*Partners*

for Mathematics Learning

Handouts for K-2 Number

2008-2009

Big Ideas in the Number Strand

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1. Numbers can be classified in multiple ways to show relationships ○ Properties are the basis of classifications ○ Some representations show equivalent relationships ○ Part-whole relationships can reflect composing and decomposing	
2. Numbers in elementary mathematics are represented using a base-10 place value system ○ System - based on groupings of ten - allows us to represent all numbers with just 10 digits ○ Digits have different values depending on their positions (both whole numbers and decimals) ○ Students must understand both place value and face value ○ Composite groups (groups of more than one) can be counted multiple times and operated on as an entity	
3. Dealing with multiplicative reasoning requires a shift in thinking about numbers from numbers representing single units to composite units that are grouped ○ Instruction should focus on helping students identify, create, and count composite groups ○ Composite groups (groups of more than one) can be counted multiple times and operated on as an entity	
4. Operations (addition, subtraction, multiplication, division) are used to suggest distinct actions that are defined mathematically and are dependent on the context; performing those actions leads to consistent results for all numbers (whole and rational) ○ Operation relationships are an important part of number sense ○ Properties combined with operations are the foundation of arithmetic ○ Properties lead to mathematical generalizations	
5. Reasonable estimates reflect an understanding of both operations and number relationships ○ Context influences what an appropriate range (estimate) would be ○ Appropriate estimates reflect students' sense making	
6. Fluency (accuracy, efficiency, flexibility) is reasoning about and using rational number operations with understanding ○ Mastery involves knowing strategies for retrieving basic facts and being able to apply them in other computations ○ Fluency is built upon number relationships, place value, properties, and operation understandings	
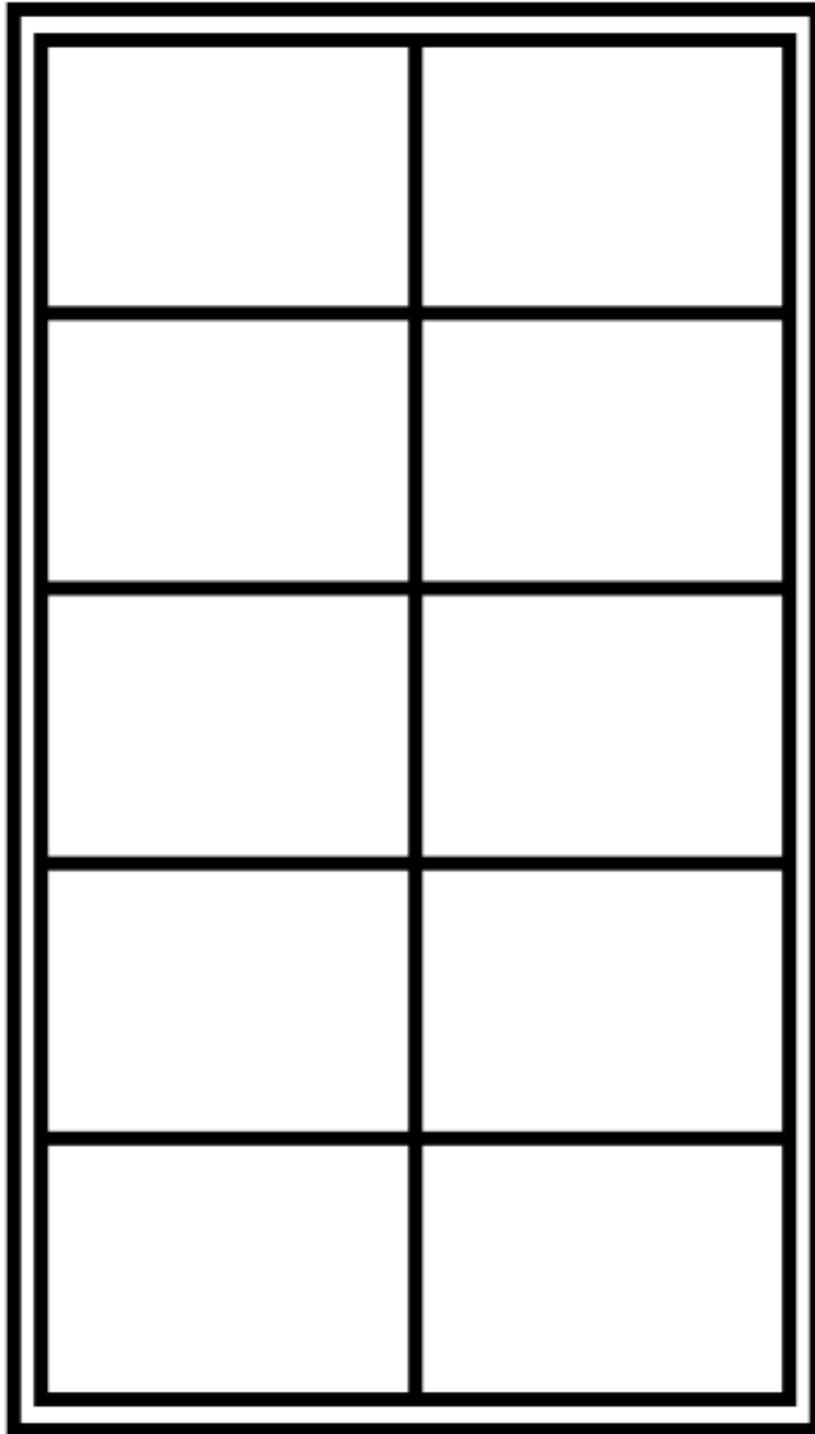
BLM 1—Ten-frame

Description of Spill the Counters -- Choose a designated number for the group. Have the children place that many counters in a canister. Shake and spill the counters. Using a recording sheet, have the students color in the appropriate number of counters. What do you notice about the number? Conversation may include, "I got 3 red and 2 yellow" or "5 can be 2 and 3." (*Developing Number Concepts*, Kathy Richardson)

Description of Cover Up – Choose a designated number and place that many counters under a cup or piece of tagboard. Next, pull some out from under the cup. Then the child will tell how many are hidden under the cup. For example, if there are 6 counters under the cup and 2 were pulled out, the child would respond, "2 and 4 is 6." (*Developing Number Concepts*, Kathy Richardson & *Teaching Student-Centered Mathematics*, John Van de Walle)

Missing Part Cards – Using card stock, create a set of flip cards for numbers 1-10. On each flip card, write the designated number in the first space, and use the remaining two spaces for dots. Cover up the last set of dots (or the first set of dots). Have children respond and then flip the cover to check. This can be read as 5 is 3 and ? or 5 minus 3 is ?. (*Teaching Student-Centered Mathematics*, John Van de Walle)

Note: Black line many of the black line masters used in this module can be downloaded.
Source: Teaching Student-Centered Mathematics
(http://www.ablongman.com/vandewalleseries/)
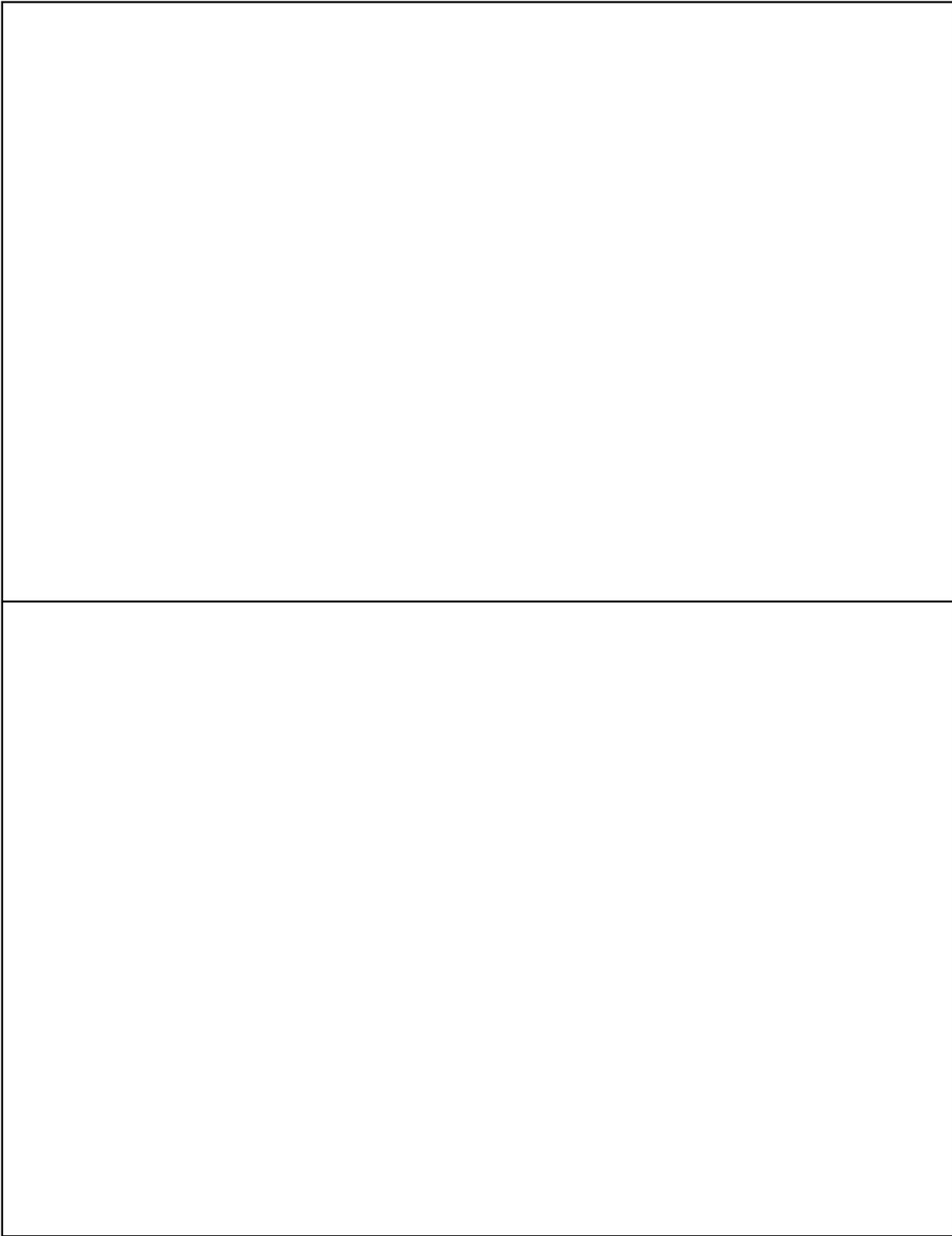
BLM 15—Place-value mat (with ten-frames)

Addition Strategies

Many strategies depend on ideas of place value.

A. Adding by place

     57 + 34

     50 + 30 = 80

     7 + 4 = 11   *Students may mentally decompose the 4 (3 + 1)

     80 + 11 = 91   Students may mentally decompose the 11 (10 + 1)

B. Keeping one number whole and adding on the other number in parts

     57 + 37

     57 + 30 = 87   57 + 30 =87

     87 + 7 = 94   87 + 3 = 90   (decompose the 7 into 3 + 4)

     90 + 4 = 94   associative property for addition

C. By using a traditional algorithm of "carrying" ("regrouping" or "renaming")

D. Compensation involves reformulating, adjusting, changing numbers to make the numbers easier to work with. Compensation supports fluency in mental math.

    One Way   Add an amount to one addend; subtract the same amount from the sum.

    59 + 38   Add 1 to the 59

    60 + 38 = 98

    98 – 1 = 97 Subtract 1 from the answer to compensate.

    Another Way   Add an amount to one number and subtract the same amount from the other number.

    59 + 38

    60 + 37 = 97   Add 1 to 59 and subtract one from 38 to maintain an equivalent expression.

Subtraction Strategies

Subtraction strategies include subtracting in parts, adding up, and subtracting back.

A. **Subtracting in Parts**

     72 - 49 =

     72 - 40 = 32

     32 - 9 = 23   (students may subtract the 2 first and then 7 more)

     72 – 49 =

     72 – 40 = 32

     32 – 10 = 22 (made an easier problem - subtracted 1 too many)

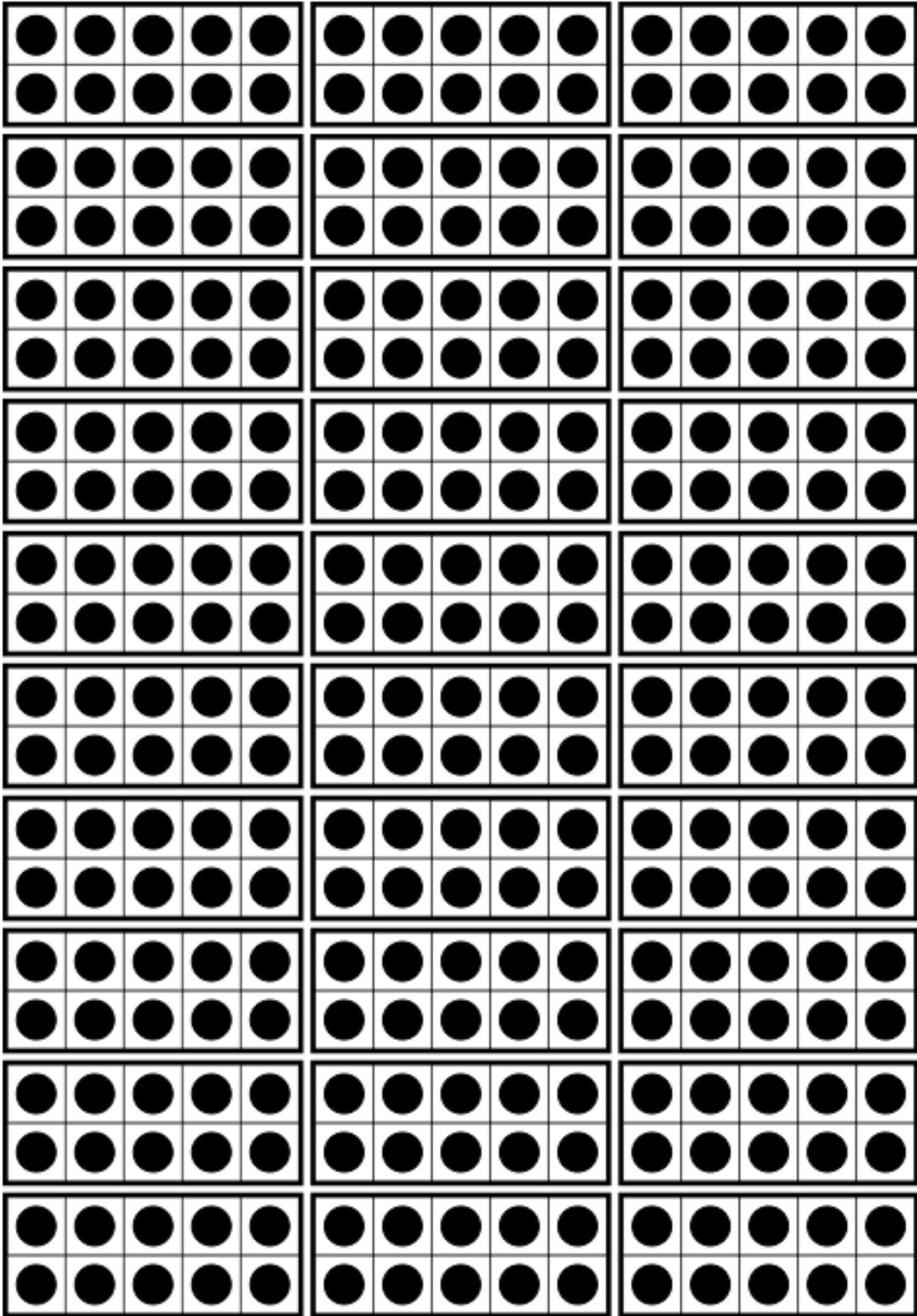   22 + 1 = 23   Compensation: Added 1 back to the answer.
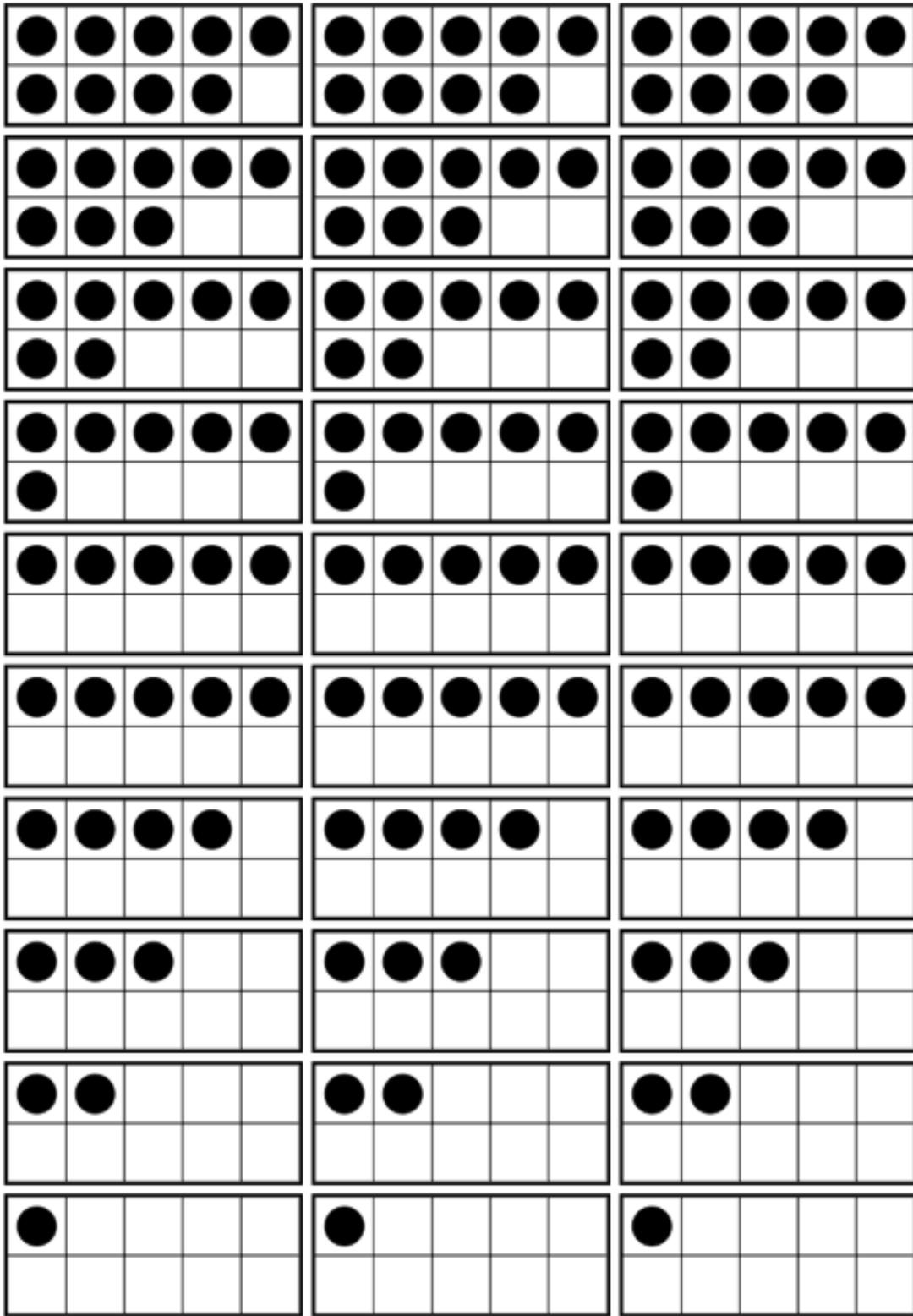
B. **Adding Up**

     49 + ___ = 72

     49 + 1 = 50

     50 + 20 = 70   The answer is in the parts that are added to make 72.

     70 + 2 = 72   1 + 20 + 2 = 23

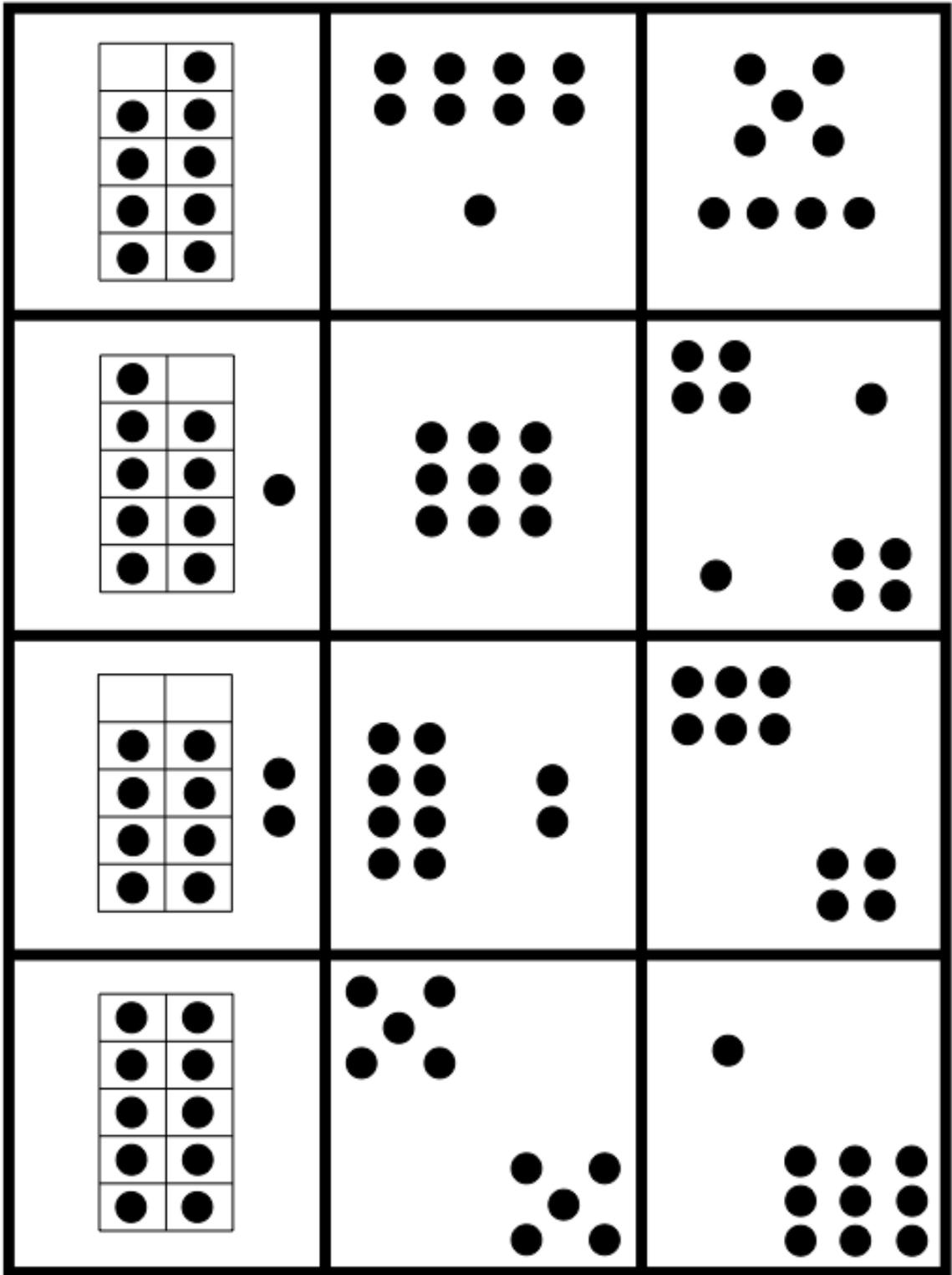*BLM 17—Little ten-frames*

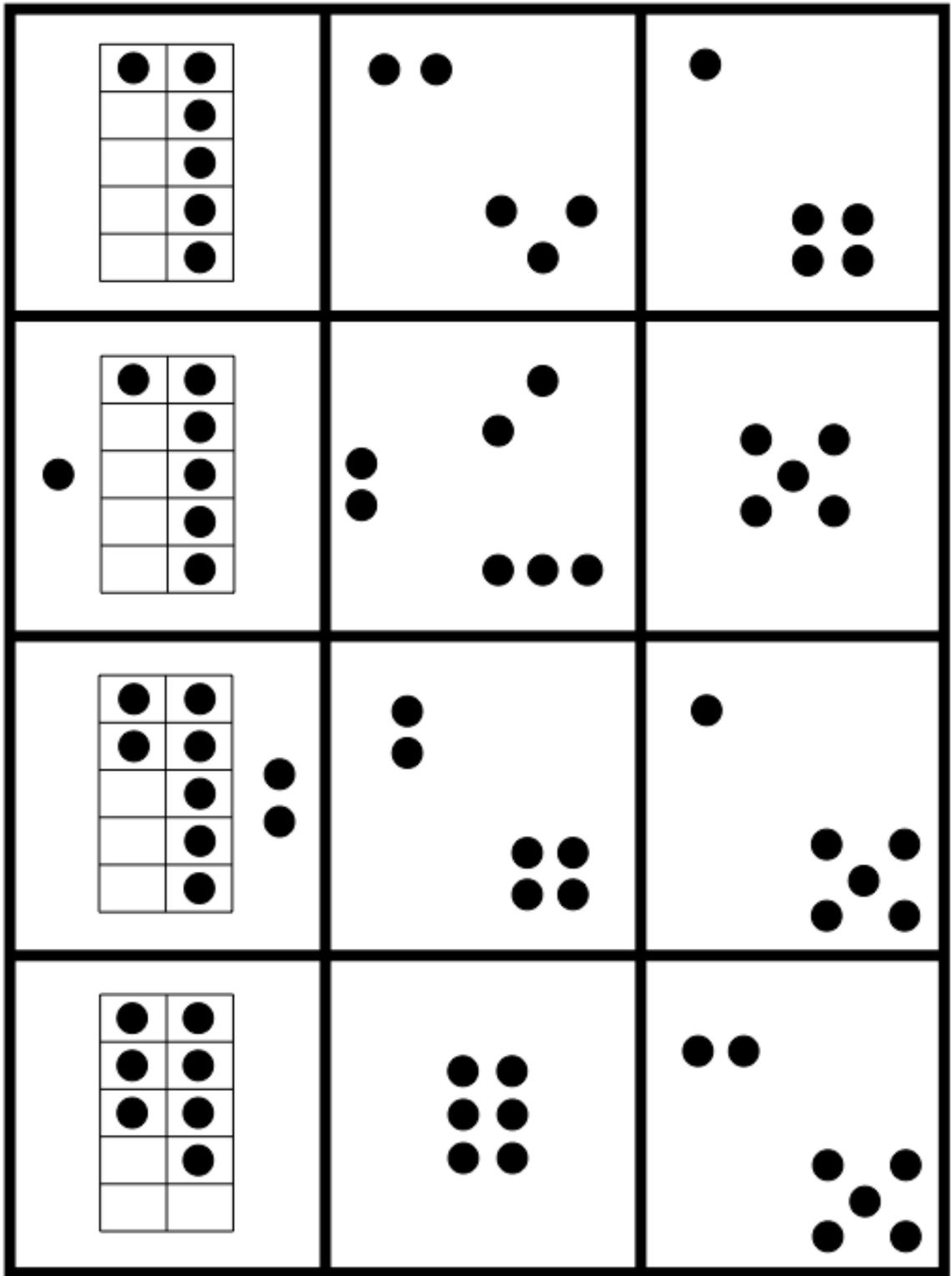Elementary K-2 Number Module   page 9
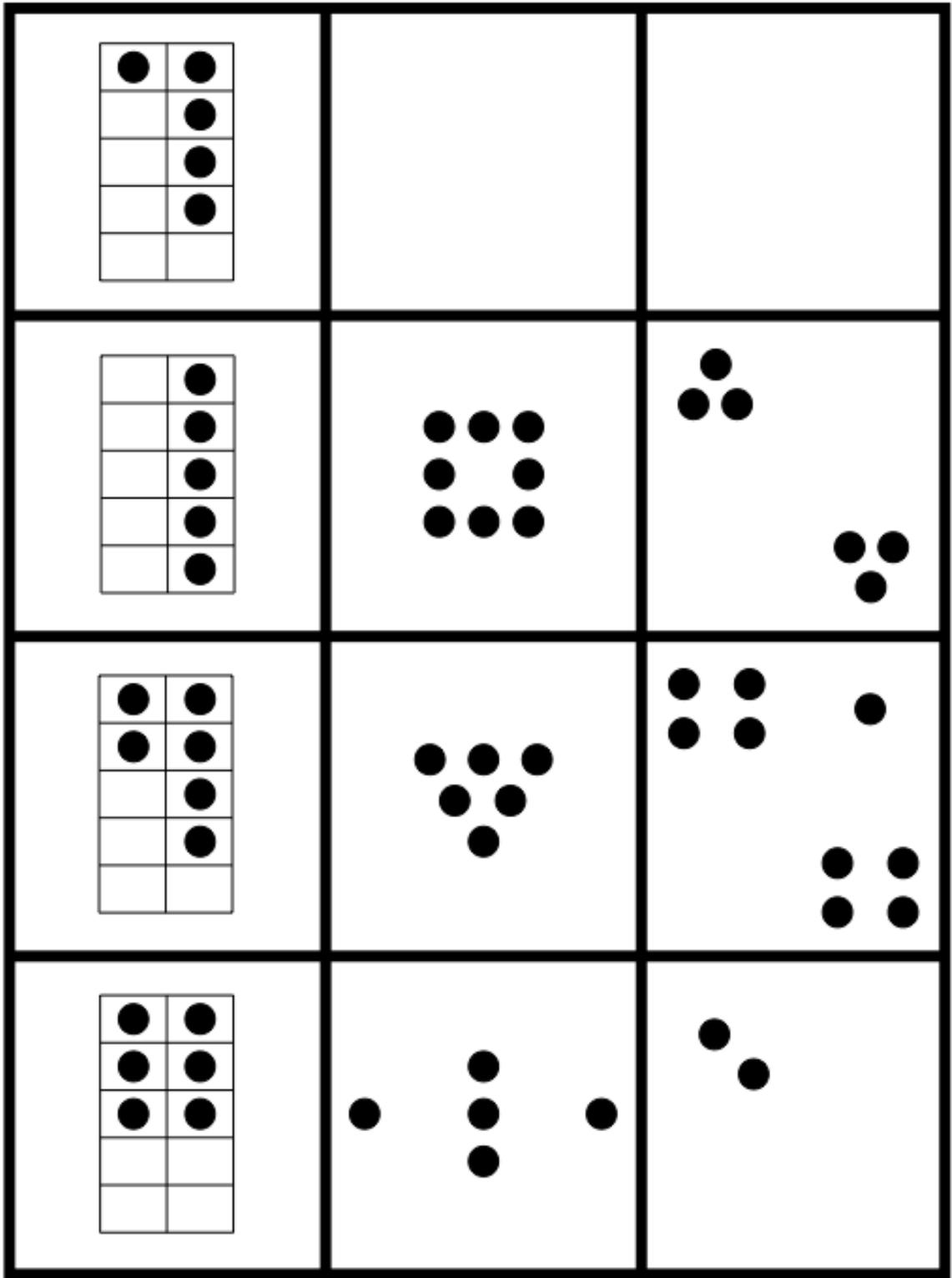
BLM 4—Dot cards

BLM 5—Dot cards

BLM 6—Dot cards

Elementary K-2 Number Module

BLM 8—Dot cards