

What Does "Times" Really Mean in Multiplication?

Multiplication as Scaling

Students need to conceptualize multiplication as more than "repeated addition." Otherwise, taking parts of parts, like multiplying with rational numbers, will not make sense. We want students to understand multiplication as "groups of" or "as many times as" to develop multiplicative thinking.

When problems are presented contextually, each factor in the multiplication problem takes on a distinct role:

| | | | | |
|-------------------------|---|--------------------------------|---|---------|
| factor | x | factor | = | product |
| MULTIPLIER | | MULTIPLICAND | | |
| <i>How many groups?</i> | | <i>How many in each group?</i> | | |

Examples:

There are 4 baskets with 3 apples in each basket. How many apples are there in all?

Multiplier: 4 baskets (groups of)

Multiplicand: 3 apples (number in each group)

Equation: $4 \times 3 = 12$ apples

There are 3 rows of tulips in the garden with 5 tulips in each row. How many tulips are there?

Multiplier: 3 rows (groups of)

Multiplicand: 5 tulips (number in each group)

Equation: $3 \times 5 = 15$ tulips

What is the area of a 2 cm long by 6 cm wide rectangle?

Multiplier: length of 2cm (groups of)

Multiplicand: width of 6 cm (number in each group)

Equation: $2 \times 6 = 12 \text{ cm}^2$

Comparative Multiplication Standards

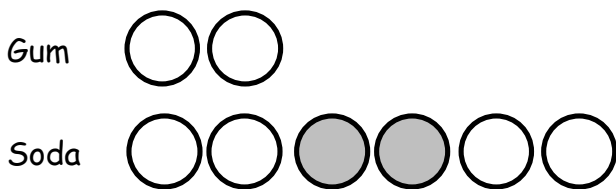
4.OA.1: Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

4.OA.2: Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown to represent the problem, distinguishing multiplicative comparison from additive comparison.

Using Tape Diagrams to Make Sense of Comparative Multiplication

Begin with concrete manipulatives like transparent chips or Unifix cubes to build the multiplicative relationships:

*A pack of gum costs \$2. A twelve-pack of soda costs 3 times as much as the gum.
How much does the soda cost? $3 \times 2 = \$6$*



Then transition to the use of tape diagrams, which are a more abstract visual representation of the multiplicative relationship:

*Ariel has 4 times as many game tokens as her little brother, Mitch.
If Mitch has 6 tokens, how many tokens does Ariel have? $4 \times 6 = 24$ tokens*

