The Big Bug Band

A book about multiplication (arrays)

Aim

Multiplication can be represented using four different models: the area model, the set model, the linear model, and the combination model. *The Big Bug Band* uses arrays to introduce the area model.

These whole-class activities provide students with the opportunity to:

- listen to a story about array situations
- use materials to act out array situations
- act out array situations using the *Teaching Tool*
- investigate turnaround multiplication number facts
- use the array model to identify factors of a number
- explore square numbers and prime numbers

Activities

1. Listening to the story
2. Using materials to act out the story
3. Using the teaching tool to act out the story
4. Matching numeral cards with array models
5. Using the array to show multiplication number facts
6. Introducing the multiplication symbol
7. Using an array to explore the turnaround
8. Using the teaching tool to explore the turnaround
9. Using the teaching tool to identify multiple factors
10. Using the teaching tool to find missing parts of a number sentence
11. Using the teaching tool to investigate special numbers

I. Listening to the story

Resources

- *The Big Bug Band*

Activity

Show the cover of *The Big Bug Band* to students and read the title aloud. Encourage volunteers to predict what they think the story might be about. Slowly read the story and discuss the pictures. Then ask, **What happened in the story? What did you see in each picture?** Bring out that the bugs were marching in equal rows. Read the story again and for each double-page spread have students identify the number of rows, the number of bugs in each row, and the number of bugs in total.

2. Using materials to act out the story

Resources

- *The Big Bug Band*
- Connecting cubes

Preparation

Each student will need 24 connecting cubes.

Activity

Read *The Big Bug Band* and have students use their cubes to model the array depicted in each double-page spread. Ask, **How many rows are there? How many bugs in each row? How many bugs in total?** For each section of the band, encourage students to show the cubes in rows as individual cubes and pushed together as joined rows. This will provide a link to the "groups of" language for multiplication. For pages 16–17 of the story, have the students create their own array. Remind them that the 24 bugs must be arranged into equal rows. Bring out that more than one array can be used to represent 24. Discuss the students' solutions.

3. Using the teaching tool to act out the story

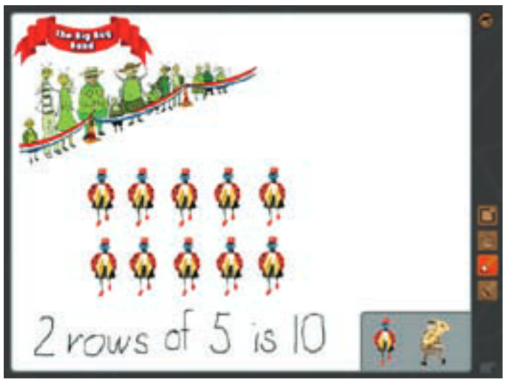
Resources

- *Teaching Tool*
- *The Big Bug Band*

Activity

Ensure that all the students can see the *Teaching Tool*. Read pages 4–5 of *The Big Bug Band*. Invite a volunteer to recreate the array depicted by dragging two rows of five bugs into the work area. Next, select another volunteer to identify the number of rows, the number of bugs in each row, and the number of bugs in total.

Invite a student to use the writing tool to record the array ***2 rows of 5 is 10*** below the bugs. Repeat for the remaining pages of the story. For the final spread of the story have a student create their own array. Bring out the fact that more than one array can be used to represent 24.



4. Making and recording arrays

Resources

- Connecting cubes

Preparation

Each group of students will need approximately 40 connecting cubes.

Activity

Challenge the groups of students to use the connecting cubes to create different arrays. Ask them to record each array, for example ***3 rows of 6 is 18***. Afterward, invite each group of students to share their arrays with the class. To extend the activity, have the students make an array that matches a given number sentence.

5. Using the array to show multiplication number facts

Resources

- Support 1 – see attached
- Large sheets of paper
- Scissors
- Permanent markers
- Glue

Preparation

Print multiple copies of Support 1. Each group of students will need some copies of Support 1, a large sheet of paper, scissors, a felt marker and glue.

Activity

Allocate a number from 1 to 6 to each group of students. Tell the students that this is the number of squares in each row of their arrays. Have them work together to cut out different arrays of squares. Remind them that the number in each row must always bethe number that their group has been allocated. For example, for a group allocated 3, they would cut out arrays that show 1 row of 3, 2 rows of 3, 3 rows of 3, 4 rows of 3, and so on. Have the students paste each array on their large sheet of paper and write the completed number sentence below. When all the groups have finished, compare and discuss the arrays. Ask, **What do you notice about the shape of the arrays? What happens as more rows are added? Which arrays look different, yet have the same number of squares in total?**

6. Introducing the multiplication symbol

Resources

- *The Big Bug Band*
- Connecting cubes
- Calculator

Activity

Write ***2 rows of 9*** on the board. Ask, **Which picture in *The Big Bug Band* matches these numbers? What is another way to write the words?** Provide cubes for a student to model the two rows of nine unconnected cubes and then join the cubes in each row to show two "groups of" nine and include this language as an alternative. Write ***2 groups of 9*** under the first expression on the board. Ask, **Does anyone know a quicker way to write this?** Encourage a confident individual to suggest the multiplication symbol and show the buttons on a calculator to remind students of where they might have seen the symbol. Reinforce the students' understanding by saying, **This symbol is a shorter way of writing "rows of" or "groups of" and it can used be for any situation.** Write 2×9 on the board. Repeat for other arrays in the story.

7. Using an array to explore the turnaround

Resources

- Support 1 – see attached
- Scissors

Preparation

Each student will need a copy of Support 1 and scissors.

Activity

Write $2 \times 4 = 8$ on the board and have the students cut out the matching array. Have the students display their array and ask one student to describe the number of rows, the number in each row, and the total number of squares. Then ask, **What will happen if I turn the array? What will it look like? What number sentence will we write? Will the total number of squares be different?** Turn the array to confirm the students' predictions. Bring out the fact that no squares have been removed or added so the total is the same but the array does look different when it is turned. Extend the activity by having students cut out new arrays and write the matching turnaround multiplication fact $4 \times 2 = 8$. Repeat for other arrays to reinforce the concept.

8. Using the teaching tool to explore the turnaround

Resources

- *Teaching Tool*

Activity

Ensure that all the students can see the *Teaching Tool*. Invite a volunteer to drag an array of bugs into the work area. Have the student describe the array and identify the number of rows, the number in each row, and the total. Use the writing tool to write the matching number sentence below the array. Move the bugs back to the tray and then select another volunteer to drag bugs into the work area to show the turnaround multiplication fact. Again, have the student identify the number of rows, the number in each row, and the total. Ask, **Has the total number changed? What is different about the arrays? What is the same?** Write the turnaround fact below the first number sentence. Reset the tool and repeat for other arrays.

9. Using the teaching tool to identify multiple factors

Resources

- *Teaching Tool*

Activity

Ensure that all the students can see the *Teaching Tool*. Invite a volunteer to drag bugs into the work area to make an array for 24. Ensure that the volunteer writes the multiplication number fact below the array. Next, challenge the other students to find other arrays for 24. Invite volunteers to show their arrays and write the matching number fact. Repeat for other numbers such as 16 and 32 that have multiple factors.

10. Using the teaching tool to find missing factors

Resources

- *Teaching Tool*

Activity

Ensure that all the students can see the *Teaching Tool*. Use the writing tool to write the incomplete number fact ____ × *3* = *12* toward the base of the screen. Invite students to make an array in the work area to figure out the missing part of the number sentence. Encourage students to identify alternate factors that could be used to complete the number sentence, for example 3 × 4, 6 × 2, 2 × 6, 1 × 12, and 12 × 1. To extend the activity, remove both factors and write only the total of the number fact. Ask, **How many arrays can we make that show a total of 24?**

II. Using the teaching tool to investigate special numbers

Resources

- *Teaching Tool*
- *The Big Bug Band*

Activity

Ensure that all the students can see the *Teaching Tool*. Use the writing tool to write the incomplete sentence ___ × ___ = *11* in the work area. Challenge students to make an array to complete the number sentence. After several trials, bring out the fact that some numbers have only factors of themselves and one. Ask students to find other numbers from 1 to 20 that fall into this category. Create bug arrays to confirm their findings.

Read pages 10–11 of *The Big Bug Band*. Invite a volunteer to model the array on the *Teaching Tool* and write the matching number sentence below. Have students identify the shape of the array. Encourage students to explain that five rows of five make an array that is shaped like a square. Challenge students to find other arrays that make a square and have them use the *Teaching Tool* to demonstrate their findings to the class.

Grid Paper