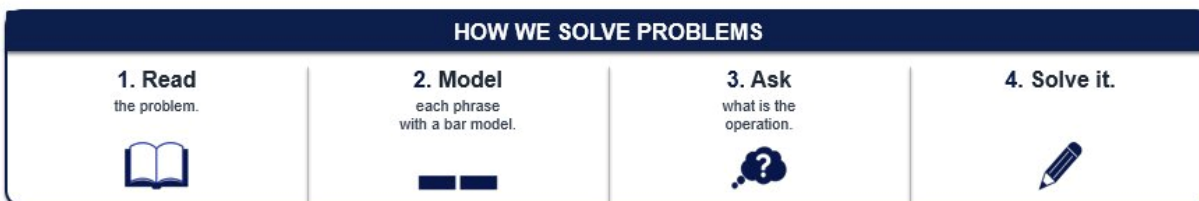


The Power of the Bar Model

How Bar Models Help K–8 Students See the Structure Behind Word Problems

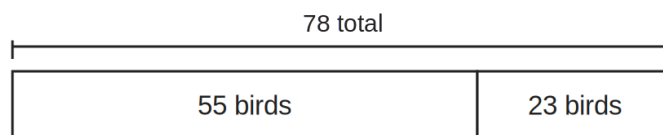


Rectangles to Show Proportional Relationships

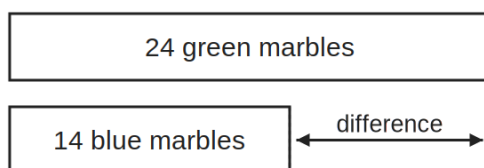
Bar models grow with students from kindergarten through grade 8. The same simple rectangle that represents “55 birds” in first grade can later represent “ x^2 ” in algebra.

K–2: Whole Numbers

In the early grades, bar models support join, separate, part-whole, and compare situations.



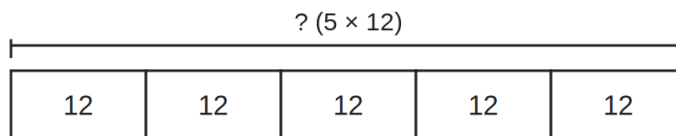
Join / Part-Whole: $55 \text{ birds} + 23 \text{ birds} = 78 \text{ total}$



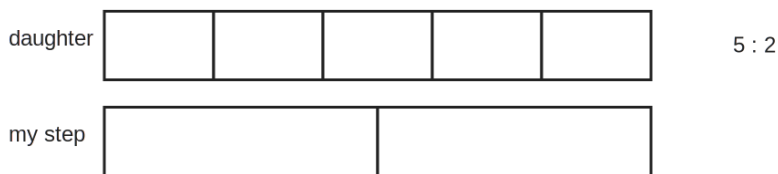
Compare: $24 \text{ green marbles vs. } 14 \text{ blue marbles}$

3–6: Multiplication, Division, Ratio, and Percent

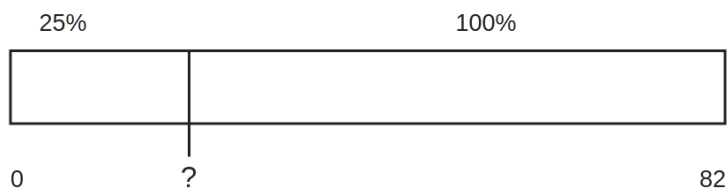
In the upper elementary grades, bar models extend naturally to multiplicative situations, fractions, decimals, ratios, and percents.



Multiplication: $5 \times 12 = ?$ (and $60 \div 5 = ?$)



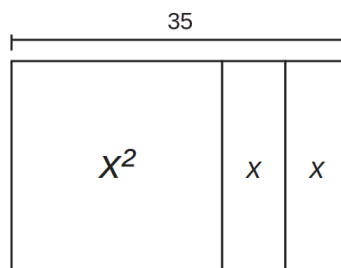
Ratio: daughter's step to my step (5 : 2)



Percent: 25% of 82 is ?

Algebra: Same Model, New Quantities

The same rectangle structure represents algebraic expressions, helping students see equations as relationships rather than symbols to manipulate.



$$x^2 + 2x = 35$$

Algebra: $x^2 + 2x = 35$

Why Bar Models Work

1. Bar models reduce cognitive load

- Word problems require students to process language, track quantities, and coordinate relationships all at once.
- The bar model puts the structure on paper so students don't have to hold it in their heads.
- This frees up mental resources to focus on reasoning and operations.

2. Bar models build spatial reasoning

- Spatial reasoning predicts long-term success in mathematics.
- Bar models support dual coding by connecting visual and verbal information, which strengthens both comprehension and memory.

3. Bar models make structure visible

- They support schema development, helping students recognize problem types across contexts.
- They promote transfer to new and unfamiliar problems by emphasizing relationships rather than surface features.

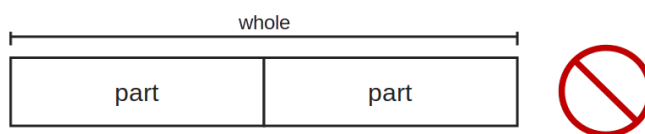
Common Pitfalls: Three “Don’ts”

Don’t #1: Treat bar models as a procedure

Bar models are not just another step to follow. They are a way to reveal relationships and structure. Always model first, then solve. The point is to expose the relationships behind the numbers — not to memorize how to draw a bar.

Don’t #2: Use equal-size rectangles unless quantities are equal

Drawing equal-size parts when quantities are unequal hides the very structure the model is meant to reveal. The size of each rectangle should reflect the relative size of each quantity.



Don’t #3: Use part-whole language unless it’s a part-whole problem

Default “part-part-whole” language doesn’t fit every situation. For comparison, ratio, or percent problems, use language that fits the context — quantities, units, total, difference, factor, and so on. Match the words to the structure.

Bar models work because they make structure visible, support schema development, and promote transfer.
