Bar Diagrams:
Draw Your Way to Problem Solving Success

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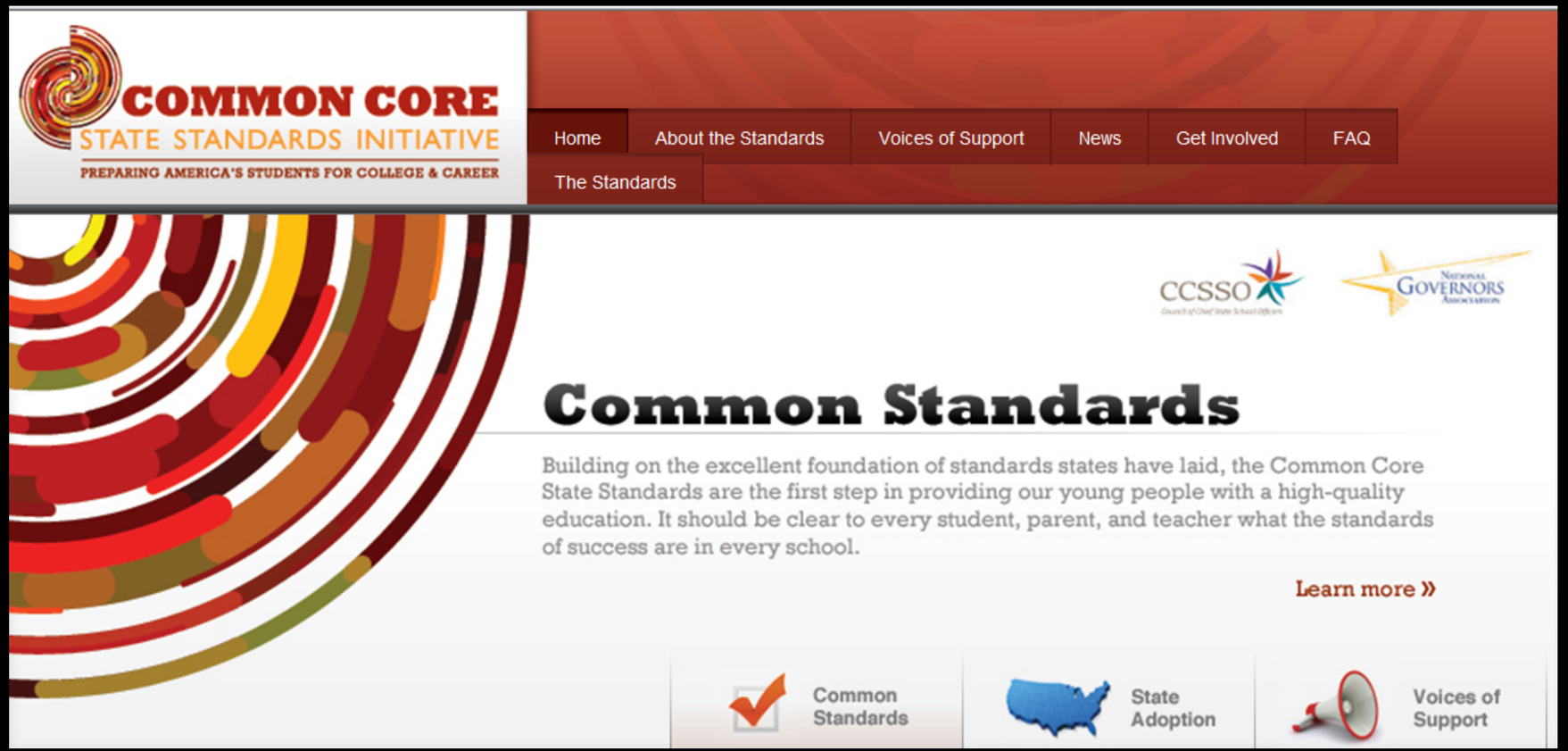
What's the Problem with Problem Solving?

Basic computation:
80-90% accuracy

Comprehension:
____ accuracy

Agenda

1. Highlight the Common Core Standards for Mathematical Practice
2. Solve Enhanced Bar Diagrams
   - Learn
   - Teach
   - Solve problems grades 3-8



http://corestandards.org/

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Mathematical Practices

The Standards of Mathematical Practice describe "processes and proficiencies" that maximize students' deep and lasting conceptual understanding in mathematics.

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Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.

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Mathematical Practices

5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

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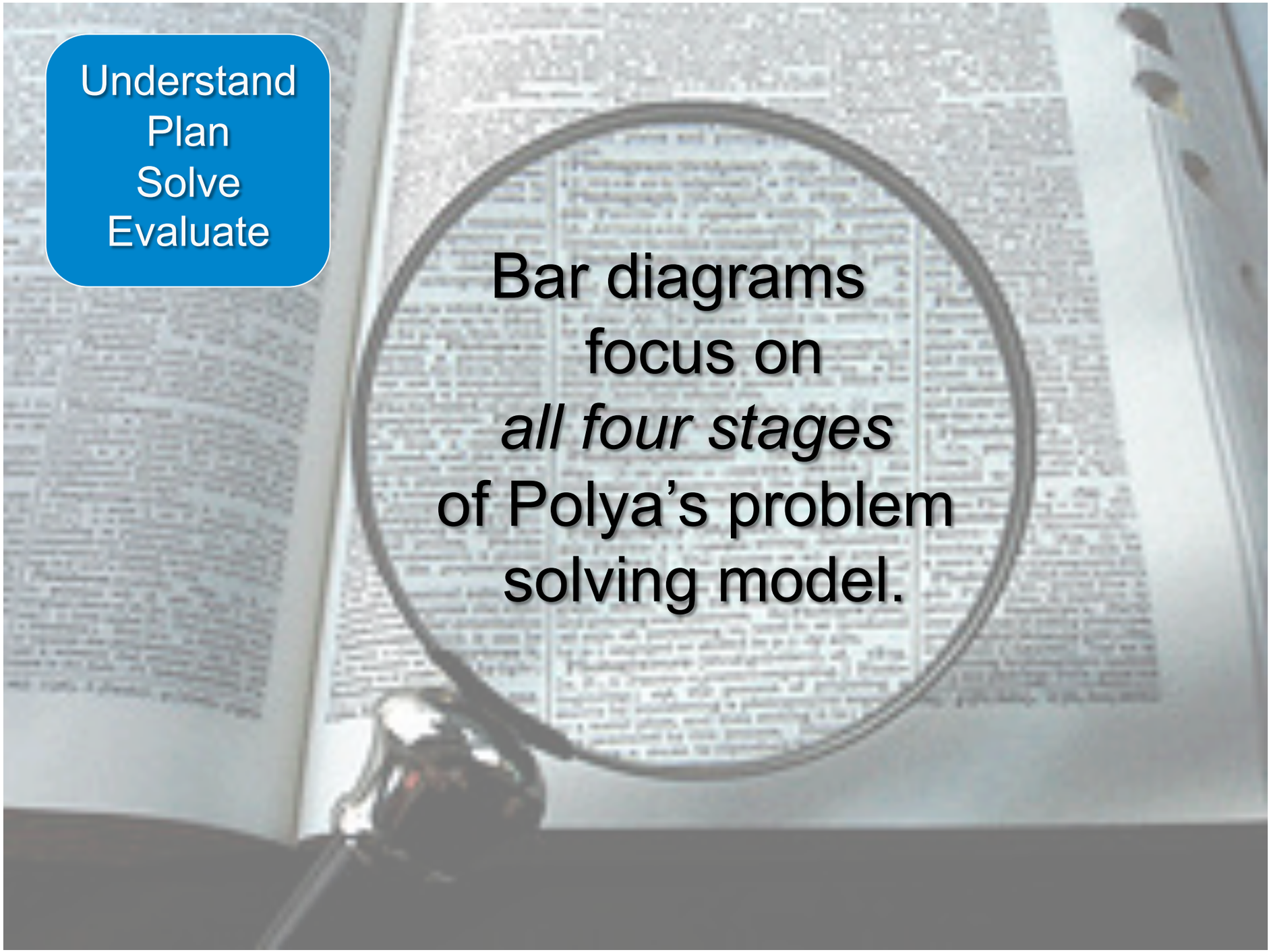
Polya's Problem Solving Stages

1. Understand: Identify what is known and what is unknown.
2. Plan: Decide how you will solve the problem.

3. Solve: Execute the plan.
4. Evaluate: Assess reasonableness using substitution.


Understand
Plan
Solve
Evaluate
Bar diagrams
focus on
all four stages
of Polya's problem
solving model.

There are 3 birds on a tree branch.
2 birds fly over to the same branch.
How many birds are on the branch now?

Enhanced Bar Diagramming

Understand

There are 3 birds on a tree branch.
2 birds fly over to the same branch.
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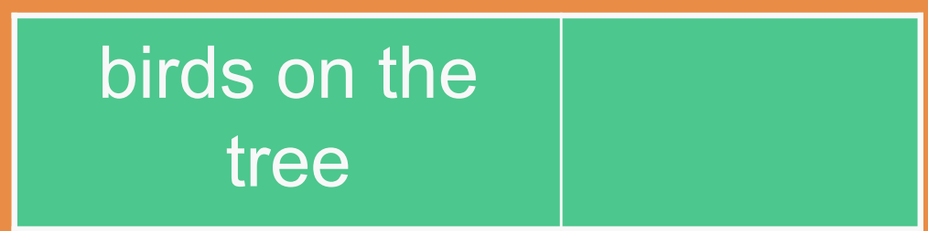

How do words inside the model affect understanding?

Enhanced Bar Diagramming

Understand

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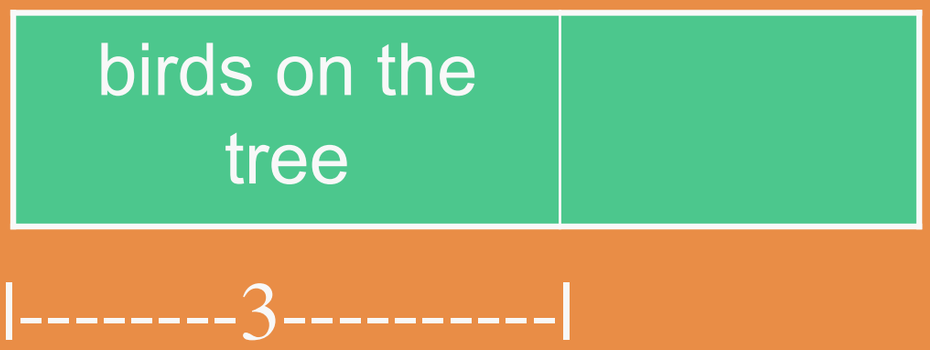

Enhanced Bar Diagramming
Understand

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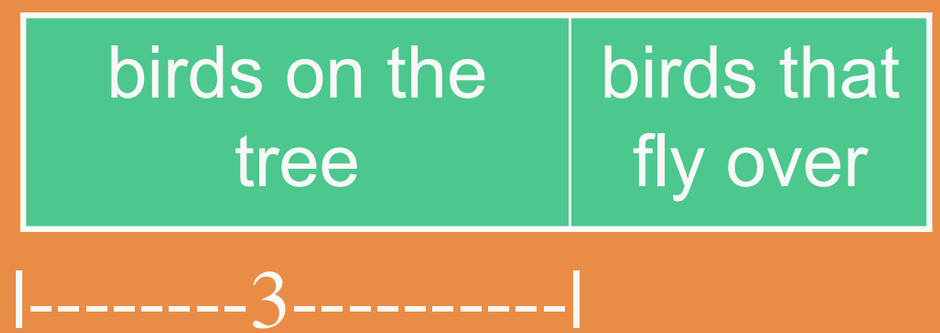

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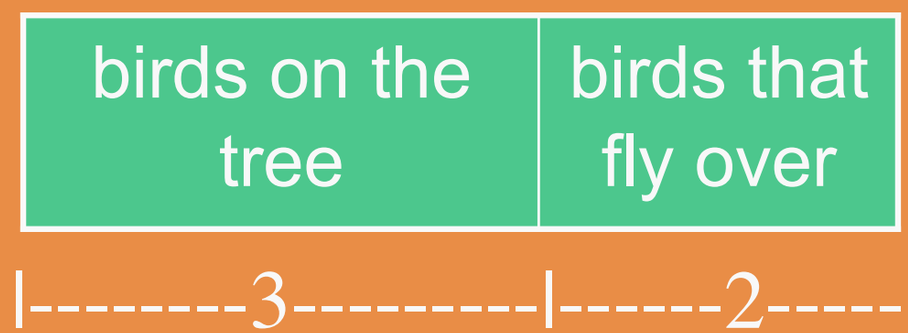

Enhanced Bar Diagramming

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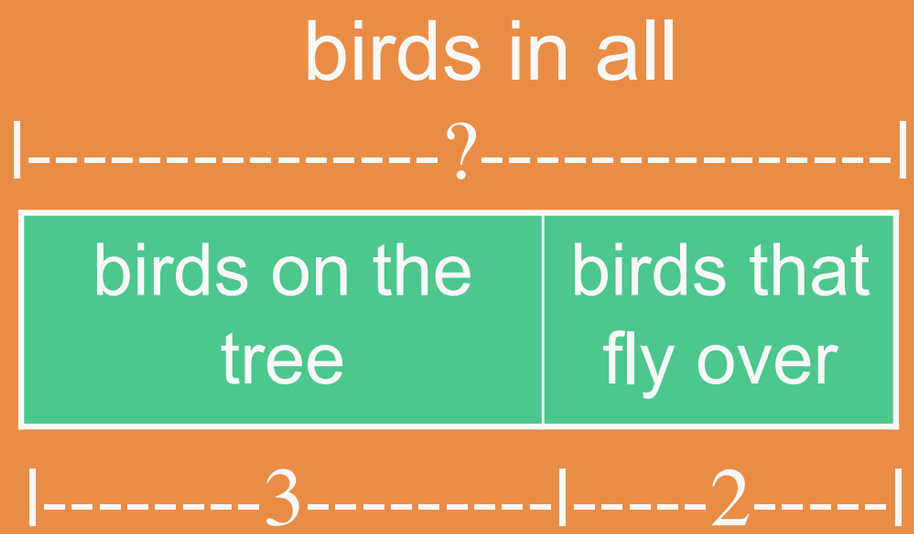
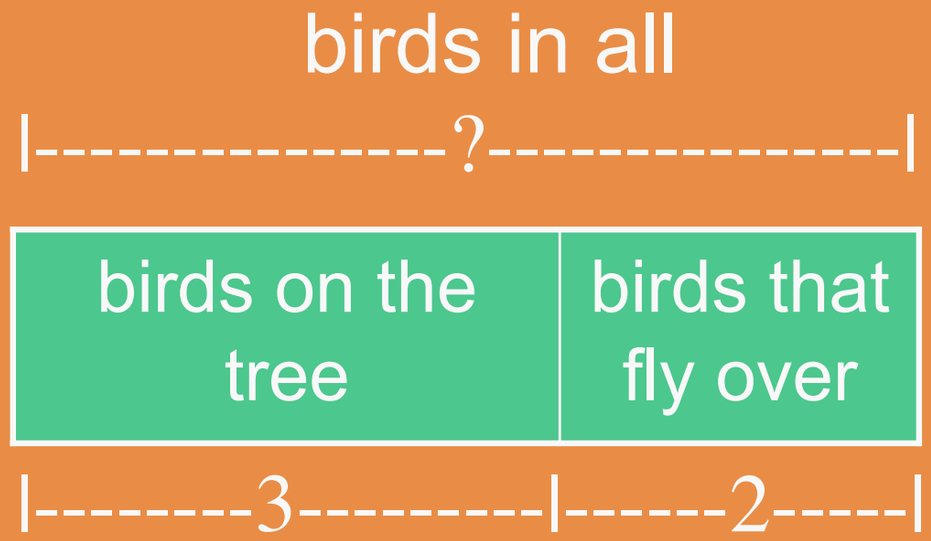


Enhanced Bar Diagramming
Plan and Solve

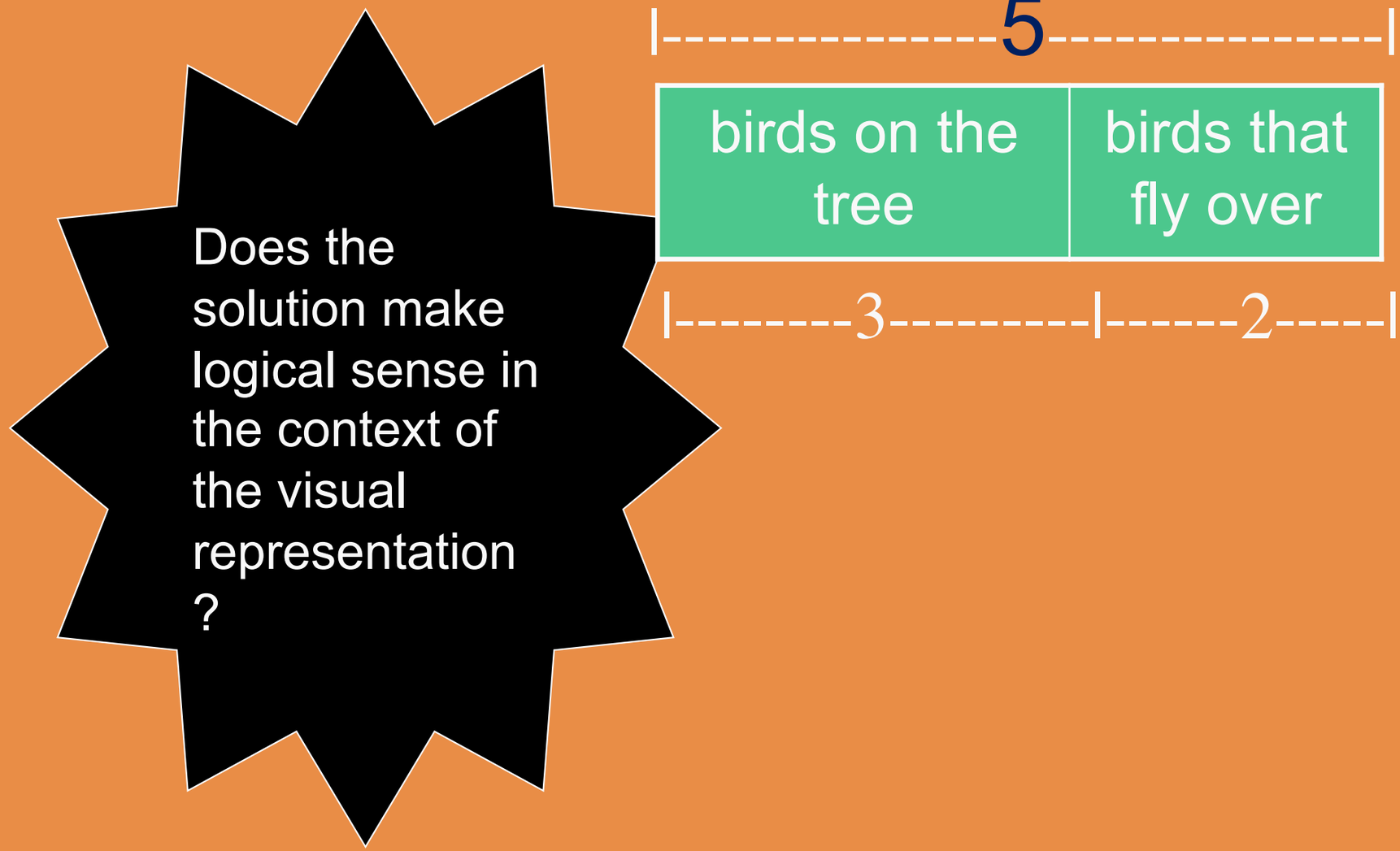
The “whole” is missing. Add.



How does the visual representation lead students to the plan and the solution?

Enhanced Bar Diagramming

Evaluate



Algebraic Reasoning

There are 5,691 birds on a tree branch.
2,087 birds fly over to the same branch.
How many birds are on the branch now?

Enhanced Bar Diagramming
Algebraic Reasoning

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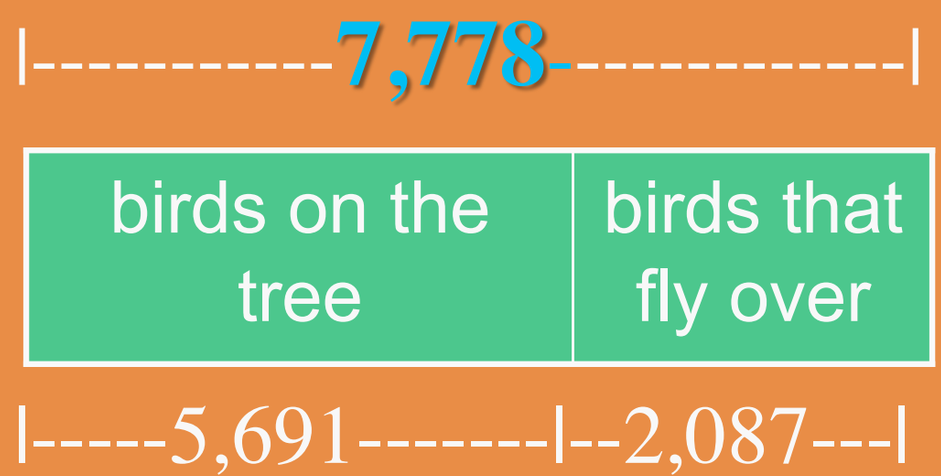
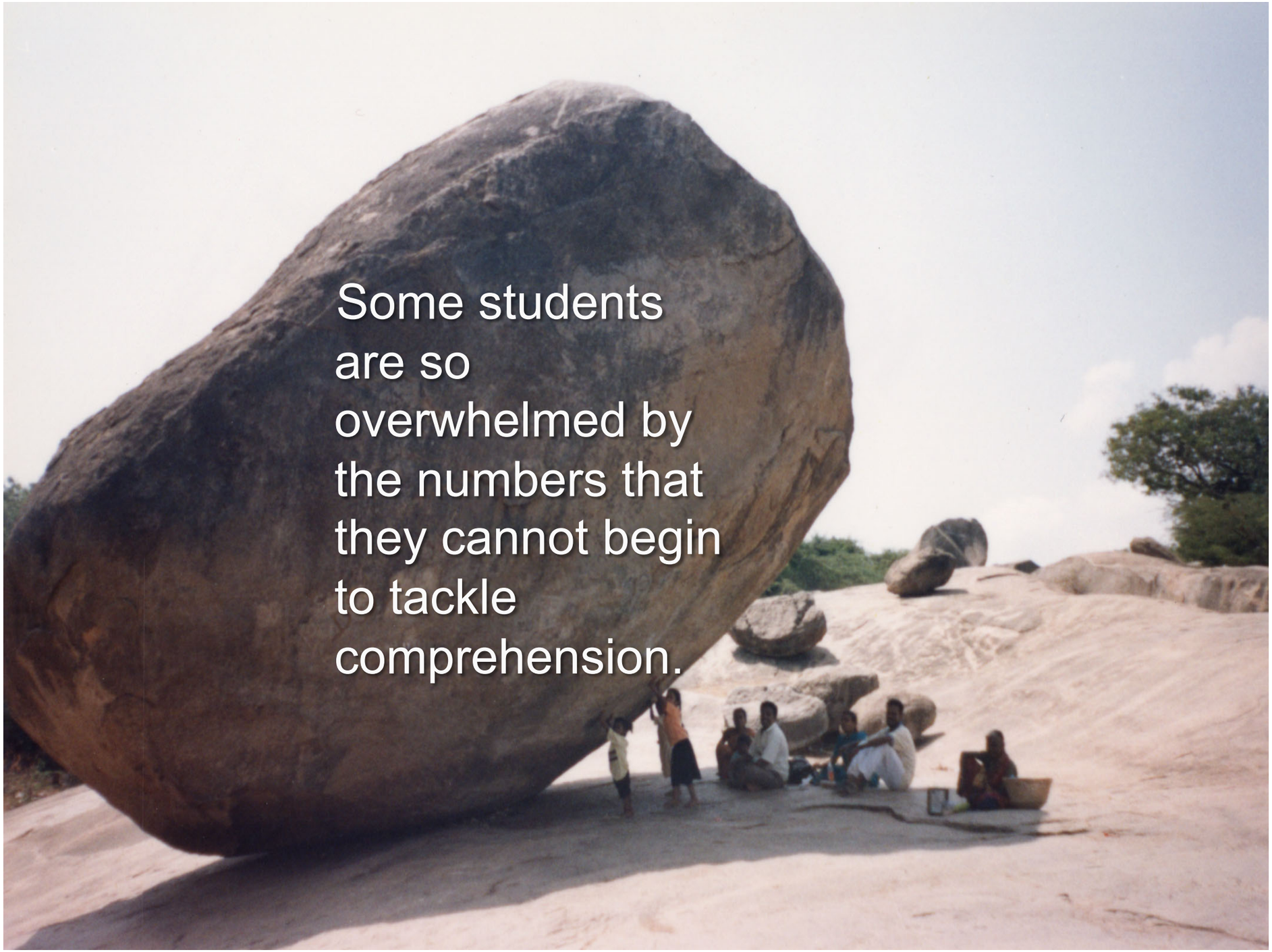


One Step: Addition

Rani earned $128 mowing lawns and $73 babysitting. How much money did Rani earn?

One Step: Subtraction

Jin had $67 in his pocket after he bought a radio controlled car. He went to the store with $142. How much did Jin spend on the car?


Some students
are so
overwhelmed by
the numbers that
they cannot begin
to tackle
comprehension.

One Step: Subtraction

$2

Jin had ~~$67~~ in his pocket after he bought a radio controlled car. He went to the store with ~~$142~~. How much did Jin spend on the car?

$5

One Step: Multiplication

There are 9 puffy stickers. There are 3 times as many plain stickers as there are puffy stickers. How many plain stickers are there?

One Step: Division

Four children share the cost of a gift equally. The gift costs $28. How much does each child pay?

Two-Step Problem

Rosa has 336 shells. She keeps 72 of the shells for herself, and shares the remaining shells evenly among 6 friends. How many shells does each friend receive?

Two-Step Problem

A soccer ball and six golf balls weigh a total of 1 kilogram. Each golf ball weighs 70 grams. What is the weight of the soccer ball?

(Hint: 1 kg = 1,000 g)

Two-Step Problem

Sara buys a printer for $120. She buys a computer that costs 4 times as much as the printer.

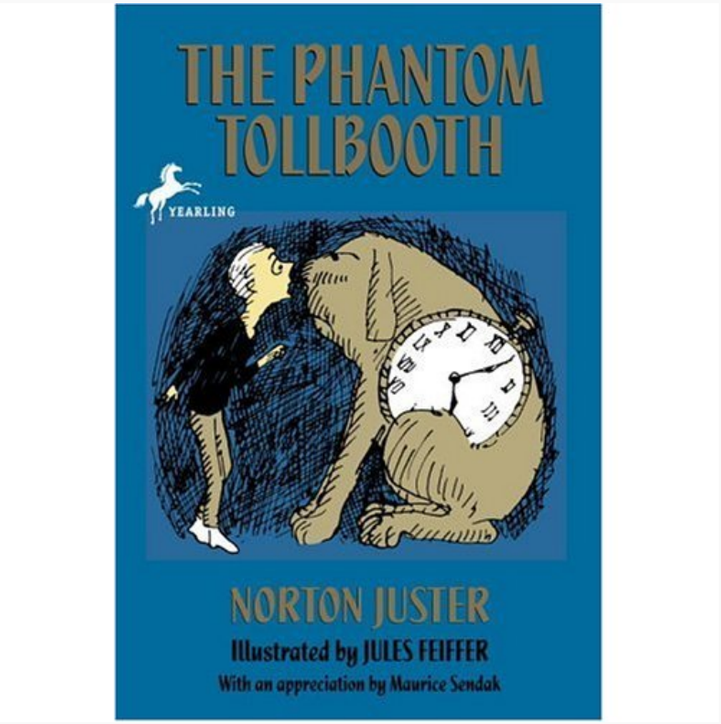
- What is the cost of the entire purchase?
- How much more does the computer cost than the printer?

Two Step: Proportion

The ratio of the length of Ribbon A to the length of Ribbon B is 7:4. If Ribbon A is 21 cm, what is the length of Ribbon B?

Two Step: Fractions

David had $40. He spent 1/5 of the money on a storybook and 3/10 on a calculator. How much did he spend?

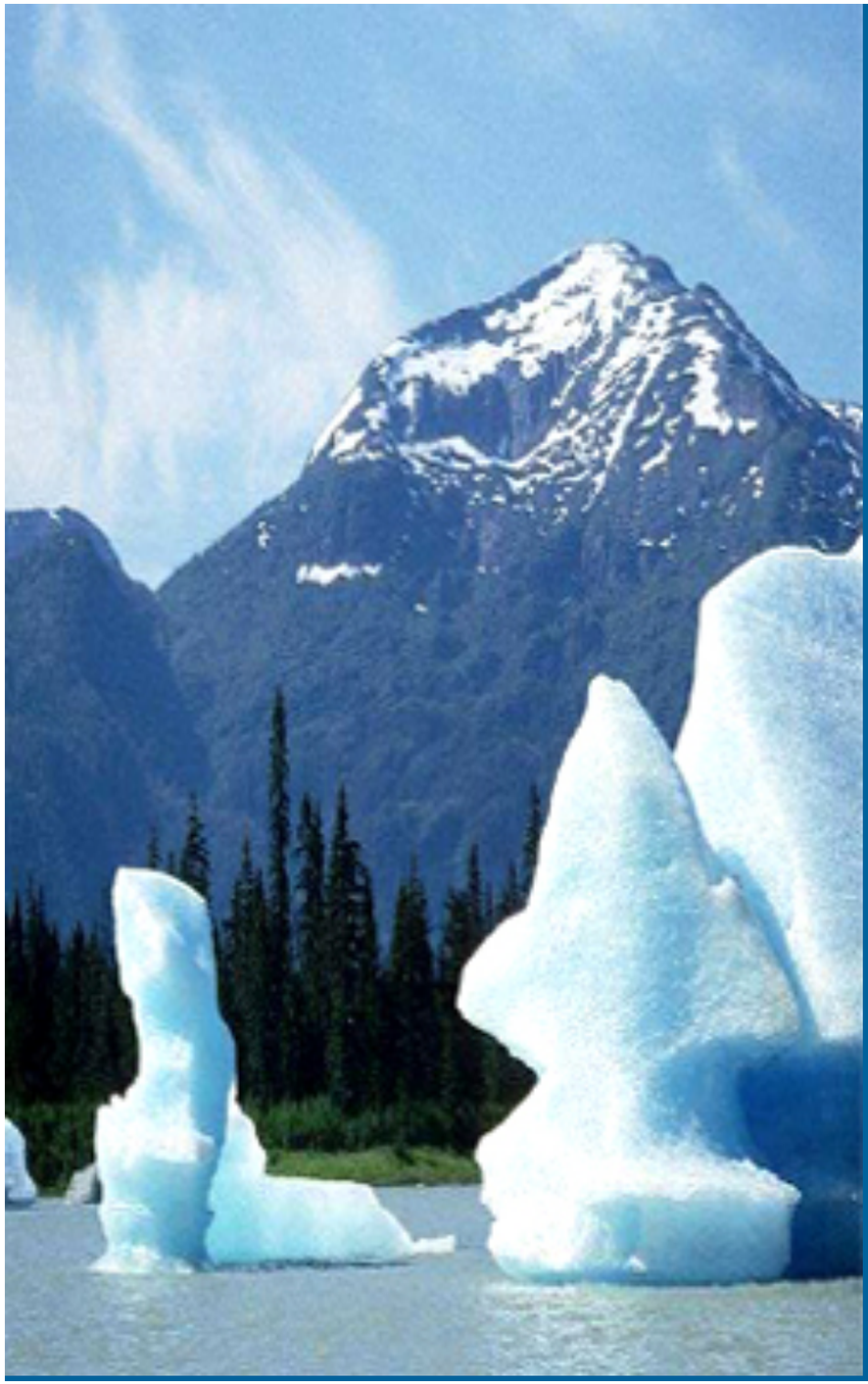


Multi-Step Problems

Liz put 2/5 of her money in the bank and spent 1/2 of the remainder. If she had $30 left, how much money did Liz have at first?

What This Means for YOU

- How do Enhanced Bar Diagrams support the Mathematical Practices in the CCSS??
- What are some things you find valuable about the Enhanced Bar Diagrams? How might you integrate Enhanced Bar Diagrams into your curriculum?



Bar diagramming helps students…

know how

and also know why

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