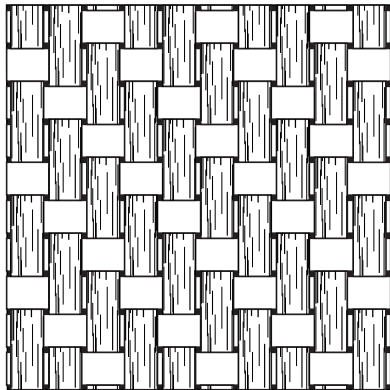


Unit 9

Weaving a Story




**Concepts**

- Algebraic thinking
- Patterns
- Skip counting
- Problem solving

Materials

- TI-10
- Book: *The Goat in the Rug*
- Yellow high lighter or crayon for each student
- Hundred charts
- Construction paper in strips of 1" x 10" (blue and yellow)
- Glue
- Blue markers or crayons for each student
- Connecting cubes
- Mini hundred charts
- Butcher block or bulletin board paper (at least 100-inches long)

Calculator Connections

- Scrolling  
- Constant feature 

Suggested Age/Grade Level

- Ages 6-8
- First through second grade

Overview

After listening to *The Goat in the Rug* written by Charles Blood and Martin Link, illustrated by Nancy Winslow Parker (Aladdin, 1992; Four Winds Press, 1987) students will construct a paper weaving using a hundreds 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.

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.

New Vocabulary:

Hundred Chart
Loom
Multiples
Navajo
Operation
Pattern
Repeated Addition
Skip Counting
Sum
Symbol

Activity A: 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 B: 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.

Teaching Tip:

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

3. Direct the students to continue the pattern until finished.

Questions to ask:










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

Possible Answers:

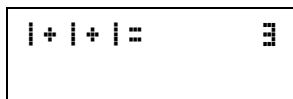
Answers may include counting, adding, +, $1+1+1$, or $+3$.

Activity C: Finding Patterns with the TI-10

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-10 displays:

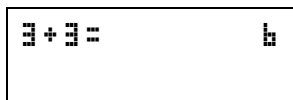


$$1 + 1 + 1 = 3$$

Question to ask:

- How might the TI-10 show this action another way?
6. Press   .

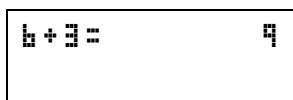
The TI-10 displays:



$$3 + 3 = 6$$

7. Press   .


The TI-10 displays:





$$6 + 3 = 9$$

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

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.




Sample 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

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


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

8. Reset the TI-10.

9. Press   3 .

10. Press the number you wish to start with, in this case , and then press .

The TI-10 displays:


number sentence →  ← result
 counter → 

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


11. Remove the first cube from your hundred chart and highlight the numeral 3.

12. Press the  again.

13. Remove the second cube and highlight that sum on the hundred chart.

14. Press  again.

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  key 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.

Activity C: 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.

Questions to ask:

- 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.

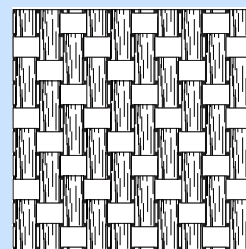
Students can follow the same steps and weaving instructions.

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

Teaching Tip:

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

Teaching Tip:



Teaching Tip:

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

Teaching Tip:

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

Sample Cylinder:**Teacher Note:**

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.

Using a sample number, like twelve, ask the following questions:

- What numbers did you count with on the TI-10 using the **[Op]** 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 **[Op]** feature and mini hundred charts to create other number patterns by skip counting as before.

Extensions

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 left. 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. Place large sheets of butcher block paper or bulletin board paper (at least 100" in length) on the floor.

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 with multiples of 2. Continue the process until all rows have been assembled.

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

Mini 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

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

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