My Friend TEN

Topic
Addition/number families

Key Question
What are all of the ways you can make the number 10 by adding two numbers?

Learning Goals
Students will:
- use Unifix cubes to model addition problems, and
- explore the various combinations of numbers that will produce 10.

Guiding Document
NCTM Standards 2000*
- *Illustrate general principles and properties of operations, such as commutativity, using specific numbers*
- *Model situations that involve the addition and subtraction of whole numbers, using objects, pictures, and symbols*
- *Develop a sense of whole numbers and represent and use them in flexible ways, including relating, composing, and decomposing numbers*
- *Gain new mathematical knowledge through problem solving*

Math
Number and operations
  addition
Problem solving

Integrated Processes
Observing
Recording
Comparing and contrasting
Applying

Problem-Solving Strategies
Write a number sentence
Use manipulatives
Organize the information
Look for patterns

Materials
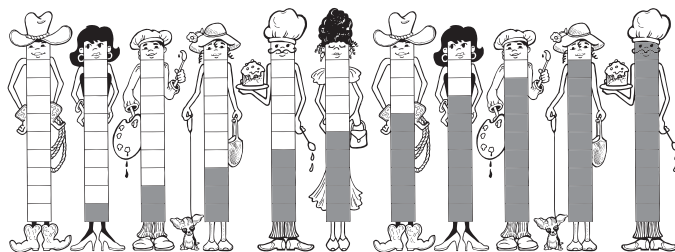Student page, two copies per student
Unifix cubes
Crayons

Background Information
Young learners need multiple hands-on experiences to develop a strong sense of number and number operations. In this activity, the target sum is 10 and students will physically connect two colors of Unifix cubes to represent the two addends that combine for a tower of ten. As students are linking the various combinations and making a record of their work on the student pages, they will be gaining insight into the process of addition, the fact family of 10, and the commutative property. Throughout this process, students will make use of multiple problem-solving strategies, including using a manipulative and writing a number sentences.

Management
1. Each student will need 10 Unifix cubes each in two colors, one color for each addend. They should also have corresponding crayons for recording purposes.
2. As written, the activity asks students to find combinations for 10. It is suggested that you further students' exploration of number families by assigning various other numbers for students to compose during center time or as a home link.
3. Allow students to use $2 + 8 = 10$, and $8 + 2 = 10$ in order for them to gain exposure to the commutative property.
4. Prior to teaching this lesson, enlarge and cut apart 11 "friends" and color them to represent each possible solution (from $0 + 10 = 10$ to $10 + 0 = 10$).
   These large copies will be used during the whole-class sharing time.

Procedure
1. Give each student the Unifix cubes and crayons in matching colors, along with two copies of the student page.

2. Draw students' attention to the student page. Together count how many Unifix cubes make up each "friend." [10]
3. Ask the *Key Question.*
4. Challenge the class to find all of the possible ways to make 10. Explain that they are to use two colors in each combination and that they should first build and count, then record the combination in both colors and numbers.
5. Allow time for students to work.
6. Gather the class back together and ask the groups to share their combinations. As the groups share solutions, place the corresponding "friends" that you prepared ahead of time on the board (see *Management 4).*
7. When all solutions have been identified, ask the class to help you organize the "friends" so that you can be sure that all solutions have been found and so that you can look for patterns in the solutions. Elicit suggestions for how to organize the friends. If students do not suggest it, guide them to see that a good way would be by starting with the 0 + 10 = 10 friend, then placing the 1 + 9 = 10 friend next to that, and so on.
8. Discuss the patterns revealed and the relationship between "pairs" of solutions, such as 1 + 9 = 10 and 9 + 1 = 10.
9. End with a discussion about what would happen if they chose a different target number or used three colors instead of two.

Connecting Learning
1. How many ways did you find to make 10? Do you think you have found them all? Why or why not?
2. How can we see if all possible solutions have been discovered? [Have all groups share and organize the information to see if anything is missing.]
3. How many ways are there to make 10 with two colors of Unifix cubes? [11]
4. How is the 3 + 7 = 10 friend like the 7 + 3 = 10 friend? [Both friends use the same numbers to make 10.] How are they different? [The colors are in different places, the numbers are in a different order, etc.]
5. What patterns do you see in our friends when we have them organized in order? [One color grows and the other one shrinks; the 0 + 10 = 10 friend is at the opposite end from the 10 + 0 = 10 friend; there are two friends for every pair of numbers except for 5; etc.]
6. How would the activity change if you used a different target number or had three colors of cubes instead of two?
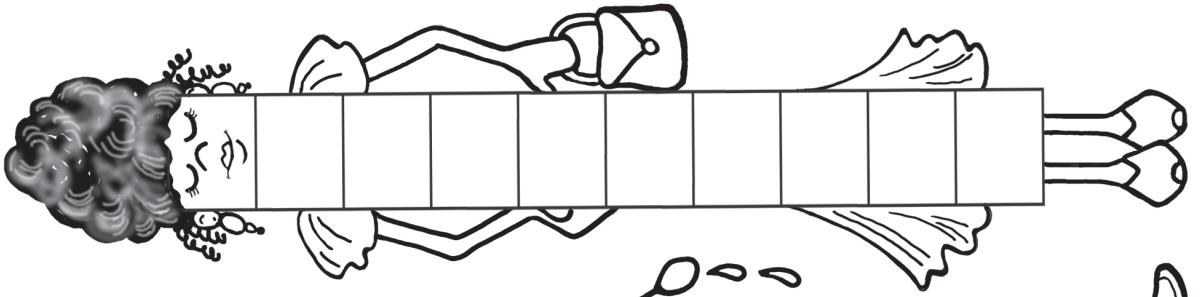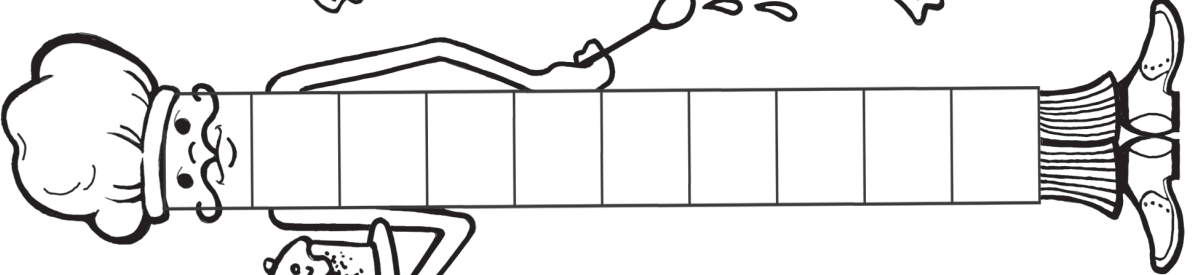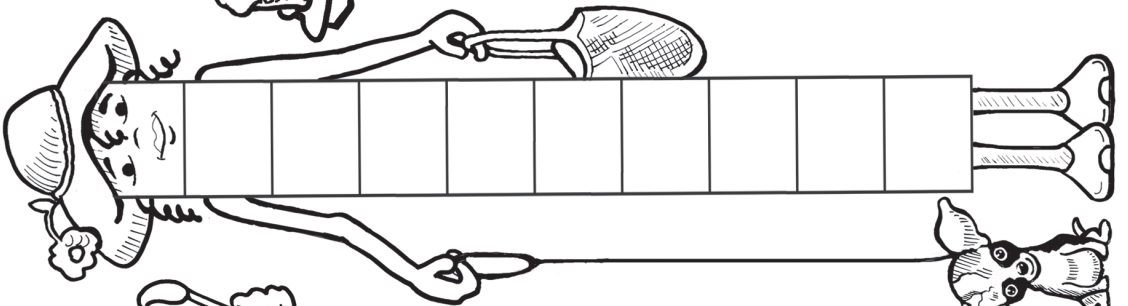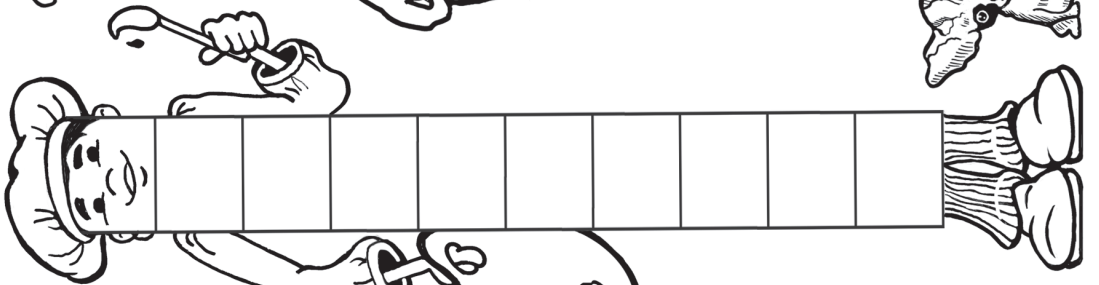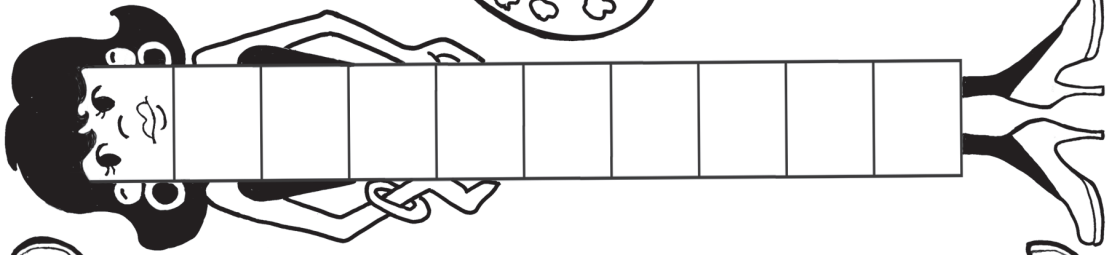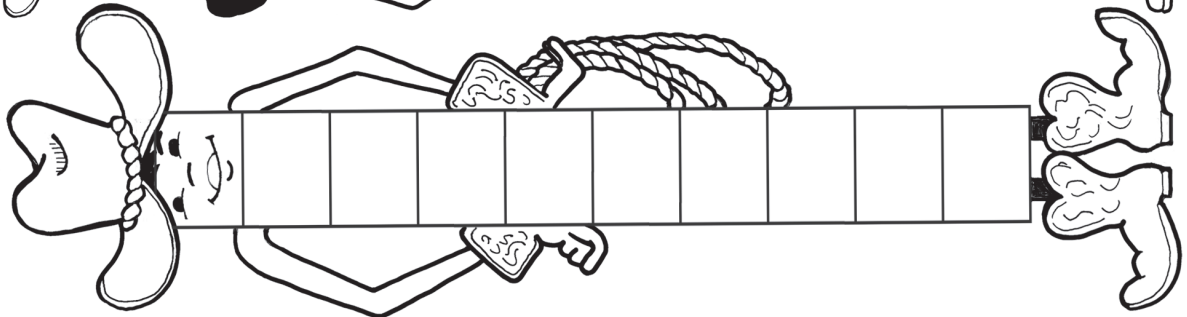
Extensions
1. Repeat the experience with different target numbers and compare the patterns in the solutions.
2. Repeat the experience using three colors of Unifix cubes. How many more solutions are possible? How can they be organized so that you know you have found them all?

My Friend TEN

How many ways can you make 10?

_____ + _____ = 10

_____ + _____ = 10

_____ + _____ = 10

_____ + _____ = 10

_____ + _____ = 10

_____ + _____ = 10