BRIDGES IN MATHEMATICS 2

GRADE 2 SUPPLEMENT

Set A2 Number & Operations: Solving Equations

Includes

Skills & Concepts

- ★ generate addition and subtraction strategies to find missing addends and subtrahends in number combinations through 20
- ★ solve equations in which the unknown number appears in a variety of positions

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Bridges in Mathematics Grade 2 Supplement
Set A2 Numbers & Operations: Solving Equations

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Bridges in Mathematics is a standards-based K–5 curriculum that provides a unique blend of concept development and skills practice in the context of problem solving. It incorporates the Number Corner, a collection of daily skill-building activities for students.

The Math Learning Center is a nonprofit organization serving the education community. Our mission is to inspire and enable individuals to discover and develop their mathematical confidence and ability. We offer innovative and standards-based professional development, curriculum, materials, and resources to support learning and teaching. To find out more, visit us at www.mathlearningcenter.org.

Set A2 ★ Activity 1

ACTIVITY

The Blue Square Game, Part 1

Overview

Students each build a train of either 10 or 11 Unifix cubes in 2 or 3 different colors. Next, they color in a paper strip and write an addition expression to match their train. The class then works with the paper strips and the expressions to explore the idea of solving equations in which an unknown number appears in a variety of positions.

Skills & Concepts

- ★ generate addition and subtraction strategies to find missing addends and subtrahends in number combinations through 20
- ★ solve equations in which the unknown number appears in a variety of positions

You'll need

- ★ Ten Strips (page A2.5, several copies, cut apart along heavy lines)
- ★ Eleven Strips (page A2.6, several copies, cut apart along heavy lines)
- ★ Expression Cards (page A2.7, 8–10 copies, cut apart along heavy lines)
- ★ Numerals & Symbols Cards (page A2.8, 2 copies on cardstock, cut the cards apart)
- ★ Unifix cubes (see Advance Preparation)
- ★ eight 2" × 2" squares of blue construction paper
- ★ crayons and pencils
- ★ pocket chart
- ★ Work Places currently in use

Advance Preparation Have students help you set up a container of cubes for each table or group of 4 students. Each container should have about 100 cubes in 4–5 different colors.

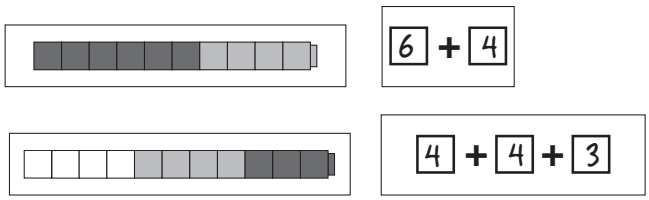
Instructions for The Blue Square Game, Part 1

1. Gather students to your discussion circle. Explain that they are going to use Unifix cubes today to solve some addition equations. Tell them that in a minute, each of them is going to make a train of 10 or 11 Unifix cubes using 2 or 3 different colors. Demonstrate by making a train of 6 blue and 4 green cubes. Group the like colors so all the blues are together, and all the greens are together.

2. Next, make a train of 11 cubes using 3 different colors, but don't tell students what your total is beforehand. When you're finished, give them a moment to examine your train carefully and share with the person next to them what they believe the total is. Then ask several volunteers to share their answer and their reasoning with the class.

3. Show the children a Ten Strip, an Eleven Strip, and two expression cards. Explain that when they have finished building, they are going to color in a strip and write an addition expression to match their train. Demonstrate the process with the two trains you have built. Let students know that they need to use very large, neat printing because their strips and cards are going to be posted on the pocket chart.

Activity 1 The Blue Square Game, Part 1 (cont.)

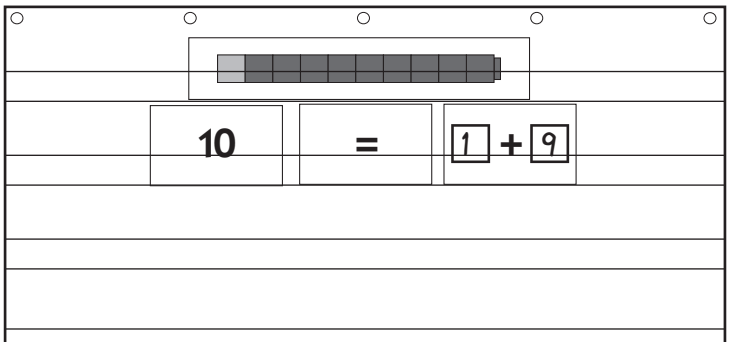


4. Send students back to their tables. Assign the students seated at half the tables to each make a train of 10 cubes. Have the students at the rest of the tables each make a train of 11 cubes. Encourage them to make their trains different than yours and different from anyone sitting near them. Remind them that they can only use 2 or 3 colors, and cubes of the same color need to be grouped together.

5. As students are building their trains, pass out Ten Strips to the students building trains of 10 and Eleven Strips to the students building trains of 11. Give them expression cards with boxes for 2 or 3 addends depending on whether they have used 2 or 3 different colors for their train.

6. As students finish coloring their strip and writing their expression, ask them to write their names on the back of each and read a book quietly at their seats until their classmates are done. When most everyone has finished, have students gather in your discussion area, and ask them to set their strips and cards down in front of them.

7. Ask a student who has a strip and an expression for 10 to bring her cards up for you to post in the pocket chart. Use the strip, the expression, and two of the Numerals & Symbols cards you have prepared to build a display similar to the one shown below.

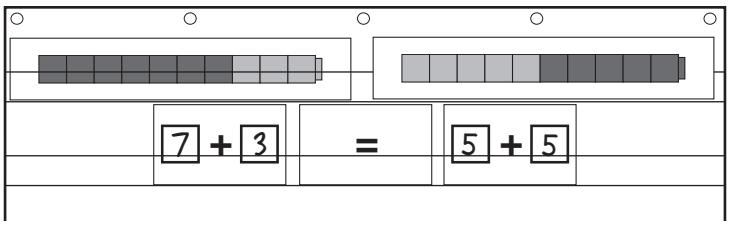


Have students read the equation with you. Invite their comments and observations. Some may feel that you've inserted the cards backwards, and that the equation should end with the total, rather than starting with it. Remind students that the equals sign means "the same as", and read the sentence that way with the class (i.e., 10 is the same as 1 + 9).

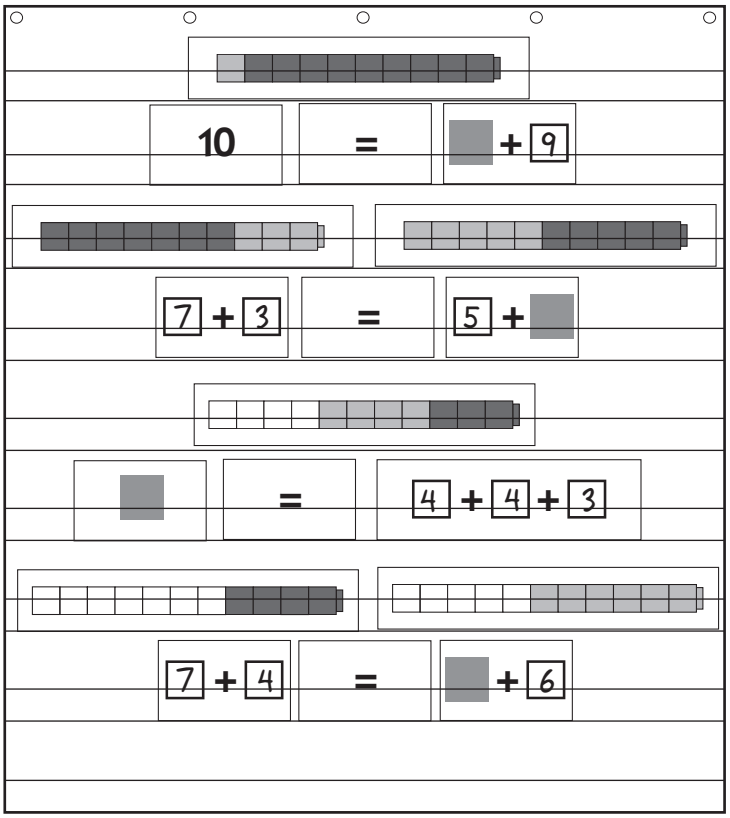
8. Now ask two students with strips and expressions for 10 to bring their cards to you. Use an equals card from your collection to set up an equation similar to the one shown at the top of the next page. Read the equation with your students and ask volunteers to explain it to the class.

> ***Teacher*** *Is this true? Is 7 + 3 really the same as 5 + 5? Talk with the person next to you for a moment, and then let's have some volunteers share their thinking with the class.*
>
> ***Students*** *They're both 10, so they're kind of the same.*
> *The numbers look kind of weird that way, but they both make 10.*

Activity 1 The Blue Square Game, Part 1 (cont.)



9. Repeat steps 7 and 8 until you have four different equations posted in the chart, two for 10 and two for 11. Now show students one of the blue squares you cut. Tell them that you are going to cover some of the numbers in the pocket chart with squares like this. Ask them to cover their eyes while you cover the numbers so it will be a surprise to them. When you have covered 4 numbers, have them open their eyes.



10. Ask students to pair-share ideas about the numbers you have hidden under the blue squares. Can they use all the clues on the pocket chart to figure out what each hidden number is? Call on several volunteers to share what they believe the hidden number in the first row is and why.

> ***Students*** *I think it's 1 because I know that 1 + 9 is 10.*
> *I think it's 1 because I can see it on the colored cubes. It's 1 green and 9 blues.*
> *9 and 1 makes 10. It has to be 1.*

Then remove the blue square to reveal the hidden number.

11. Repeat step 10 until all the hidden numbers have been revealed. Pull all the strips and expressions out of the pocket chart and put them aside for now. Call on 6 more students to bring their strips and ex-

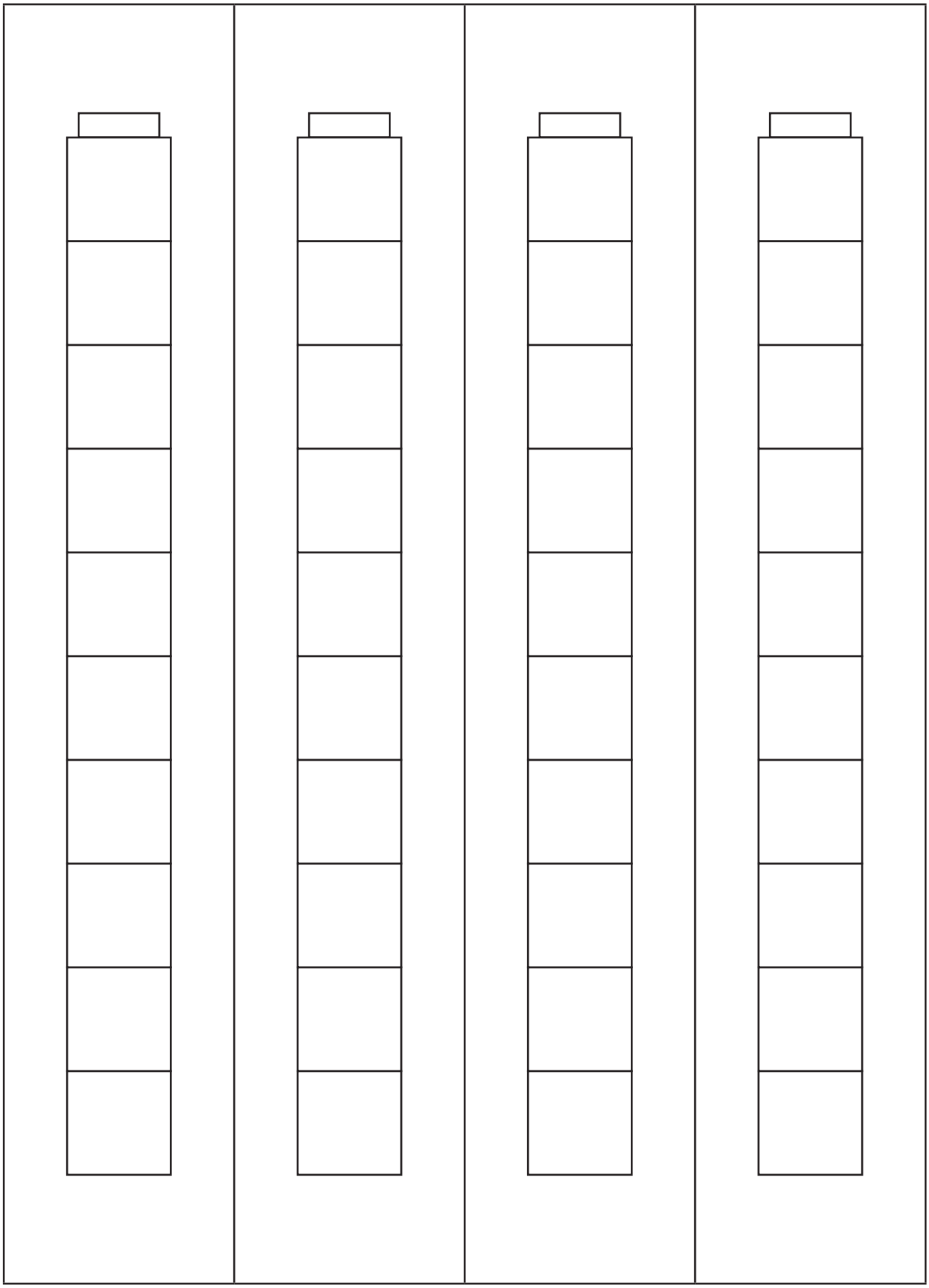
Activity 1 The Blue Square Game, Part 1 (cont.)

pressions up to the chart and help you build equations in quick succession. When 4 new equations have been posted, give the class a few moments to examine them.

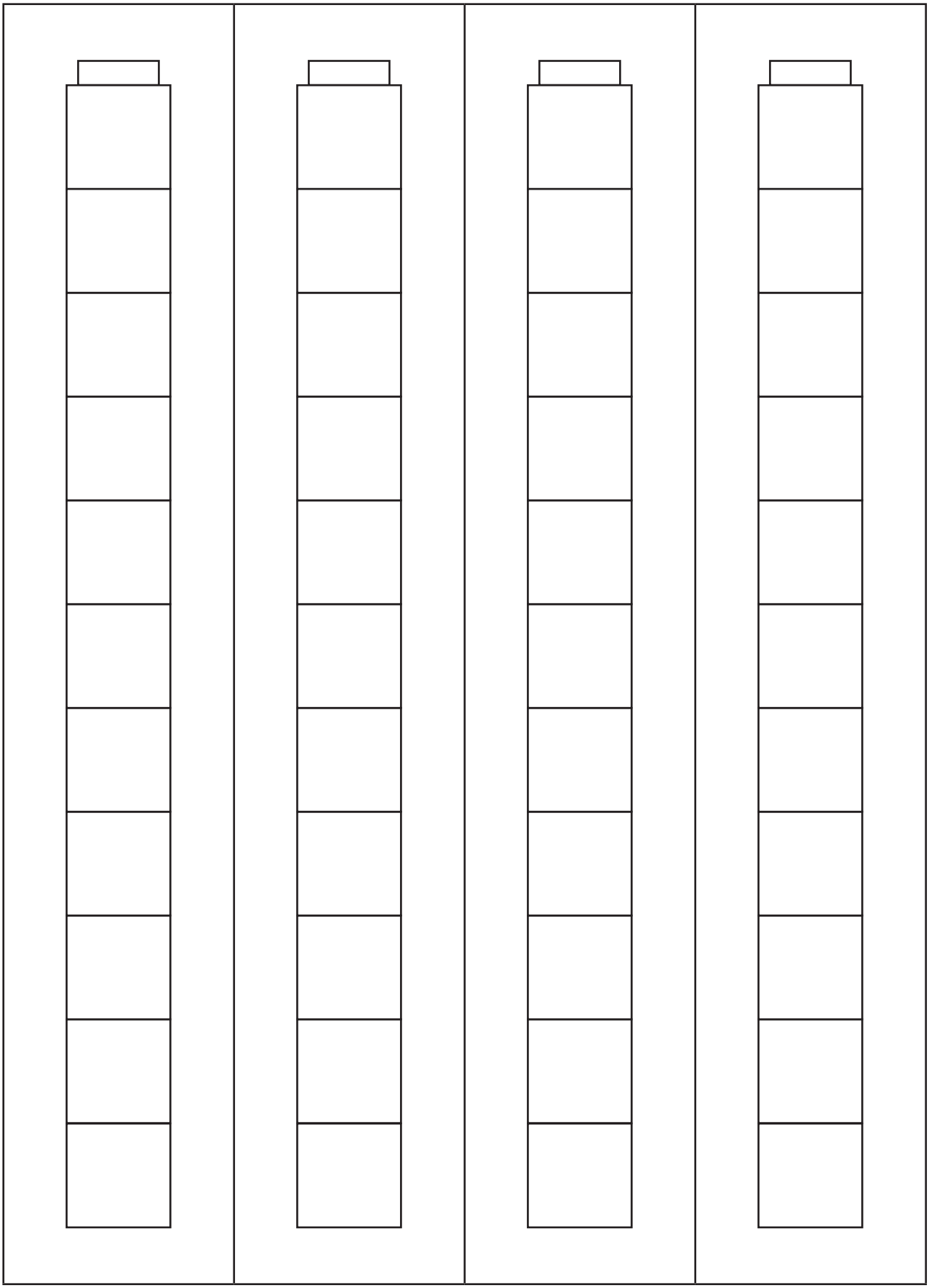
12. Cover 4 of the numbers in the equations with blue squares. Have students pair-share ideas about the numbers that have been hidden. Then point to the first blue square and ask students to show what they believe the hidden number is by holding up the corresponding number of fingers. Then pull out the square to reveal the hidden number. Call on one of the students to explain how he figured it out. Continue in this fashion until all 4 numbers have been revealed.

13. Send students out to Work Places. As they leave the discussion area, collect the unused strips and expression cards from students. Promise to use them during the next activity. Pull all the strips and cards out of the pocket chart and save them to return to the children later.

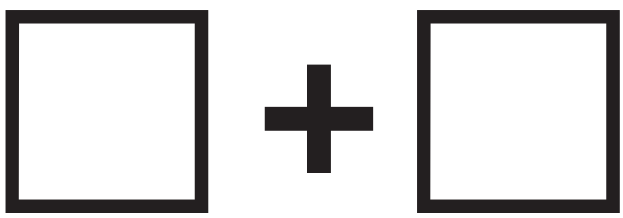
Ten Strips



Eleven Strips



Expression Cards

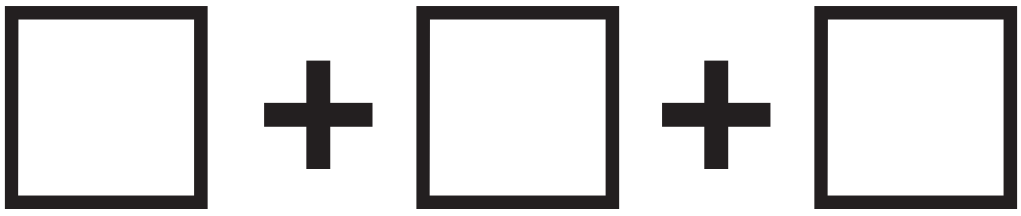


Expression Card

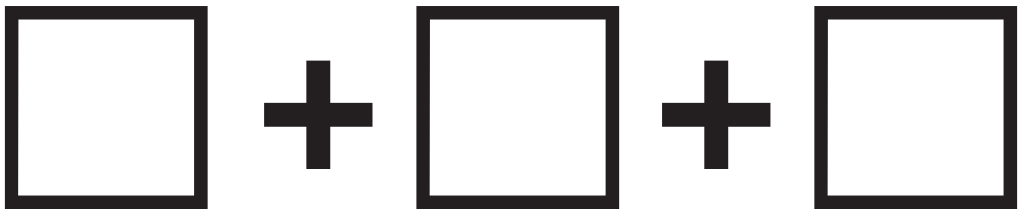
Expression Card

Expression Card

Expression Card



Expression Card



Expression Card

Numerals & Symbols Cards

10 Numerals & Symbols Card	10 Numerals & Symbols Card
11 Numerals & Symbols Card	11 Numerals & Symbols Card
= Numerals & Symbols Card	= Numerals & Symbols Card
= Numerals & Symbols Card	= Numerals & Symbols Card

Set A2 ★ Activity 2

ACTIVITY

The Blue Square Game, Part 2

Overview

The teacher plays another round of the Blue Square Game with the class, and has students solve a few equations at the board together. Then students solve some equations independently.

Skills & Concepts

★ generate addition and subtraction strategies to find missing addends and subtrahends in number combinations through 20

★ solve equations in which the unknown number appears in a variety of positions

You'll need

★ Solving Equations pages 1 and 2 (pages A2.12 and A2.13, class set of each)

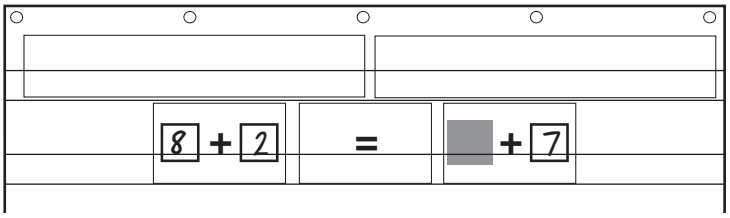
★ Blue Square game materials from Set A2, Activity 1 (see Advance Preparation)

★ pocket chart

Advance Preparation Use your Numeral & Symbol cards and any strips and expression cards left over from the previous activity to build equations in the pocket chart before you conduct this activity. Cover one number in each equation with a blue square.

Instructions for The Black Square Game, Part 2

1. Gather students to your discussion area. Give them a minute to examine the equations in the pocket chart and pair-share ideas about the numbers that are hidden. Then turn the unifix strips over so only the equations are showing. Point to the first blue square and ask students to indicate what number they think is hidden by holding up that number of fingers. Then ask several volunteers to explain their reasoning.



Students *8 + 2 is 10. Then you have to think how to get the other side to be 10 because I'm pretty sure both of those strips have 10 on them. I counted 8, 9, 10. I think it's 3.*
I know 8 + 2 is 10. Then I know 7 + 3 is 10, so it has to be 3.
7 is just 1 away from 8, so I moved 1 over from the 2 and made it 3 on that side.

2. Reveal the hidden number. Continue in this fashion until students have solved all of the equations.

3. Now explain that you are going to write some equations on the board for students to solve. Record the following equation. Ask students to pair-share what they think belongs in the box. Give them a few moments to talk and then ask them to indicate the answer by holding up that number of fingers. Ask a couple of volunteers to explain their reasoning.

$8 - \square = 4$

Activity 2 The Blue Square Game, Part 2 (cont.)

Students *It's 4 because I know 8 minus 4 is 4. 4 + 4 is 8, so the missing number must be 4.*

4. Repeat step 3 with the equations shown below.

$4 + 5 = 6 + \square$

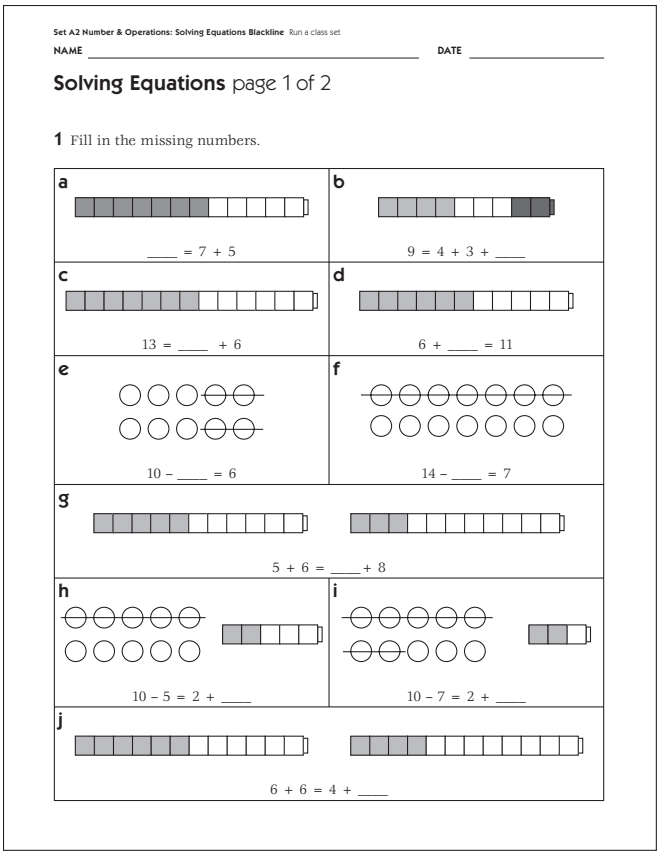
$\square = 10 + 4$

$10 - 5 = 2 + \square$

$\square = 2 + 4 + 6$

$12 - 4 = 10 - \square$

5. Give students each a copy of Solving Equations page 1. Read over the sheet with them and clarify as needed. Then give them the rest of the math period to work on the sheet. Consider assigning page 2 as extra work for early finishers, homework, or seatwork the following day.



Set A2 Number & Operations: Solving Equations Blackline Run a class set

NAME _____ DATE _____

Solving Equations page 1 of 2

1 Fill in the missing numbers.

a ____ = 7 + 5

b 9 = 4 + 3 + ____

c 13 = ____ + 6

d 6 + ____ = 11

e 10 – ____ = 6

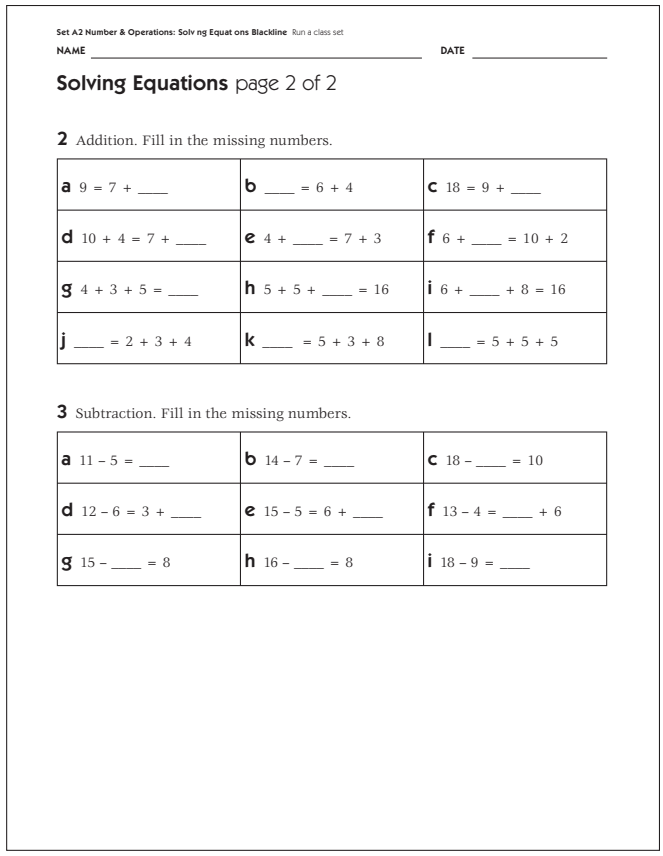
f 14 – ____ = 7

g 5 + 6 = ____ + 8

h 10 – 5 = 2 + ____

i 10 – 7 = 2 + ____

j 6 + 6 = 4 + ____



Set A2 Number & Operations: Solv ng Equat ons Blackline Run a class set

NAME _____ DATE _____

Solving Equations page 2 of 2

2 Addition. Fill in the missing numbers.

a 9 = 7 + ____	**b** ____ = 6 + 4	**c** 18 = 9 + ____
d 10 + 4 = 7 + ____	**e** 4 + ____ = 7 + 3	**f** 6 + ____ = 10 + 2
g 4 + 3 + 5 = ____	**h** 5 + 5 + ____ = 16	**i** 6 + ____ + 8 = 16
j ____ = 2 + 3 + 4	**k** ____ = 5 + 3 + 8	**l** ____ = 5 + 5 + 5

3 Subtraction. Fill in the missing numbers.

a 11 – 5 = ____	**b** 14 – 7 = ____	**c** 18 – ____ = 10
d 12 – 6 = 3 + ____	**e** 15 – 5 = 6 + ____	**f** 13 – 4 = ____ + 6
g 15 – ____ = 8	**h** 16 – ____ = 8	**i** 18 – 9 = ____

Extensions

- Make the Numerals & Symbols cards and blue squares, along with students' strips and expression cards available during Work Places. Encourage students to set up equations in the pocket chart for their classmates to solve.

Activity 2 The Blue Square Game, Part 2 (cont.)

- Every week or so through the rest of the school year, post a few equations on the board for students to solve. Depending on the needs and strengths of your students, you can increase the challenge level by using higher numbers and/or longer sequences of operations.

INDEPENDENT WORKSHEETS

See Set A2 Independent Worksheets 1 and 2 for more practice solving equations in which the unknown number appears in a variety of positions.

NAME _____ **DATE** _____

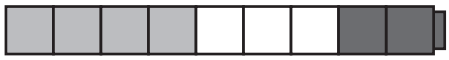
Solving Equations page 1 of 2

1 Fill in the missing numbers.

a

_____ = 7 + 5

b



9 = 4 + 3 + _____

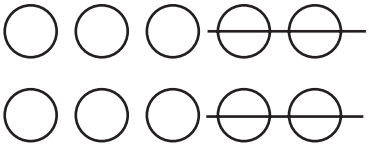
c

13 = _____ + 6

d

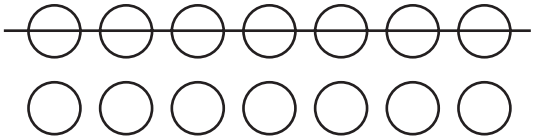
6 + _____ = 11

e



10 – _____ = 6

f

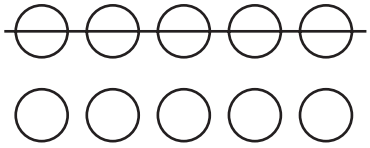


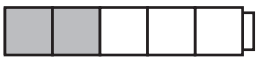
14 – _____ = 7

g

5 + 6 = _____ + 8

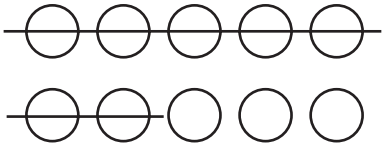
h





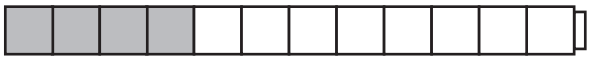
10 – 5 = 2 + _____

i



10 – 7 = 2 + _____

j



6 + 6 = 4 + _____

NAME _____ **DATE** _____

Solving Equations page 2 of 2

2 Addition. Fill in the missing numbers.

a 9 = 7 + ____	**b** ____ = 6 + 4	**c** 18 = 9 + ____
d 10 + 4 = 7 + ____	**e** 4 + ____ = 7 + 3	**f** 6 + ____ = 10 + 2
g 4 + 3 + 5 = ____	**h** 5 + 5 + ____ = 16	**i** 6 + ____ + 8 = 16
j ____ = 2 + 3 + 4	**k** ____ = 5 + 3 + 8	**l** ____ = 5 + 5 + 5

3 Subtraction. Fill in the missing numbers.

a 11 – 5 = ____	**b** 14 – 7 = ____	**c** 18 – ____ = 10
d 12 – 6 = 3 + ____	**e** 15 – 5 = 6 + ____	**f** 13 – 4 = ____ + 6
g 15 – ____ = 8	**h** 16 – ____ = 8	**i** 18 – 9 = ____

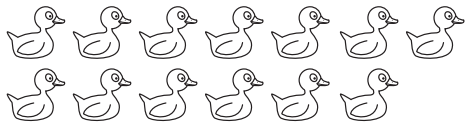
NAME _____ **DATE** _____

Set A2 ★ Independent Worksheet 1

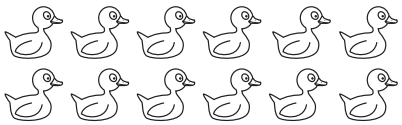
INDEPENDENT WORKSHEET

Addition & Subtraction Puzzles

1 Fill in the missing numbers to solve these equations.



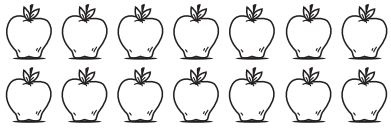
a ____ = 7 + 6



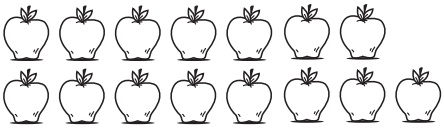
b 12 = 4 + 5 + ____

c 16 = ____ + 9

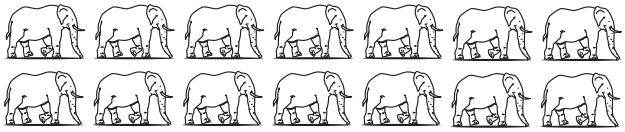
d 8 + ____ = 12



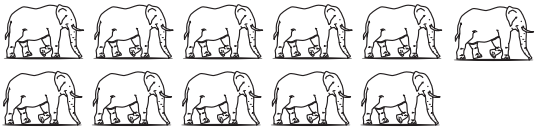
e 14 – ____ = 8



f 15 – ____ = 7



g 9 + 5 = ____ + 7



h 11 – 5 = 4 + ____

i 5 + 4 + 2 = ____

j 6 + 4 + ____ = 17

k 5 + ____ + 9 = 15

l 16 – ____ = 9

m 15 – ____ = 7

n 17 – 9 = ____

o 11 – 3 = 5 + ____

p 14 – 6 = 6 + ____

q 12 – 8 = ____ + 1

Independent Worksheet 1 Addition & Subtraction Puzzles (cont.)

2 Use numbers, pictures, and/or words to solve these problems. Show your work.

a James has 8 dollars. How many more dollars does he need to have 15 dollars altogether?

b Emily had some stickers. Her mom gave her 8 more stickers. Now she has 15 stickers. How many stickers did Emily have to start with?

c There were 17 apples in the bowl. The kids ate some. Now there are only 8 apples in the bowl. How many apples did the kids eat?

CHALLENGE

d Katy has 8 dollars. How many more quarters does she need to have 12 dollars altogether?

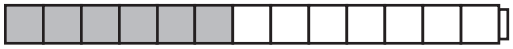
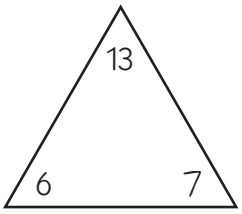
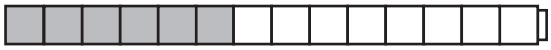
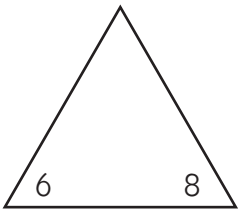
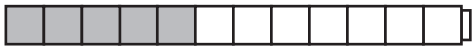
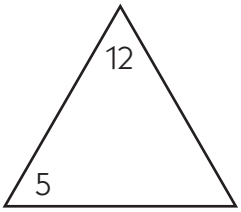
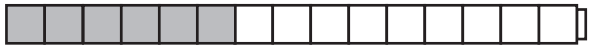
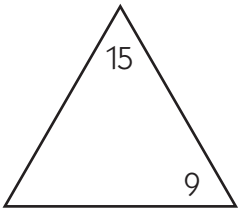
NAME _____ **DATE** _____

Set A2 ★ Independent Worksheet 2

INDEPENDENT WORKSHEET

Missing Numbers

1 One number from each family is lost! Write the missing number in the triangle. Use the pictures to help. Then write 2 addition and 2 subtraction sentences to match.

Unifix Train	Triangle Fact Family	Fact Family
example 		6 + 7 = 13 7 + 6 = 13 13 - 6 = 7 13 - 7 = 6
a 		
b 		
c 		

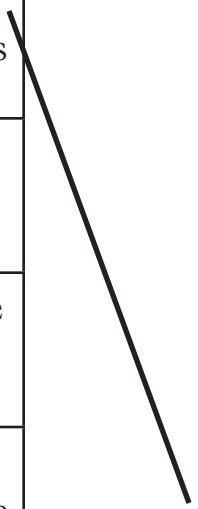
2 Fill in the missing numbers to solve these equations

a 6 + 5 + 3 = ____	**b** 7 + 3 + ____ = 18	**c** 6 + ____ + 2 = 14
d 13 – ____ = 8	**e** 14 – ____ = 8	**f** 13 – 4 = ____

Independent Worksheet 2 Missing Numbers (cont.)

3 Draw a line to match each problem with its equation. Then find the answers.

a Sara had 15 marbles. She gave 6 marbles to her brother. Then she gave 3 marbles to her sister. How many marbles does Sara have left?
b There were 13 kids on the bus. Some kids got off. Now there are 8 kids on the bus. How many got off?
c Lin got a t-shirt for 12 dollars. He gave the clerk 15 dollars. How much money did he get back?
d There were 17 cookies on the plate. The dog ate some of them. Now there are only 9 cookies on the plate. Howmany did the dog get?
e Max had 8 toy cars. He got some more toy cars for his birthday. Now Max has 14 toy cars. How many toy cars did he get for his birthday?



17 – ____ = 9

15 – 12 = ____

8 + ____ = 14

15 – 6 – 3 = ____

13 – ____ = 8

CHALLLENGE

4 Solve these equations.

a 4 + 5 – 2 + 7 = ____

b 40 – 20 + ____ = 25

c 6 + 14 + 23 = ____

d ____ + 4 = 10

e 10 + 20 + ____ = 30 + 5

f 8 – 3 + 5 – 10 + 439 = ____