



Overview

After listening to *The Goat in the Rug*, students will construct a paper weaving using a hundred chart model.

Skip counting (repeated addition) with the TI-10 is introduced with the scrolling feature and enhanced with the constant feature. The story and activity help students recognize number patterns in art from the Navajo culture.

Grade Levels: 1–2




Concepts

- Algebraic thinking
- Patterns
- Skip counting
- Problem solving



Materials

-  TI-10 calculators
Note: the TI-15 Explorer™ can be used in place of the TI-10 for this activity.
- *The Goat in the Rug*
Blood, Charles L., and Link, Martin, illustrated by Nancy Winslow Parker (NY, NY: Aladdin, 1990; NY, NY: Four Winds Press, 1976)
- Yellow high lighter or crayon for each student
- Construction paper in strips of 1" x 10" (blue and yellow)
- Blue markers or crayons
- Connecting cubes
- Butcher block or bulletin board paper (at least 100-inches long)
- Hundred chart and mini hundred charts (*Provided at the end of the Teacher Notes.)
- Student activity sheet



Assessment

Throughout the activities, questions are included for formative assessment. Student work samples should be used as a check for understanding. Have the students use mini hundred charts and the TI-10 to create other number patterns with skip counting in order to assess an understanding of number patterns.



Vocabulary

multiples: a number that is the product of a given number and another number

operation: a mathematical process; for example, add, subtract, multiply, and divide

pattern: a repeated design or sequence

repeated addition: adding the same number again and again in order to find the result of a multiplication

skip counting: counting forward or backward by a number other than 1

sum: the result of adding two or more numbers

symbol: a character used to show a mathematical relationship



Activity 1

Connecting Literature and Mathematics

Prepare students for the literature-mathematics connection by introducing patterns in art from the Navajo culture. Discuss weaving and if possible, show an actual weaving or use a search engine to find an illustration.

1. To begin the activity, gather students on the floor and call attention to a student wearing a patterned fabric and describe the pattern.
2. Encourage students to find and describe a pattern on clothing and to look around the room and find other patterns that might be found in floor tiles, carpeting, ceilings, walls, bulletin boards, and so forth.
3. Ask the students to describe a weaving. If a sample weaving is available, ask students if they can see any patterns.
4. Read *The Goat in the Rug*. Depending on the students, this reading may take more than one class session.
5. Explain to the students that a design is often drawn before the actual yarn is used in the weaving.

Activity 2

Explaining Patterns with a Hundred Chart

Tell students that they will be making a paper weaving. Explain that they will first need to make their design on paper.

1. Pass out a hundred chart, yellow high lighter, blue marker, and TI-10 to each student. Also, have connecting cubes available.
2. Have students count to the three on the hundred chart and place a cube on the numeral.
3. Ask students to count three more and place a cube on the numeral. Direct the students to continue the pattern until finished.

Teacher Tip

Some students may need to place their finger on each number while counting.



Activity 2 (continued)

Questions for Students:










- ❖ *How did you know where to place your cubes?*
- ❖ *How might you describe this action?*
- ❖ *How might the TI-10 help show this action?*

Answers may vary. Possible answer: adding +, 1 + 1 + 1; or +3.

Activity 3

Finding Patterns with the TI-10 (or TI-15)

The following activity uses the TI-10 to reinforce the concrete-symbolic connection.

1. Have the students place the TI-10 next to the hundred chart.
2. Press  to begin.
3. Press  to clear anything previously stored in memory.
4. Press  to clear the display.
5. Press      

The TI displays:

$$1 + 1 + 1 = 3$$

Question for Students:

- ❖ *How might the TI-10 show this action another way?*

6. Press   

The calculator displays:

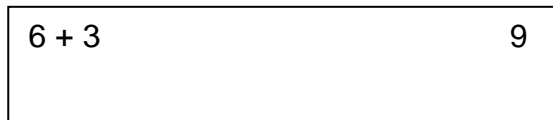
$$3 + 3 \qquad \qquad \qquad 6$$



Activity 3 (continued)

7. Press $+$ 3 $=$

The calculator displays:



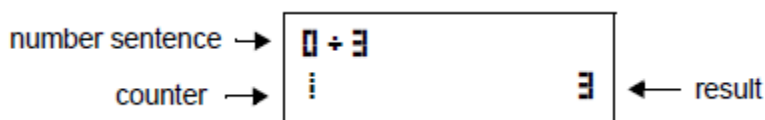
Continue this process until students show understanding of skip counting patterns.


Explain to students that they can see their sums and number sentences by scrolling .

Introduce another way to skip count using the TI-10.


1. Reset the TI-10.
2. Press Op1 $+$ 3 Op1 .
3. Press the number you wish to start with, in this case 0 and then press Op1


The TI displays:




 **Calculator Tip**

Resetting the TI-10:

Press  to wake it up if it has turned off.

Press  if you need to clear the memory.

Press  to clear the display.


Discuss how the students' actions are expressed in symbols on the TI-10.

4. Remove the first cube from your hundred chart and highlight the numeral 3.
5. Press Op1 again.
6. Remove the second cube and highlight that sum on the hundred chart.
7. Press Op1 again.



Activity 3 (continued)

Highlight the sum. Remove all cubes from the hundred chart. Continue the pattern on the TI-10 and highlight each sum on the hundred chart.

Scroll back by pressing the  to view the number sentences and number patterns generated.

When finished, ask students to use the colored marker or crayon to color in those numbers not highlighted.

Students now have a representation of their number pattern and a model for their paper weaving.

Weaving Patterns

1. Distribute the pre-cut paper strips to each student (10 yellow and 10 blue). For the actual weaving, yellow will be used for the horizontal threads.
2. Have students place the 10 blue strips side by side in a vertical arrangement. (This may resemble a grass skirt.)
3. Ask students to weave the yellow strip to illustrate the +3 pattern: under two, over one, under two, over one and so forth. Glue the first row in place.

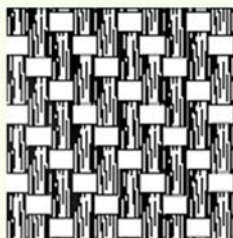
Example:

b	b	y	b	b	y	b	b	y	b
---	---	---	---	---	---	---	---	---	---

4. In the second row, students will continue: under one, over one, under two, over one, under two, over one, and so forth.

Teacher Tip

The example in this activity uses blue construction paper strips and blue markers/crayons. A different color may be used.



When working with very young students, it may be helpful to complete only part of the weaving.



Activity **3** (continued)

Questions for Students:

- ❖ *How would you describe your weaving to someone else in the class by using words about mathematics?*
- ❖ *How would you describe your weaving by writing?*
- ❖ *How would you describe your weaving with symbols?*
- ❖ *If you skip counted with another number, what would your weaving look like?*

5. Distribute another hundred chart to each student.

Assign each student a different number for skip counting.

Students can follow the same steps and weaving instructions.

Arrange sample weavings on a bulletin board or wall space for students to see. Discuss what students notice about the patterns.



Teacher Tip

It may be helpful to assign pairs or small groups of students the same number for skip counting.

Questions for Students:

- ❖ Using a sample number, like twelve, ask the following questions:
- ❖ *What numbers did you count with on the TI-10 using the **Op1** key to make 12?*
- ❖ *What can we say about 12 and the numbers used to count to twelve?*

Conclusion

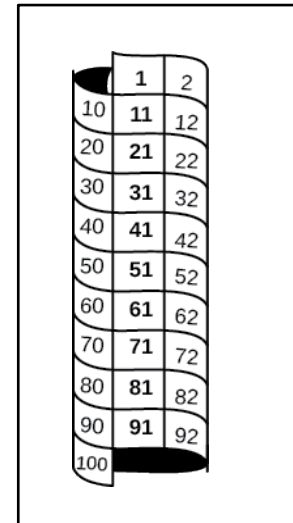
Have students use the TI-10 **Op1** feature and mini hundred charts to create other number patterns by skip counting as before.



Extension

Another example of skip counting patterns (multiples) can be illustrated by assigning individuals, pairs, or small groups a different number for skip counting. Students can color on another hundred chart.

1. Ask students to cut off three sides (the top, bottom, and one side) of the hundred chart, leaving the border on the fourth side.
2. Roll the hundred chart into a cylinder, as shown in the graphic to the right. The numbers should be lined up 10 next to 11, and so forth.
3. Tape or glue the cylinder along the seam.
4. Cut under the first row of numbers and continue cutting in a spiral manner. This will create a number line.
5. Display large sheets of butcher block paper or bulletin board paper (at least 100" in length).



Ask each student who has colored in multiples of two to glue the row on a separate sheet of butcher block or bulletin board paper. Next, ask students who have colored multiples of 3 to glue their row adjacent and underneath the one with multiples of 2. Continue the process until all rows have been assembled.



Teacher Tip

Depending on the class, this display may only include a few rows. As student understanding increases, continue to add rows throughout the year until a giant chart is created.



Lesson Materials

Hundred 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



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

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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

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81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

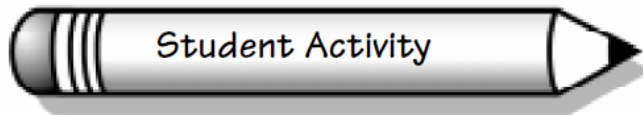
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
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71	72	73	74	75	76	77	78	79	80
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91	92	93	94	95	96	97	98	99	100



SOLUTIONS



Name _____

Date _____

Focus: Show a number pattern by skip counting.



Vocabulary

Write the meaning of the words.

Skip counting *counting forward or backward by a number other than 1*

Pattern *a repeated design or sequence*

Use the hundred chart.



Skip count by 5s to 100.

Color the count by 5 numbers on the hundred chart.

The first row is done.

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



2 Write the numbers you colored.

5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70

75, 80, 85, 90, 95, 100

_____, _____, _____, _____, _____, _____,

_____, _____, _____, _____, _____, _____,

_____, _____, _____, _____, _____, _____, _____, _____



Using the Calculator

3 Use the TI-10 to show skip counting by 5s.

Press $0 + 5 =$

Write what the TI-10 shows.

$0 + 5$	5
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4 Press $+ 5 =$

Write what the TI-10 shows.

$5 + 5$	10
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- 5** Keep pressing $+ 5 =$ until you get a sum of 100.

Write the sums that the TI-10 shows.

5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70
75, 80, 85, 90, 95, 100

- 6** Compare the pattern from question 1 to the pattern in question 5. What do you see?

Answers will vary. Possible answer: They are the same.
