

Multiplying and Trading

Reporting Category	Computation and Estimation
Topic	Multiplying whole numbers
Primary SOL	4.4 The student will b) add, subtract, and multiply whole numbers.

Materials

- Base-10 blocks
- Calculators
- Multiplication Using Base-10 Blocks handout (attached)

Vocabulary

multiply, factor, product, array, area model

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Using base-10 blocks, demonstrate an array to show the product of 5 times 6. Choose a student to model a solution for the class, using the blocks. Explain to students that today they will be exploring the area of a rectangle whose dimensions are larger factors.
2. Lead a discussion of using the area model to find the product of 13 times 34. Have students share their suggestions.
3. Demonstrate how to build a 13-by-34 rectangle with base-10 blocks. Begin by representing 13 with 1 rod and 3 units to correspond to the length of the rectangle. Then represent 34 with 3 rods and 4 units placed to correspond to the width of the rectangle. Remind students that they were able to find the product of 5 times 6 by completing a rectangle that was 5 units wide and 6 units long and that the same process can be used to find the product of two-digit factors. Ask students what blocks can be used to complete the 13-by-34 rectangle, using the fewest number of blocks. Have them start with the largest blocks, the flats. Model placing the 3 flats in the rectangle. Ask students how many rods will fit in the remaining area. Next, ask how many units will fit in the remaining area. At this point, students should have created a rectangle containing 3 flats, 13 rods, and 12 units. After trading in units for rods and rods for flats, students should have a final value of 4 flats, 4 rods, and 2 units.
4. Have students work in pairs to find the product of 25 times 32, using the same process.
5. Explain to students that they will be recording in a table the results of several such problems and will be looking for patterns that occur with the number of flats, vertical rods, horizontal rods, and units. Distribute copies of the Multiplication Using Base-10 Blocks handout, which already has the first problem represented as an example. Review the results listed in the table. Ask students to record the information in the second row of the table for the product of 25 times 32. Discuss the patterns that students observe, and ask them to share any other observations.

Assessment

- **Questions**

- How would you solve a problem that resulted in 12 flats, 6 vertical rods, 6 horizontal rods, and 8 units? How would you use this strategy to complete this solution?
- Could we use this strategy to multiply larger numbers—i.e., more than 2-digit numbers? If so, how?

- **Journal/Writing Prompts**

- Write a letter to your teacher explaining what you discovered about this multiplying and trading strategy.
- Write a list of steps to follow for this strategy.

Extensions and Connections (for all students)

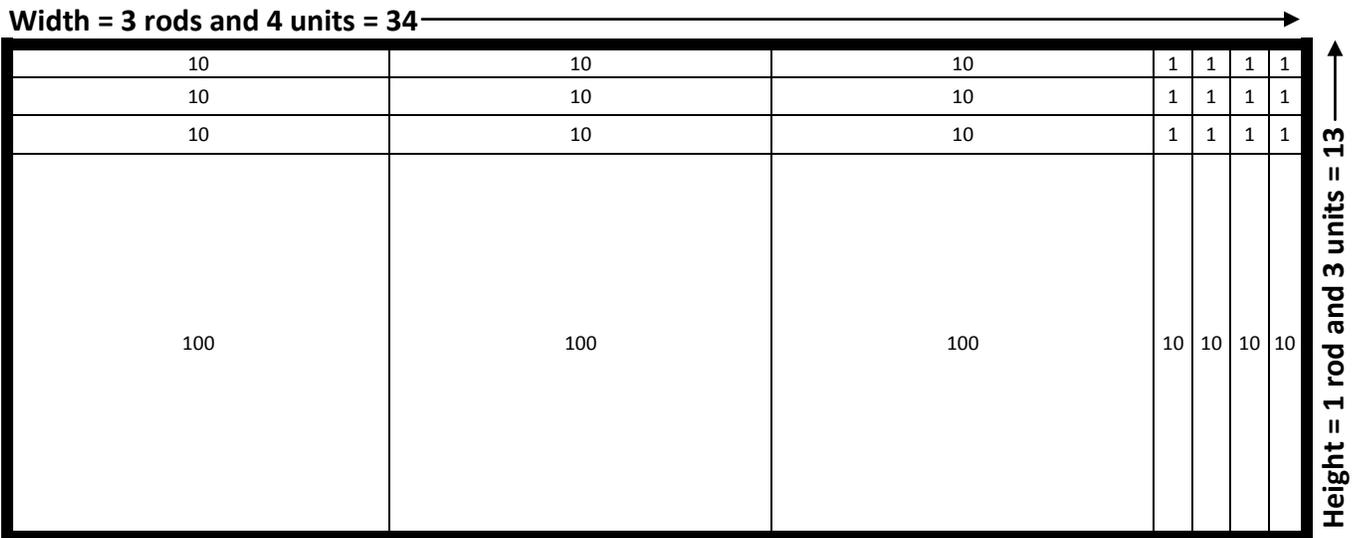
- Distribute index cards, and have each student create a study card illustrating this strategy. Have them put the two-digit number times the two-digit number multiplication problem on one side of the card and illustrate the strategy on the reverse side. Have them include any helpful notes on this side as well.

Multiplication Using Base-10 Blocks

Name _____ Date _____

Represent the problem $13 \times 34 = \underline{\quad}$ as shown below. Use trading to find the product.

- Represent 13 vertically. (The height of the rectangle equals the first factor.)
- Represent 34 horizontally. (The width of the rectangle equals the second factor.)
- Fill in the rectangle with as few base-10 blocks as possible.
- The sum of the value of these blocks after trading is the product.



Use this strategy to find the following products. Fill in the following table for each product.

Problem	No. Flats	No. Vertical Rods	No. Horizontal Rods	No. Units	Product
$13 \times 34 = \underline{\quad}$	3	4	9	12	442
$25 \times 32 = \underline{\quad}$					
$12 \times 23 = \underline{\quad}$					
$16 \times 13 = \underline{\quad}$					

Refer to the table above.

- How did you determine the number of flats in the rectangle in each problem?
- How did you determine the number of vertical rods in the rectangle in each problem?
- How did you determine the number of horizontal rods in the rectangle in each problem?
- How did you determine the number of units in the rectangle in each problem?
- Use the strategy you just discovered to find the following products mentally:
 - $31 \times 22 = \underline{\quad}$
 - $41 \times 12 = \underline{\quad}$
 - $52 \times 45 = \underline{\quad}$
 - $28 \times 36 = \underline{\quad}$
- Why does this work?