Creating AHAs

Closing the Mathematical Language Gap, Grades PK-5

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Mathematics Education Professional Development

Closing the Mathematical Language Gap, Grades PK-5

Conference Presentation

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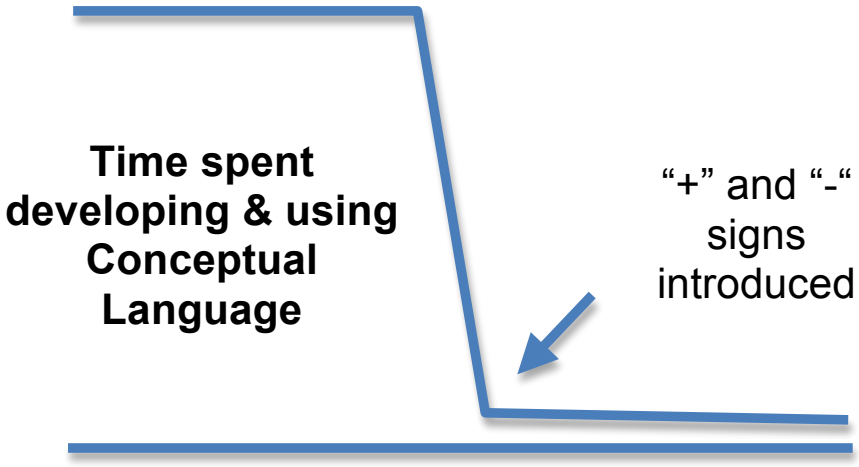
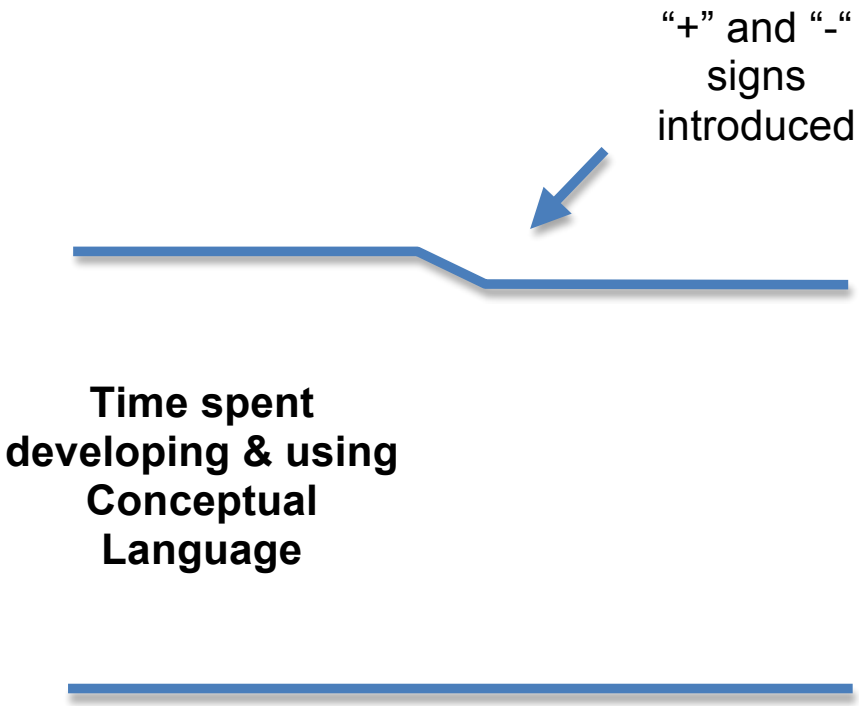
Typically Happens



Needs to Happen



Language of Operations—Models & Concepts

Operation	Notation	Conceptual Understandings	Symbolic Language	Conceptual Language

Mathematical Language & Problem Solving

- How do I build an understanding of operations in such a way as to build the language needed for word problems?

- How do I make problem solving the primary instructional strategy used?

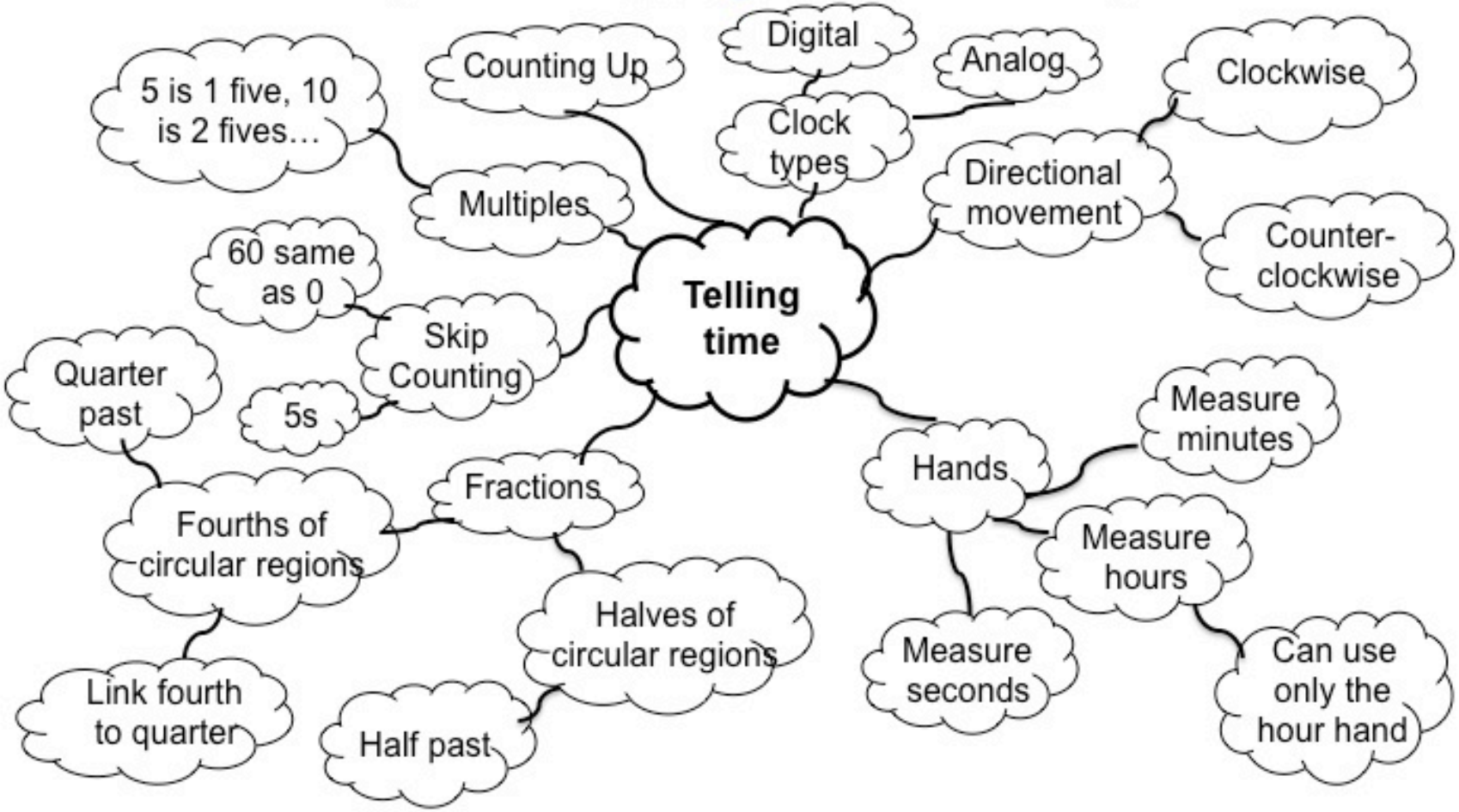
- How do I increase the students' level of thought throughout the mathematics lesson?

- How do I create multiple opportunities for students to articulate their thinking?

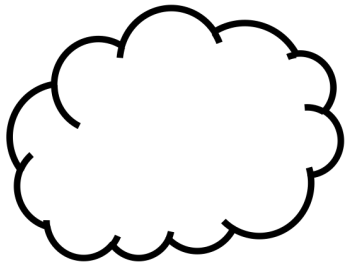
- What is the role of context?

Creating AHAs

If a student really understood telling time what would they understand?



If a student really understood _____ what would they understand?



Domino Activities

Materials: 1 bag of double nine, five frame, or ten frame dominoes (blanks removed) per group of 3 or 4

Activities

Matching

- Turn all dominos face down on the table
- Each player selects 7 dominoes
- The player with the highest double begins. Note: doubles are always turned perpendicular to the other dominos.
- Players take turns placing matching dominos at either end of the train. Players must state the quantity matched. If a player cannot make a play they draw from the pile until they can.
- **Goal:** Be the first to get rid of all of your dominos.

Domino Tens

- Turn all dominos face down on the table
- Each player selects 7 dominos
- A player with a total of 10 on the 2 halves of the domino starts the game. If no one has a domino totaling 10, select one from the pile and place in the center of the group.
- Players take turns placing dominos so that the 2 touching squares total 10. For each turn the player must state the combination of 10 made. If playing with 10-frame dominoes they must also state how they know it totals 10.
- If a player can not make a play they will draw from the pile until they can.
- **Goal:** Be the first to get rid of all of your dominos.

Phase 1—Verbal

Use conceptual language to describe the combination. State the fact and the turn around fact. E.g., 3 combined with 7 is the same as 10. 7 put together with 3 is the same as 10.

Phase 2—Symbolic

Phase 1 plus each person in the group records the equations.

3 + 7 = 10 7 + 3 = 10

Phase 3—Verbal extended

Same as phase 1 but add in two additional ways of describing the combination by beginning with the total. E.g., Phase 1 examples plus, Ten is the same as three and seven. Ten is the same as seven joined with three.

Phase 4—Symbolic

Phase 3 plus each person in the group records the equations

3 + 7 = 10 7 + 3 = 10

10 = 3 + 7 10 = 7 + 3

Phase 5—Extend combinations

3 squares touching to make 10

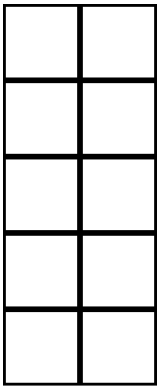
Phase 6—Extend combinations another step

4 squares touching to make 10

Extension to Decimals: Same sequence as above using the tenths decimals

CCSS Mathematical Practices & NCTM Process Standards

CCSS Mathematical Practice	NCTM Process Standard
Make sense of problems and persevere in solving them.	Problem solving; Reasoning
Reason abstractly and quantitatively.	Reasoning
Construct viable arguments and critique the reasoning of others.	Reasoning; Communication
Model with mathematics.	Representation; Connections
Use appropriate tools strategically.	Problem solving
Attend to precision.	Communication; Representation
Look for and make use of structure.	Reasoning; Representation
Look for and express regularity in repeated reasoning.	Reasoning



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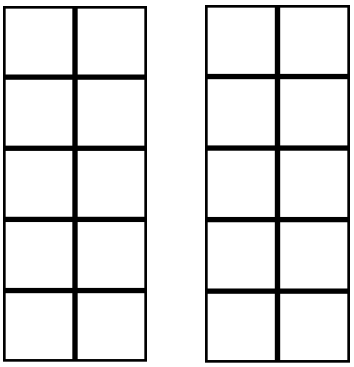

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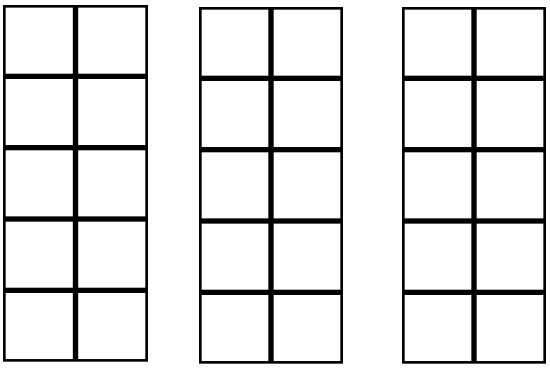

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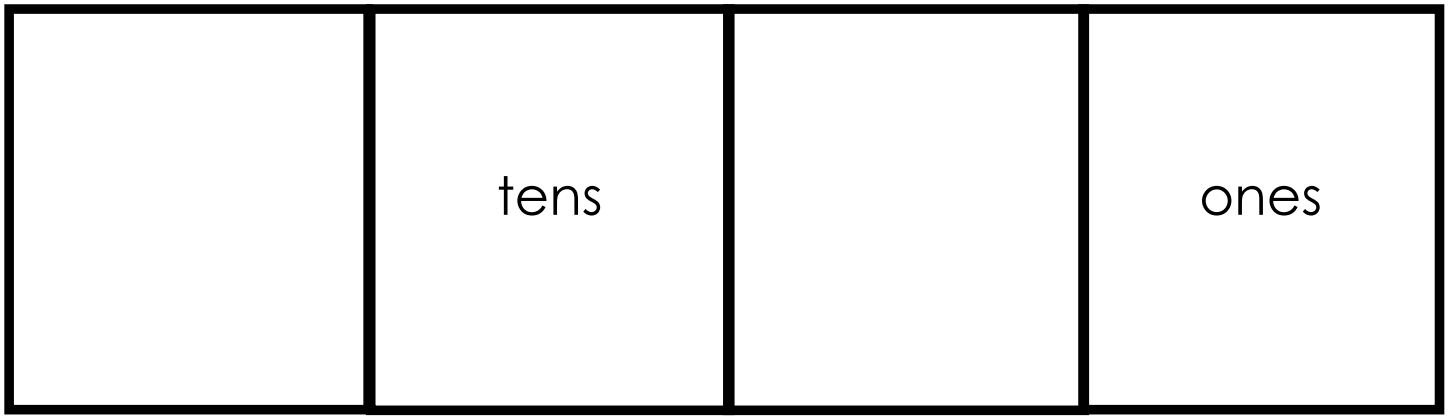
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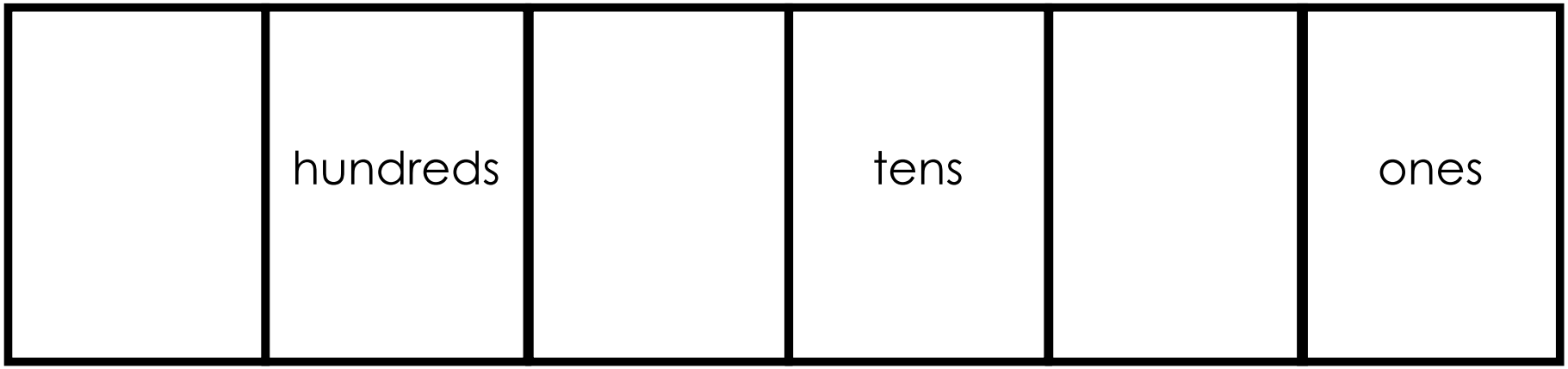
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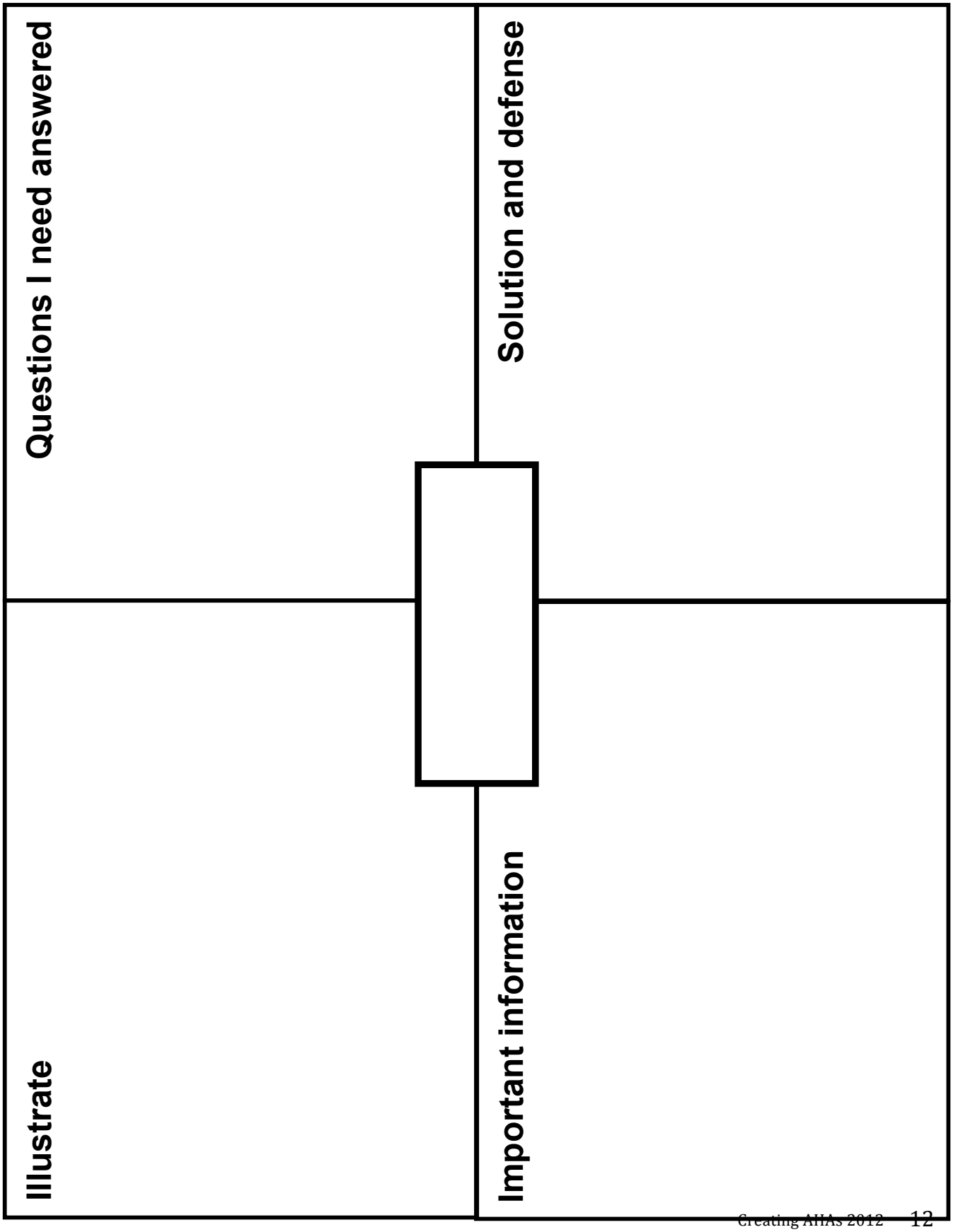
Model for working with word problems



Illustrate

Questions I need answered

Collin and Chloe are having a jumping contest in a field behind their house. Chloe jumped first. She jumped 11 ft. Collin jumped 9 ft. How much farther did Chloe jump?

Important information

Solution and defense

Illustrate

Questions I need answered

Lauren and her brother, Thom, are fencing in a rectangular play yard for their two dogs. The play yard will be 25 ft by 20 ft. How many feet of fencing will they need? If fencing is $114 per 50 ft. roll, how much will the fencing cost?

Important information

Solution and defense

Concentration

Materials: 1 set of concentration cards per group of 3 or 4

Activity

- Mix the cards well and turn upside-down in the center of the group forming a 4 x 6 array.
- Each player takes turns turning over two of the cards.
  - If they match, the player describes how they match and takes the cards.
  - If they do not match, the player describes why they do not match and turns them back over in the same location.
- Continue until all of the card pairs are found.