Mathematics Instructional Cycle Guide

Skip Counting 2.NBT.2

Created by Jessica Szafran, 2014 Connecticut Dream Team teacher

CT CORE STANDARDS

This Instructional Cycle Guide relates to the following *Standards for Mathematical Content* in the *CT Core Standards for Mathematics*:

Understands Place Value
2.NBT.A.2 Counts within 1000; skip-counts by 5s, 10s, 100s.

This Instructional Cycle Guide also relates to the following *Standards for Mathematical Practice* in the *CT Core Standards for Mathematics*:

MP 5 Use appropriate tools strategically
- Students can use different tools to strengthen their ability to identify skip counting patterns.
- Students can use tools to help solve problems related to skip counting.

MP 8 Look for and express regularity in repeated reasoning
- Students can solve problems by using repeated patterns developed from skip counting.

WHAT IS INCLUDED IN THIS DOCUMENT?

- A Mathematical Checkpoint to elicit evidence of student understanding and identify student understandings and misunderstandings **(page 2)**
- A student response guide with examples of student work to support the analysis and interpretation of student work on the Mathematical Checkpoint **(pages 3-5)**
- A follow-up lesson plan designed to use the evidence from the student work and address the student understandings and misunderstandings revealed **(pages 7-10)**
- Supporting lesson materials **(pages 11-26)**
- Precursory research and review of standard **2.NBT.A.2** and assessment items that illustrate the standard **(pages 27-28)**

HOW TO USE THIS DOCUMENT

1) Before the lesson, administer the **Buttons, buttons, buttons!** ***Mathematical Checkpoint*** individually to students to elicit evidence of student understanding.
2) Analyze and interpret the student work using the ***Student Response Guide***
3) Use the next steps or ***follow-up lesson plan*** to support planning and implementation of instruction to address student understandings and misunderstandings revealed by the Mathematical Checkpoint
4) Make instructional decisions based on the checks for understanding embedded in the follow-up lesson plan

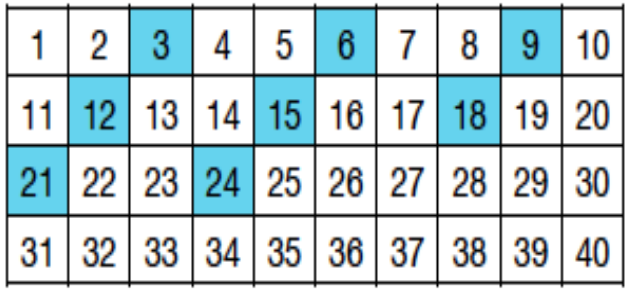
MATERIALS REQUIRED

- Story related to skip counting. Possible titles include: How many seeds in a pumpkin? by Margaret McNamara, Leaping Lizards by Stuart Murphy, Plenty of Petals: Counting by 10s by Michael Dahl,
- Student size number line. This can be made with either a close line/string with numbers marked in regular intervals or with masking tape on the floor.
- Number lines to 100, open number lines
- Copies of hundreds charts from 0 – 100 and 101- 200
- Tens frames
- Base ten blocks
- Numeral cards
- Place value mats
- spinners
- clothes pin, masking tape/clothes line
- markers such as small blocks, counters, paper clips or clothes pins

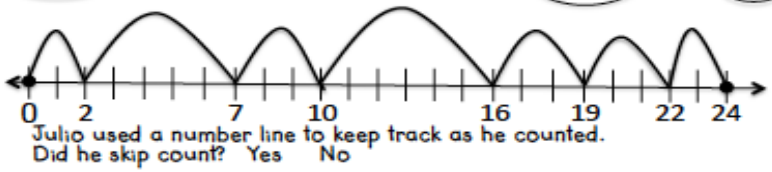
TIME NEEDED

Buttons, buttons, buttons! administration: **30 minutes**
Follow-Up Lesson Plan: **1-2 instructional blocks**
Timings are only approximate. Exact timings will depend on the length of the instructional block and needs of the students in the class.

<table>
<tr><th colspan="3">Step 1: Elicit evidence of student understanding</th></tr>
<tr><th colspan="3">Mathematical Checkpoint</th></tr>
<tr><th>Question(s)</th><th colspan="2">Purpose</th></tr>
<tr><td rowspan="2">Julio counted each button one at a time and counted a total of 24 buttons. He wanted to make sure he counted the buttons correctly so he counted again but this time he skip counted. Julio tried counting his buttons for different ways. He used different math tools to help him keep track of the buttons as he counted. Circle Yes of No to answer each questions then expalin your thinking.

1.
 

Julio used a hundreds chart and colored in the numbers to keep track as he counted. Did he skip count? Yes No
Explain:

2.
 


Julio used a number line to keep track as he counted.
Did he skip count? Yes No
Explain:</td><td>CT Core Standard:</td><td><u>2.NBT.A.2</u> Count within 1000; skip-count by 5s, 10a, 1000.</td></tr>
<tr><td>Target question addressed by this checkpoint:</td><td>Do students understand that skip counting refers to equal groups of numbers being counted in regular intervals?
Do students understand there are different ways to group amounts when skip counting?
Can students connect counting patterns with math tools or visuals?</td></tr>
</table>

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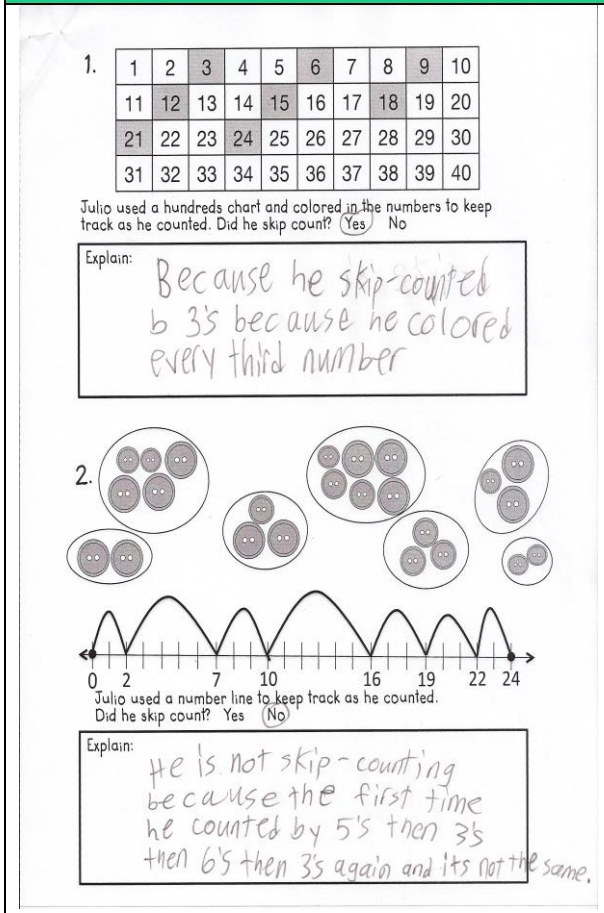
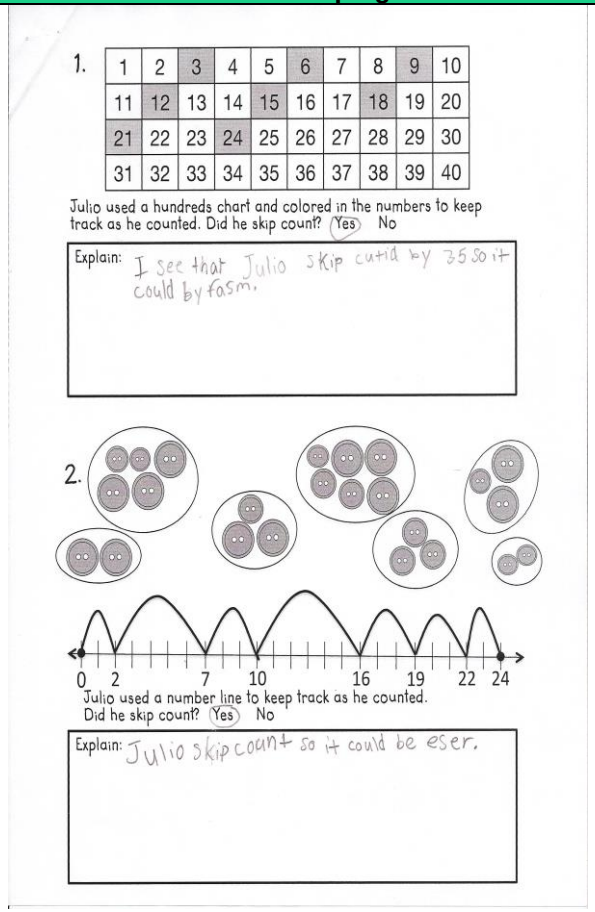
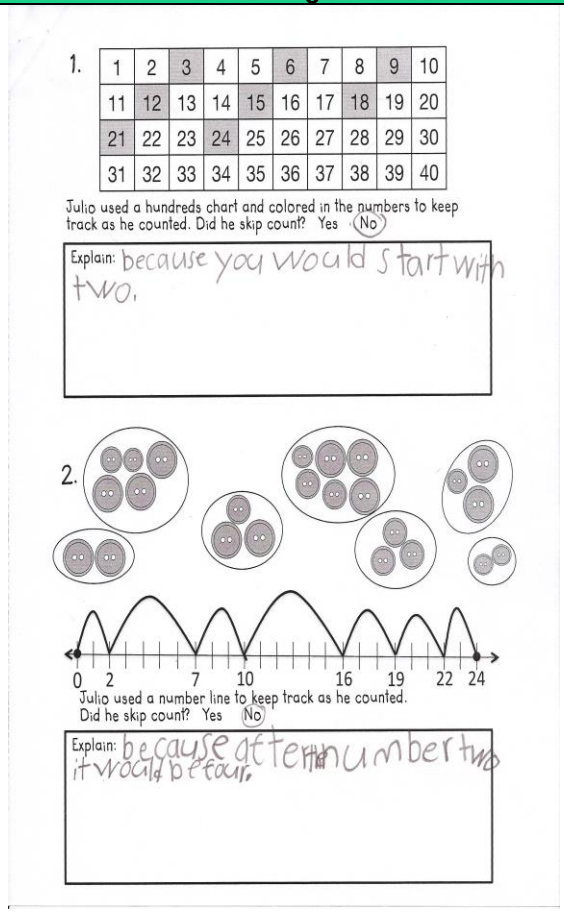
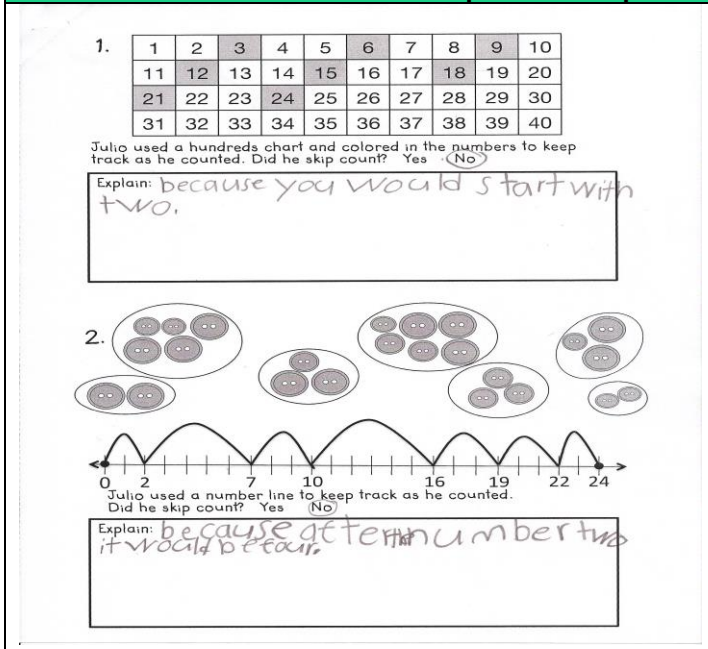
Step 2: Analyze and Interpret Student Work		
Student Response Guide		
Got It	**Developing**	**Getting Started**
		
1. Yes because he is skip counting by 3's because every third number. 2. No. He is not skip counting because the first time he counted by 5's then 3's then 6's then 3's again and it is not the same amount.	1. Yes. I see that Julio skip counted by 3 so it could be faster. 2. Yes. Julio skip counted so it could be easier.	1. No because you would start with the number two. 2. No because after the number two it would be four.

Getting Started	
Student Response Example	**Indicators**
 1. No because you would start with the number two. 2. No because after the number two it would be four.	• The student may or may not demonstrate an understanding that he/she can skip counting with any set number. • The student may demonstrate an over reliance on route counting patterns. For example the student by be able demonstrate the ability to count aloud specific patterns like those stated below. This can lead to the misconception that you can only skip count from a specific number and to leave out zero. • “2, 4, 6, 8, 10” • “5, 10, 15, 20” • “10, 20, 30, 40”
	Closing the Loop (Interventions/Extensions)
Q- Do you always have to start with 2 when skip counting? Q- Provide a set of manipulatives. How can you group these manipulatives? Could you do it differently? Now that you made these groups, how would you skip count these numbers? Q- How would you count these groups?	Using a variety of manipulatives to practice forming equal groups from one larger group making sure each group has the same amount in it. Practicing counting equal groups of objects with a focus on counting each object in the group and the last number said aloud representing the total of the group. As the student moves to the next group the last number said is the total amount of the two groups. http://learnzillion.com/lessons/3424-count-objects-by-5s-10s-and-100s

<table>
<tr><th colspan="2">Developing</th></tr>
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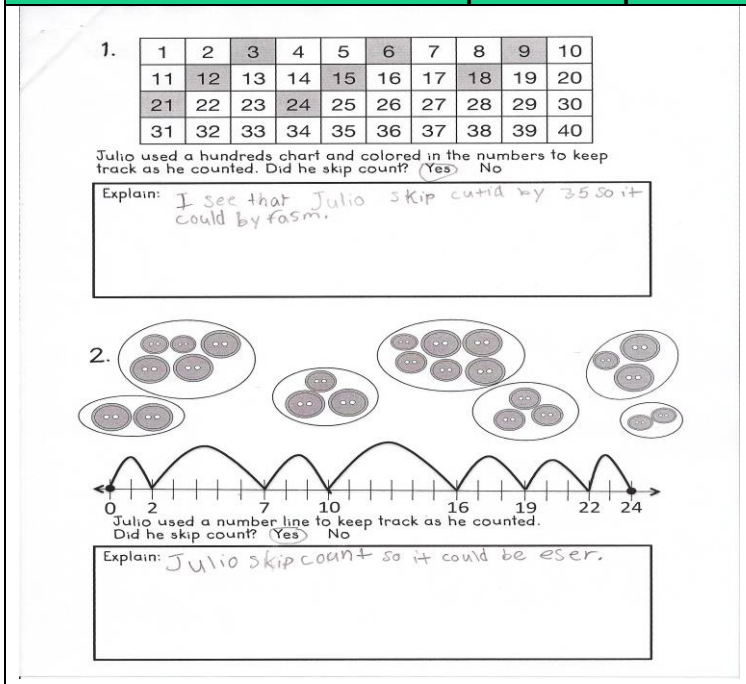

1. Yes. I see that Julio skip counted by 3 so it could be faster.
2. Yes. Julio skip counted so it could be easier.
</td><td>

- The student demonstrates an understanding that skip counting is not counting by ones.
- The student may or may not have developed the understanding that skip counting requires the same amount to be added or subtracted each time. The response to the second questions demonstrates
- The student may rely on route counting patterns. This can be seen in the response to the first problem. The student may use the route pattern of 3, 6, 9 seen in the first line of the hundreds chart.

</td></tr>
<tr><th>In the Moment Questions/Prompts</th><th>Closing the Loop (Interventions/Extensions)</th></tr>
<tr><td>
Q- How is the hundreds chart showing counting by 3s?

Q- Provide a set of manipulatives. How can you group these manipulatives? Could you do it differently? Now that you made these groups, how would you skip count these numbers?

Q- What do you notice is similar and different between the two problems?
</td><td>
Using a variety of manipulatives to practicing forming equal groups from one larger group making sure each group has the same amount in it.

Providing anchor charts posted in the classroom to help the student explain his/her thinking.

http://learnzillion.com/lessons/3424-count-objects-by-5s-10s-and-100s
</td></tr>
</table>

<table>
<tr><th colspan="2">Got it</th></tr>
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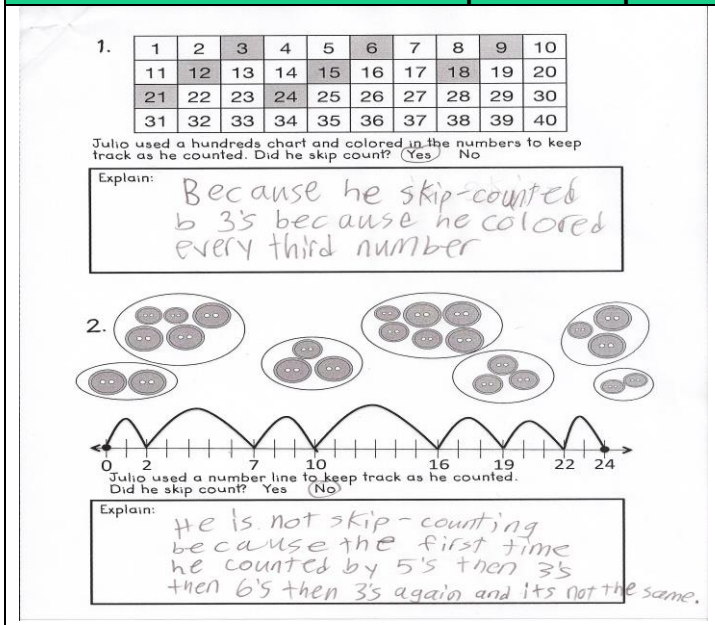

Yes because he is skip counting by 3's because every third number.
No. He is not skip counting because the first time he counted by 5's then 3's then 6's then 3's again and it is not the same amount.

</td><td>

The student can explain how Julio was or was not skip counting with specific evidence from the information provided. The student demonstrates the ability to explain the pattern
The student can identify multiple skip counting patterns within the same range of numbers.
The student is able to connect different math visuals and organizers with skip counting.

</td></tr>
<tr><th>In the Moment Questions/Prompts</th><th>Closing the Loop (Interventions/Extensions)</th></tr>
<tr><td>Q- Did you notice any patterns in the hundreds chart?

Q- What would the hundreds chart look like if he had different size groups?</td><td>Exploring number patterns on the hundreds charts and number lines, starting with a variety of numbers within 1000.
Exploring skip counting with a calculator.
Begin connecting with repeated addition, arrays and multiplication within 25.

http://learnzillion.com/lessons/3571-connect-skipcounting-to-repeated-addition-using-number-patterns

Using skip counting to solve word problems.
http://learnzillion.com/lessons/3572-use-skipcounting-to-solve-problems</td></tr>
</table>

Steps 3 and 4: Act on Evidence from Student Work and Adjust Instruction	
Lesson Objective:	Students will be able to count by 5s and 10s from any number.
Content Standard(s):	Number and Operations in Base Ten 2.NBT ○ Understand place value. 2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.
Targeted Practice Standard :	MP 5 Use appropriate tools strategically ○ How can students use different tools to strengthen their ability to identify skip counting patterns? ○ How can students use tools to help solve problems related to skip counting? MP 8 Look for and express regularity in repeated reasoning • How can students solve problems by using skip counting patterns?

Mathematical Goals	Success Criteria
○ *Understand that skip counting requires counting in regular intervals.* ○ *Understand that skip counting can occur at any starting point. This conceptual understanding will help students connect skip counting to improving his or her fluency when adding and subtracting within 100. The student*	○ *Use concrete and visual models to skip count by 5s and 10s from a given number.*

Launch (Probe and Build Background Knowledge)

Purpose: Engage students in modeling with mathematics to probe and build background knowledge of skip counting and using visual models to represent patterns.

Begin by reading aloud a story related to skip counting. Ask the students to think about how they could model the different counting patterns using the student size number line to model skip counting. After giving thinking time have several students share their ideas. Have students begin to represent the numbers from the book on the number line. Questions and prompts to guide the discussion could include:

- How are we modeling skip counting?
- Do you notice any patterns?
- What do you notice about the space between each student?
- Could you model this with another math tool?

Work with the students to define skip counting. Help students come to a basic understanding that “skip counting means counting by any other number than one.” This is an incomplete definition which will be added to later in the lesson. This should written on a Frayer model poster. You will work together to refine the definition as you and the students continue through the tasks. For information on Frayer models go to: *http://iris.peabody.vanderbilt.edu/module/sec-rdng/cresource/what-should-content-area-teachers-know-about-vocabulary-instruction/sec_rdng_07/*

At this point in the lesson, you will only fill in the definition part of the Frayer model.

We just modeled how to skip count from 0 using the number line. Would we still be skip counting if we started at 7 and continued the same pattern?

Instructional Task

Purpose: Students use multiple math tools to model skip counting by 5s and 10s starting from numbers other than multiples of 5.

Engage (Setting Up the Task)

You will model and demonstrate how to create a starting number, use the Skip Counting spinners, use a variety of math tools to anchor their work, and record the patterns. Depending on the students' readiness they can either work with 2 or 3 digit numbers or be assigned to use a specific math tool instead of the spinner. Some Getting Started students may benefit from focusing their practice on one tool and/or counting by 5s only before using the spinner.

Model the process of using math tools and the spinner to practice skip counting. The starting number is selected by either rolling 1 or 2 dice or drawing 1 or 2 numeral cards. Next, the student will use the spinner to decide which counting pattern will be explored. Finally, they will use the other spinner to decide which math tool (Hundreds Chart, Tens Frames, Base Ten Blocks, Number Lines, Linking Cubes) they will use for their explorations. Demonstrate how to use one of the tools and record the work. Invite 2 or 3 students to share how they might show the same pattern with a different tool from the spinner.

Explore (Solving the Task)

Students work with partners to build 1 or 2 digit numbers and skip count by either 5s or 10s. They will record the starting number, what they counted by, the math tool they used and the counting pattern. Each partnership should have access to the variety of math tools on the spinner.

Circulate to observe, support, and gather information on student thinking. As you circulate you should see students using different tools to as they skip count. Students can be marking the pattern on the tool with blocks, paper clips or clothespins. Students will be transferring the numbers from the tool to the recording page. Partners may have the numbers 23, 33, 43, 54, 63 marked on their hundreds chart and the numbers listed on the recording page.

Clarifying

- What was your starting number?
- Can you show or explain how you got this pattern?

Advancing

- What number patterns do you notice?
- Will the pattern always stay the same?

Elaborate (Discuss Task and Related Mathematical Concepts)

Ask for student volunteers to share an error or non-example and how they know it is not correct. Add these non-examples to the Frayer Model. Ask: Does our definition still work? Do we need to make any adjustments? Add to the anchor chart or Frayer model poster important characteristics of skip counting. Make sure that the discussion includes: 1) always counting on the same amount and 2) can begin at any number.

Present the students with the following problem.

Louis wants to give $15 to help kids who need school supplies. He also wants to buy a pair of shoes for $39.

a. ***How much money will he have to save for both?***
b. ***Louis gets $5 a week for his allowance. He plans to save his allowance every week. How many weeks does it take him to reach this goal?***

How could we use what we know about skip counting to help us solve this problem? Discuss with students the connection between skip counting and Louis saving his allowance. Select students to share one of their counting patterns and which math tool they used to explore the pattern. Add these to the Frayer Model as examples.

- Did you notice any patterns on your recording sheet?

Checking for Understanding

Purpose: *The question will demonstrate the student's ability to skip count by 10 from the given number. The student will also explain how he or she got the counting pattern and what math tool was used to get it.*

Joseph is getting ready for his birthday party. He wants to have a lot of balloons all over his house. He found 17 balloons left over from last year. When he went to the store the balloons were sold in packages of 10. Joseph skip counted out loud as he bought 6 new bags of balloons.

What did Joseph say? "_____"
Explain how you got your answer. You may include pictures or diagrams to help.

Common Misunderstanding

Purpose: *One misunderstanding is that skip counting by 5s always follows the same number pattern of 5, 10, 15, 20, 25, 30, 35 and so on. The same being true for counting by 10s with the pattern 10, 20, 30, 40, 50 and so on.*

Ranjit and Sammy were practicing skip counting. Ranjit said, "When you skip count by 5 you always go 5, 10, 15, 20 and 25." Sammy did not agree. What do you think?

Checking for Understanding

Purpose: *This probe is an open ended response allowing you to see the range of understanding related to skip counting. The task also allows for differentiation within one question.*

Marta was skip counting. She ended at the number 70. What numbers did she skip count to get to 70? You may use any tool you like to help you explore this pattern.
Record what you think Marta's pattern looked like.

- What number did she start at?
- What did she count by?

Closure

Purpose: *Provide students an opportunity to monitor and reflect on their own understanding of skip counting using self-assessment prompts.*

I can explain what skip counting is. ☺ ☹

I can explain how to use a math tool to show skip counting. ☺ ☹

What else would you like to share?

Extension Task
Purpose: *For students who are ready to deepen their understanding based on the checkpoint and observations provide them different numbers to explore with such as 3, 4, 6, 25.* *Creating a skip counting picture book.* The students can create a story and pattern that grows or decreases over each page. The students can use stickers, drawings and equations to model the counting pattern.

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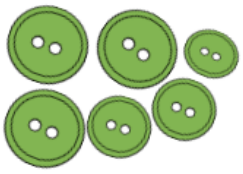
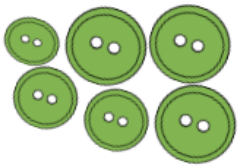
Name: Date:



Buttons, buttons, buttons!



Julio has a jar full of buttons he has been collecting for the past month to make a gift for his teacher. He wanted to know how many buttons he had so far.

Julio counted each button one at a time and counted a total of 24 buttons.

He wanted to make sure he counted the buttons correctly so he counted again but this time he skip counted.

Julio tried counting his buttons four different ways. He used different math tools to help him keep track of the buttons as he counted.

Circle Yes or No to answer each question then explain your thinking.

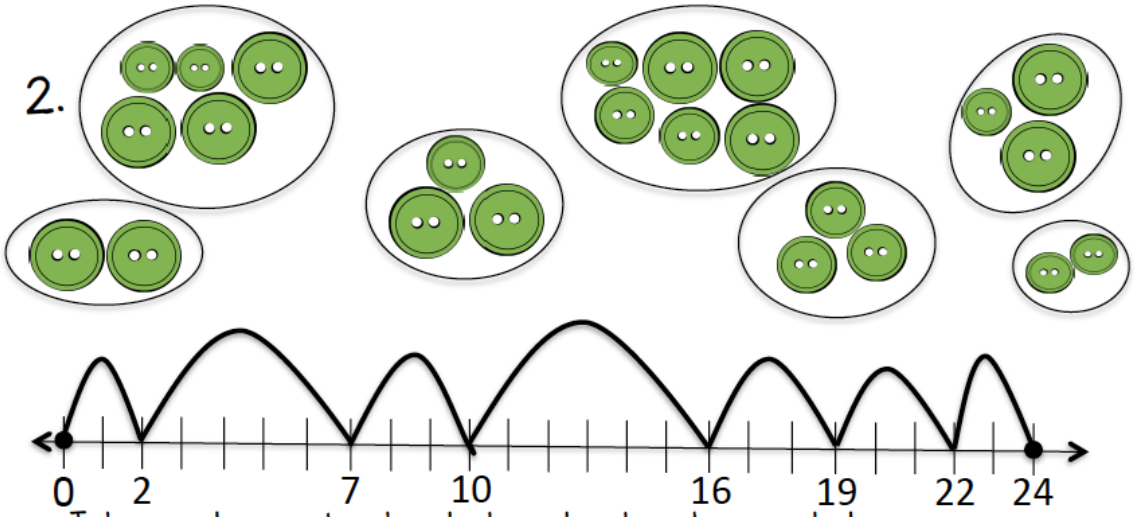
1.

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

Julio used a hundreds chart and colored in the numbers to keep track as he counted. Did he skip count? Yes No

Explain:

2.



Julio used a number line to keep track as he counted. Did he skip count? Yes No

Explain:

Skip Counting Practice Materials

The following pages are the materials needed for the skip counting lesson.

Spinners:
The spinners can be made with brads or a pencil and paperclip. One spinner has different math tools already filled in while the other one is left blank for you put in the tools you have available. Number lines, hundreds charts and base-ten blocks are strongly encouraged.
Tip: It may be helpful to copy the spinner board on cardstock paper and laminate. This board can be used for reinforcement and reteaching throughout the school year.

Numerals:
The students will need a way to make the starting number. This can either be accomplished with multiple copies of the provided numeral cards (0-9) or with a 10-sided dice.

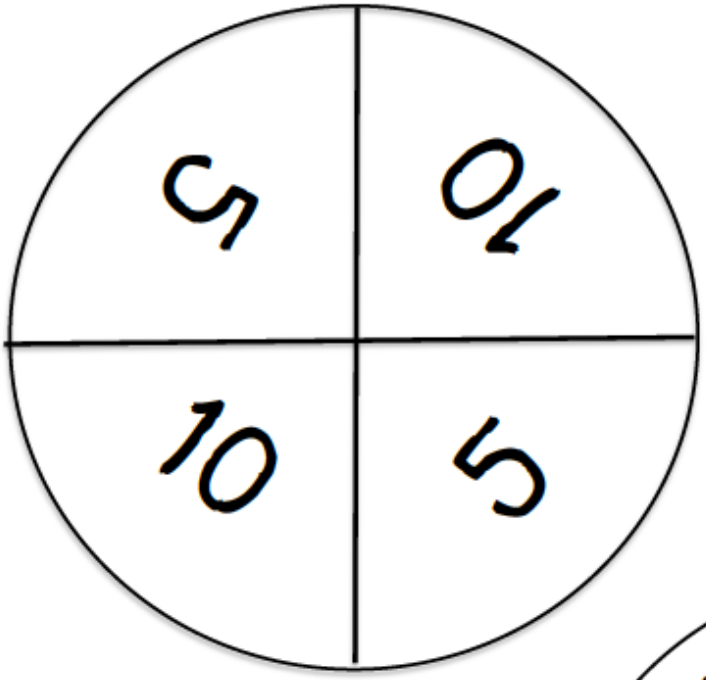
Place Value Mats:
Some students may benefit from building the starting number on a place value mat.

Math Tools:

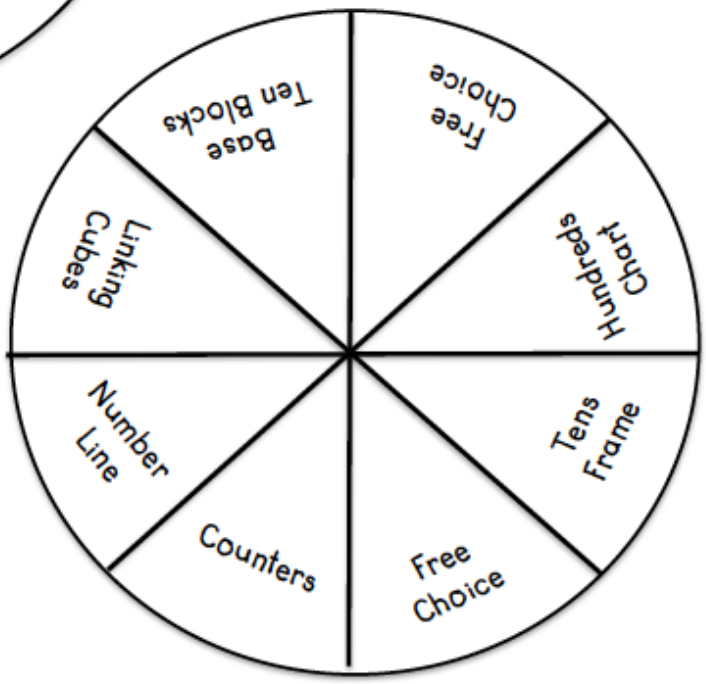
- Hundreds charts 0-100 and 101-200 if needed
- Number lines
- Base ten blocks
- Tens frames
- Linking cubes
- Counters (links, bears, beans, etc.)

Skip Counting

1. Build and record your starting number.
2. Use the Skip By Spinner to find if you are counting by 5s or 10s.
3. Use the Math Tool Spinner to find which tool you will use to help you skip count.
4. Record your pattern.



Skip By Spinner



Math Tool Spinner

Skip Counting

1. Build and record your starting number.
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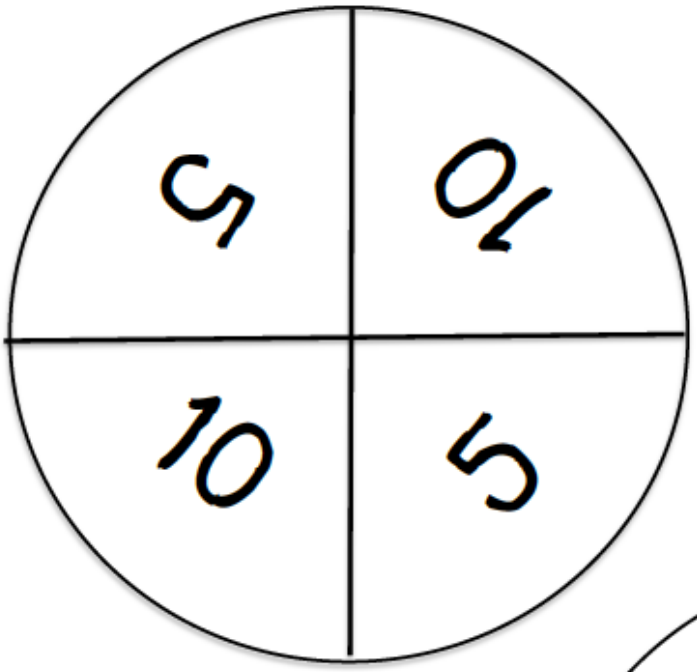
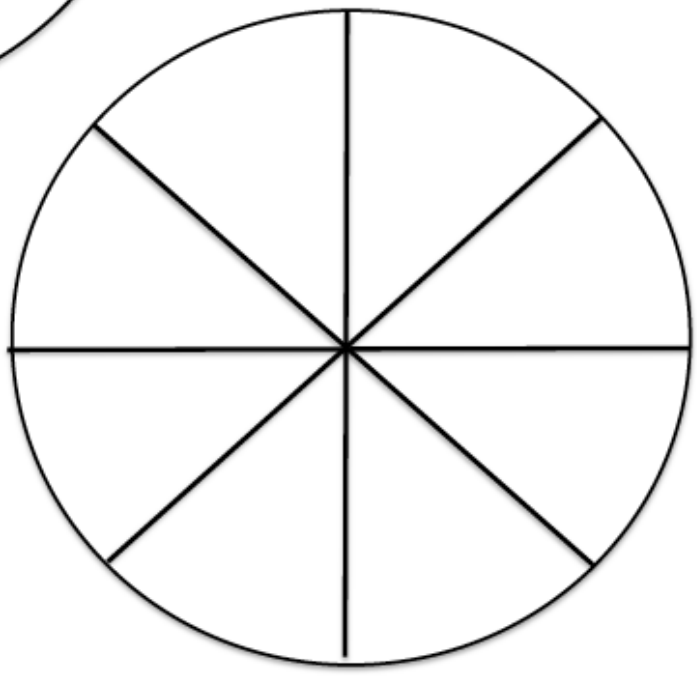


Skip By Spinner



Math Tool Spinner

Name: Date:

The starting number is_____. I am skip counting by_____.

I used: (circle one) base ten blocks number line

tens frame hundreds chart

My pattern is: _____, _____, _____,

_____, _____, _____, _____, _____

The starting number is_____. I am skip counting by_____.

I used: (circle one) base ten blocks number line

tens frame hundreds chart

My pattern is: _____, _____, _____,

_____, _____, _____, _____, _____

The starting number is_____. I am skip counting by_____.

I used: (circle one) base ten blocks number line

tens frame hundreds chart

My pattern is: _____, _____, _____,

_____, _____, _____, _____, _____

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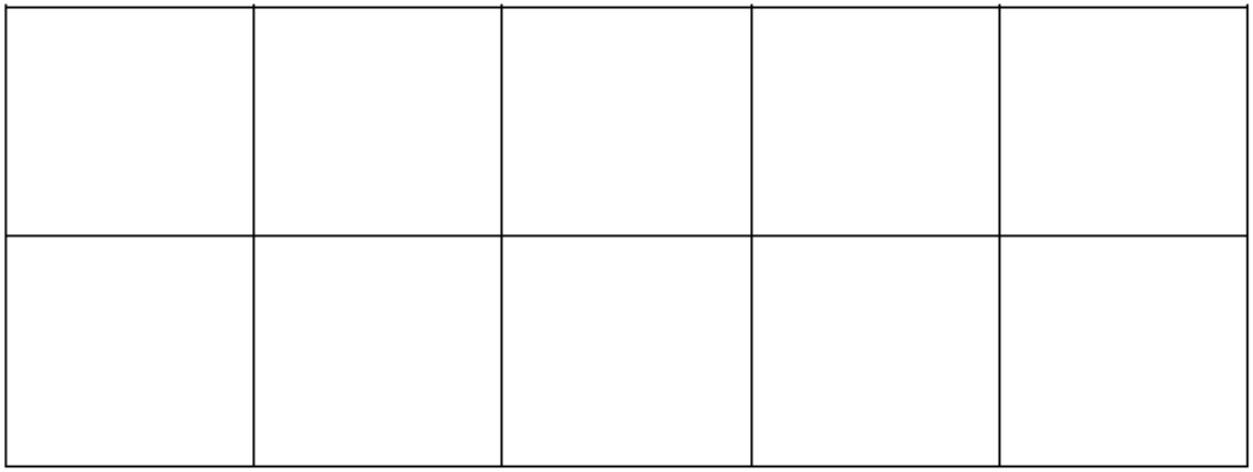
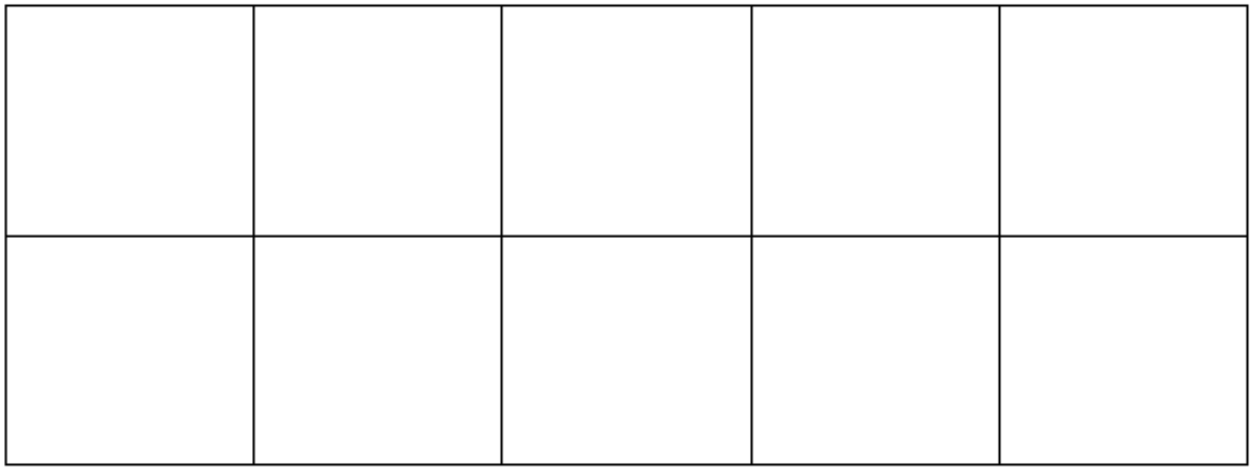
Numerals

0	1	2	3
4	5	6	7
8	9	0	1
2	3	4	5
6	7	8	9

Tens Frames



Tens Frames



Place Value Mat

Hundreds	Tens	Ones

Place Value Mat

Hundreds	Tens	Ones

Hundreds Chart

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

101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200

Number Lines

This can be used to make a number line from 0 to 100 or whatever length you want. Cut each row and attach at the blank squares. Students can use paperclips or clothespins to keep track of the numbers in the pattern.

0	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:_____

Joseph is getting ready for his birthday party. He wants to have a lot of balloons all over his house.

He found 17 balloons left over from last year.

When he went to the store the balloons were sold in packages of 10. Joseph skip counted out loud as he bought 6 new bags of balloons.

What did Joseph say? _____

_____

Explain how you got your answer. You may include pictures or diagrams to help.

Name:_____

Ranjit and Sammy were practicing skip counting.

Ranjit said, "When you skip count by 5 you always go 5, 10, 15, 20 and 25."

Sammy did not agree.

What do you think?

Name:_____

Marta was skip counting. She ended at the number 70. What numbers did she skip count to get to 70?

You may use any tool you like to help you explore this pattern.

Record what you think Marta's pattern looked like.

- What number did she start at?
- What did she count by?

Name:_____

I can explain what skip counting is.

I can explain how to use a math tool to show skip counting.

What else would you like to share?

Research and review of standard	
Content Standard(s):	**Standard(s) for Mathematical Practice:**
Number and Operations in Base Ten 2.NBT ○ **Understand place value.** **2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.**	MP 5 Use appropriate tools strategically MP 8 Look for and express regularity in repeated reasoning

Illustrative Mathematics Item

Saving Money 2

Louis wants to give $15 to help kids who need school supplies. He also wants to buy a pair of shoes for $39.

a. ***How much money will he have to save for both?***
b. ***Louis gets $5 a week for his allowance. He plans to save his allowance every week. How many weeks does it take him to reach this goal?***
c. ***Louis remembers his sister's birthday is next month. He sets a goal of saving $16 for her gift. How many weeks does he have to save his allowance to reach this goal? How many weeks does he have to save his allowance for all three of his goals?***

CPR Pre-Requisites
(Conceptual Understanding, Procedural Skills, and Representations)

Look at the Progressions documents, Learning Trajectories, LZ lesson library, unpacked standards documents from states, NCTM Essential Understandings Series, NCTM articles, and other professional resources. You'll find links to great resources on your PLC Platform.

Conceptual Understanding and Knowledge
- Understand that numbers have a sequence and order
- Understand that you can count on and back from a given number
- Understand how to count a set amount of objects
- Understand that ten ones can be "bundled" together to make one set of ten; a ten can also be represented as 10 single units

Procedural Skills
- Counting on from a given number
- Counting back from a given number
- Counting a set amount of given objects by one

Representational
- Use concrete and visual models to represent numbers
- Tens frames, hundreds charts, number lines

Conventions and Social knowledge
- Comparing numbers, numbers get larger as you count on or get smaller as you count back

Standards Progression *Look at LearnZillion lessons and expert tutorials, the Progressions documents, learning trajectories, and the "Wiring Document" to help you with this section*		
Grade(s) below	**Target grade**	**Grade(s) above**
1.NBT.B.2: Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: 1.NBT.B.2a 10 can be thought of as a bundle of ten ones- called one "ten." 1.NBT.B.2b The numbers from 11 to 19 are composed of a ten and one, two, three, four, five six, sever, eight, or nine ones. 1.NBT.B.2c The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two three, four, five, six, seven, eight, or nine tens (and 0 ones). 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.	2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s. 2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. 2.NBT.9 Explain why addition and subtraction strategies work, using place value and the properties of operations. 2.OA.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. 3.OA.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each.

Common Misconceptions/Roadblocks
What characteristics of this problem may confuse students? • *Students need to skip count to get a specific number ($60) but then need to answer the questions by counting how many times they skip counted (12).* **What are the common misconceptions and undeveloped understandings students often have about the content addressed by this item and the standard it addresses?** • *Students will memorize the counting patterns and repeat numbers. Students are not linking the pattern and numbers with an amount being added each time. (Howard)* • *Students will not connect the number being stated represents multiple groups being added.* **What overgeneralizations may students make from previous learning leading them to make false connections or conclusions?** • *Students my see a pattern that only digits in the tens place change as the skip count and try to connect that to all counting patterns.*