4th Grade Math: Multiplying by a 1-Digit Number

Lesson Objective:

By the end of this lesson, students will be able to:

- Multiply multi-digit numbers by a 1-digit number.
- Use different strategies such as area models, place value, and standard algorithm to multiply.
- Apply multiplication of multi-digit numbers to solve real-world problems.

1. Introduction to Multiplying by a 1-Digit Number

What Does It Mean to Multiply by a 1-Digit Number?

- Multiplying by a 1-digit number means finding the product of a number (with multiple digits) and a single-digit number.

Example:

Multiply **46 × 3**. This means adding **46** three times:

46 + 46 + 46 = 138, or we can solve it more efficiently using multiplication.

2. Place Value Strategy

Understanding Place Value: When multiplying a multi-digit number by a 1-digit number, we can break down the multi-digit number by place value (ones, tens, hundreds, etc.).

Example: Multiply **23 × 4**:

1. Break apart **23** into **20 + 3**.
2. Multiply each part by **4**:
    - **20 × 4 = 80**
    - **3 × 4 = 12**
3. Add the products:

80 + 12 = 92.

3. Area Model for Multiplying by a 1-Digit Number

Using the Area Model: The area model is a visual method to multiply a multi-digit number by a 1-digit number. We break the number into parts and represent them as areas.

Example: Multiply **34 × 5** using the area model.

4. Break **34** into **30 + 4**.
5. Draw a rectangle, divide it into two parts (one for **30** and one for **4**).
6. Multiply each part by **5**:
    - **30 × 5 = 150**
    - **4 × 5 = 20**
7. Add the areas (products):

150 + 20 = 170.

4. Standard Algorithm for Multiplication

Steps for the Standard Algorithm: This is the traditional method used for multiplying multi-digit numbers by 1-digit numbers.

Example: Multiply **275 × 3** using the standard algorithm:

8. Start by multiplying the ones place:

5 × 3 = 15. Write down **5**, carry over **1**.

9. Multiply the tens place:

7 × 3 = 21, plus the carried over **1** makes **22**. Write down **2**, carry over **2**.

10. Multiply the hundreds place:

2 × 3 = 6, plus the carried over **2** makes **8**.

11. The final product is **825**.

5. Word Problems with Multiplying by a 1-Digit Number

Example Word Problem 1: Lucy is buying pencils. Each pack contains **7 pencils**, and she buys **5 packs**. How many pencils does she have in total?

Solution: Multiply **7 × 5**:

7 × 5 = 35. Lucy has **35 pencils**.

Example Word Problem 2: A farmer has **123 apple trees**. Each tree produces **4 apples**. How many apples are there in total?

Solution: Multiply **123 × 4** using the standard algorithm:

12. **3 × 4 = 12** (write down **2**, carry over **1**).
13. **2 × 4 = 8**, plus **1** makes **9**.
14. **1 × 4 = 4**. The final product is **492 apples**.

6. Practice Problems (Guided Practice)

Using Place Value:

15. Multiply **42 × 6**.
16. Multiply **56 × 3**.

Using the Area Model:

17. Multiply **65 × 4** using an area model.
18. Multiply **47 × 2** using an area model.

Using the Standard Algorithm:

19. Multiply **198 × 5**.
20. Multiply **324 × 3**.

7. Independent Practice

Place Value Strategy:

21. Multiply **53 × 7**.
22. Multiply **84 × 5**.

Area Model:

23. Multiply **72 × 6** using the area model.
24. Multiply **93 × 4** using the area model.

Standard Algorithm:

25. Multiply **267 × 8**.
26. Multiply **431 × 6**.

8. Challenge Problems

Challenge Problem 1: Multiply **546 × 9** using the standard algorithm.

Challenge Problem 2: A bus can carry **45 passengers**. How many passengers can **6 buses** carry? Solve using the method of your choice.

9. Review and Wrap-Up

- **Recap Key Concepts:**
  - Use place value to break apart numbers when multiplying.
  - Area models can help visualize the multiplication process.
  - The standard algorithm is an efficient method for multiplying multi-digit numbers by 1-digit numbers.
- **Discuss:** Which method do you find easiest? Why?