KENTUCKY CENTER FOR MATHEMATICS

The Kentucky Numeracy Project

Session 4 – Counting and Early Addition

March 3, 2011

Alice Gabbard

Cindy Aossey

Kris Jarboe


The Kentucky
Numeracy
Project
CLOSING
KNP TASK GROUP 304
KNP TASK GROUP 340
INTROD UCTION

DEVELOPMENT OF LITERACY AND NUMERACY

Stages of Literacy Development

New Mexico Reading Initiative
http://reta.nmsu.edu/reading/willows/stages/index.html

Stage 0: PreLiteracy Stage
(Emergent Literacy)

- Enjoys being read to
- Pretends to read familiar books
- Names letters of alphabet
- Recognizes some signs
- Plays with pencils and paper
- Interest in printing own name
- Begins developing phonologic awareness

Stage 1: Beginning Literacy

- Develops phonemic awareness
- Associates letters with sounds
- Prints letters and numbers
- Recognizes high-frequency words "by sight"
- Sounds out regularly spelled words
- Uses contextual and picture clues
- Writes using inventive spelling

Stage 2: Beginning Fluency

- Consolidates "sight" vocabulary
- Expands letter-sound knowledge
- Reads simple familiar stories independently
- Practices using repeated and partner reading
- Develops reading fluency (speed & accuracy)
- Writes and spells with less effort

Stage 3: Literacy for Growth

- Reads "for pleasure"
- Reads to gain new knowledge
- Expands vocabulary through reading
- Writes and spells more automatically
- Writes for personal expression of

Initial Phases of Numeracy Development

Bruner ,J. S.: 1966. *Towards a Theory of Instruction*. New York: Norton.
Wright, R.J., Martland, J., & Stafford, A.K. (2006). *Early Numeracy: Assessment for Teaching and Intervention*. London: Paul Chapman.

Phase 0: Emergent Numeracy

- May be able to say number words in sequence up to and beyond ten
- Attempts to coordinate number words and items in a collection.
- Recognizes numerals 1-5 but may confuse certain numerals in the range of 1-10 (i.e. 6 & 8).
- Attempts to count the individual dots when presented with dominos or dice but may be able to immediately recognize some patterns
- Can represent numbers up to 5 on their fingers but needs to raise each finger one at a time
- Number is attached to one object or position (ordinal)

Phase 1: Perceptual / Enactive Numeracy

- Can accurately produce verbal number sequences from 1-20 forward, 10-1 backwards, and identify and sequence numerals from 1-10
- Can accurately add collections of visible items by counting from one to construct each collection and counting from one to construct the sum.
- May begin to raise fingers simultaneously (rather than one at a time) to solve addition tasks when both addends are less than five
- Number exists as nested quantities (cardinal)

Phase 2: Figurative / Iconic Numeracy

- Can accurately add collections of concealed items but begins the count at 1 and continue the count even beyond finger range (>10)
- Often drops back when asked to say the number that comes before (i.e. 12: "nine, ten, eleven, twelve . . . **Eleven!"**)
- Has difficulty making sense of subtractive tasks
- Can accurately identify numerals from 1-30 but commonly reverses numerals above 30 (i.e. 46 is named "sixty four")
- Numbers begin to take on a composite form (i.e. 8 may be described as two 4's)

Phase 3: Initial Number sequence / Counting-on stage

- Can accurately add quantities without relying on physical collections
- Can anticipate counts and keep track of counting internally
- Can count forward and backward by 10 on the decade (10, 20, 30,) but not off the decade (22, 32, 42)

Phase 4: Intermediate/Facile Number sequence / Symbolic Numeracy

- Has developed a deeper understanding of quantitative and operational relationships - Number Sense (i.e. 20 = 4fives = 2tens; subtraction is the inverse of addition)
- Numbers exists as composite objects that may be easily partitioned and reassembled to explore solutions –Mental Math Strategies (subtracts ei-

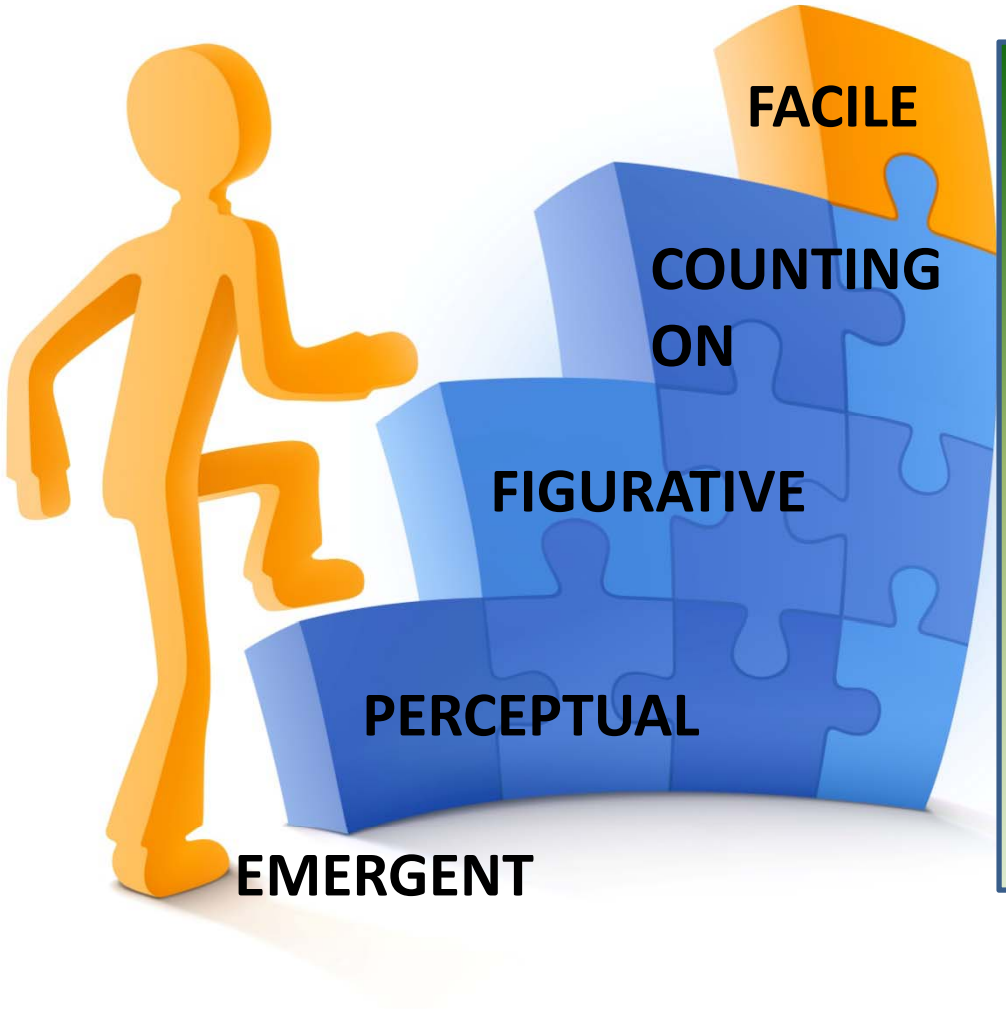
CONCRETE / SENSORY

FIGURATIVE

ABSTRACT / SYMBOLIC

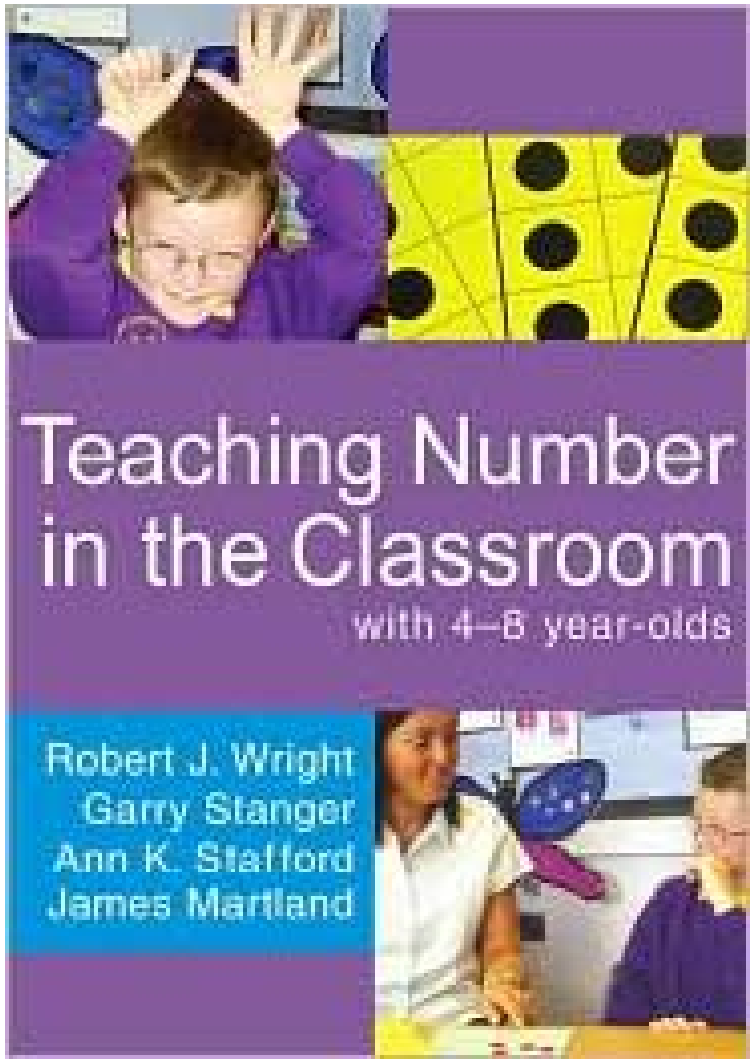
Student Development

Abstract: Memorization, Mental Computation, Robust Automaticity with Flexibility, Efficiency, Accuracy, Fluency



Unitizing
Visualizing

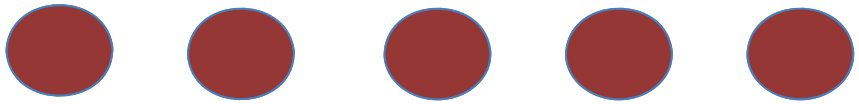
KENTUCKY CENTER FOR MATHEMATICS



SAGE Publications 2006 (reprinted 2009),
ISBN 978-1-4129-0758-3

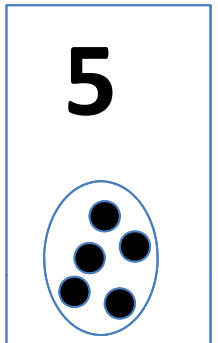
Cardinality

How many?

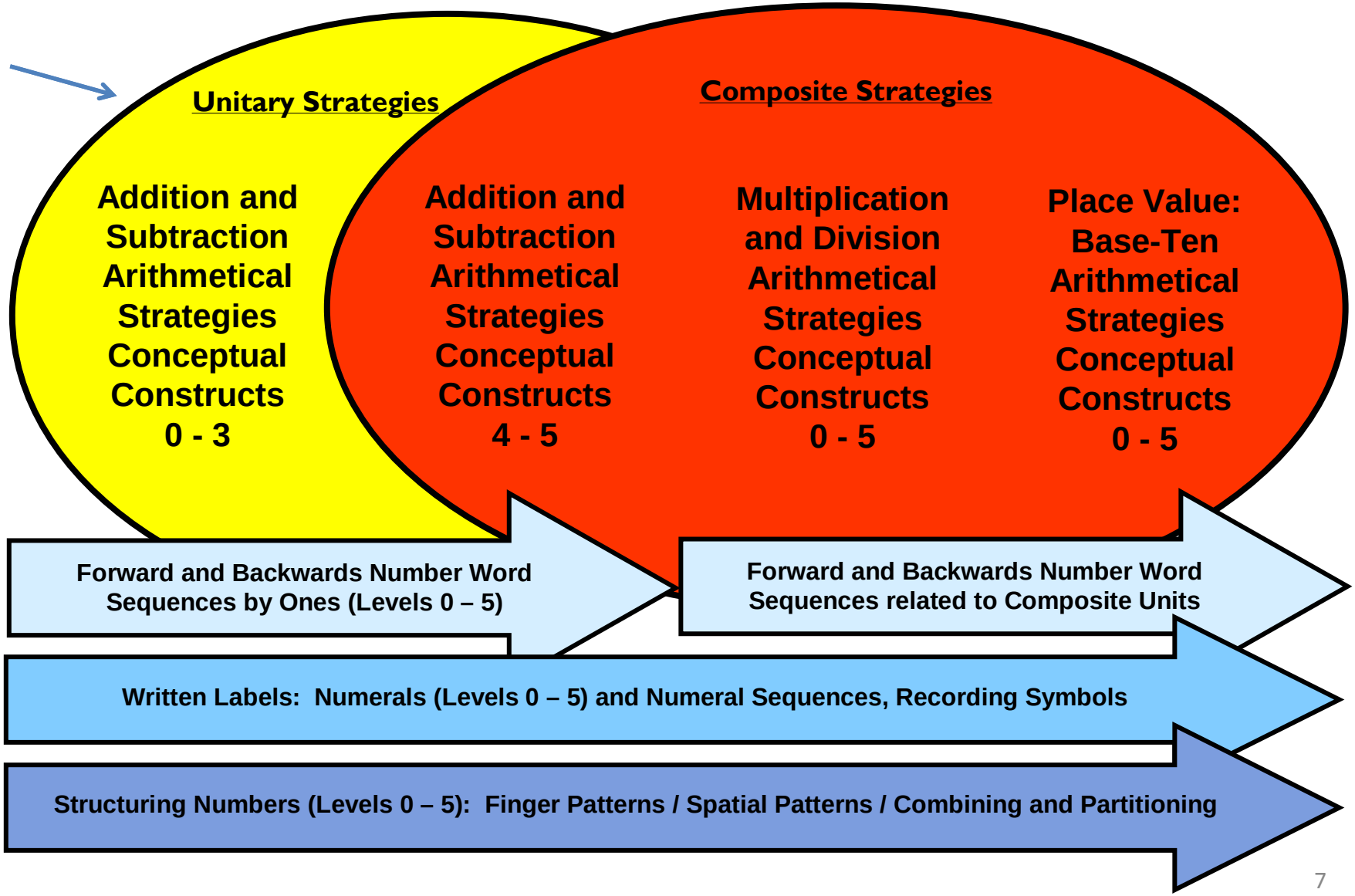


“one” “two” “three” “four” “five”

“The number of objects in a set or group (considered as a property of that grouping).”
-Princeton WordNet

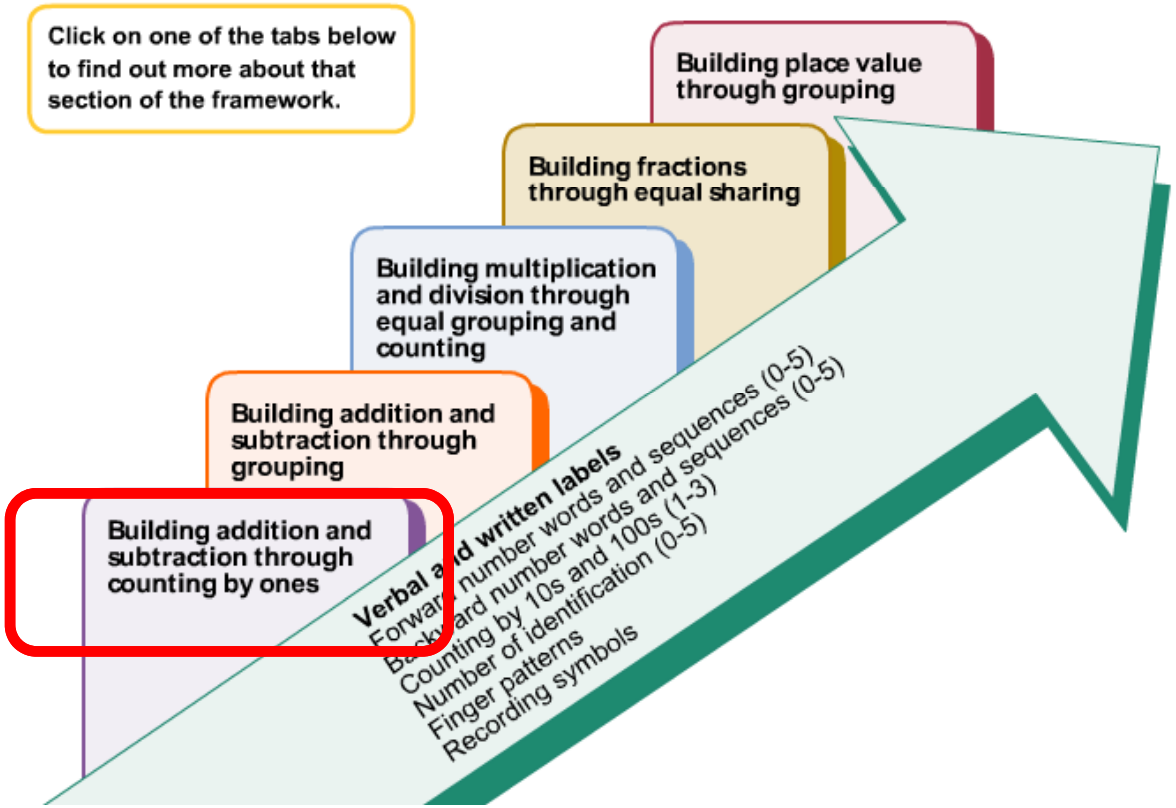


The Learning Framework in Number



Count Me In Too

The Learning Framework in Number



Count Me In Too

The Learning Framework in Number

Building addition and subtraction through counting by ones

Building addition and subtraction through counting by ones

- Emergent counting
- Perceptual counting
- Figurative counting
- Counting-on-and- back

Count Me In Too

- Learning Framework
- **The Learning Framework in Number**
- Strategies for solving arithmetical problems
- Subitising
- Counting sequences and grouping

The Learning Framework in Number

Building addition and subtraction through counting by ones

Building addition and subtraction through counting by ones

- Emergent counting
- Perceptual counting
- Figurative counting
- Counting-on-and- back

Learning Framework
The Learning Framework in Number
Strategies for olving arithmetical roblems
Subitising
Counting equences and rouping

The Learning Framework in Number

Building addition and subtraction through counting by ones

Building addition and subtraction through counting by ones

- Emergent counting
- Perceptual counting
- Figurative counting
- Counting-on-and-back

- Learning Framework
- **The Learning Framework in Number**
- Strategies for solving arithmetical problems
- Subitising
- Counting sequences and grouping

The Learning Framework in Number

Building addition and subtraction through counting by one

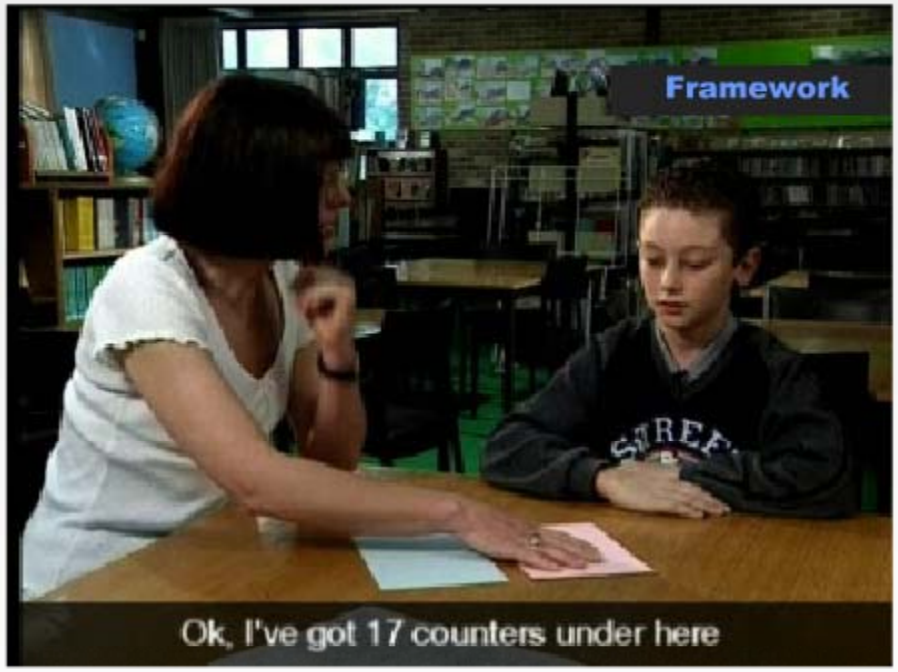
Building addition and subtraction through counting by ones

- Emergent counting
- Perceptual counting
- Figurative counting
- Counting-on-and- back
- An example

arning
mework
he Learning
mework in
mber
rategies for
ving arithmetical
blems
ubitising
ounting
uences and
uping

The Learning Framework in Number

Building addition and subtraction through counting by ones

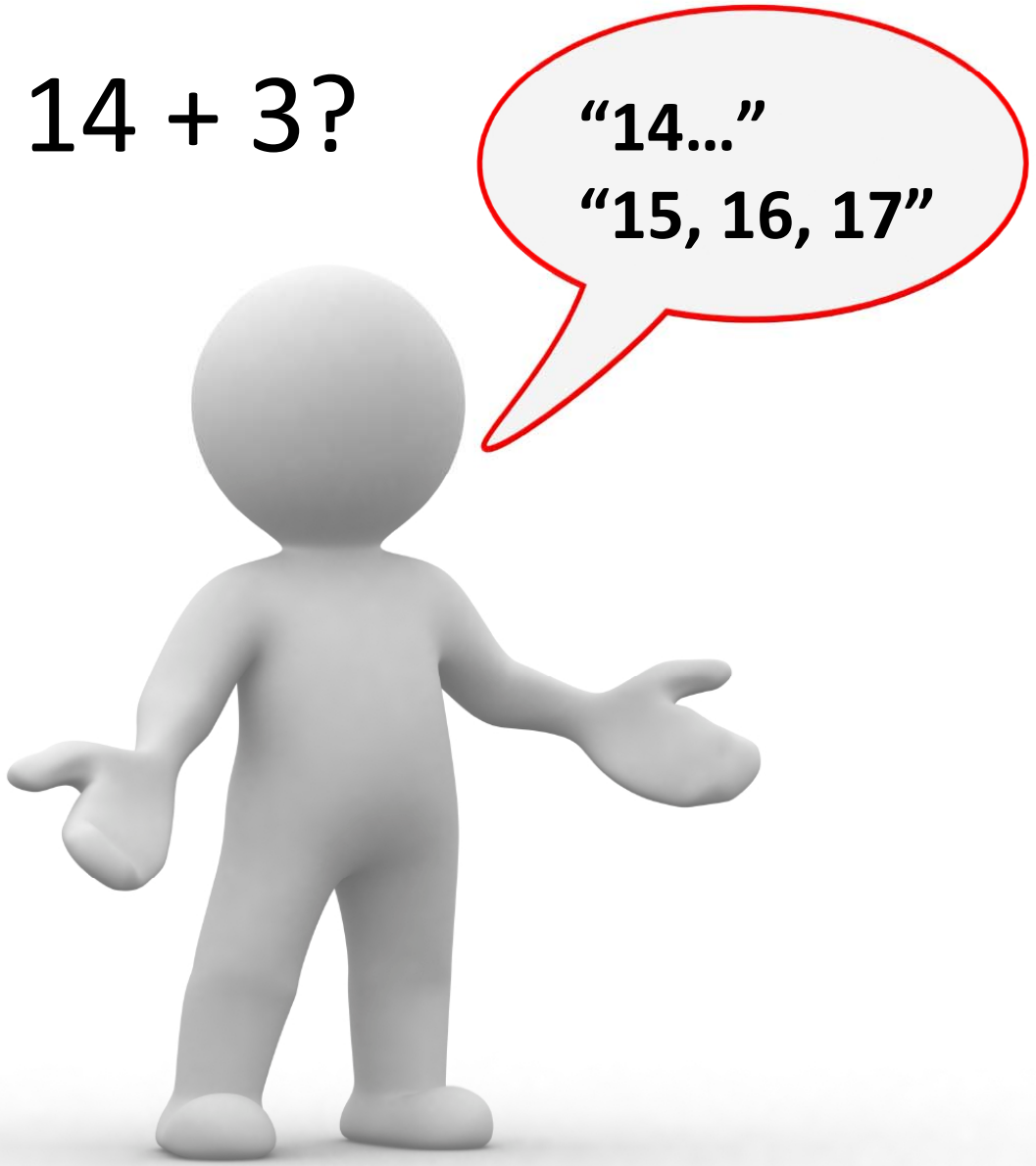


Building addition and subtraction through counting by ones

- Emergent counting
- Perceptual counting
- Figurative counting
- Counting-on-and-back
- An example

KENTUCKY CENTER FOR MATHEMATICS

What is 14 + 3?



Kentucky Common Core Academic Standards for Mathematical Practice

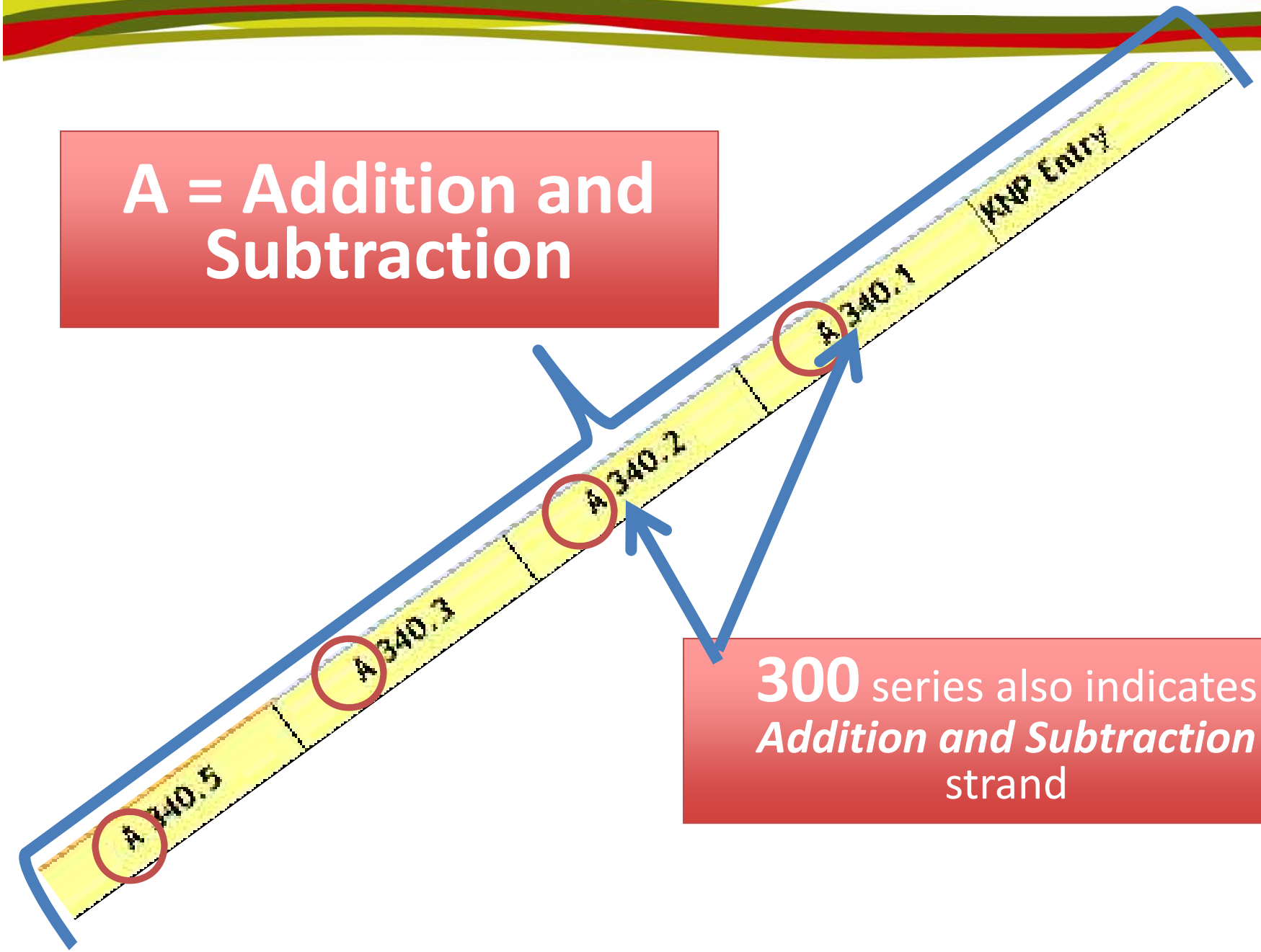
2 Reason abstractly and quantitatively.

Quantitative reasoning entails … attending to the meaning of quantities, not just how to compute them ….

KENTUCKY CENTER FOR MATHEMATICS


The Kentucky Numeracy Project
CLOSING
KNP TASK GROUP 304
KNP TASK GROUP 340
INTRODUCTION

A = Addition and Subtraction



300 series also indicates ***Addition and Subtraction*** strand

Task Group A340

KNP Entry	Kentucky Common Core Academic Standard (KCAS) (*see glossary)	KCAS Domain	KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy Strand	Construct/Level	Numeracy Target	"I CAN ....." (*see glossary)	Assessment for Learning	Student Grouping	Video Link	Print Link	Interactive	Reference	Teacher Notes
A 340.1	K.CC 5 Count* to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle or as many as 10	Counting and Cardinality	Count to tell the	Two panel dot cards - level 2 (see link)	Choose a 2 panel dot card. Open both doors and leave the doors open. Student determines the total number of dots.	Addition and	0 to 1 RED	Perceptual counting	... tell the sum of two collections.	Put out a card with up to 20 dots. Open both doors and, leaving the doors open, ask student "how many dots?"	individual or small		http://www.kentuc			Use the print link to print the two panel dot cards. The same cards are used for A340.1 and A340.2. Fold the card in half lengthwise at the dotted line. Cut a slit in the top panel to create doors. The total may be written on the back for students
A 340.2	1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6	Operations and Algebraic Thinking	Add and subtract	Two panel dot cards - level 2 (see link)	Choose a 2 panel dot card. Open the door on the left, determine the number of black dots and then close the	Addition and	1 to 2 BLUE	Figurative counting	... tell the sum of two collections when screened	Put out a card with 8 dots on the left and 5 dots (arranged irregularly) on the right. Flash the dots under the left door	individual or small		http://www.kentuc			Use the print link to print the two panel dot cards. The same cards are used for A340.1 and A340.2. Fold the card in half lengthwise at the dotted line. Cut a slit in the top panel to create doors. The total may be written on the back for students
A 340.3	1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6	Operations and Algebraic Thinking	Add and subtract	Two panel dot cards - level 3 (see link)	Choose a 2 panel dot card. Open the door on the left, determine the number of black dots and then close the	Addition and	2 to 3 GREEN	Initial Number	... tell the sum by counting on	Put out a card with 17 dots on the left and 5 dots (arranged irregularly) on the right. Flash the dots under the left door	individual or small		http://www.kentuc			Use the print link to print the two panel dot cards. Fold the card in half lengthwise at the dotted line. Cut a slit in the top panel to create doors. Students may additionally be asked to write the corresponding equation. The sum or the

KCAS

KNP Entry	Kentucky Common Core Academic Standard (KCAS) (*see glossary)	KCAS Domain	KCAS Cluster
A 340.1	K.CC.5 Count* to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects.	Counting and Cardinality	Count to tell the number of objects
A 340.2	1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).	Operations and Algebraic Thinking	Add and subtract within 20
A 340.3			

KCAS

KNP Entry	Kentucky Common Core Academic Standard (KCAS) (*see glossary)	KCAS Domain	KCAS Cluster
A 340.1	K.CC.5 Count* to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects.	Counting and Cardinality	Count to tell the number of objects
A 340.2 A 340.3	1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).	Operations and Algebraic Thinking	Add and subtract within 20

KCAS Grade 1 Introduction

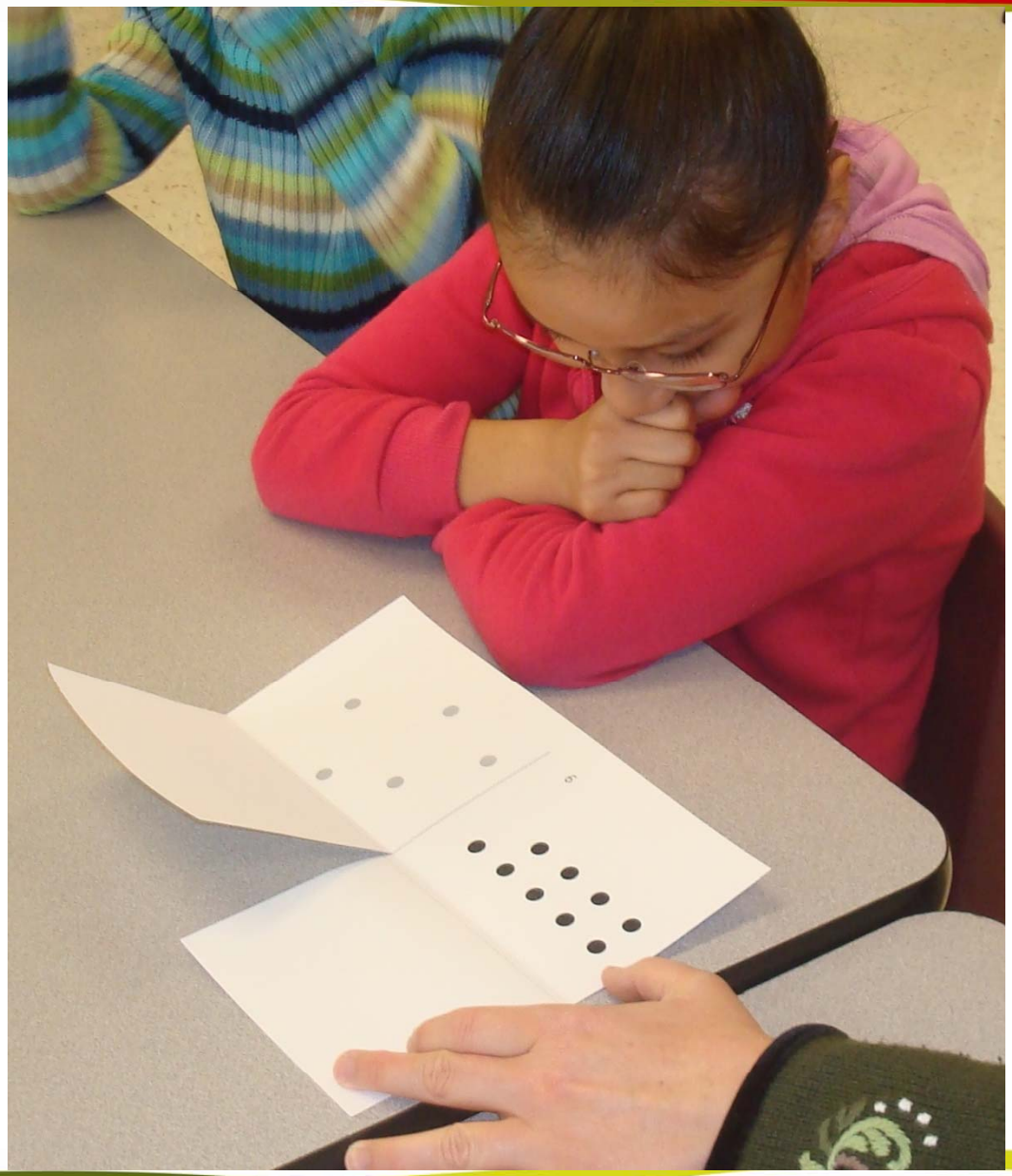
Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

KCAS Grade 1 Introduction

Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

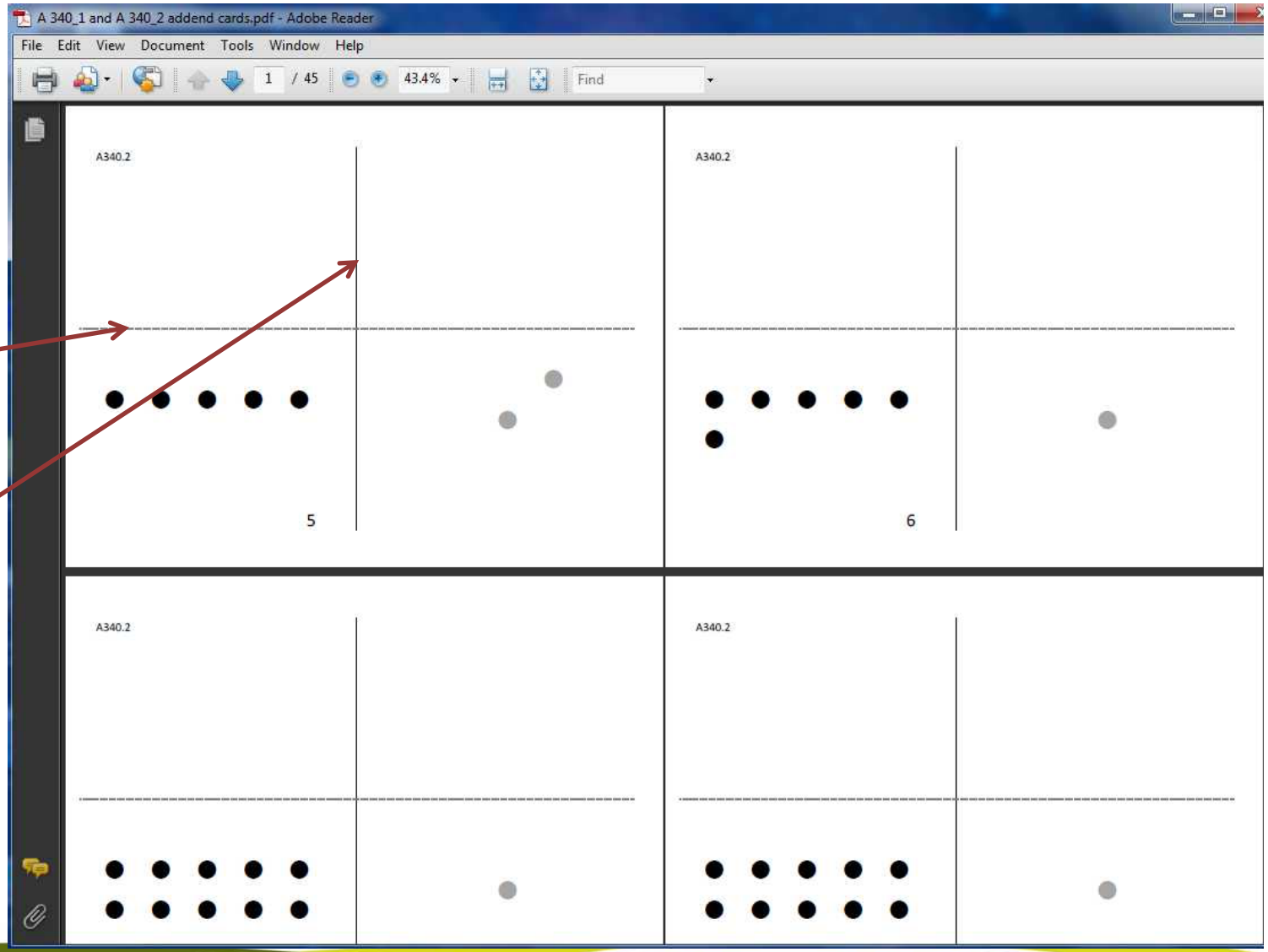
A340.1

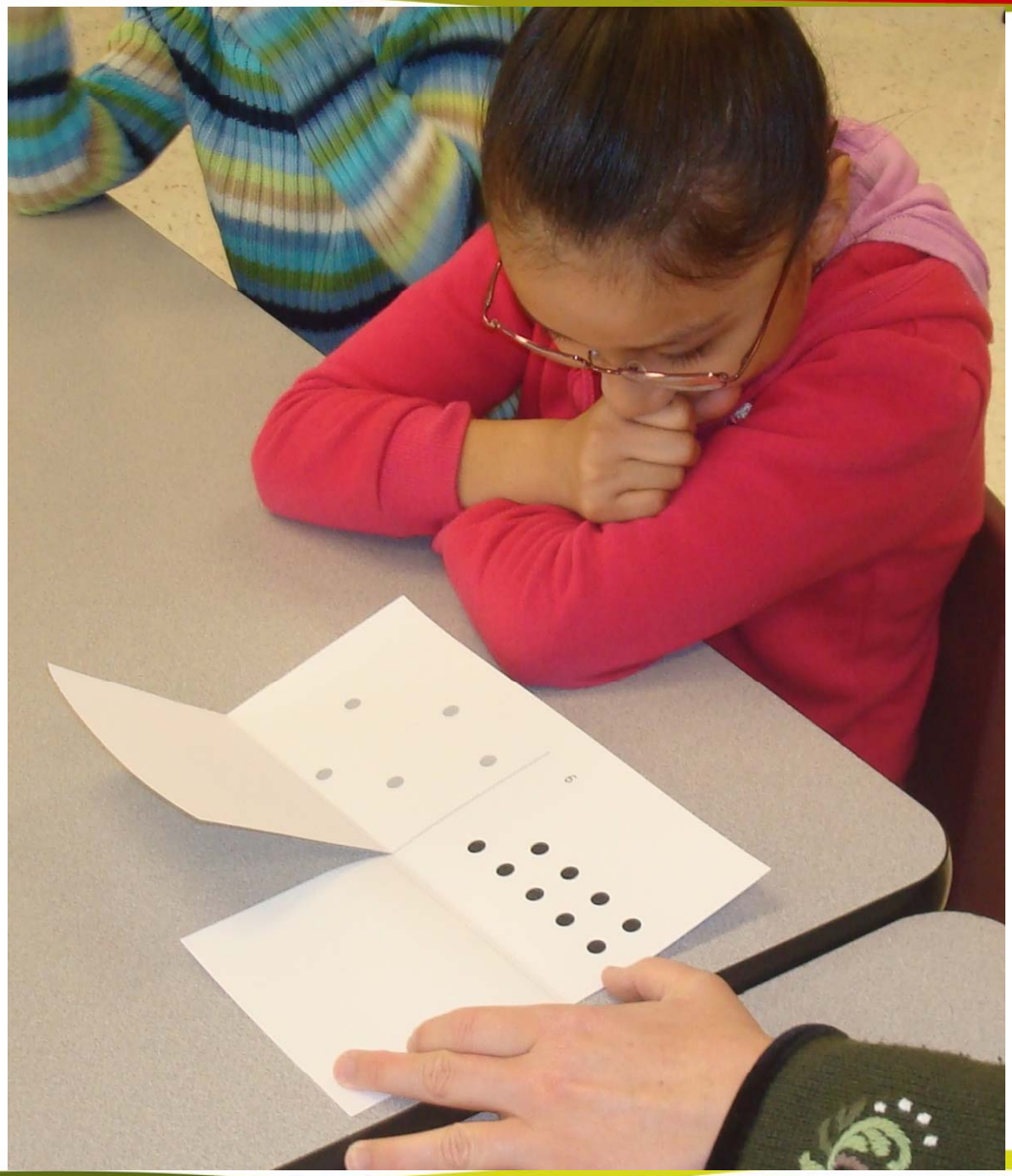
KCAS Domain	KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy Strand	Construct/Level	Numeracy Target	"I CAN ....." (*see glossary)	Assessment for Learning	Student	Video Link	Print Link	Interactive	Reference	Teacher Note
Counting and Cardinality	Count to tell the number of objects	Two panel dot cards - level 2 (see link)	Choose a 2 panel dot card. Open both doors and leave the doors open. Student determines the total number of dots.	Addition and Subtraction	0 to 1 RED	Perceptual counting	... tell the sum of two collections.	Put out a card with up to 20 dots. Open both doors and, leaving the doors open, ask student "how many dots?" Give student permission to touch dots if student is hesitant.	individual or small group		http://www.kentuckymathematics.org/interventio			Use the print link to pri panel dot cards. The sa are used for A340.1 an Fold the card in half len the dotted line. Cut a sli panel to create doors. may be written on the students to use a check is struggling with the nu sequence, it may be hel some of the Nf activitie that supporting skill. If help student to work wit such as loose counters student can move the



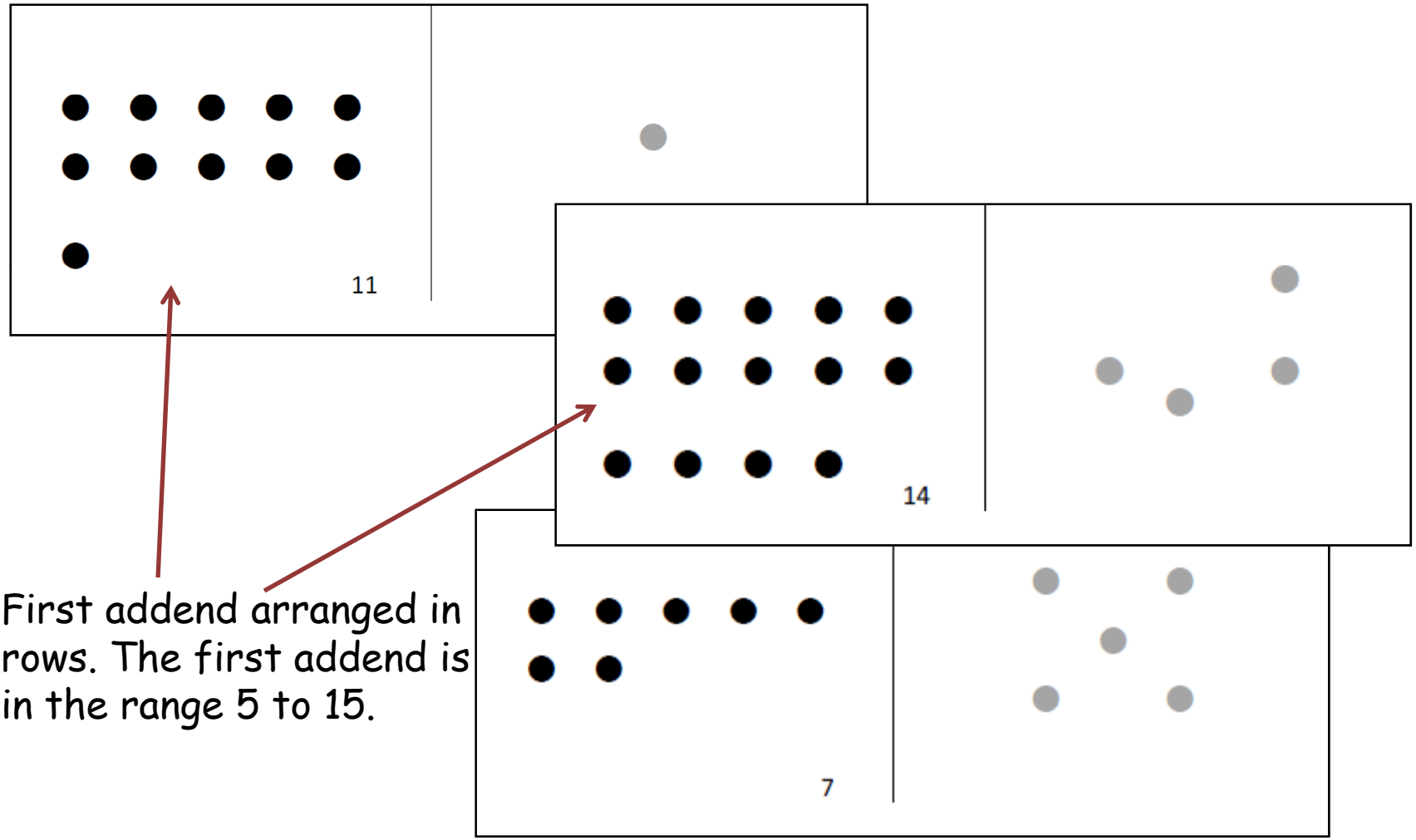
Printable includes 45 two panel dot cards like these.

1. Print.
2. Fold on the dotted line.
3. Cut along top vertical line to make doors.



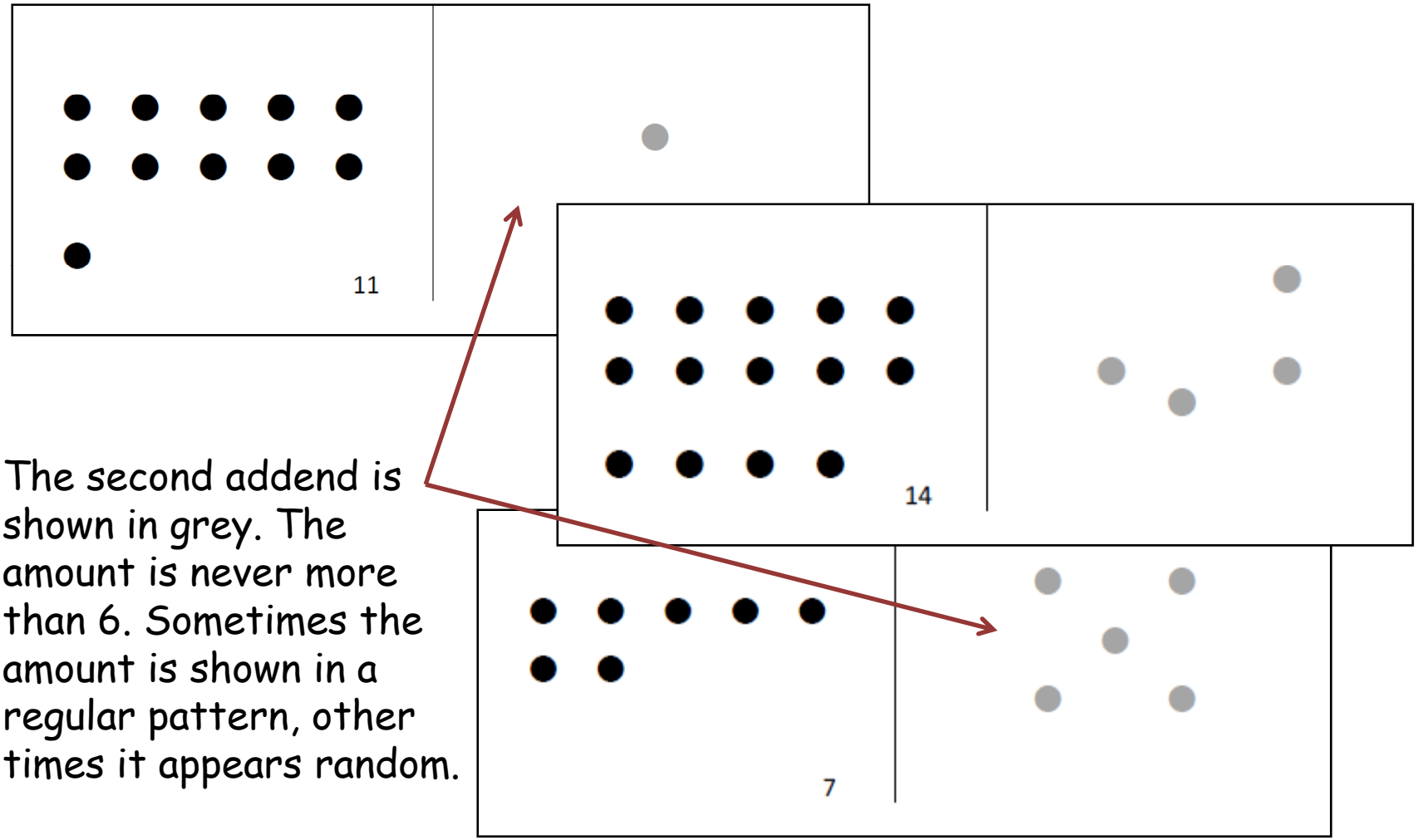


Examples of 2 panel dot cards



First addend arranged in rows. The first addend is in the range 5 to 15.

Examples of 2 panel dot cards



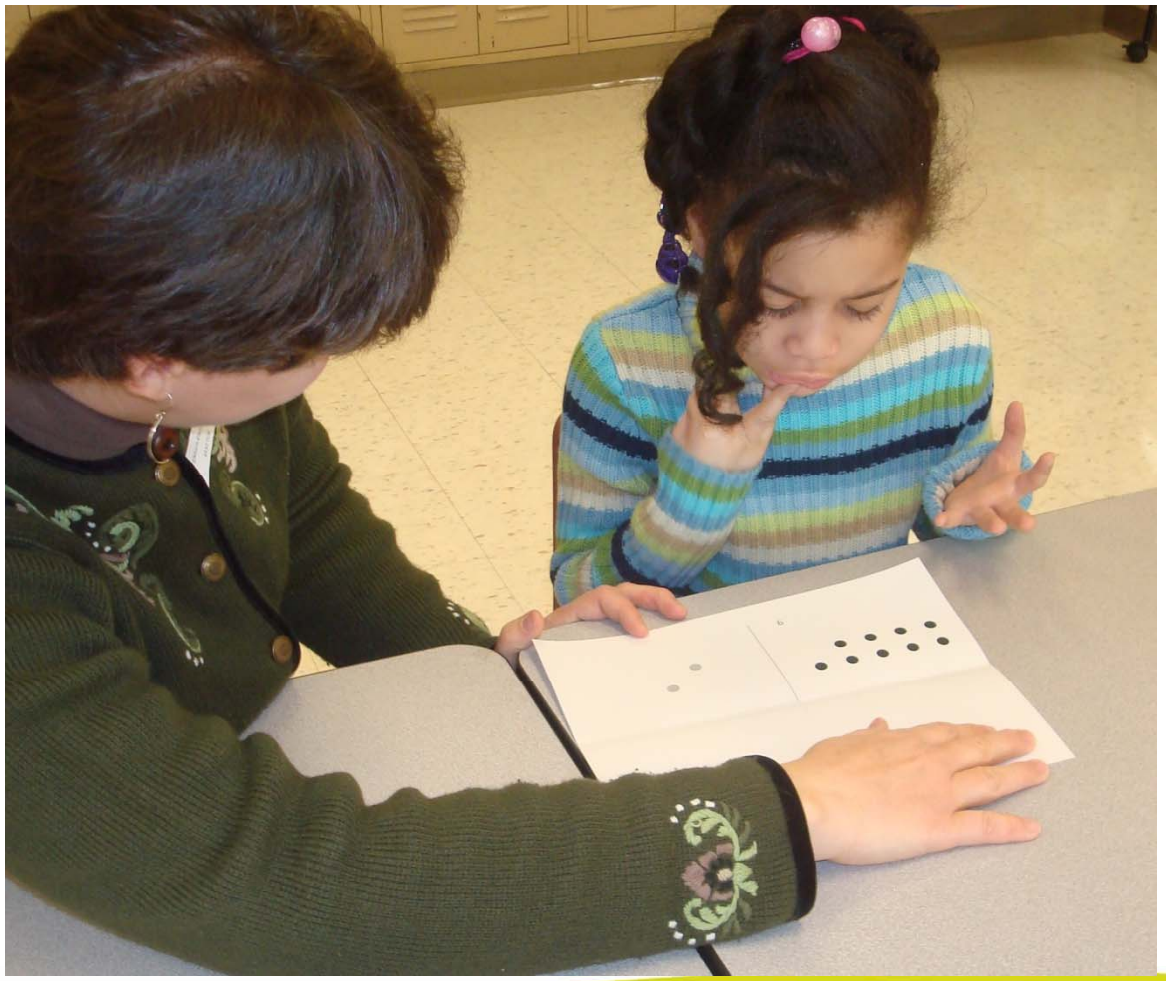
The second addend is shown in grey. The amount is never more than 6. Sometimes the amount is shown in a regular pattern, other times it appears random.

A340.1 – Perceptual counting

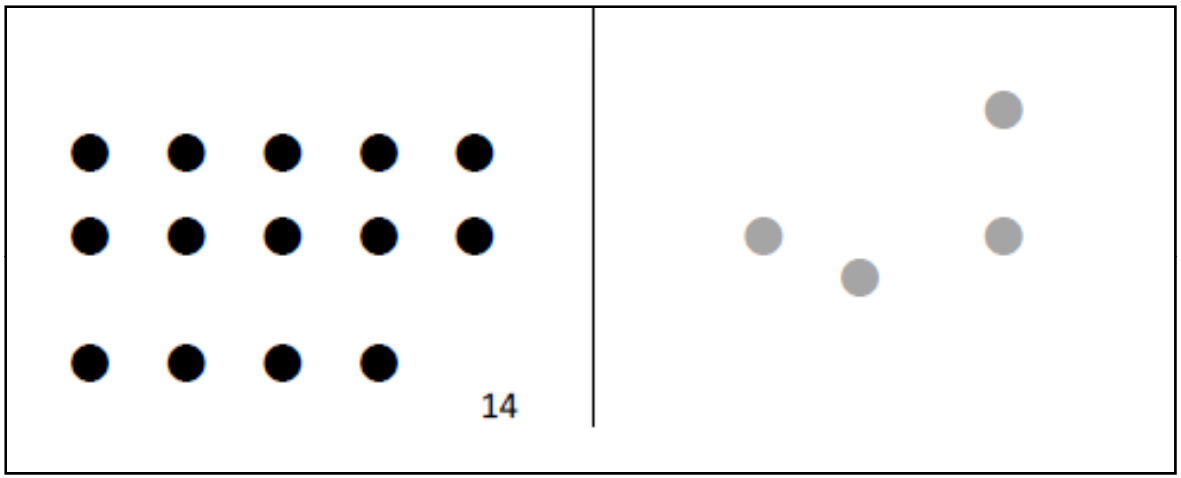
KCAS Domain	KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy Strand	Construct/Level	Numeracy Target	"I CAN ....." (*see glossary)	Assessment for Learning	Student	Video Link	Print Link	Interactive	Reference	Teacher Note
Counting and Cardinality	Count to tell the number of objects	Two panel dot cards - level 2 (see link)	Choose a 2 panel dot card. Open both doors and leave the doors open. Student determines the total number of dots.	Addition and Subtraction	0 to 1 RED	Perceptual counting	... tell the sum of two collections.	Put out a card with up to 20 dots. Open both doors and, leaving the doors open, ask student "how many dots?" Give student permission to touch dots if student is hesitant.	Individual or small group		http://www.kentuckymathematics.org/interventio			Use the print link to pri panel dot cards. The sa are used for A340.1 an Fold the card in half len the dotted line. Cut a sli panel to create doors. may be written on the students to use a check is struggling with the nu sequence, it may be hel some of the Nf activitie that supporting skill. If help student to work wit such as loose counters student can move the

A340.1

"How many dots?"



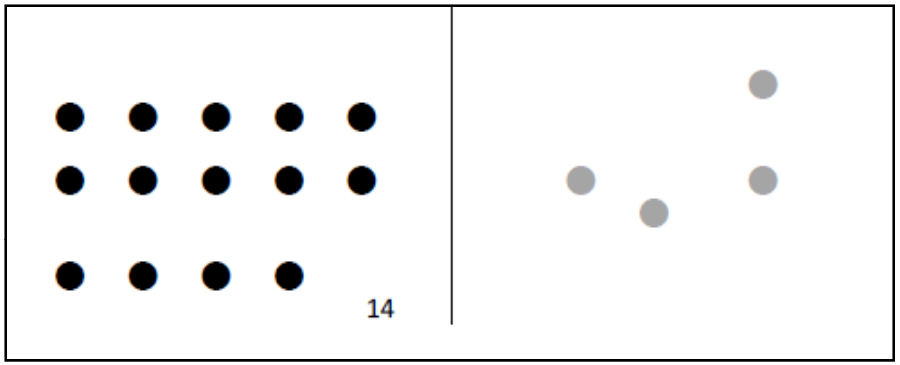
I can tell the sum of two collections



What does a student need to *understand* and *be able to do* to be successful?

I can tell the sum of two collections

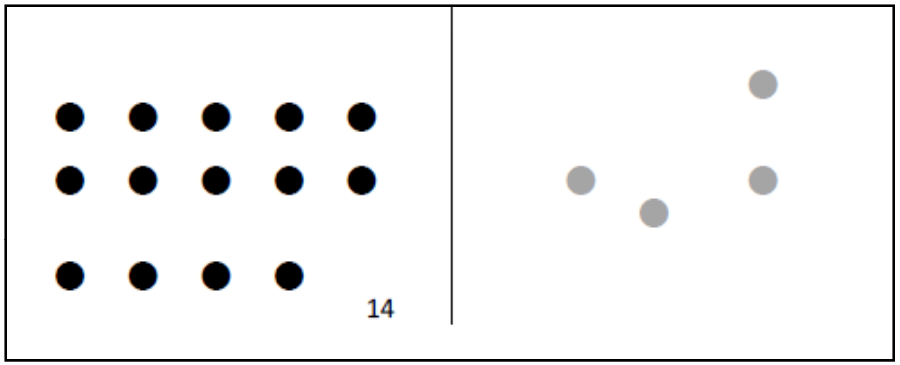
What does a student need to understand and be able to do to be successful?



- Forward Number Word Sequence

I can tell the sum of two collections

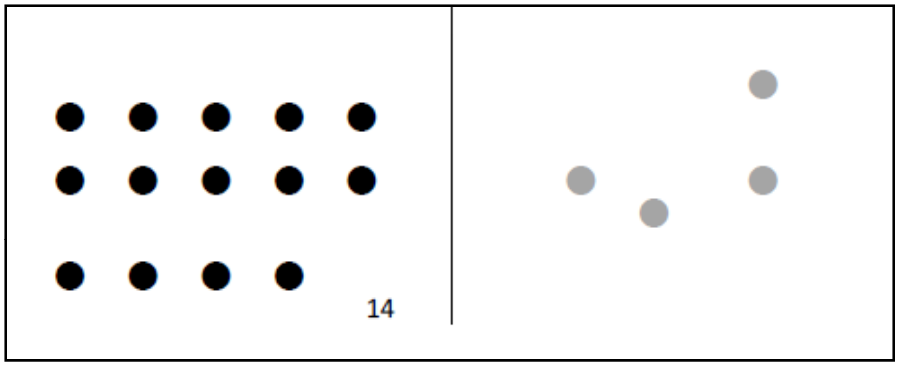
What does a student need to understand and be able to be successful?



- Forward Number Word Sequence
- One to One correspondence

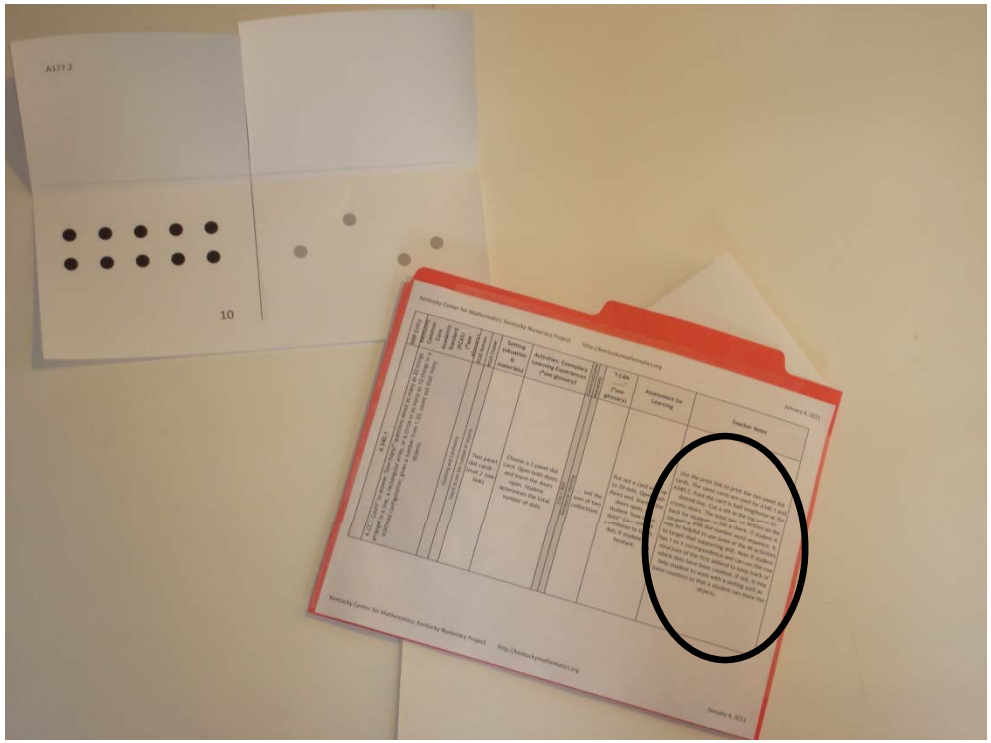
I can tell the sum of two collections

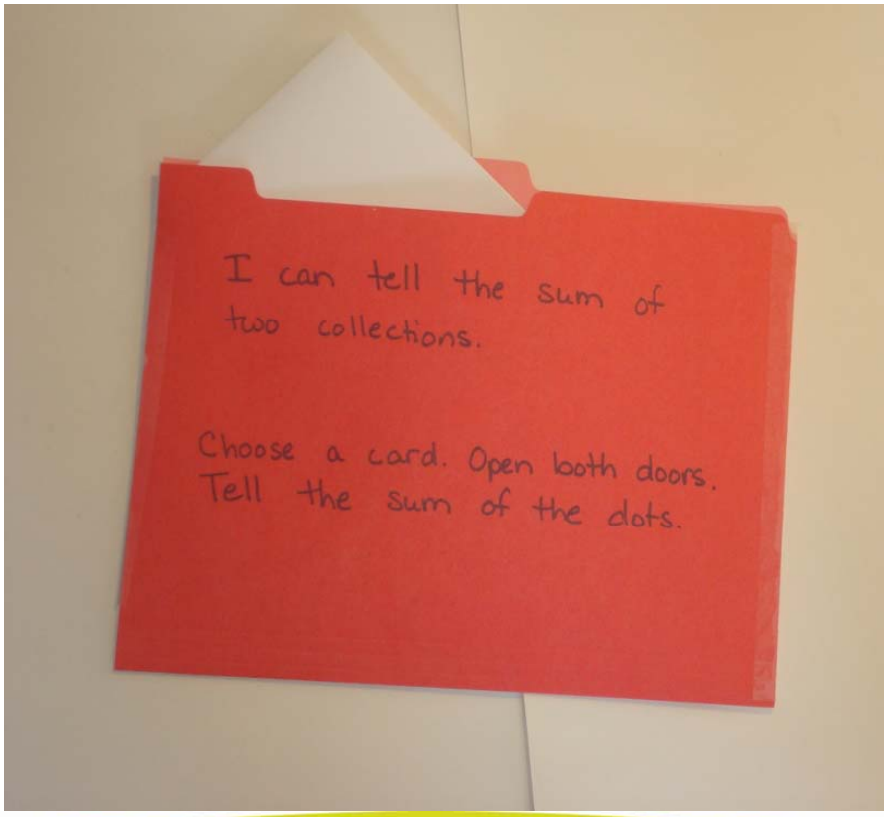
What does a student need to understand and be able to be successful?



- Forward Number Word Sequence
- One to One correspondence
- Use row structure to know which dots have been counted

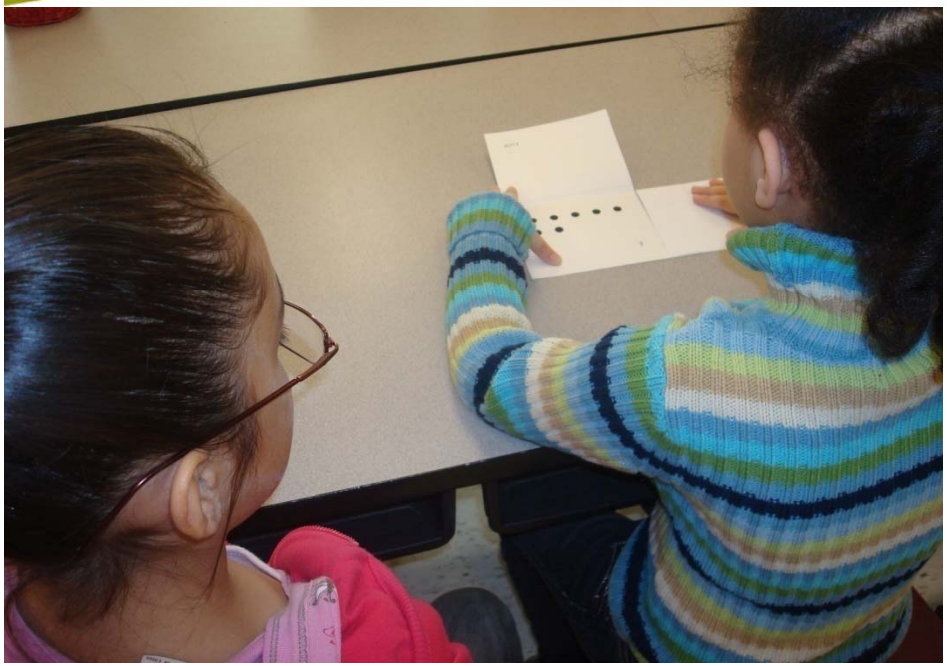
A340.1


A177.2
10


I can tell the sum of two collections.
Choose a card. Open both doors. Tell the sum of the dots.

A340.2 - Figurative counting

KNP Entry	Kentucky Common Core	KCAS Domain	KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy Strand	Construct/Level	Numeracy Target	"I CAN ....." (*see glossary)	Assessment for Learning	Student	Video Link	Print Link	Interactive	Reference	Teacher Notes
A 340.2	1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting	Operations and Algebraic Thinking	Add and subtract within 20	Two panel dot cards - level 2 (see link)	Choose a 2 panel dot card. Open the door on the left, determine the number of black dots and then close the door. Open briefly (approximately 1 second) the door on the right and determine how many grey dots are under the door. Determine the number of dots altogether.	Addition and Subtraction	1 to 2 BLUE	Figurative counting	... tell the sum of two collections when screened	Put out a card with 8 dots on the left and 5 dots (arranged irregularly) on the right. Flash the dots under the left door saying "Here are 8 black dots". Flash the dots under the right door saying "Here are 5 grey dots. How many dots are there altogether?" Ask student to explain strategy. Repeat with other two panel dot cards.	Individual or small group		http://www.kentuckymathematics.org/intervention/doc/Numera			Use the print link to print the two panel dot cards. The same cards are used for A340.1 and A340.2. Fold the card in half lengthwise at the dotted line. Cut a slit in the top panel to create doors. The total may be written on the back for students to use a check. If a student is struggling, leave one of doors open. Start with dot cards where the second addend is no more than 2 or 3. Gradually build up to cards where the second addend is 5 or 6 and student can find the sum with no more than a quick glance under each door. If a teacher is presenting the task, the teacher may say "There are ___ black dots under here, there are ___ grey dots under here... how many dots altogether?" while briefly flashing the dots behind the doors. Students at this construct are starting to use a mental understanding of the quantity to add rather than depending on physical objects. Some may use fingers to keep track, others may

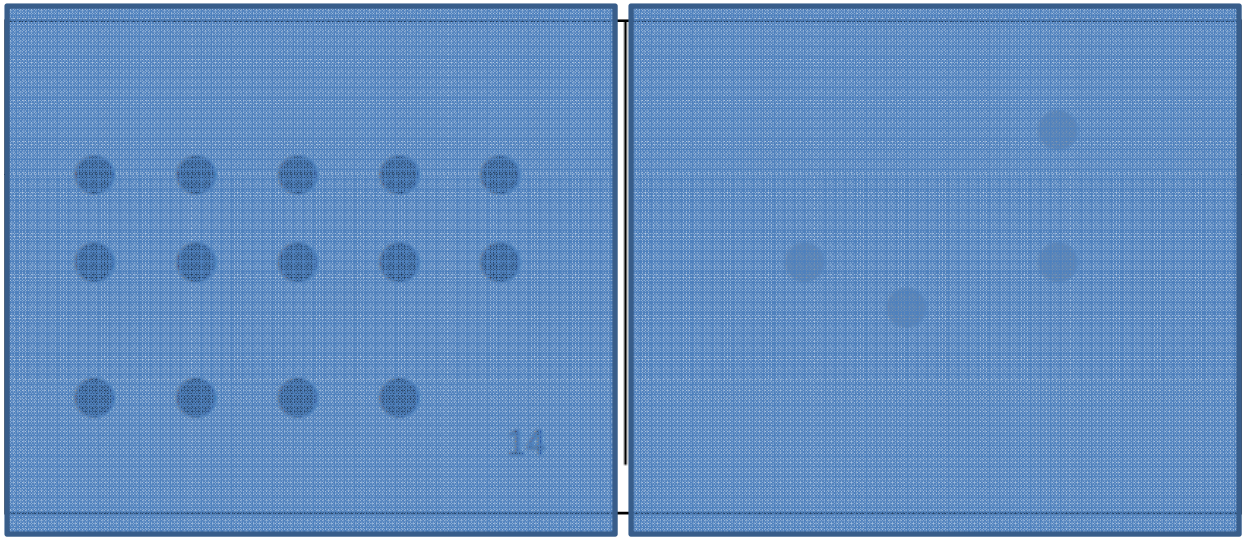


Look briefly behind the first door.

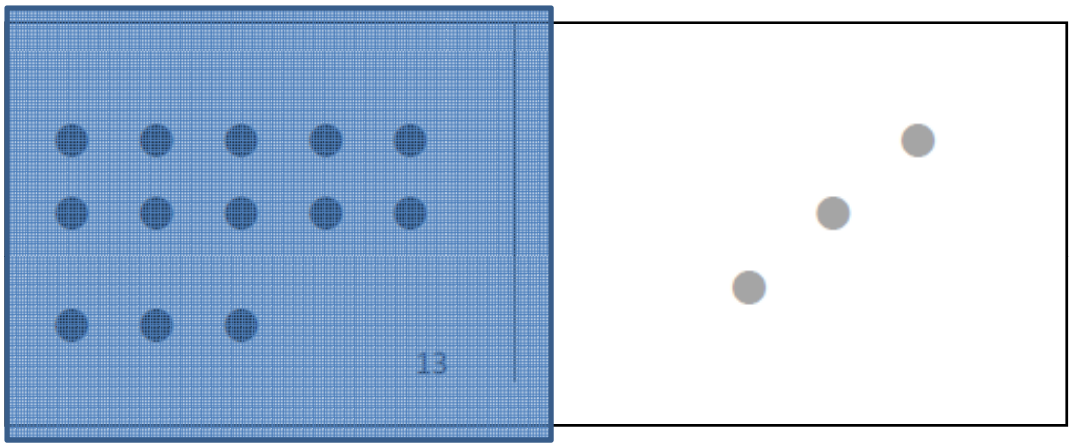
Look briefly behind the second door.

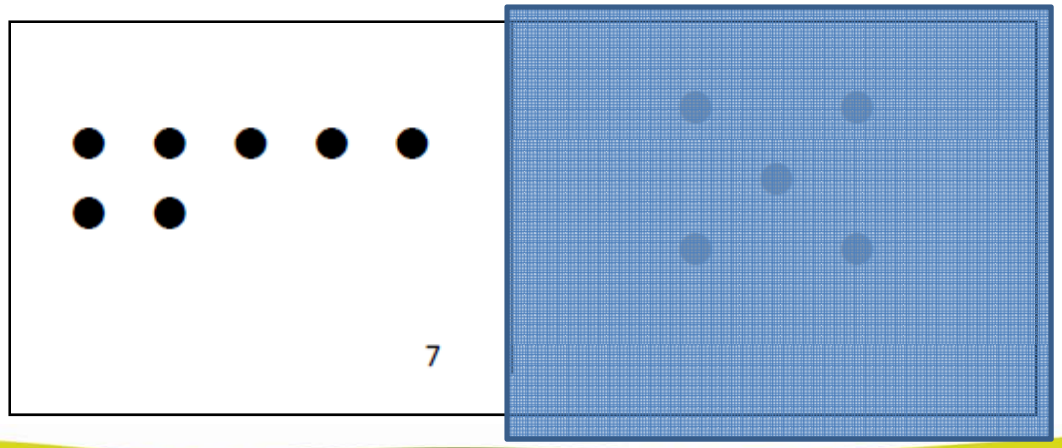
Determine how many dots in all.

I can tell the sum of two collections *when screened*



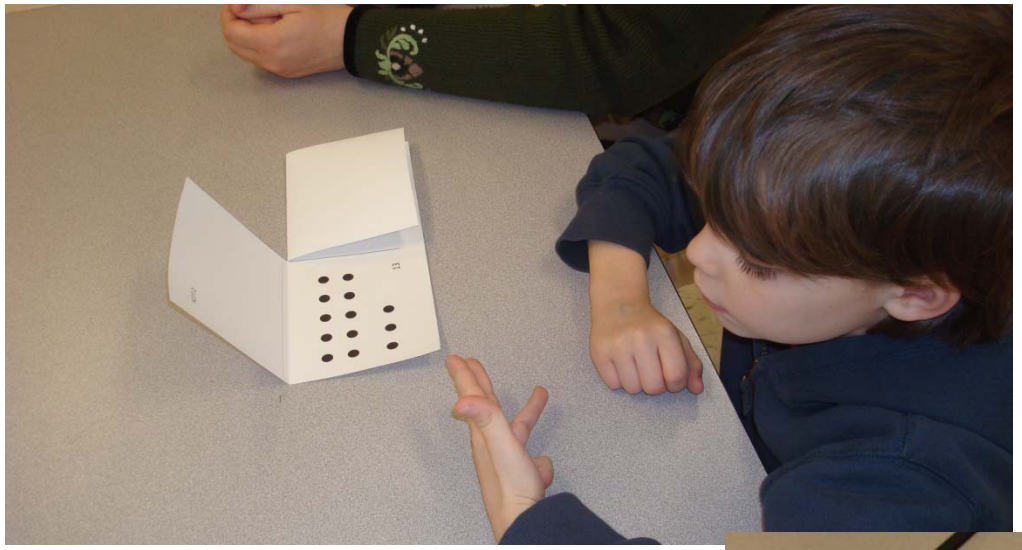
"Distancing the Setting"





Except from the Teacher Notes: "If a student is struggling, leave one of doors open. Start with dot cards where the second addend is no more than 2 or 3. Gradually build up to cards where the second addend is 5 or 6 and student can find the sum with no more than a quick glance under each door."

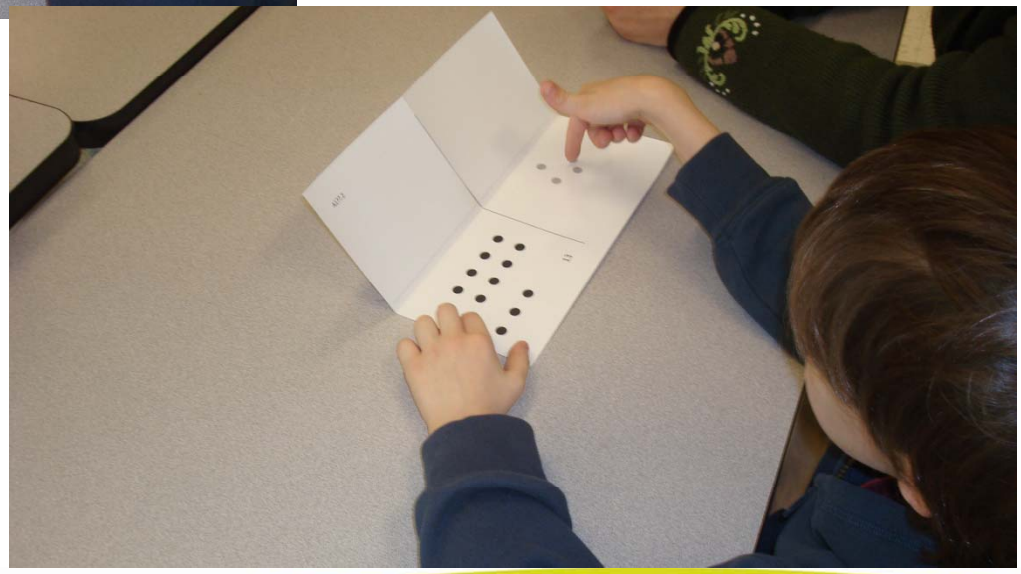
One addend screened



Leave *one* of the doors open as student solves the task.

Here we see the student use his fingers to "keep track" of the amount under the door.

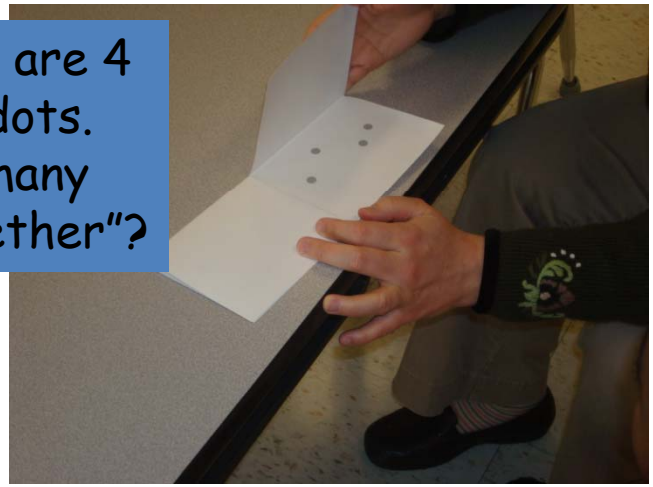
Door is opened so that student can verify his own work.



Both addends screened

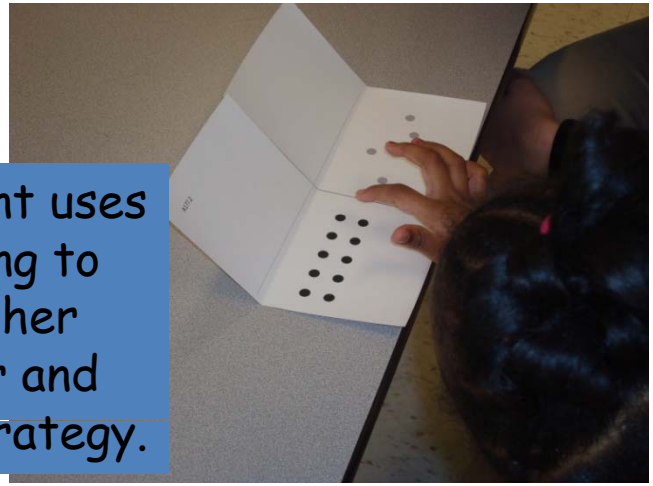
"Here are 10 black dots"

"Here are 4 grey dots. How many altogether"?



Student matched her fingers to the arrangement of the dots

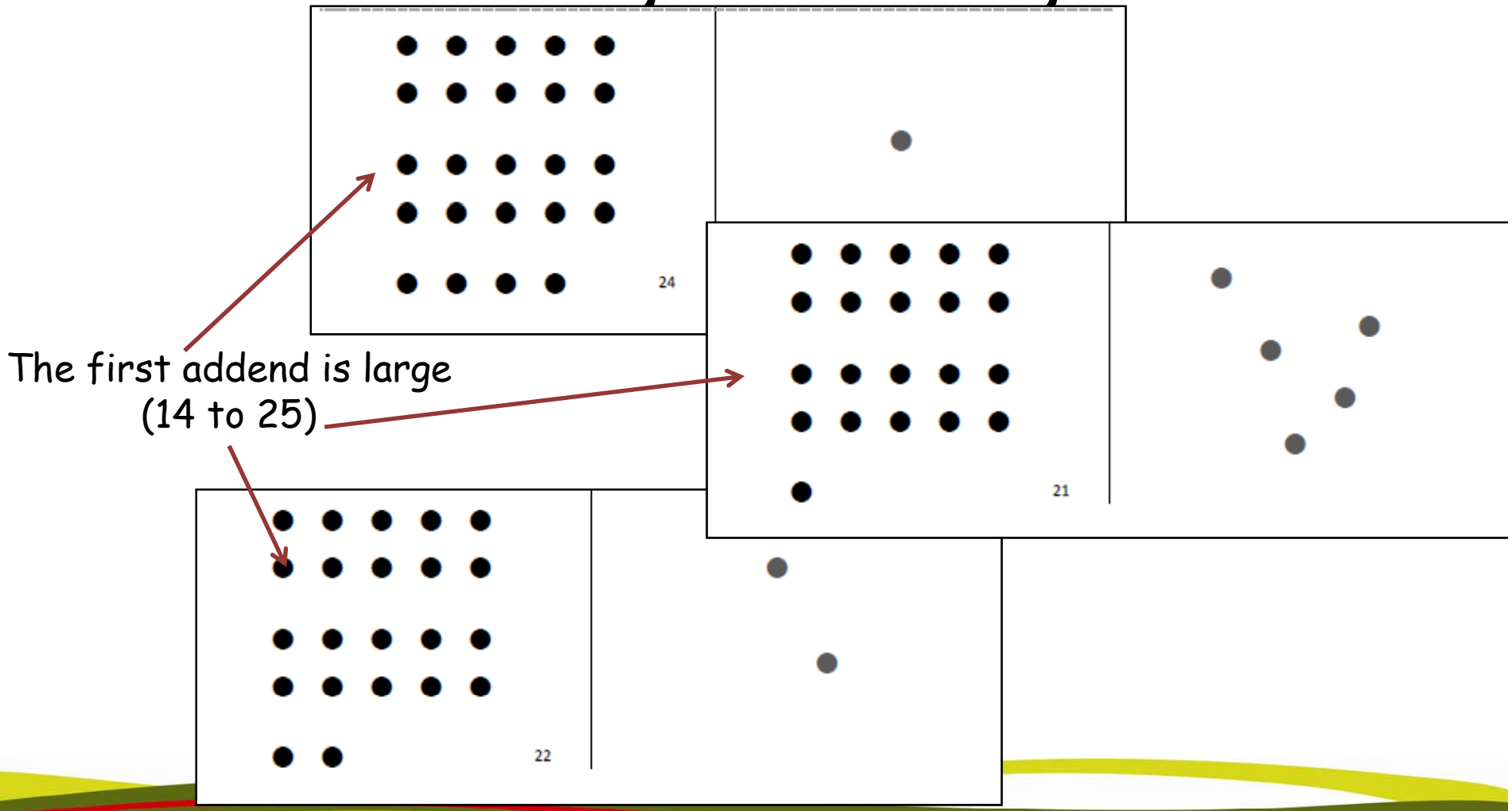
Student uses counting to verify her answer and her strategy.



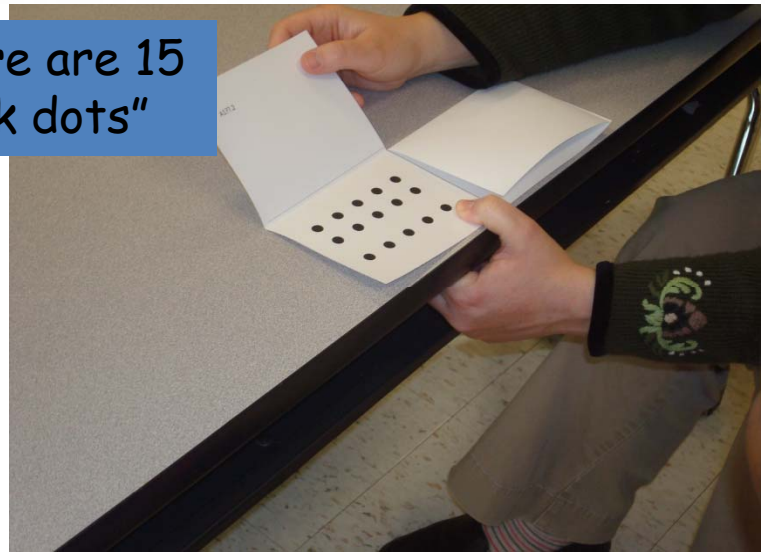
A340.3 – Counting on

KNP Entry	Kentucky Common Core	KCAS Domain	KCAS	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy	Construct/L	Numeracy	"I CAN ....." (*see glossary)	Assessment for Learning	Student	Video Link	Print Link	Interactive	Reference	Teacher Notes
A 340.3	6 Add and subtract within 20, demonstrating fluency for addition and on within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 =	Operations and Algebraic Thinking	Add and subtract within 20	Two panel dot cards - level 3 (see link)	Choose a 2 panel dot card. Open the door on the left, determine the number of black dots and then close the door. Open briefly (approximately 1 second) the door on the right and determine how many grey dots are under the door. Determine the number of dots altogether.	Addition and Subtraction	2 to 3 GREEN	Initial Number Sequence	... tell the sum by counting on	Put out a card with 17 dots on the left and 5 dots (arranged irregularly) on the right. Flash the dots under the left door saying "Here are 17 black dots". Flash the dots under the right door saying "Here are 5 grey dots. How many dots are there altogether?" Ask student to explain strategy. Repeat with other two panel dot cards.	individual or small group		w.kentuckymathematics.org/intervention/doc/NumeracyProject/MultiTenF			Use the print link to print the two panel dot cards. Fold the card in half lengthwise at the dotted line. Cut a slit in the top panel to create doors. Students may additionally be asked to write the corresponding equation. The sum or the corresponding equation may be written on the back for students to use a check. If a teacher is presenting the task, the teacher may say "There are ___ black dots under here, there are ___ grey dots under here... how many dots altogether?" while briefly flashing the dots behind the doors. Initially students will likely start the count from one and/or build quantities on their fingers. Students will let go of this redundant behaviour naturally as the develop a deeper understanding of qantity and addition. By using large first addends, this behavior is discouraged. Encourage students to explain their strategies. Observe if students are relying on a visible aid such as a number line, 100 chart or calendar. If so, remove or cover the aid.

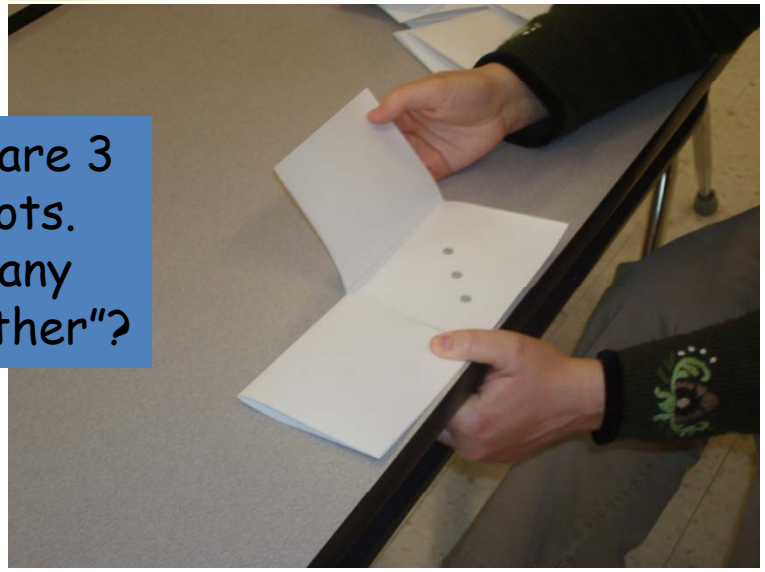
Examples of 2 panel dot cards to encourage counting on



"Here are 15 black dots"

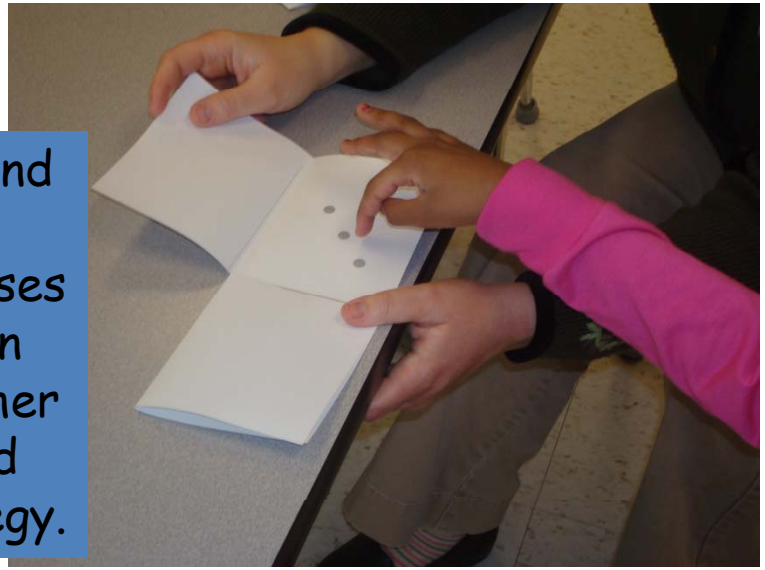


"Here are 3 grey dots. How many altogether"?



Student monitored counts for second addend on her fingers "16, 17, 18"

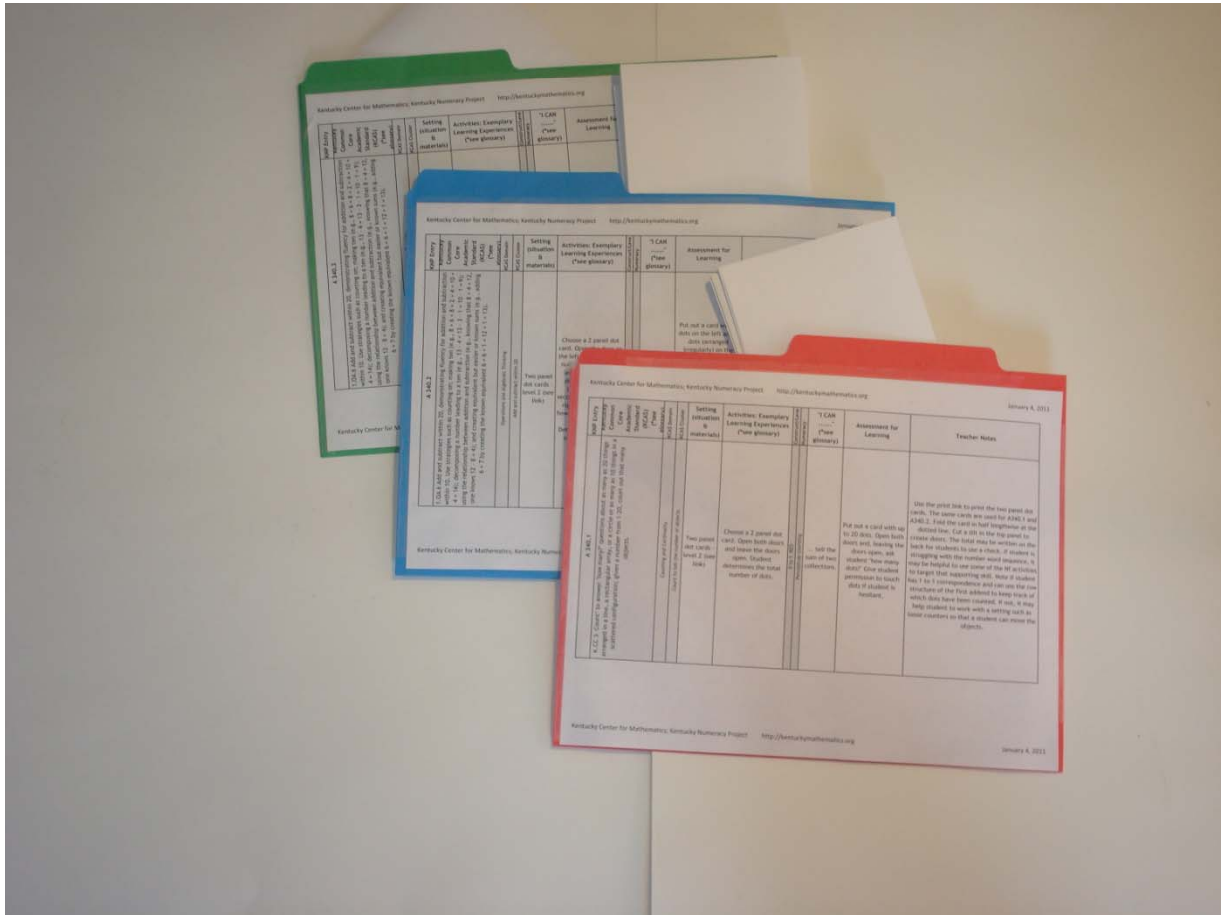
Open second door only. Student uses counting on to verify her answer and her strategy.



A340.3 – Counting on

KNP Entry	Kentucky Common Core Standard	KCAS Domain	KCAS	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy	Construct/L	Numeracy	"I CAN ....." (*see glossary)	Assessment for Learning	Student	Video Link	Print Link	Interactive	Reference	Teacher Notes
A 340.3	6 Add and subtract within 20, demonstrating fluency for addition and on within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 =	Operations and Algebraic Thinking	Add and subtract within 20	Two panel dot cards - level 3 (see link)	Choose a 2 panel dot card. Open the door on the left, determine the number of black dots and then close the door. Open briefly (approximately 1 second) the door on the right and determine how many grey dots are under the door. Determine the number of dots altogether.	Addition and Subtraction	2 to 3 GREEN	Initial Number Sequence	... tell the sum by counting on	Put out a card with 17 dots on the left and 5 dots (arranged irregularly) on the right. Flash the dots under the left door saying "Here are 17 black dots". Flash the dots under the right door saying "Here are 5 grey dots. How many dots are there altogether?" Ask student to explain strategy. Repeat with other two panel dot cards.	individual or small group		www.kentuckymathematics.org/intervention/doc/NumeracyProject/MultiTenF			Use the print link to print the two panel dot cards. Fold the card in half lengthwise at the dotted line. Cut a slit in the top panel to create doors. Students may additionally be asked to write the corresponding equation. The sum or the corresponding equation may be written on the back for students to use a check. If a teacher is presenting the task, the teacher may say "There are ___ black dots under here, there are ___ grey dots under here... how many dots altogether?" while briefly flashing the dots behind the doors. Initially students will likely start the count from one and/or build quantities on their fingers. Students will let go of this redundant behaviour naturally as the develop a deeper understanding of qantity and addition. By using large first addends, this behavior is discouraged. Encourage students to explain their strategies. Observe if students are relying on a visible aid such as a number line, 100 chart or calendar. If so, remove or cover the aid.

A340



KENTUCKY CENTER FOR MATHEMATICS


The Kentucky
Numeracy
Project
CLOSING
KNP TASK GROUP 304
KNP TASK GROUP 340
INTROD UCTION

A304.1

KNP Entry	Kentucky Common Core Academic Standard (KCAS) (*see glossary)	KCAS Domain	KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy
A 304.1	K.CC.4 Understand relationship between number and quantities; connect counting to cardinality. a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.	Counting and Cardinality	Count to tell the number of objects	Fill 20 Game Board (see link), 20 counters or pennies per player, dot or numeral cube	Each student uses 1 "Fill 20" game board. On a player's turn, the player rolls a cube and adds that many counters to his/her game board. The player should says how many counters he or she has. The first player to fill his/her board wins the game.	

A304.1

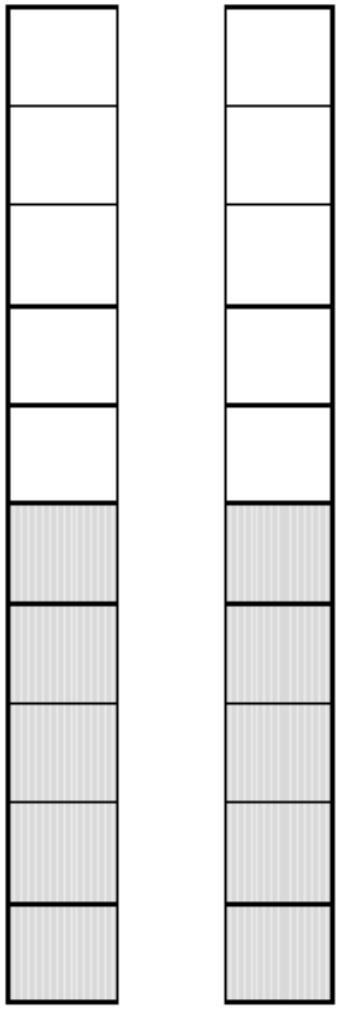
KNP Entry	Kentucky Common Core Academic Standard (KCAS) (*see glossary)	KCAS Domain	KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy
A 304.1	K.CC.4 Understand relationship between number and quantities; connect counting to cardinality. a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.	Counting and Cardinality	Count to tell the number of objects	Fill 20 Game Board (see link), 20 counters or pennies per player, dot or numeral cube	Each student uses 1 "Fill 20" game board. On a player's turn, the player rolls a cube and adds that many counters to his/her game board. The player should says how many counters he or she has. The first player to fill his/her board wins the game.	

A304.1

Activities: Exemplary Learning Experiences (*see glossary)	Numeracy Strand	Construct/Level	Numeracy Target	"I CAN ....." (*see glossary)	Assessment for Learning	Student Grouping	Video Link
Each student uses 1 "Fill 20" game board. On a player's turn, the player rolls a cube and adds that many counters to his/her game board. The player should says how many counters he or she has. The first player to fill his/her board wins the game.	Addition & Subtraction	0 to 1 RED	Perceptual counting	...carefully count each item to 20	Put 14 counters or pennies on a game board. Show board to student and ask "How many counters are on this board." Allow student to point and/or touch the counters.	teacher partner small group	

A304.1

y Learning Experiences glossary)	Numeracy Strand	Construct/Level	Numeracy Target	"I CAN ....." (*see glossary)	Assessment for Learning	Student Grouping	Video Link	Print Link	Interactive Website	Reference	
ill 20" game board. On a rolls a cube and adds that er game board. The player ounters he or she has. The her board wins the game.	Addition & Subtraction	0 to 1 RED	Perceptual counting	...carefully count each item to 20	Put 14 counters or pennies on a game board. Show board to student and ask "How many counters are on this board." Allow student to point and/or touch the counters.	teacher partner small group		Fill 20 Game Board			The cube students. cube in the



Fill 20 Game Board

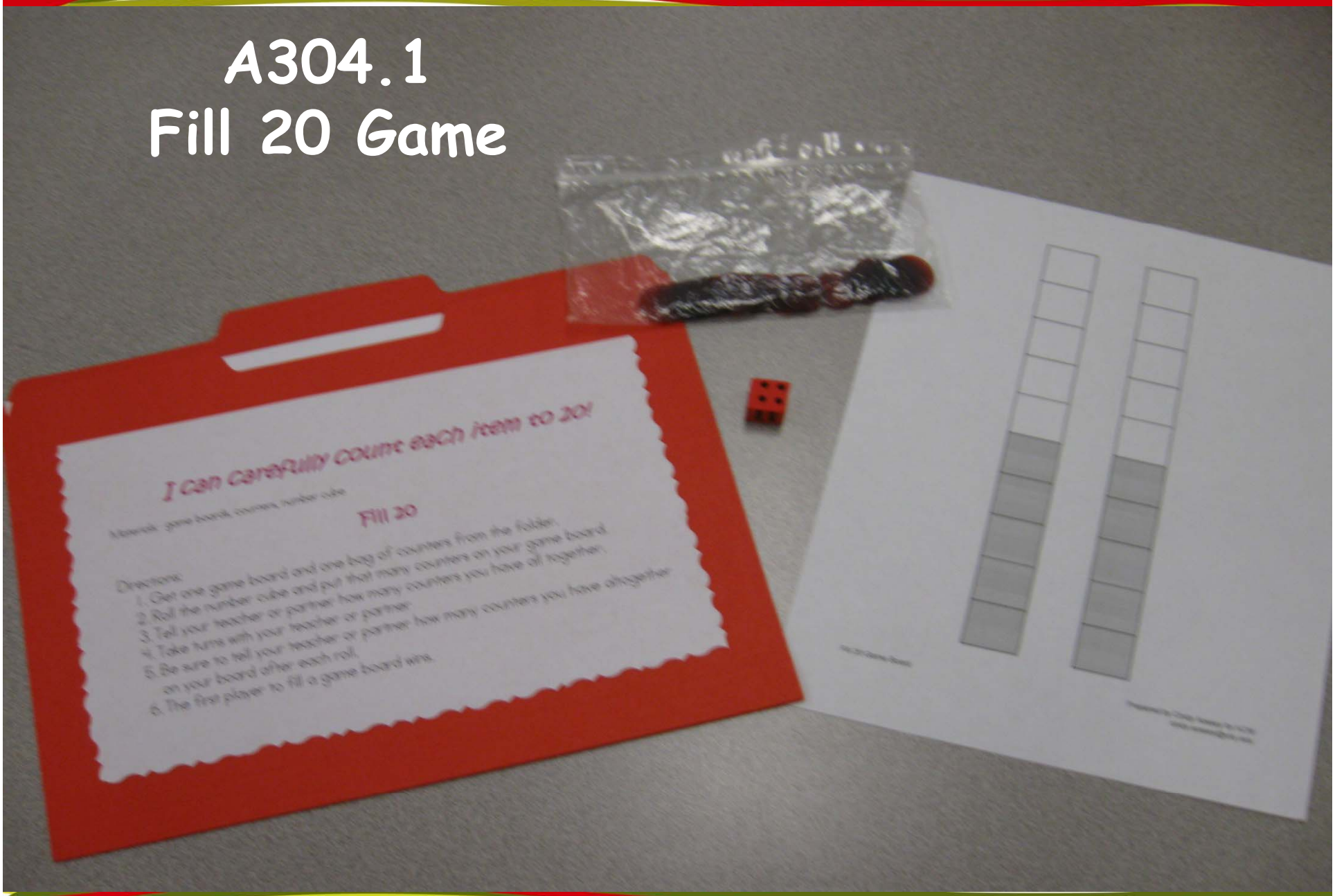
Prepared by Cindy Aossey for KCM
cindy.aossey@sky.edu


EAI EDUCATION
#531003
Cubes
1" Natural Wood
Set of 100
WARNING!
CHOKING HAZARD
Hands-On
LEARNING RESOURCES
6 colors!
One-Inch
Color Cubes
LER 6334
Set of 102
WARNING:
CHOKING HAZARD
Sharpie
40
3
2 groups of
-3
+1

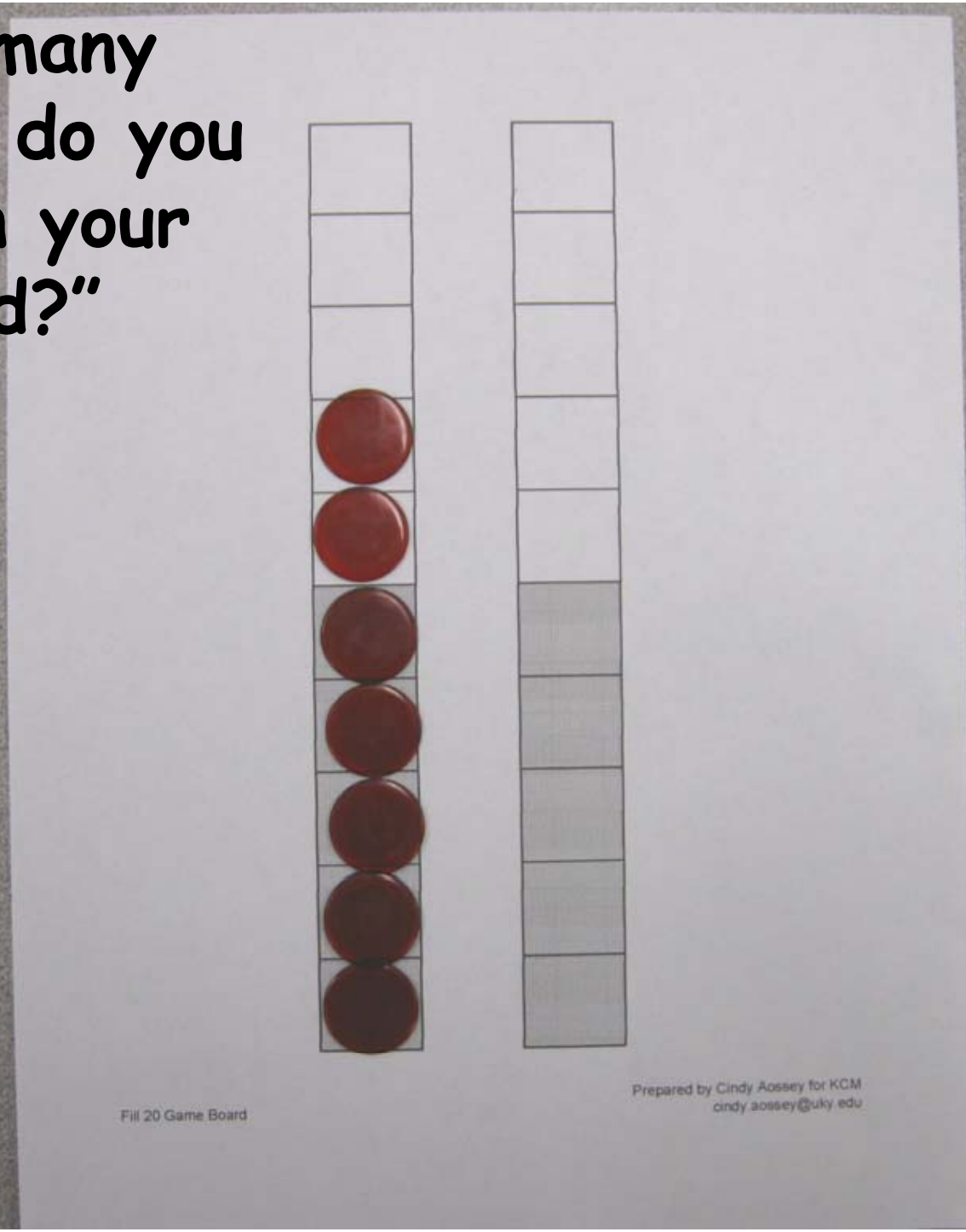
A304.1

"I CAN ....." (*see glossary)	Assessment for Learning	Student Grouping	Video Link	Print Link	Interactive Website	Reference	Teacher Notes
...carefully count each item to 20	Put 14 counters or pennies on a game board. Show board to student and ask "How many counters are on this board." Allow student to point and/or touch the counters.	teacher partner small group		Fill 20 Game Board			The cube can be adjusted to meet the needs for students. To make the game simpler, use a dot cube in the range 1 to 3. To make the game more complex, use a numeral cube.

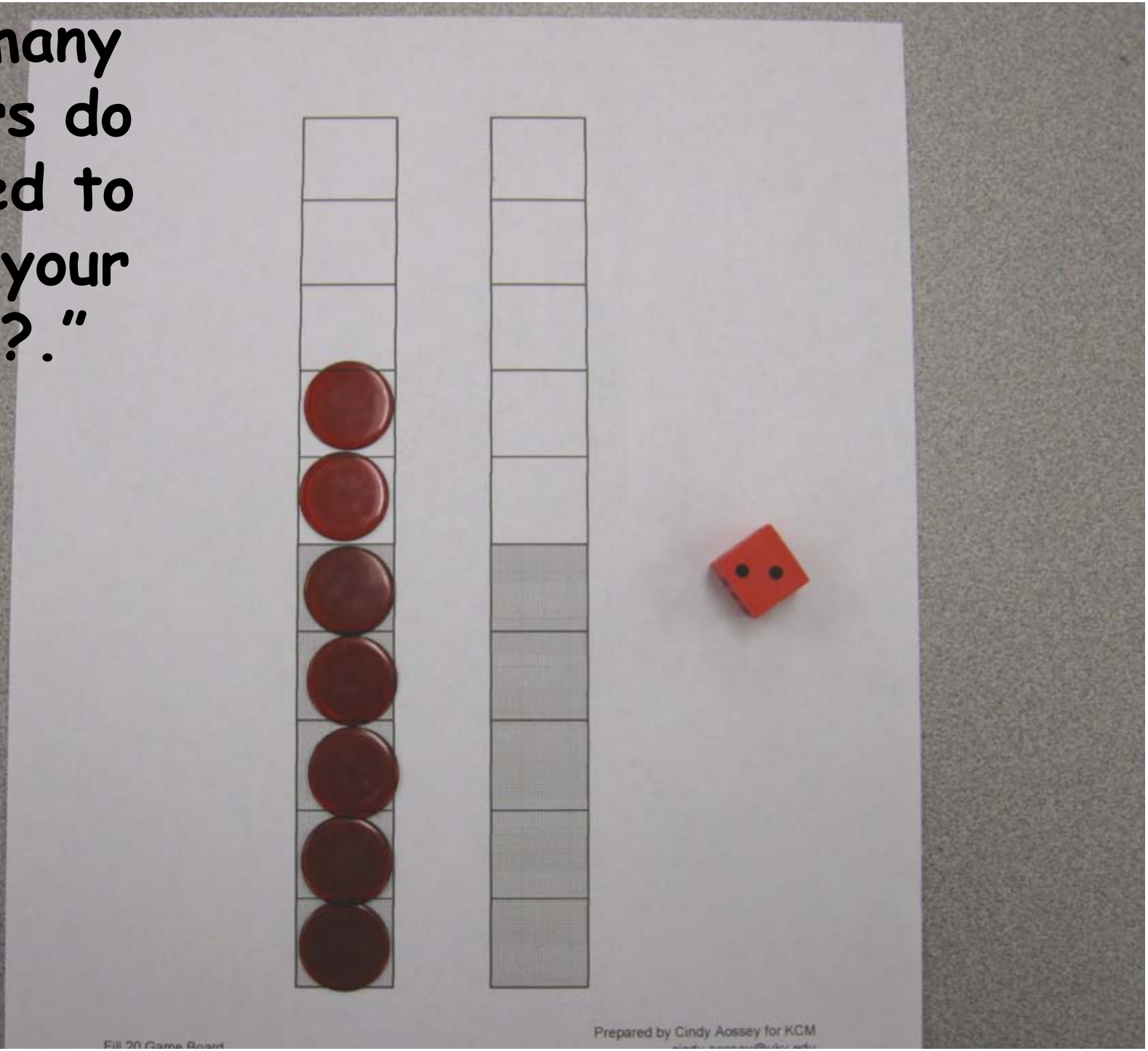
A304.1
Fill 20 Game



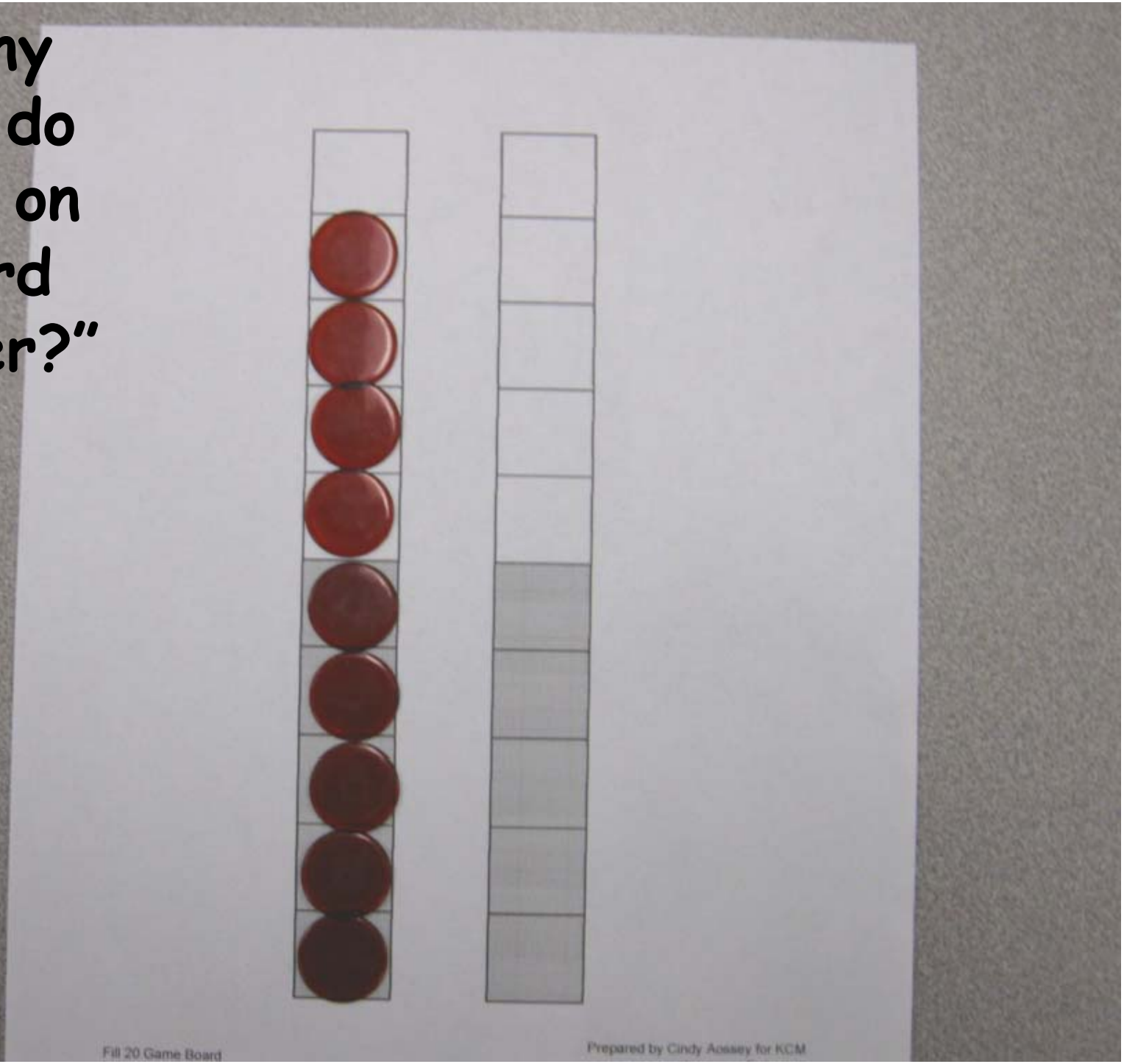
"How many counters do you have on your board?"



"How many counters do you need to put on your board?."



"How many counters do you have on your board altogether?"



A304.2

KNP Entry	Kentucky Common Core Academic Standard (KCAS) (*see glossary)	KCAS Domain	KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)
A 304.2	1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 - 4 = 13 - 3 - 1 = 10 - 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 - 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).	Operations and Algebraic Thinking	Add and subtract within 20	Fill 20 Game Board (see link), 20 counters or pennies per player, numeral cube	Each student uses 1 "Fill 20" game board. On a player's turn, the player rolls a numeral cube. The player mentally determines how many counters he/she will have after adding the rolled amount to his/her game board and say the prediction aloud. The student should then add the counters to his/her game board and determine the total. The first player to fill his/her board wins the game. The teacher may choose to add a rule that if the prediction is incorrect, the player does not add any counters on that turn.

A304.2

KNP Entry	Kentucky Common Core Academic Standard (KCAS) (*see glossary)	KCAS Domain	KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)
A 304.2	1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 - 4 = 13 - 3 - 1 = 10 - 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 - 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).	Operations and Algebraic Thinking	Add and subtract within 20	Fill 20 Game Board (see link), 20 counters or pennies per player, numeral cube	Each student uses 1 "Fill 20" game board. On a player's turn, the player rolls a numeral cube. The player mentally determines how many counters he/she will have after adding the rolled amount to his/her game board and say the prediction aloud. The student should then add the counters to his/her game board and determine the total. The first player to fill his/her board wins the game. The teacher may choose to add a rule that if the prediction is incorrect, the player does not add any counters on that turn.

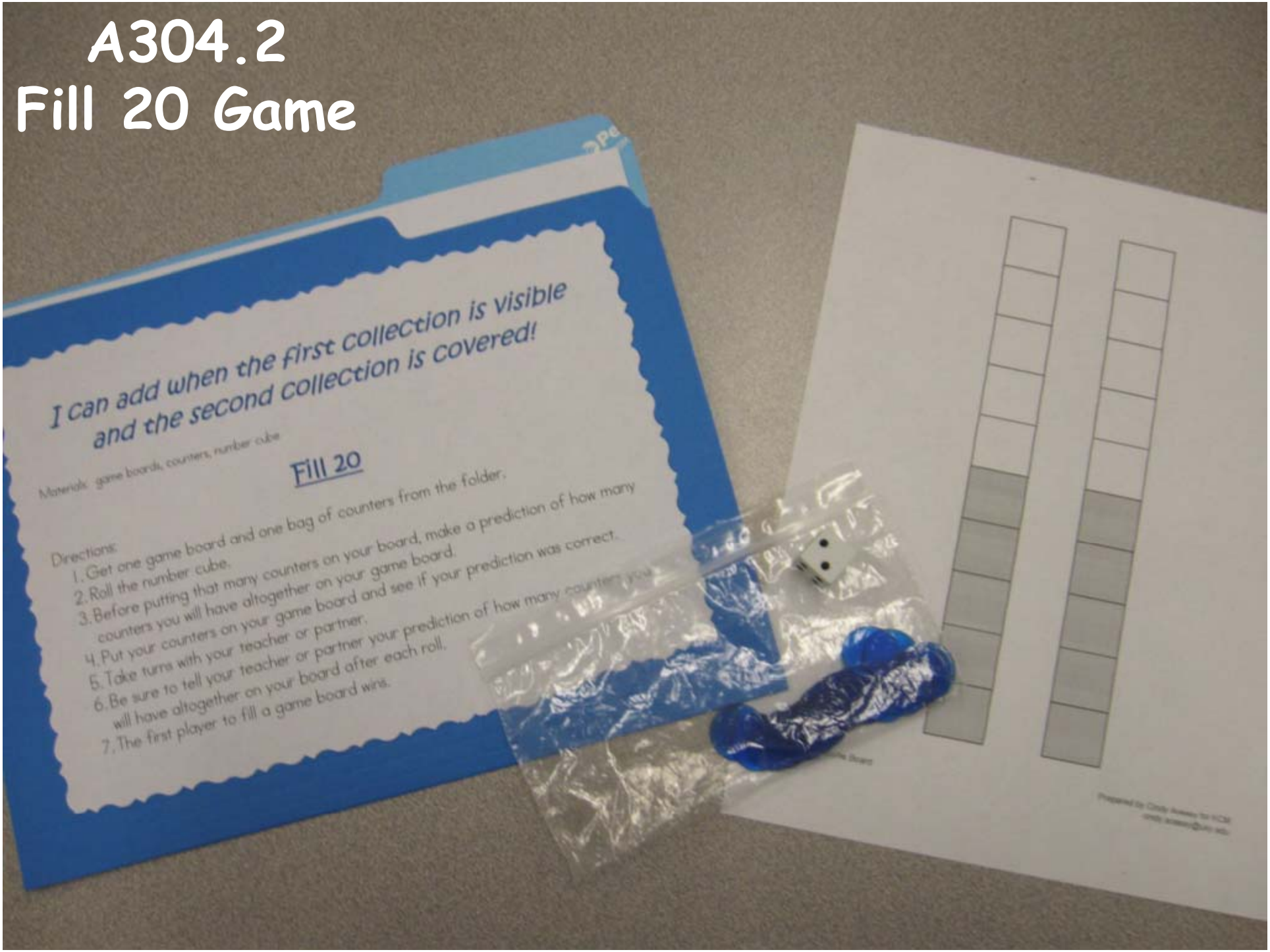
A304.2

KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy Strand	Construct/Level	Numeracy Target	"I CAN ....." (*see glossary)	Assessm Lear
Count to tell the number of objects	Fill 20 Game Board (see link), 20 counters or pennies per player, numeral cube	Each student uses 1 "Fill 20" game board. On a player's turn, the player rolls a numeral cube. The player mentally determines how many counters he/she will have after adding the rolled amount to his/her game board and say the prediction aloud. The student should then add the counters to his/her game board and determine the total. The first player to fill his/her board wins the game. The teacher may choose to add a rule that if the prediction is incorrect, the player does not add any counters on that turn.	Addition & Subtraction	1 to 2 BLUE	Figurative counting	...add when the first collection is visible and the second collection is covered.	Show a ga filled w counters seconds cover. Sa student have a 12 and you counter many cou you have desired, r similar qu

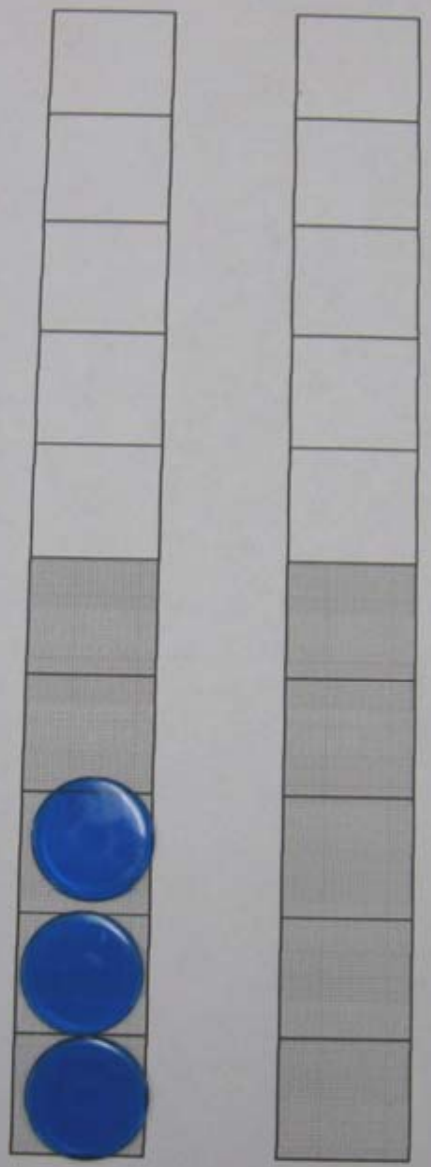
A304.2

Target	"I CAN ....." (*see glossary)	Assessment for Learning	Student Grouping	Video Link	Print Link	Interactive Website	Reference	Teacher Notes
	...add when the first collection is visible and the second collection is covered.	Show a game board filled with 12 counters for 1-3 seconds and then cover. Say to the student, "If you have a 12 counters and you add 4 counters, how many counters will you have in all?" If desired, repeat for similar quantities.	teacher partner small group		Fill 20 Game Board			To make game simpler, use a numeral cube in the range 1 to 3. To increase the challenge, place a paper over the child's game board just before the child rolls for his or her turn. After the child rolls, say "You have ___. What will you have when you add ___?"

A304.2
Fill 20 Game

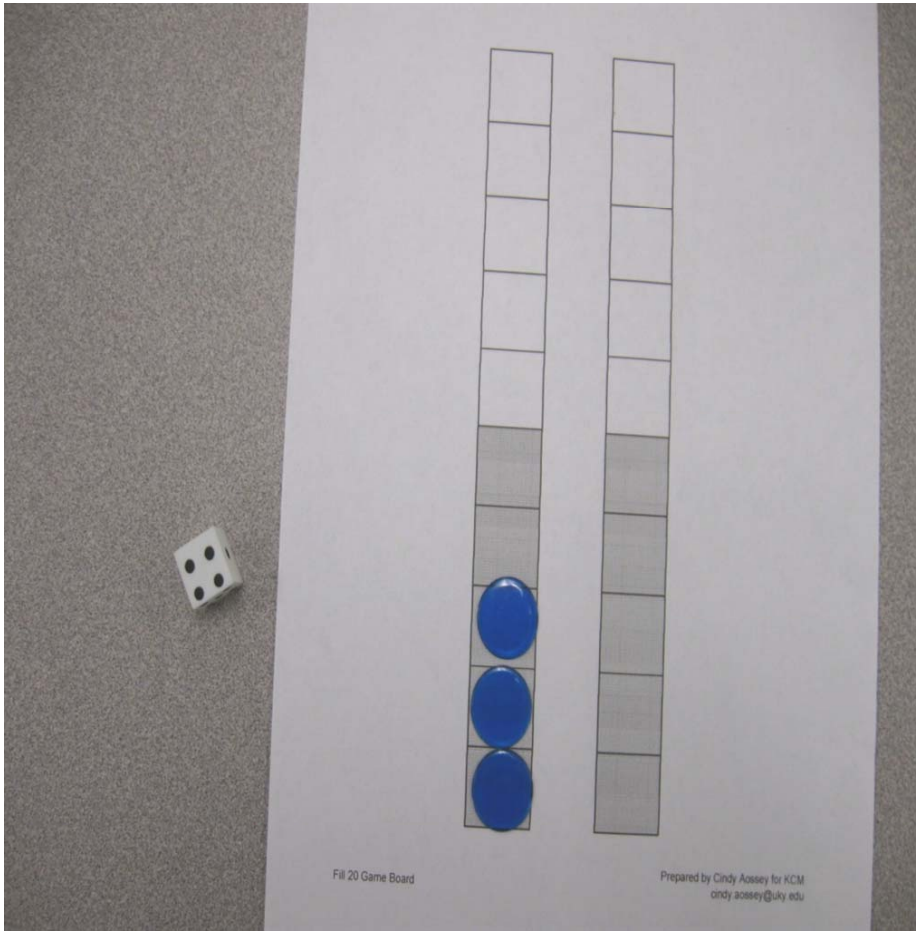


"How many counters do you have?"



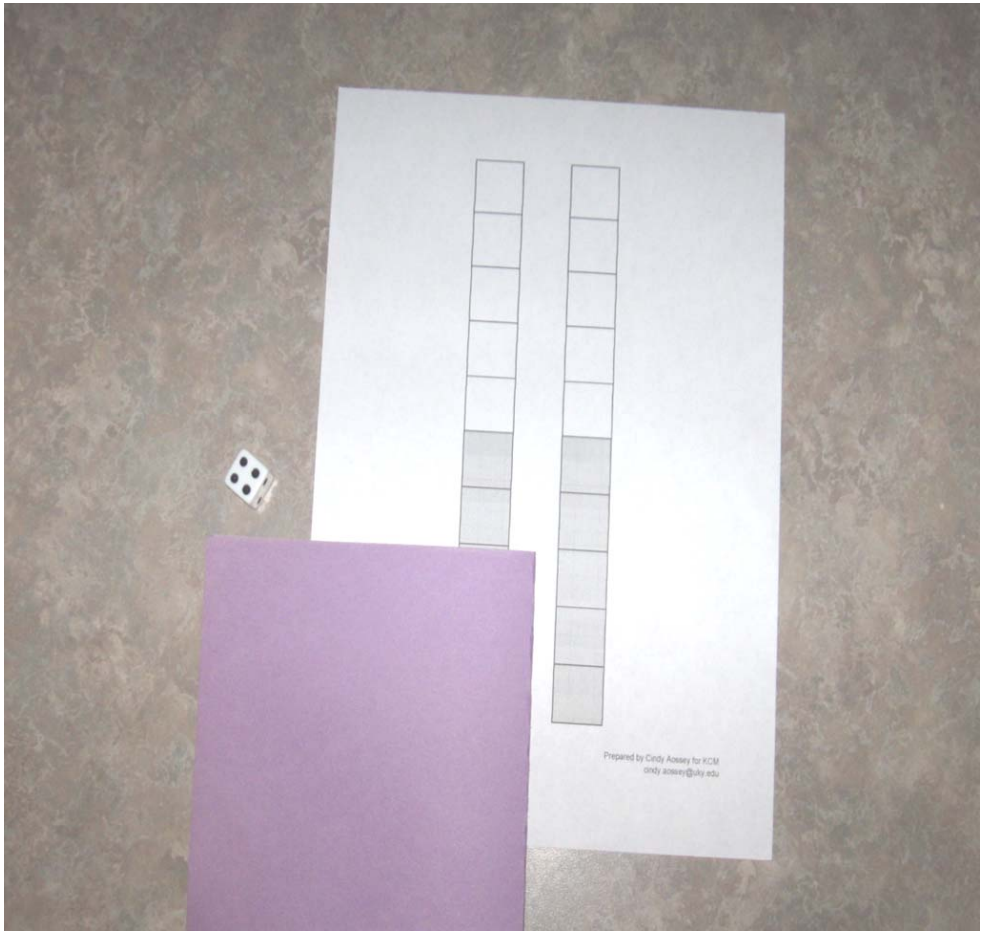
Fill 20 Game Board

Prepared by Cindy Aossey for KCM
cindy.aossey@uky.edu



"How many counters will be on your board after you add 4 more?"

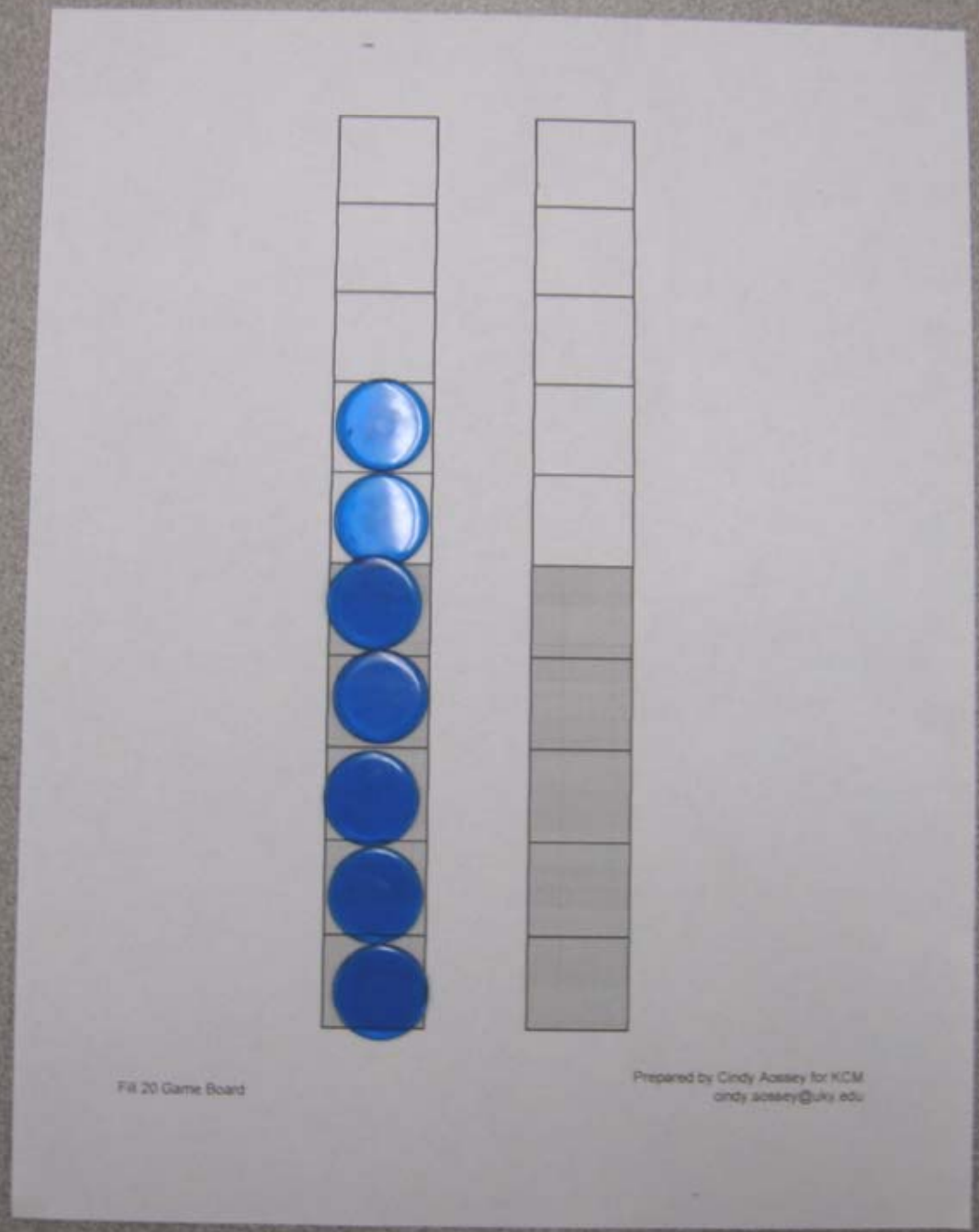
-OR-



"You have 3 counters on your board. How many counters will be on your board after you add 4 more?"

"Let's check your prediction. Were you correct?"

"How many more counters do you think you'll need to have 10 altogether?"



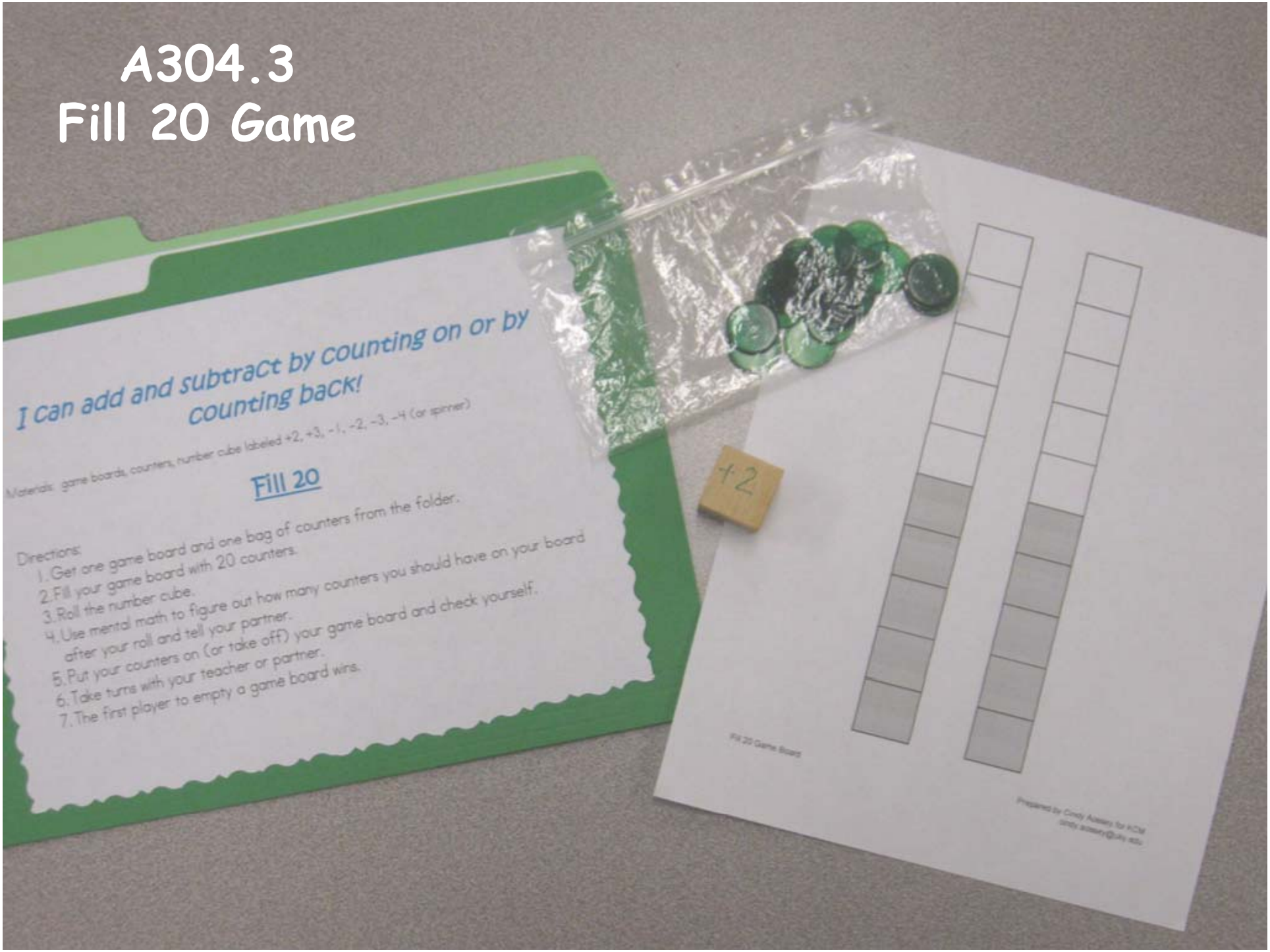
A304.3

KNP Entry	Kentucky Common Core Academic Standard (KCAS) (*see glossary)	KCAS Domain	KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy Strand
A 304.3	1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 - 4 = 13 - 3 - 1 = 10 - 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 - 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).	Operations and Algebraic Thinking	Add and subtract within 20	Fill 20 Game Board (see link), 20 counters per player, cube labeled "+2, +3, -1, -2, -3, -4"	Each students use 1 "Fill 20" game board. Before starting the game, each student should fill his/her game board with 20 counters. During a turn, the player rolls the cube, mentally determines and says aloud 'how many' counters will result after applying the action indicated on the cube. The player adds or removes the indicated number of counters and determiens if the prediction was correct. First student to empty his/her board wins the game. A screen may be placed over the game board to encourage mental imagery and strategies.	

A304.3

KCAS Cluster	Setting (situation & materials)	Activities: Exemplary Learning Experiences (*see glossary)	Numeracy Strand	Construct/Level	Numeracy Target	"I CAN ....." (*see glossary)	Asse L
Count to tell the number of objects	Fill 20 Game Board (see link), 20 counters per player, cube labeled "+2, +3, 1, -2, -3, -4"	Each students use 1 "Fill 20" game board. Before starting the game, each student should fill his/her game board with 20 counters. During a turn, the player rolls the cube, mentally determines and says aloud 'how many' counters will result after applying the action indicated on the cube. The player adds or removes the indicated number of counters and determiens if the prediction was correct. First student to empty his/her board wins the game. A screen may be placed over the game board to encourage mental imagery and strategies.	Addition & Subtraction	2 to 3 GREEN	Mental Number Sequence	...add and subtract by counting on or counting back	Brie game with Say to "If yo coun remov how m will y If des fo qu

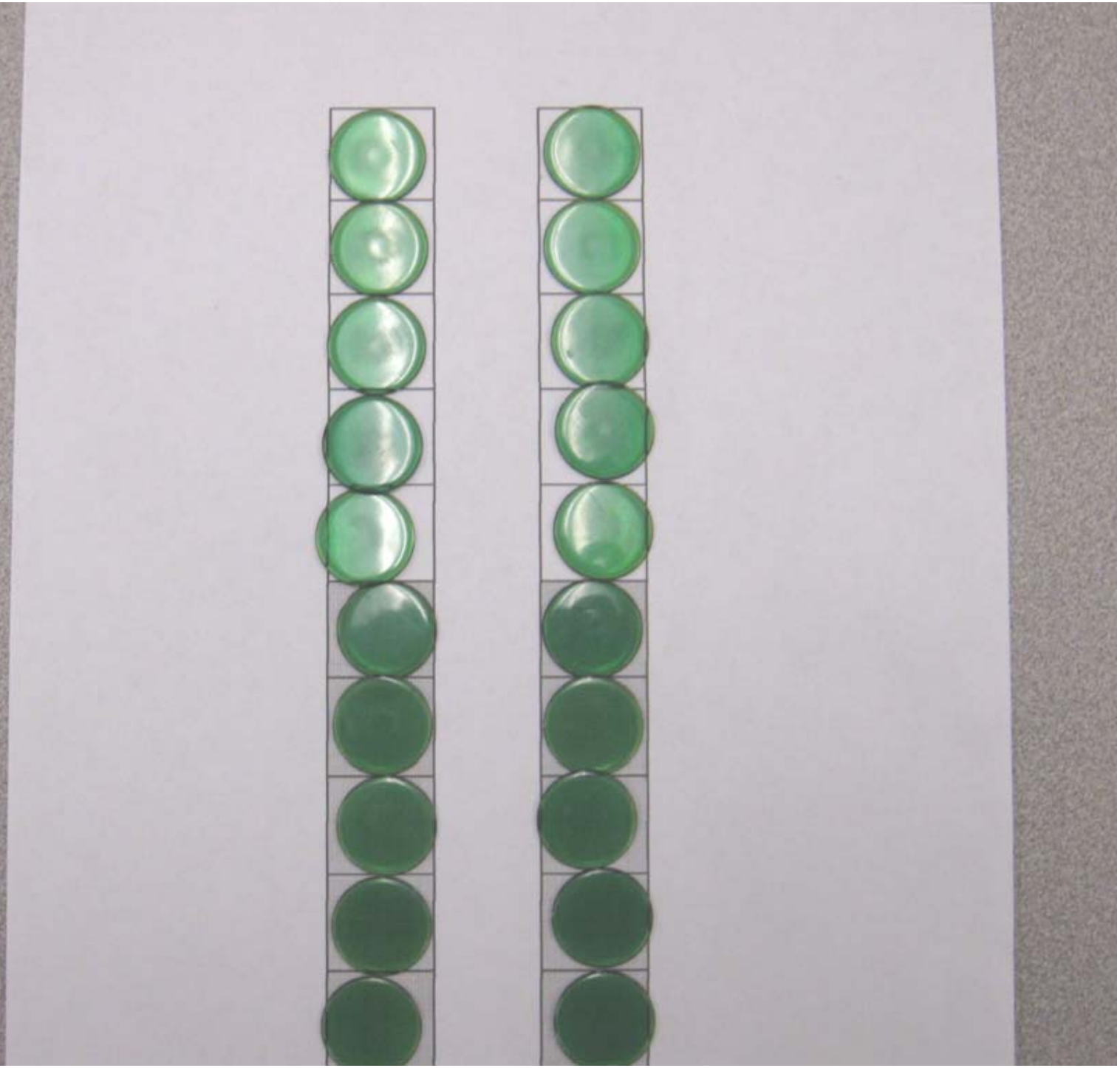
A304.3
Fill 20 Game



"How many counters are on your board?"

"How many counters are in the gray squares?"

"How many counters are in the white squares?"

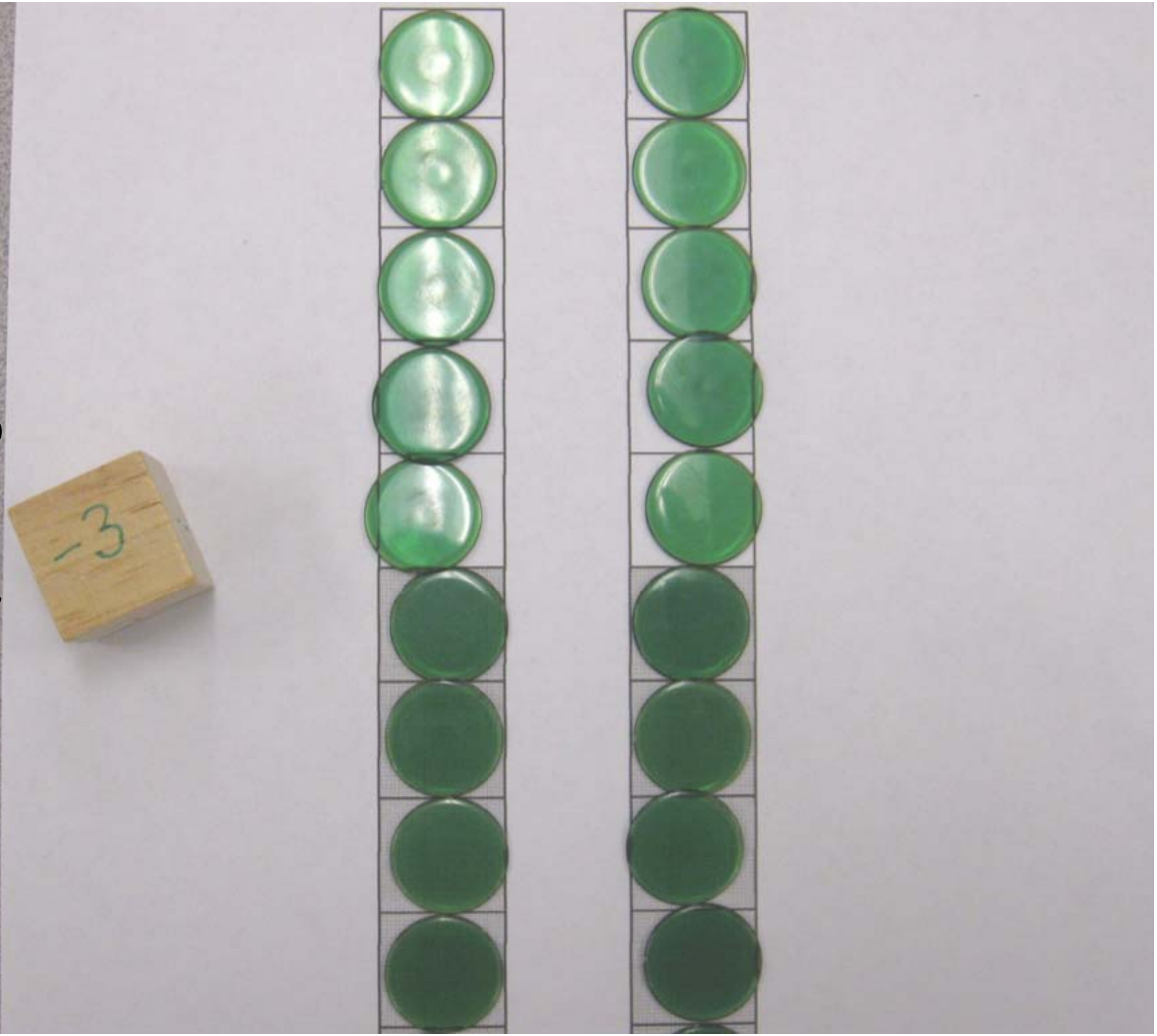


"What did you roll?"

"What do you need to do?"

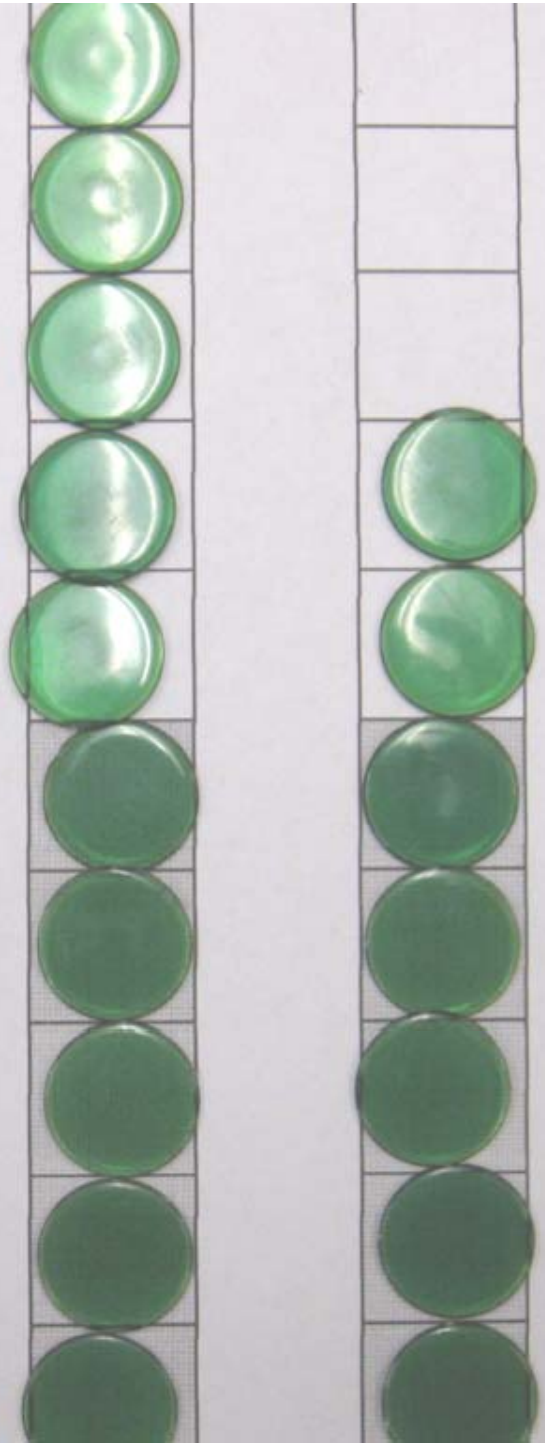
"Why?"

"How many will you have left?"



"How did you know it was 17?

"Can you tell me how many counters you'll have to take off in order to have 10 counters left?"

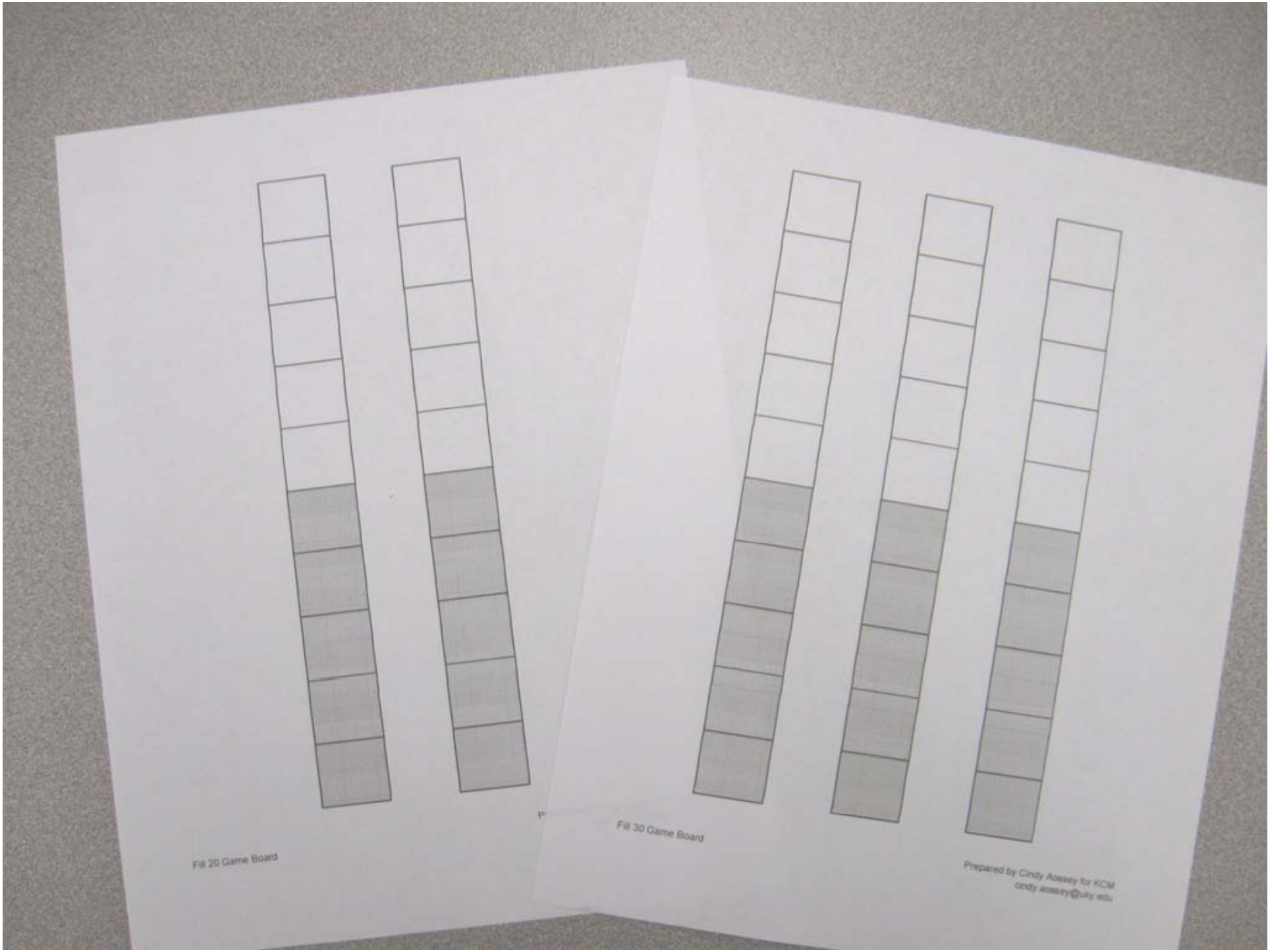


"What will you need to roll in order to only have 13 counters?"

"How many more counters do you have than your partner?"

A304.3

Numeracy Target	"I CAN ....." (*see glossary)	Assessment for Learning	Student Grouping	Video Link	Print Link	Interactive Website	Reference	Teacher Notes
Initial Number Sequence	...add and subtract by counting on or counting back	Briefly show a game board filled with 16 counters. Say to the student, "If you have a 16 counters and you remove 4 counters, how many counters will you have left?" If desired, repeat for similar quantities.	teacher partner small group		Fill 20 and Fill 30 game boards			To increase the challenge, use the Fill 30 game board and start so that each player has 30 counters. To make game simpler, use a cube with smaller numbers. To make game quicker, use a cube with only subtraction.


Fill 20 Game Board
Fill 30 Game Board
Prepared by Cindy Aossey for KCM
cindy aossey@uky edu

KENTUCKY CENTER FOR MATHEMATICS


The Kentucky
Numeracy
Project
CLOSING
KNP TASK GROUP 304
KNP TASK GROUP 340
INTROD UCTION

KENTUCKY CENTER FOR MATHEMATICS

Upcoming KNP Sessions, 3:30 to 4:30 p.m. ET

- March 31 – Structuring to Twenty
- April 21 – Advanced Addition and Subtraction
- May 12 – Multiplication and Division
- June 2 – Tens and Ones

http://kymath.org/intervention/iKNP.asp

Reflection Questions

1) When looking at the "Development of Literacy and Numeracy" chart, think about which phase is least addressed in US textbooks? What is the impact on students of the missing phase?
2) How might you modify learning activities to provide plenty of opportunities, as needed, for students to count hidden/imaginary quantities when adding or subtracting?
3) Are your students facile at the counting-on stage, as evidenced by a missing addend task in the context of hidden counters as shown on the Count Me in Too website video example?