Louisiana Teacher Leader Summit

Summer 2016 – Professional Development

What's the Problem?: The Relationship Between Addition and Subtraction
Grades K–2

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Math learning experience

Participants will…

- Deepen understanding of addition and subtraction problem types as described by the Louisiana Student Standards.
- Use hands-on methods to explore computation methods that support the understanding of the relationship between addition and subtraction.

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Introduction to the Charles A. Dana Center

WHAT IS THE DANA CENTER?

At the Dana Center, we help prepare students to succeed in a complex and changing world. The center advances effective math and science education for all students, from kindergarten to college. We are known for our innovative resources that promote student engagement, motivation, and persistence in support of academic achievement. We work alongside teachers, administrators, and policymakers at the local, state, and national levels to create educational systems that put students on a path to success.

Making sense of mathematics

"Children who are successful at mathematics are those who believe that mathematics makes sense."

–Lauren Resnick

Exploring the relationship between addition and subtraction

Domain – Operations and Algebraic Thinking (OA)

Cluster Heading:

Grade K

- Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

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Exploring the relationship between addition and subtraction

Domain - Operations and Algebraic Thinking (OA)

Cluster Heading:

Grade 1

- Represent and solve problems involving addition and subtraction.
- Understand and apply properties of operations and the relationship between addition and subtraction.
- Add and subtract within 20.
- Work with addition and subtraction equations.

Exploring the relationship between addition and subtraction

Domain – Operations and Algebraic Thinking (OA)

Cluster Heading:

Grade 2

- Represent and solve problems involving addition and subtraction.
- Add and subtract within 20.

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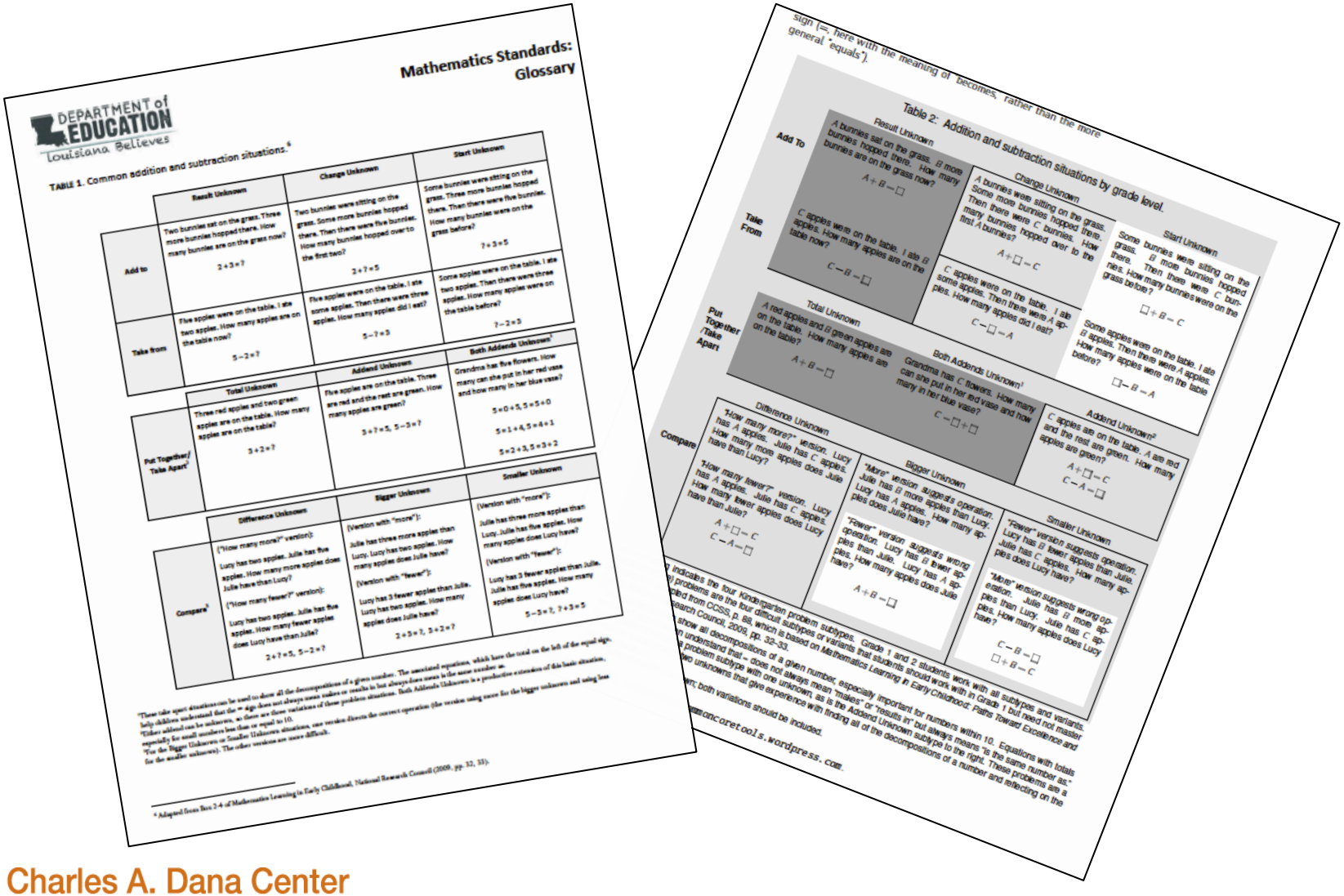
Problem types



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Progressions for Operations and Algebraic Thinking

"They represent these problems in increasingly sophisticated ways. And they learn and use increasingly sophisticated computation methods to find answers."

Pg. 6, Progressions; K, Counting and Cardinality; K-5, Operations and Algebraic Thinking.

Methods used for solving single-digit addition and subtraction problems

Level 1. Direct Modeling by Counting All or Taking Away. Represent situation or numerical problem with groups of objects, a drawing, or fingers. Model the situation by composing two addend groups or decomposing a total group. Count the resulting total or addend.

Level 2. Counting On. Embed an addend within the total (the addend is perceived simultaneously as an addend and as part of the total). Count this total but abbreviate the counting by omitting the count of this addend; instead, begin with the number word of this addend. Some method of keeping track (fingers, objects, mentally imaged objects, body motions, other count words) is used to monitor the count.

For addition, the count is stopped when the amount of the remaining addend has been counted. The last number word is the total. For subtraction, the count is stopped when the total occurs in the count. The tracking method indicates the difference (seen as an unknown addend).

Level 3. Convert to an Easier Problem. Decompose an addend and compose a part with another addend.

See Appendix for examples and further details.

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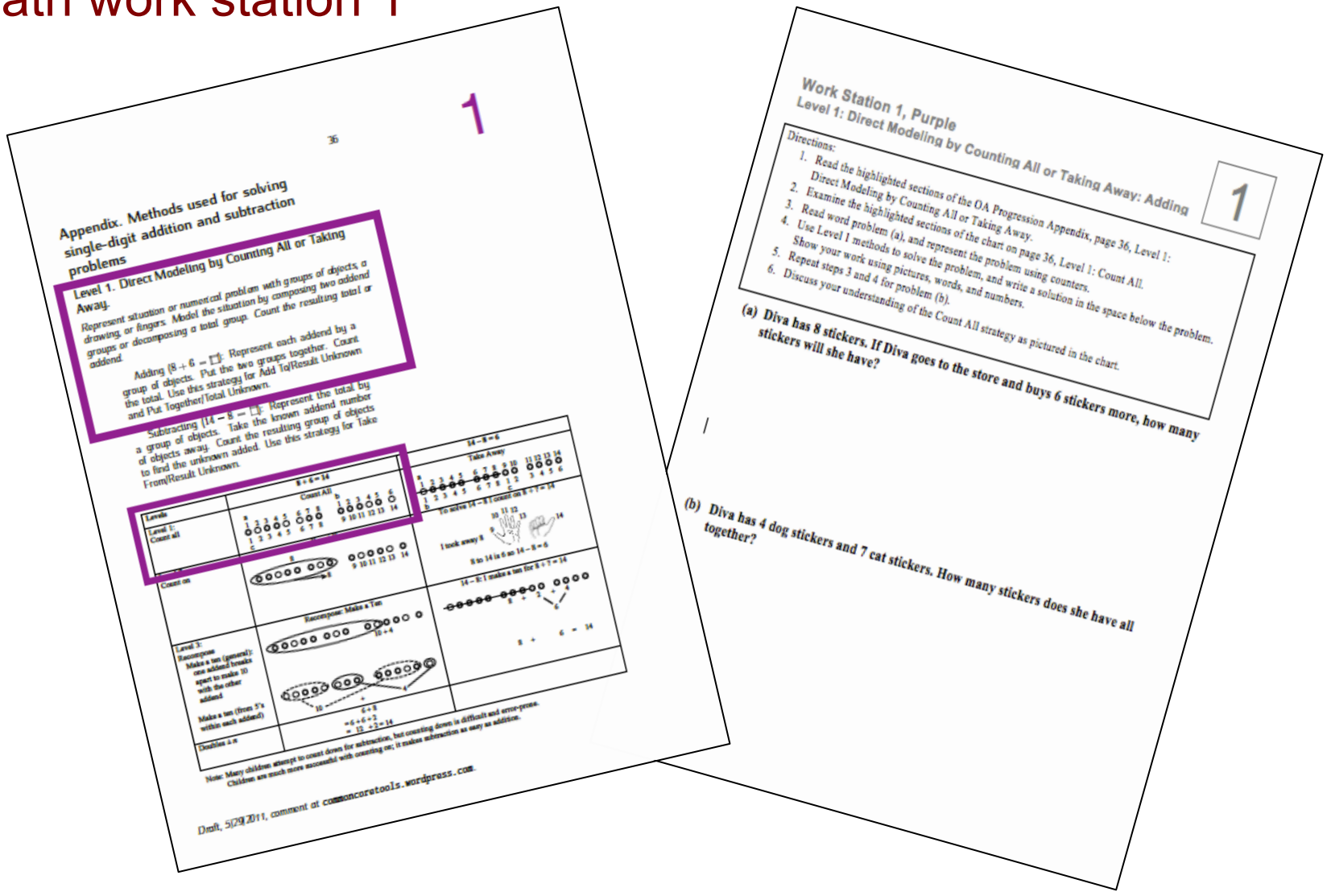
Math work station 1



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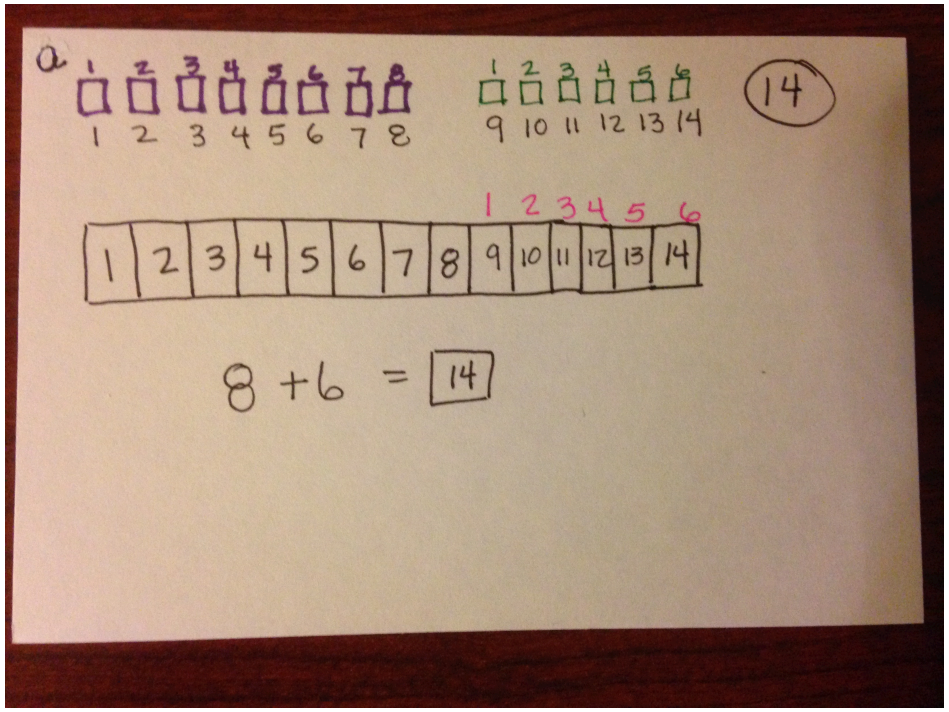
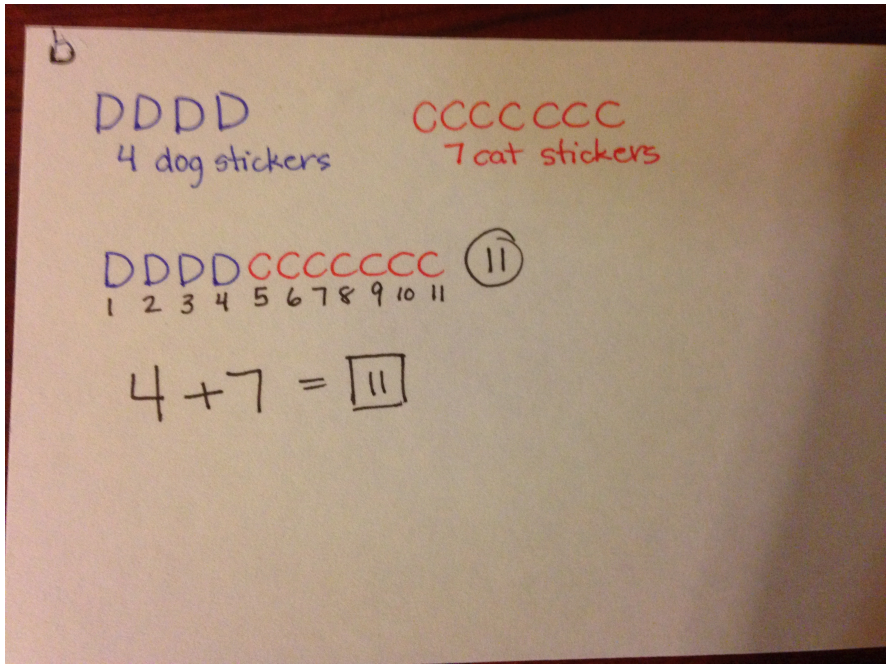
Sample representations – Work station 1

Level 1: Direct modeling by counting all – Adding





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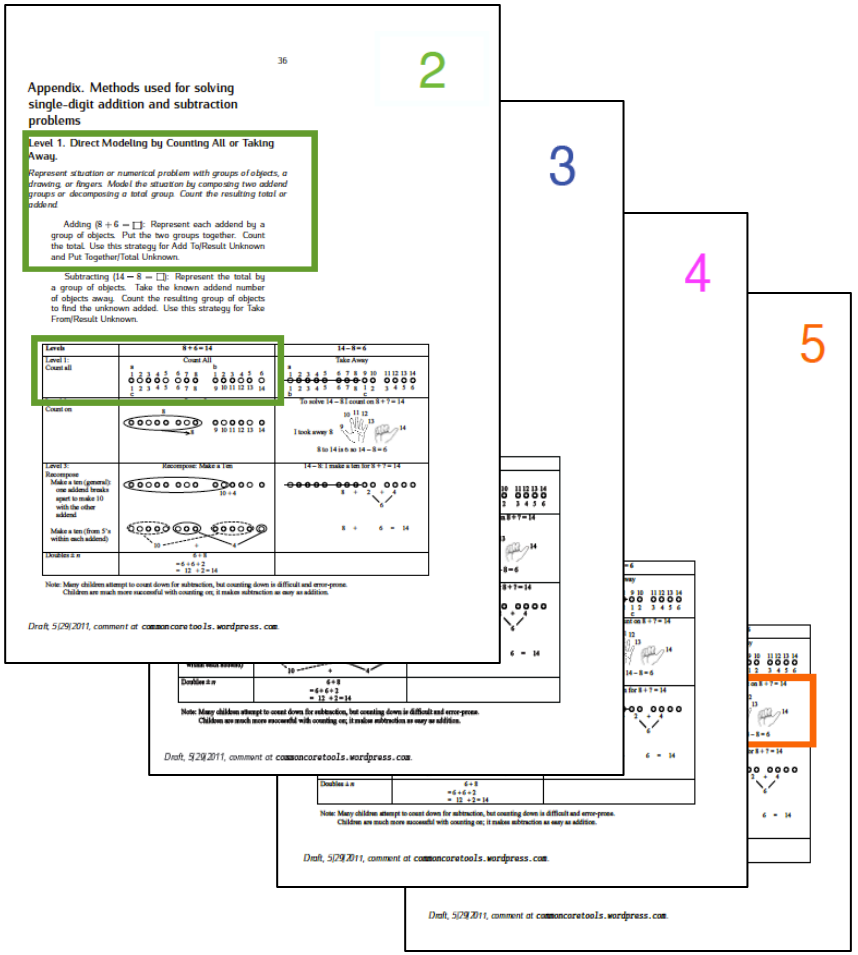
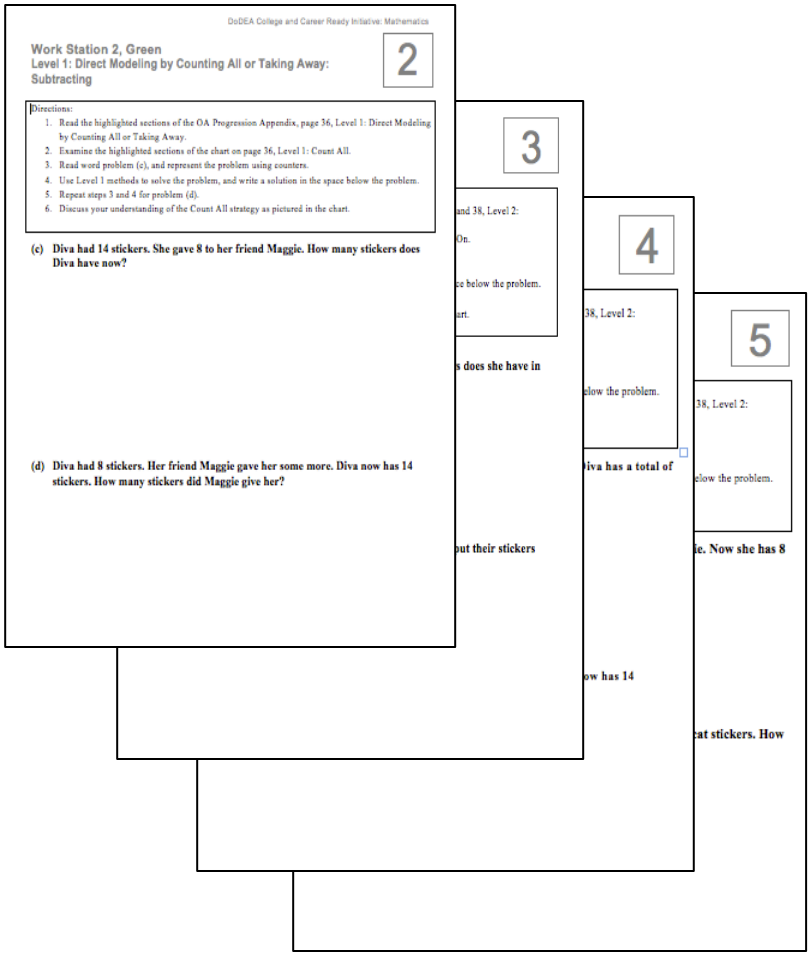
Work stations 2, 3, 4, and 5





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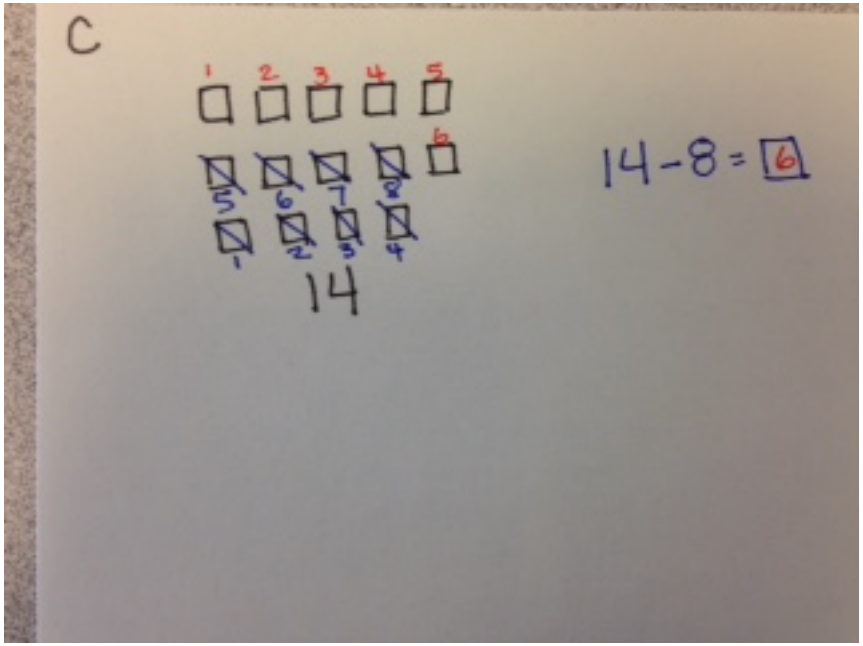
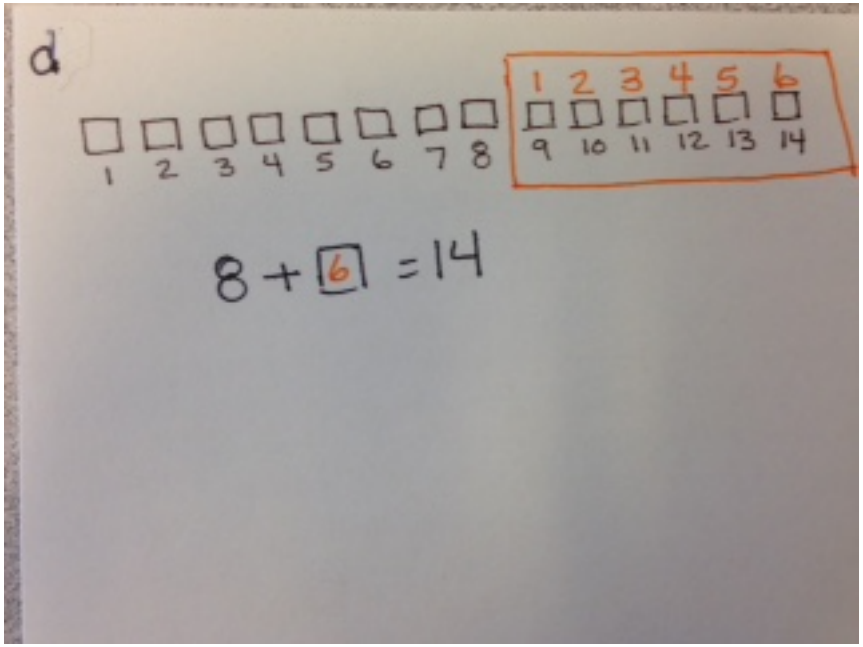
Sample representations – Work station 2

Level 1: Direct modeling by counting all or taking away – Subtracting





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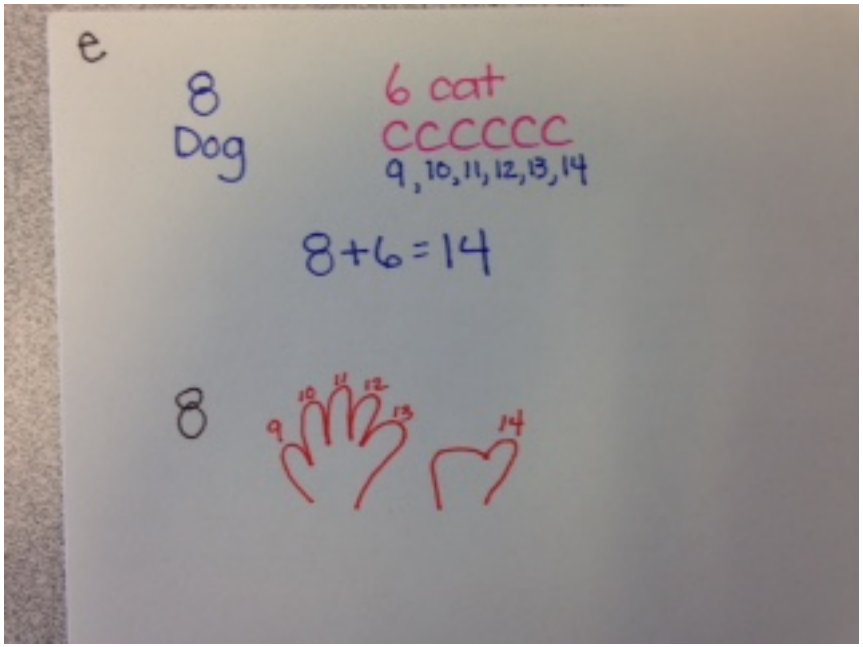
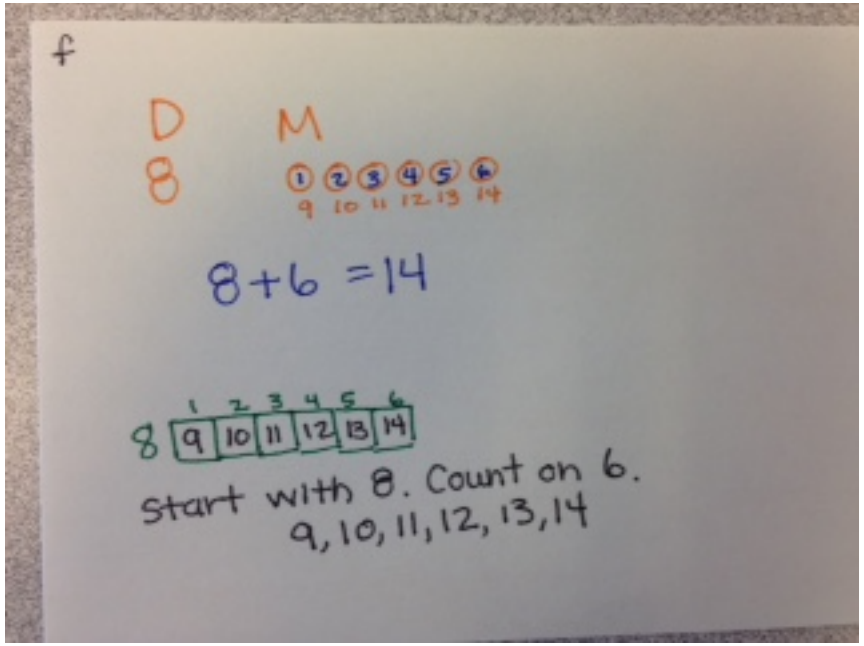
Sample representations – Work station 3

Level 2: Counting on – Adding





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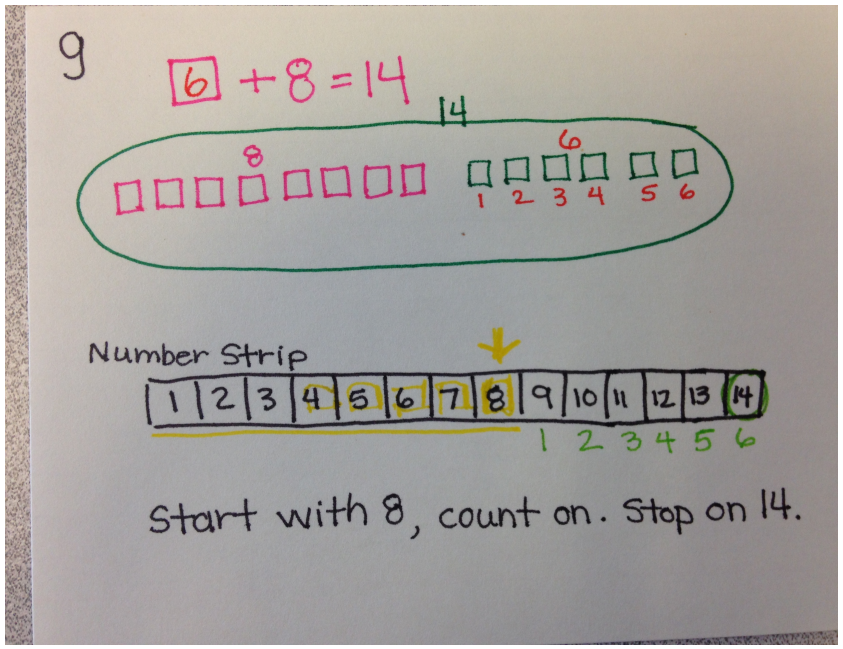
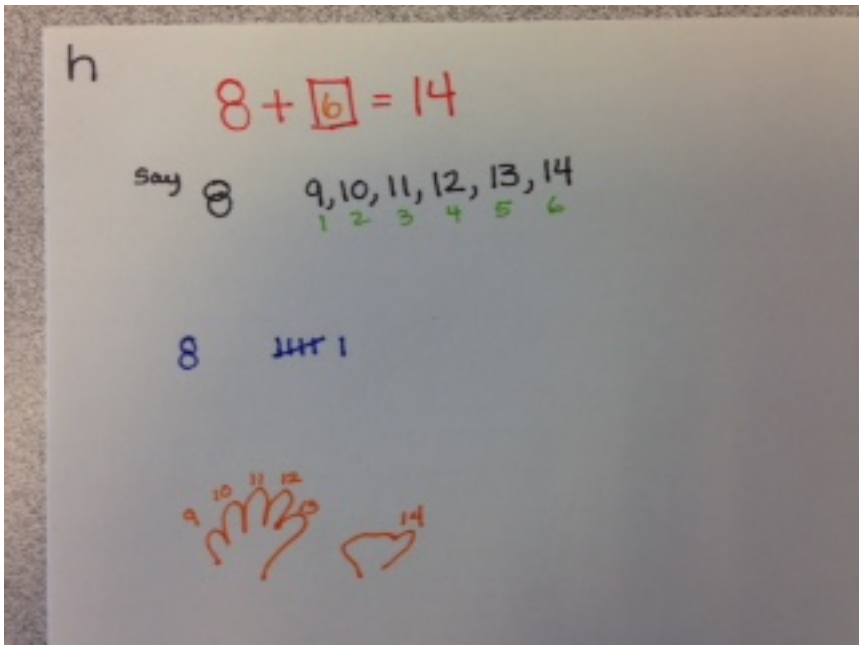
Sample representations – Work station 4

Level 2: Counting on – Finding an unknown addend





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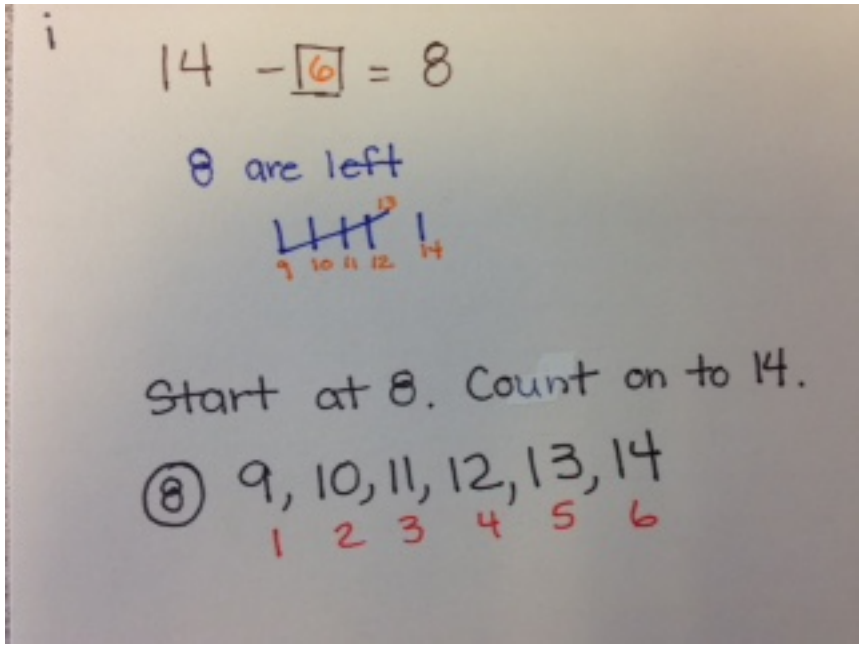
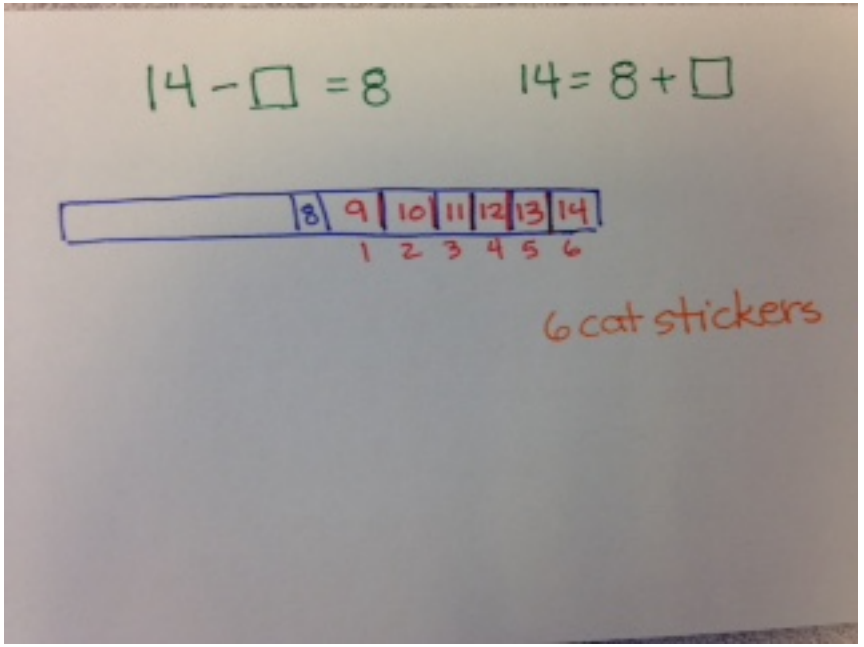
Sample representations – Work station 5

Level 2: Counting On - Subtracting





Levels 1 and 2 methods for addition and subtraction

- Why is it important to give students many opportunities to practice *counting all* when adding and subtracting?
- What makes a *start unknown or change unknown* problem more difficult than a *result unknown* problem?

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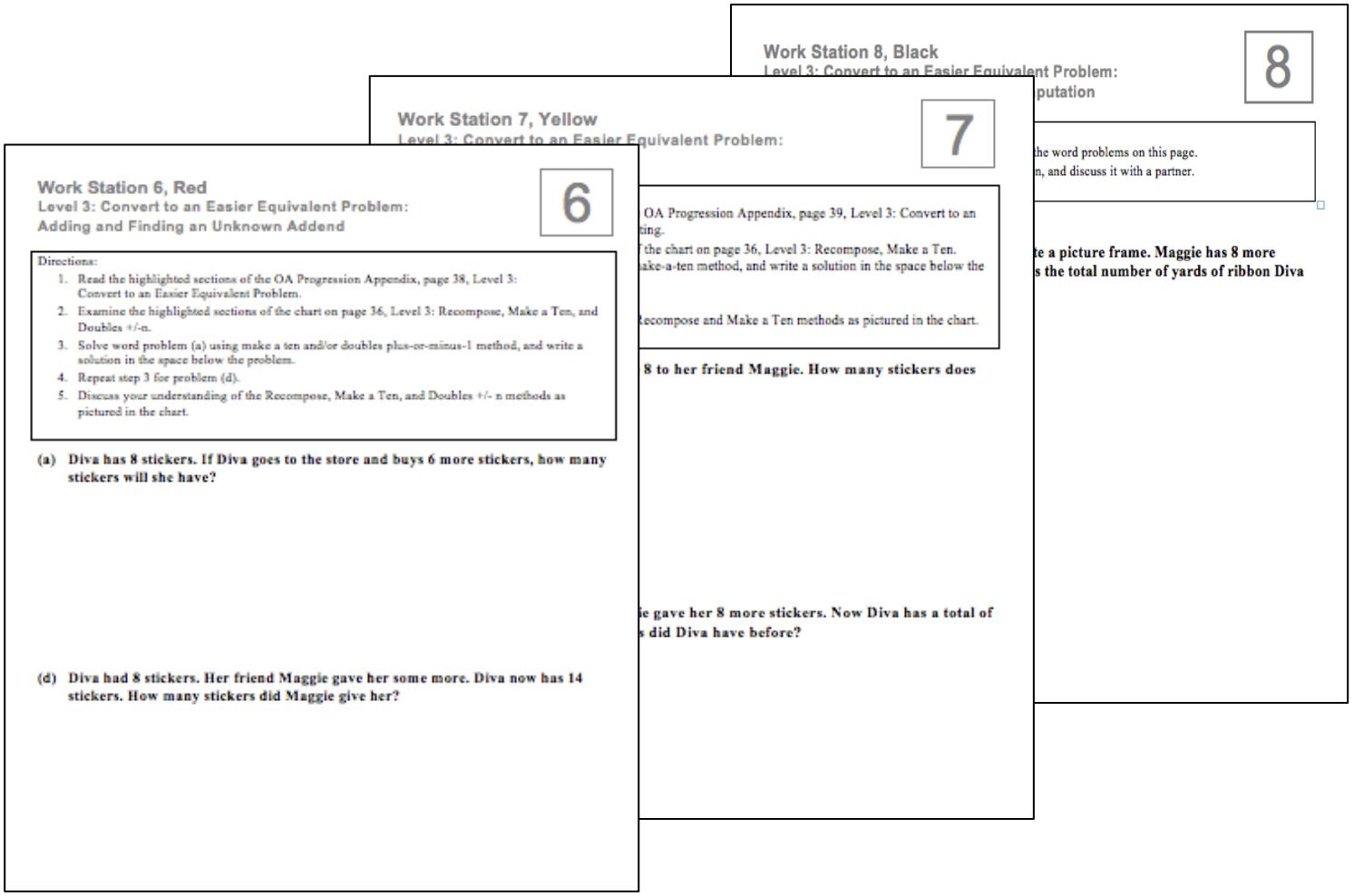
Work stations 6, 7 and 8



Work Station 8, Black
Level 3: Convert to an Easier Equivalent Problem:
putation
8
he word problems on this page.
n, and discuss it with a partner.
te a picture frame. Maggie has 8 more
s the total number of yards of ribbon Diva

Work Station 7, Yellow
Level 3: Convert to an Easier Equivalent Problem:
7
OA Progression Appendix, page 39, Level 3: Convert to an
ting.
the chart on page 36, Level 3: Recompose, Make a Ten.
ake-a-ten method, and write a solution in the space below the
ecompose and Make a Ten methods as pictured in the chart.
8 to her friend Maggie. How many stickers does
ie gave her 8 more stickers. Now Diva has a total of
s did Diva have before?

Work Station 6, Red
Level 3: Convert to an Easier Equivalent Problem:
Adding and Finding an Unknown Addend
6
Directions:
1. Read the highlighted sections of the OA Progression Appendix, page 38, Level 3: Convert to an Easier Equivalent Problem.
2. Examine the highlighted sections of the chart on page 36, Level 3: Recompose, Make a Ten, and Doubles +/-n.
3. Solve word problem (a) using make a ten and/or doubles plus-or-minus-1 method, and write a solution in the space below the problem.
4. Repeat step 3 for problem (d).
5. Discuss your understanding of the Recompose, Make a Ten, and Doubles +/- n methods as pictured in the chart.

(a) Diva has 8 stickers. If Diva goes to the store and buys 6 more stickers, how many stickers will she have?

(d) Diva had 8 stickers. Her friend Maggie gave her some more. Diva now has 14 stickers. How many stickers did Maggie give her?

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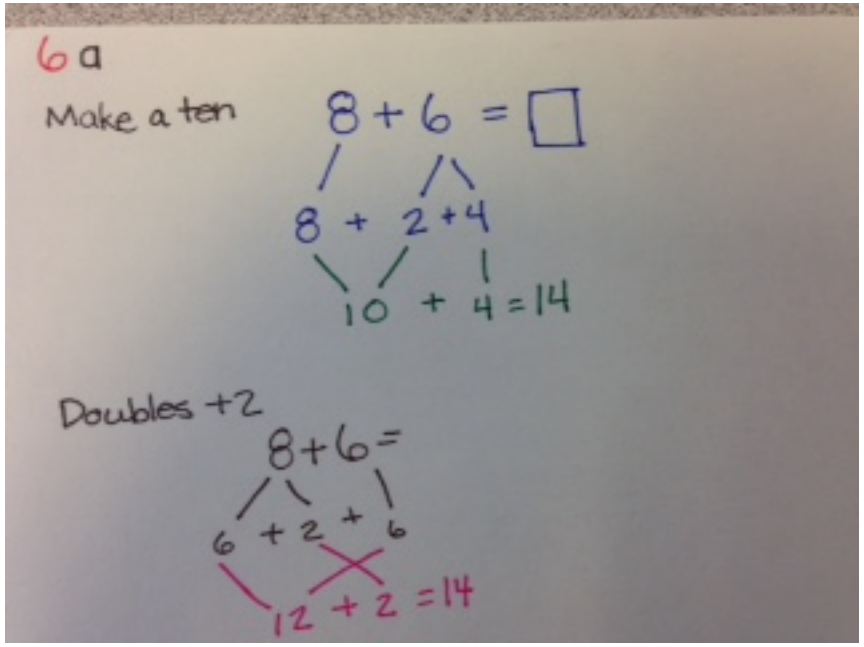
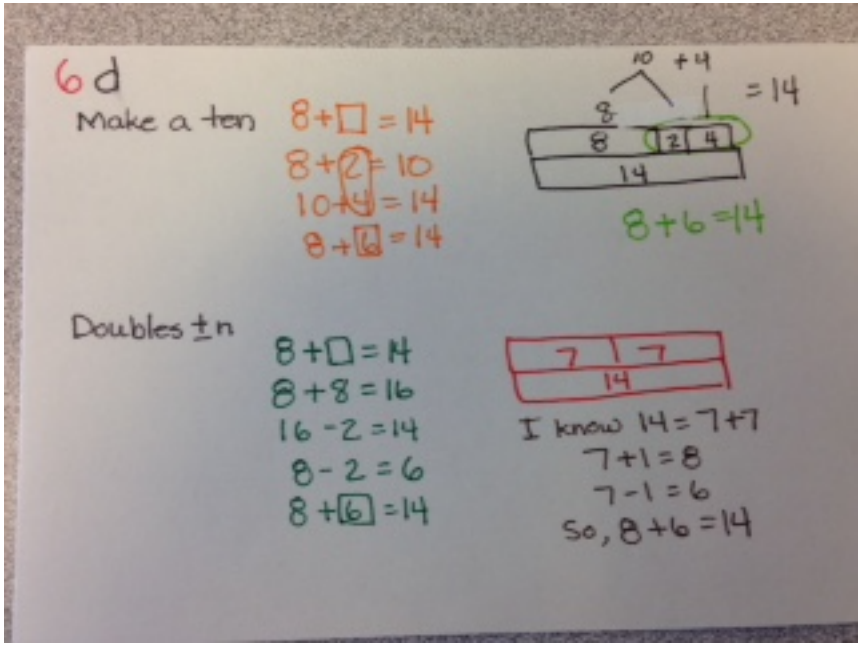
Sample representations – Work station 6

Level 3: Convert to an easier equivalent problem





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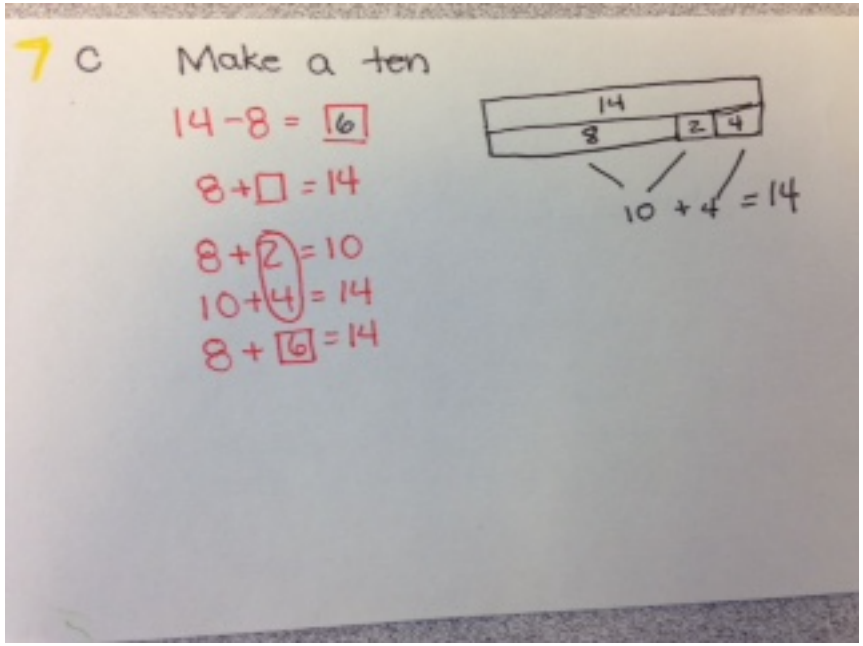
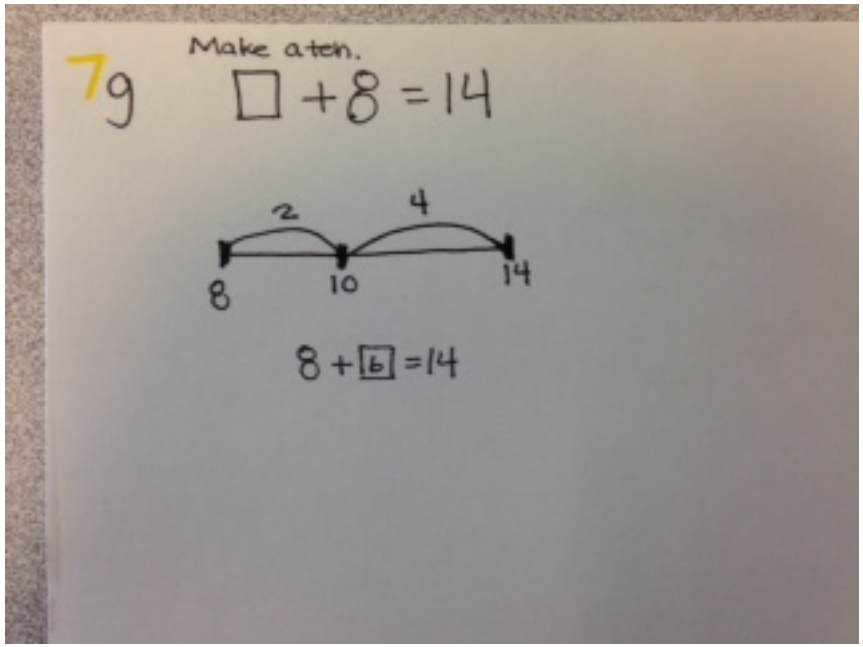
Sample representations – Work station 7

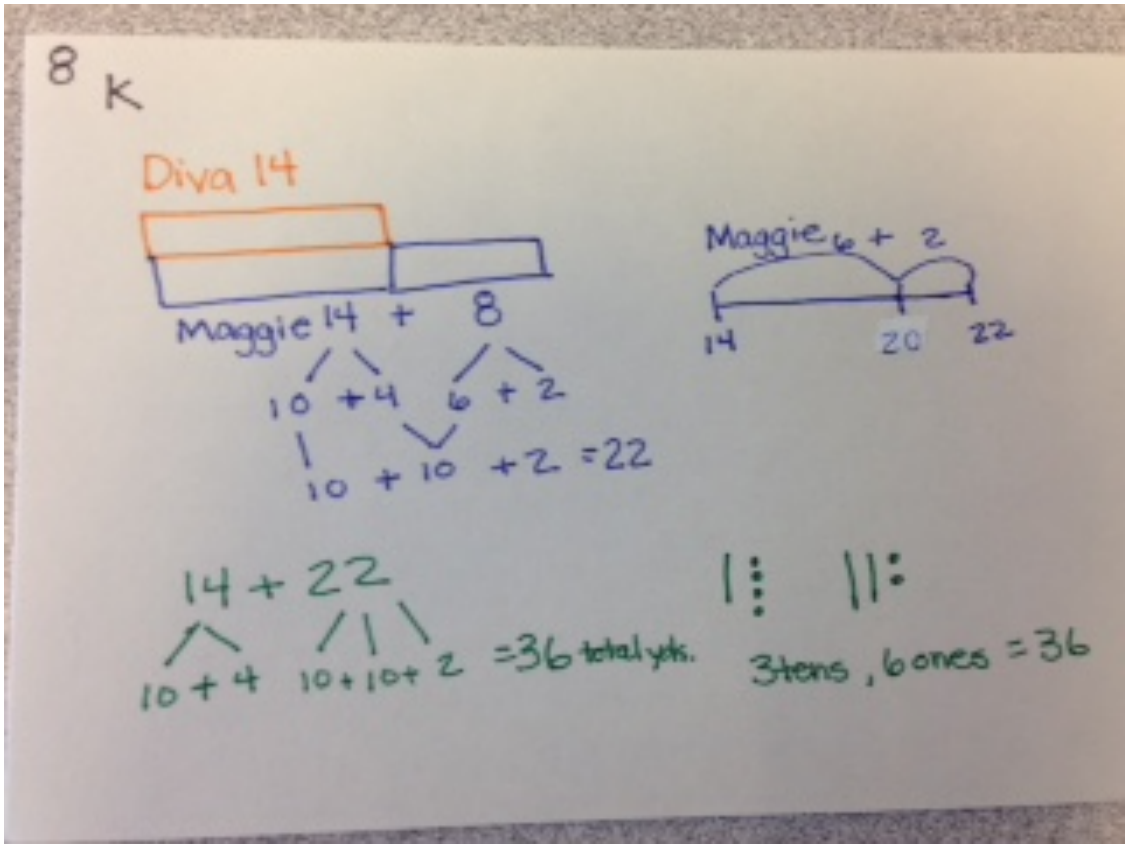
Level 3: Convert to an easier equivalent problem





Sample representations – Work station 8

Level 3: Convert to an easier equivalent problem – Generalizing beyond single digit computation



Reflection

How do these methods support and develop numerical fluency (*flexibility, efficiency, and accuracy)* and mathematical reasoning?

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Reflecting on the session

What?	*What are two important ideas that you have learned today?*
So What?	*What is important about what you have learned?*
Now What?	*What actions will you take as a result of what you have learned?*