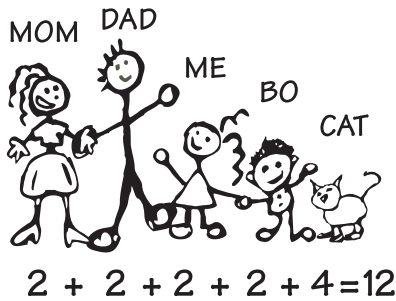


## Unit 10

## Who's in the House



- Algebraic thinking
- Combinations
- Problem solving
- Data management

- TI-10
- Book: *The Napping House*
- Manila paper
- Pencil
- Drawing paper
- Crayons
- Tape
- Index cards

- Skip counting
- Scrolling
- Order of operations

**Suggested Age/Grade Level**

- Ages 7-9
- First through second grades

*Overview*

Read *The Napping House* written by Audrey Wood, illustrated by Don Wood (Harcourt, Inc., 1984) to engage students in solving the problem of how many feet are in the bed. Each student constructs a model of his or her own house, drawing pictures of the people and pets in the house. Students use skip counting strategies to find possible combinations of people and pets that live in their classmates' houses.

*Assessment*

Throughout the activities, questions are included for formative assessment. Student work samples should be used as a check for understanding.

**Vocabulary:**

Combinations  
 Greatest  
 Least  
 Number Sentences  
 Skip Counting  
 Total  
 Triangle

**Teaching Tip:**

This is just one example of how students might represent the characters in the story.

**Teaching Tip:**

There may be some discussion about the number of feet on a flea. The fact that the flea is an insect having 6 feet is not as important as the students representing their thinking.

### Activity A: Connecting Literature and Mathematics

1. Read *The Napping House* to the class.
2. After reading through the story, read through it a second time, stopping to allow students to sequence the order in which the characters get into the bed. You may use sticky notes with character names and/or pictures to show the building pattern.

Example:

				Flea	
				Mouse	Mouse
			Cat	Cat	Cat
		Dog	Dog	Dog	Dog
	Boy	Boy	Boy	Boy	Boy
Granny	Granny	Granny	Granny	Granny	Granny

3. Tell the students to go back to their groups and work together to find how many feet were in the bed. They should show their thinking by using pictures, words, and symbols.

As students work, circulate around the room posing questions to groups that need assistance. For example:

- Do they all have the same number of feet?
- Are you sure that you have included all the characters?
- How many feet do you think a flea has?
- Is there another way you could do this problem?
- How would the problem change if the boy had a dog and a puppy instead of a cat? Use other examples such as a bird on top of the cat instead of a mouse.

After providing time for the group work, allow each group to share its findings.

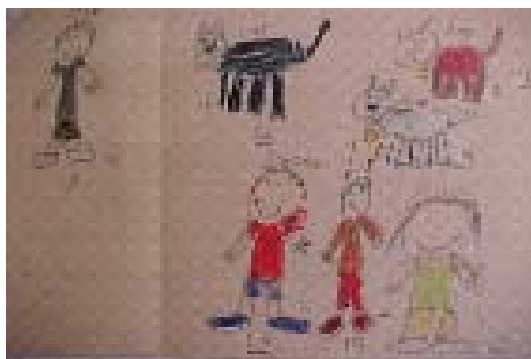
### *Activity B: Connecting Mathematics and Art*

1. Model folding the paper house step-by-step (the instructions are located at the end of this activity) as students use a sheet of manila paper and fold each step with you.
2. Draw a picture of yourself inside the house. Emphasize that you must draw your own two feet.
3. Model thinking aloud as you draw the other people and pets who live in your house.
4. Instruct students to draw and color the people and pets that live in his or her house inside the doors on their folded houses.

Questions to ask as students are working:

- How are you finding the total number of feet in your house?
  - Would your number change if this were a cat instead of a dog?
  - How many feet would you have if your gerbil just had three babies?
5. When students have completed their drawings, have them calculate the total number of feet in the house and write the number on the closed doors. Put a small piece of tape on the house to keep the doors closed.

Sample:



6. Have the students place their houses on a bulletin board or display area in a logical arrangement.

#### **Teaching Tip:**

Houses may be arranged least number of feet to most feet or vice versa. Houses with the same number of feet may be grouped together. Allow students to suggest patterns for the placement of the houses.

### Activity C: Skip Counting with the TI-10

Question to ask:

- What kinds of pets do you think your classmates have?

As students brainstorm, write animal names on the board and group by number of feet. Develop skip counting patterns for people and pets in the house.

- dogs, cats, hamsters - skip count by 4
- birds, people - skip count by 2
- fish, snakes - skip count by 0
- lady bugs, beetles - skip count by 6
- spiders - skip count by 8

1. Press  $\text{On}$   $\text{AC}$   $\text{Clear}$  to begin.
2. To explore skip counting by 2, press  $\text{0pl}$   $+$   $2$   $\text{0pl}$ .
3. Press  $0$ , the number you wish to start with.
4. Press  $\text{0pl}$  for each person in the house.

Each time  $\text{0pl}$  is pressed, another two feet are added. Students can scroll back by pressing the  $\text{Left}$  key to view the number sentences and the patterns generated. Students should continue to investigate skip counting patterns for other animals.

5. Reset the TI-10.

To skip count for dogs, cats, and other four-legged animals, press  $\text{0pl}$   $+$   $4$   $\text{0pl}$ .

To skip count for butterflies, ladybugs, or any insects, press  $\text{0pl}$   $+$   $6$   $\text{0pl}$ .

To skip count for spiders, press  $\text{0pl}$   $+$   $8$   $\text{0pl}$ .

Students will begin to see patterns develop when they skip count.

#### Resetting the TI-10:

Press  $\text{On}$  to wake it up if it has turned off.

Press  $\text{AC}$  if you need to clear the memory.

Press  $\text{Clear}$  to clear the display.

### Activity D: Order of Operations with the TI-10

Refer to the houses created in Activity B and ask the following questions.

- Who or what lives in these houses?
  - Can both people and pets live in the same house?
  - Can there be more than one kind of pet in a house?
  - Can there be several of the same kind of pet in a house?
1. Hold up a house with 12 feet inside. As a class, explore the different combinations of who or what may live in the house.

As students offer different possibilities, model the solutions with small plastic people and animals or simply with pictures drawn on the chalkboard. Use the TI-10 to find the solutions.

If students offer a solution that does not equal 12, use the TI-10 to discover how many more or less feet are needed. Group like numbers together (for example, four groups of two legs and one group of four legs).

2. Press  $( 4 \times 2 ) + ( 1 \times 4 ) =$ .

The TI-10 displays:

$$\begin{array}{r} (4 \times 2) + (1 \times 4) \\ = \quad \quad \quad 12 \end{array}$$

3. Press  $( 2 \times 2 ) + ( 2 \times 4 ) =$ .

The TI-10 displays:

$$\begin{array}{r} (2 \times 2) + (2 \times 4) \\ = \quad \quad \quad 12 \end{array}$$

4. Press  $( 1 \times 2 ) + ( 1 \times 8 ) + ( 1 \times 2 ) =$ .

The TI-10 displays:

$$\begin{array}{r} (1 \times 2) + (1 \times 8) \\ + (1 \times 2) = \quad 12 \end{array}$$

#### Possible Solutions:

4 people and a dog

$$2+2+2+2+4=12$$

2 people and 2 cats

$$2+2+4+4=12$$

1 person, a tarantula,  
and a bird

$$2+8+2+12$$

#### Teacher Tips:

To investigate animals with more than two legs, students can be introduced to  $( )$  and  $( )$ .

5. Direct the students to choose a house with a number of feet different from their own house.

Discuss with the class what they already know is in each house. They should be able to state that at least one child and one adult must be in each house because the child is a classmate who made the house and they are too young to live by themselves.

6. Give an index card to each student and instruct them to document what might live in the house they have chosen.

Since both people and pets may live in a house and there could be more than one kind of pet, students should investigate various combinations that could be inside the house. In addition to using the TI-10, children may wish to draw pictures, use manipulatives, or use another strategy to explore possible combinations.

### *Conclusion*

- Have students volunteer to share their findings.
- Classmates may check their peers' answers using the TI-10.
- If desired, open the doors of the house to see what is actually inside the house.

### *Extension*

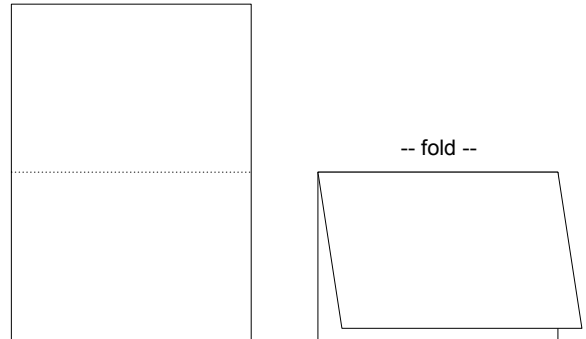
You might want to ask the students to consider if any pets might have an odd number of feet.

Questions to ask:

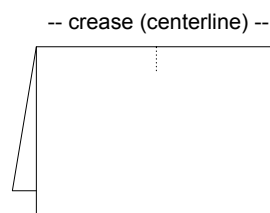
- Are there circumstances where a normal household pet might have an odd number of feet?
- What could have happened?
- Would this change your predictions? How?

## House Folding Instructions

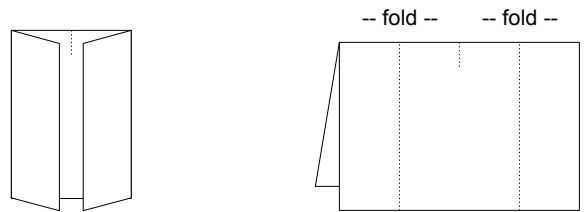
1. Holding a piece of manila or construction paper vertically, fold the paper in half...creating a "horizontal" fold.



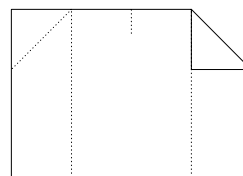
2. Along the folded edge only, make a small crease to indicate the centerline.



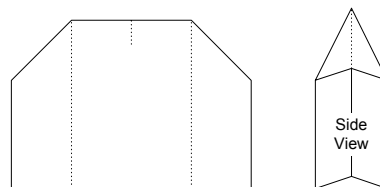
3. Fold the left and right sides of the paper to the centerline and then unfold.



4. Using the "vertical" folds created to the left and right as guidelines, create "dog ears" at the upper left and right corners. Fold the "dog ears" to the front and back several times to create a flexible fold.



5. With the paper lying flat, tuck the "dog ears" into the center of (between) the folded paper. The "dog ears" should not be seen from the front or back.



6. Fold the left and right sides of the top half of the paper to the centerline to create a house with doors.

