100 chart could include:

- Only the even numbers are highlighted.
- All of the shaded numbers are in the 'even' columns.

Encourage students to check their work as they go with other students, a calculator, or by referring to a teacher-created sample so that students don't get frustrated. Obviously, one error on the 1-100 chart will result in all of the subsequent numbers being incorrect as well.

Task Directions

Students will follow directions below from the "Skip-Counting, Directions" student sheet.

You will be skip-counting by 2, 3, 4, 5, 6, 7, 8, 9, and 10.

1. Highlight or mark all numbers counting by 2s starting with 2 (i.e., skip counting by twos). Discuss with your partner(s) what you notice about the highlighted numbers.
2. Using a new hundred chart, highlight or mark all numbers counting by 3s starting with 3. Discuss with your partner(s) what you notice about the highlighted numbers.
3. Continue with a new hundred chart for each number 4 through 10, highlighting the numbers you land on as you skip count by each number. After completing

each chart, discuss with your partner(s) what you notice about the highlighted numbers.

4. Be prepared to share your observations about patterns on your 1-100 charts with the class.

FORMATIVE ASSESSMENT QUESTIONS

- How do you know you skip-counted correctly?
- What do you notice about the numbers that are highlighted?
- How can you describe the geometric pattern that is formed with the highlighted numbers?
- After the students have skip-counted by the first few multiples (2's, 3's, 4's): When you skip-count by 5 or 6 will you have the same, more, or less, numbers highlighted than when you skip counted by 2?

DIFFERENTIATION

Extension

- Ask students to compare the two 1-100 charts they created. For example, compare the 2's and 4's chart and ask the students to describe what they notice about these two charts and more importantly why this is happening. One way students could organize their thinking is by recording the highlighted numbers in a Venn Diagram and then writing about what they notice and why their observations make sense based on our base-ten number system.
- Ask students to make predictions before they compare the various charts, such as, "Will the 6's and 9's have anything highlighted in common? Why or why not? " Or "How do you know?"

Intervention

- Encourage students to use a calculator (or another tool) to determine the highlighted numbers. Being off by one number can be very frustrating and the main objective of this task is not to generate the numbers when skip-counting but to analyze the numbers found.

Name _____ Date _____

Skip-Counting Patterns
Directions

You will be skip-counting by 2, 3, 4, 5, 6, 7, 8, 9, and 10.

1. Highlight or mark all numbers counting by 2s starting with 2 (i.e., skip counting by twos). Discuss with your partner(s) what you notice about the highlighted numbers.
2. Using a new hundred chart, highlight or mark all numbers counting by 3s starting with 3. Discuss with your partner(s) what you notice about the highlighted numbers.
3. Continue with a new hundred chart for each number 4 through 10, highlighting the numbers you land on as you skip count by each number. After completing each chart, discuss with your partner(s) what you notice about the highlighted numbers.
4. Be prepared to share your observations about patterns on your 1-100 charts with the class.

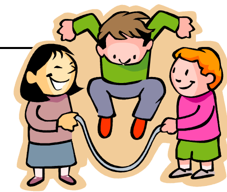
Skip-Counting by _____

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Skip-Counting by _____

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Name ____ Date ____________________



Skip-Counting Patterns

1 – 100 Charts

Skip-Counting by _____

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Skip-Counting by _____

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Skip-Counting by _____

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Skip-Counting by _____

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100