BRIDGES IN MATHEMATICS 1

GRADE 1 SUPPLEMENT

Set B1 Algebra: Properties & Relationships

Includes

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Skills & Concepts

- ★ recognize and apply the commutative and identity properties of addition
- ★ understand the inverse relationship between addition and subtraction
- ★ write and solve equations involving addition and subtraction
- ★ create problem situations from given equations involving addition and subtraction
- ★ recognize that unknowns in an addition or subtraction equation represent a missing value that will make the statement true
- ★ write and solve number sentences from problem situations involving addition and subtraction, using symbolic notation for the missing value
- ★ compose and decompose numbers to 12
- ★ practice addition and subtraction facts to 15

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Bridges in Mathematics Grade 1 Supplement
Set B1 Algebra: Properties & Relationships

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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 B1 ★ Activity 1

ACTIVITY

Introducing Double Flap Dot Cards

Overview

Children explore the relationship between addition and subtraction, as well as the commutative and identity properties of addition by examining, discussing, and finally making their own Double Flap Dot cards.

Skills & Concepts

- ★ write and solve equations involving addition and subtraction
- ★ recognize and apply the commutative and identity properties of addition
- ★ understand the inverse relationship between addition and subtraction
- ★ compose and decompose numbers to 12
- ★ practice addition and subtraction facts to 12

You'll need

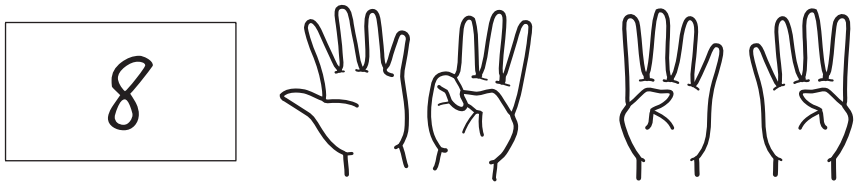
- ★ Double Flap Dot Cards (pages B1.6–B1.8, see Advance Preparation)
- ★ whiteboard or chart paper and marking pens near your discussion area
- ★ individual chalkboard/whiteboard, chalk/pen, and eraser for each student
- ★ manila, drawing, or copy paper (1 sheet per student plus a few extra)
- ★ half sheets of copy paper (1 per student plus a few extra)
- ★ crayons and/or felt markers (class set)
- ★ scissors (class set)
- ★ Unifix cubes

Advance Preparation Run 1 copy each of pages B1.6–B1.8 on cardstock. Follow the instructions at the top of the sheets to make 3 Double Flap Dot cards. Be sure to label the back of each card with the numeral 8.

Note Consider teaching this activity over a 2-day period, steps 1–11 the first day, and steps 12–15 the second day.

Instructions for Introducing Double Flap Dot Cards

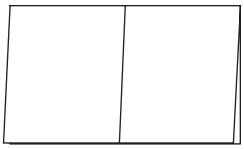
1. Ask children to join you in the discussion area, and have them sit facing you. Explain that you are going to do some counting, adding, and subtracting together. Then hold up the backside of the first Double Flap Dot Card so children can see the numeral you have written: 8. Ask children to hold up that number of fingers.



2. Next, turn the card over, but do not lift the flaps yet. Tell the students that there are some black dots under one flap, and some white dots under the other. Together the black and white dots add up to 8. Ask

Activity 1 Introducing Double Flap Dot Cards (cont.)

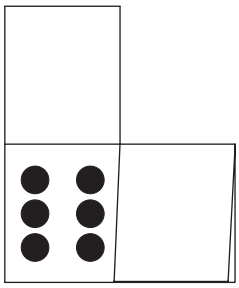
students to pair-share some ideas about the number of dots under each flap. Then invite volunteers to share with the class.



Students *Maybe it's 4 and 4.*
It could be 5, and then 6, 7, 8, so that would make 3 on the other side.
Or maybe it's 7 and 1.
Maybe all the 8 are really under one door, and nothing under the other.

3. Acknowledge children's responses, and then lift the first flap, so they can see the dots. Ask them to show the number on their fingers, and pair-share ideas about how many dots are under the other flap.

Teacher *I am going to give you a big hint by lifting the first flap. Show the number of dots you see on your fingers. Then talk with the person sitting next to you about how many dots you think are under the other flap. Remember, you will be able to see 8 dots in all when both flaps are up.*



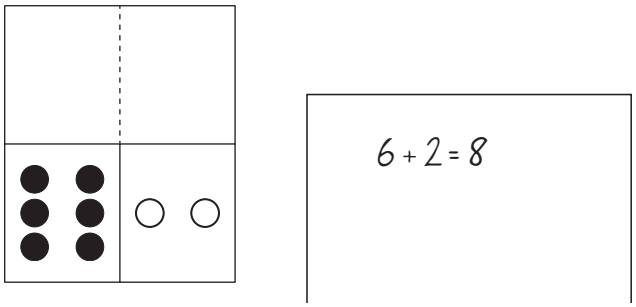
4. Invite a few volunteers to share their thinking with the group. Press them to explain their answers.

Derek *I think it's going to be 2 under there.*

Teacher *Why, Derek?*

Derek *If you go 6, then 7, 8, you can tell it will be 2.*

5. Now lift the second flap so students can see both sets of dots. Work with their input to record an addition sentence that reflects the quantities on both sides of the card and the total.



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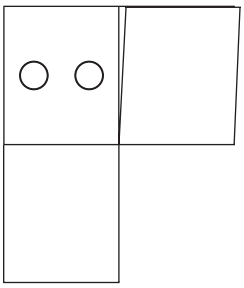
Activity 1 Introducing Double Flap Dot Cards (cont.)

6. Close both flaps and show children the numeral 8 on the back of the card again. Now flip the card over so the flaps open downwards instead of upwards, and open the flap to show the 2 white dots. How many dots are there under the other flap? How do they know?

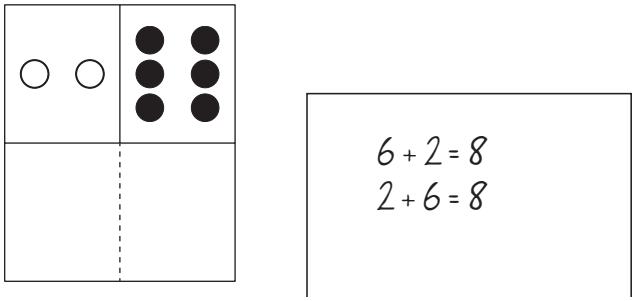


Alana *It has to be 6 under there!*

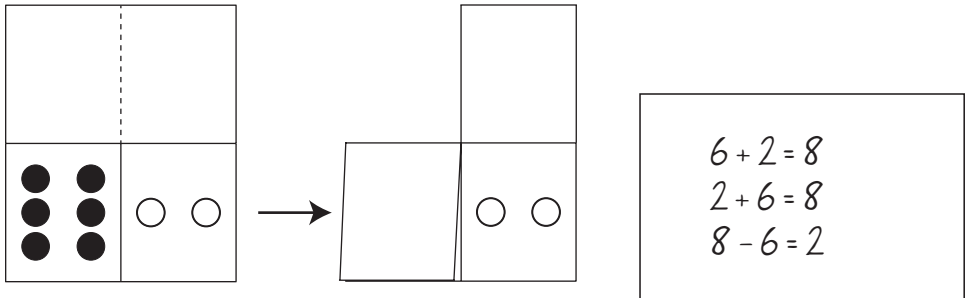
Teacher *Alana says it has to be 6. Do you agree with her? Thumbs up if you do. How do you know?*

Students *It was 6 before on that other side.*
You just turned it the other way.
You can go both ways, like 6 + 2 or 2 + 6. They both make 8.

7. After some discussion, pull the second flap down to reveal the 6 black dots. Then work with input from the class to record another addition sentence. How is this sentence like the first one you wrote? How is it different?



8. Now rotate the card so the flaps are pointing upwards again. Ask the children how many dots there are in all (8). Then ask them how many dots they will see if you close the first flap and leave the second flap open. How do they know? After some discussion, close the first flap to hide 6 of the dots, and work with input from the class to record a subtraction sentence to match.



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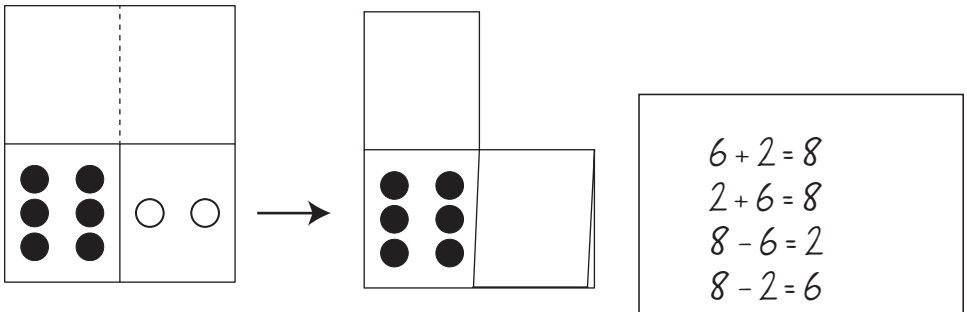
Activity 1 Introducing Double Flap Dot Cards (cont.)

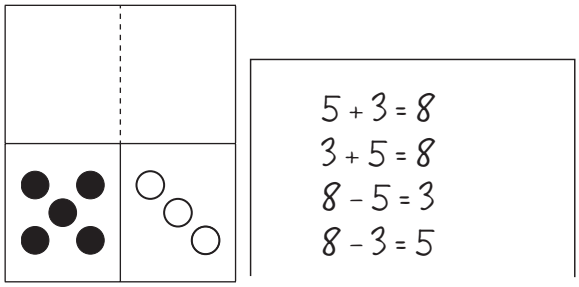
9. Open both flaps again, and have students state the total number of dots one more time. Then ask them how many dots they will see if you close the second flap and leave the first one open. How do they know? After some discussion, close the second flap to hide 2 of the dots, and work with input from the class to record a subtraction sentence to match.

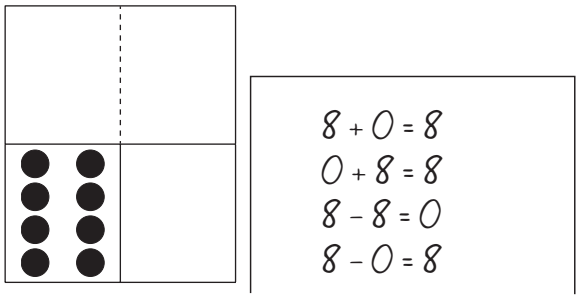


10. Read all 4 equations with the children. Then explain that these are called a fact family. Can they explain why?

> ***Students*** *They're all about that same dot card, just mixed up.*
> *They all have 8 and 6 and 2 in them, but mixed around.*

11. Give students each a whiteboard/chalkboard, pen/chalk, and an eraser. Repeat steps 1–10 with the other two dot cards, and have children record the addition and subtraction sentences along with you. When you do the third card, guide them to make observations about what happens when 0 is added to or subtracted from a number such as 8.





12. After you have worked through both cards, tell children they are each going to make their own Double Flap Dot card. Model the process as shown on the next page..

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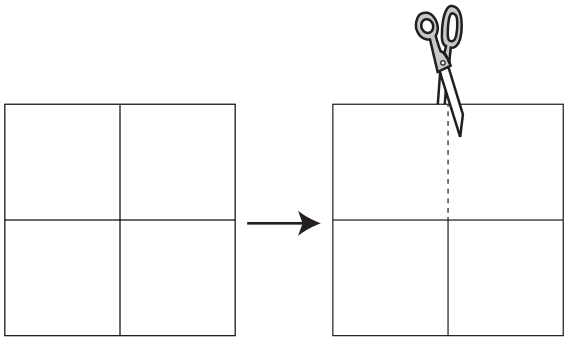
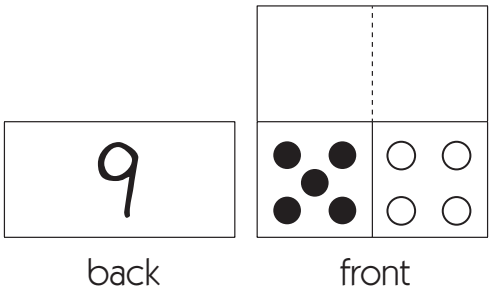
Activity 1 Introducing Double Flap Dot Cards (cont.)

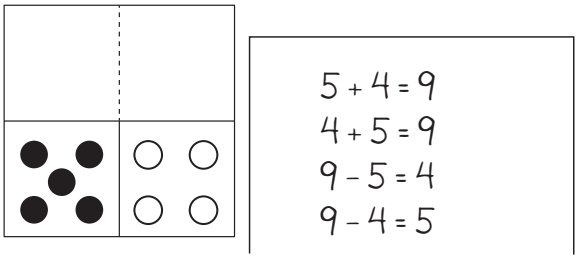
A. Fold a piece of paper in fourths. Open the piece of paper out flat, and cut the top half as shown below to create 2 flaps.



B. Choose a number between 7 and 12 for your total. Write it on the back of the folded card. Draw and color two sets of dots that combine to make your chosen total. Use one color for the first set and a second color for the second set. (Depending on the strengths and needs of your students, you might model how to use Unifix cubes in two different colors to plan the two sets of dots before you draw and color them.)



C. Write the fact family for your Double Flap Dot card on a half sheet of paper.



13. When children understand what to do, give them each a piece of paper and send them back to their tables to work on their cards. Remind them that they can use Unifix cubes to help plan how many dots they will put on each side of their card.

14. Circulate to talk with children as they are working. As they finish their dots cards, give them each a half sheet of paper to record their fact family. Ask children who finish early to trade dot cards with a partner and record a fact family for their partner's card as well.

15. After children have completed and turned in their work, post the cards and fact family sheets grouped by totals (7s, 8s, 9s, and so on) on the wall for students to read and enjoy.

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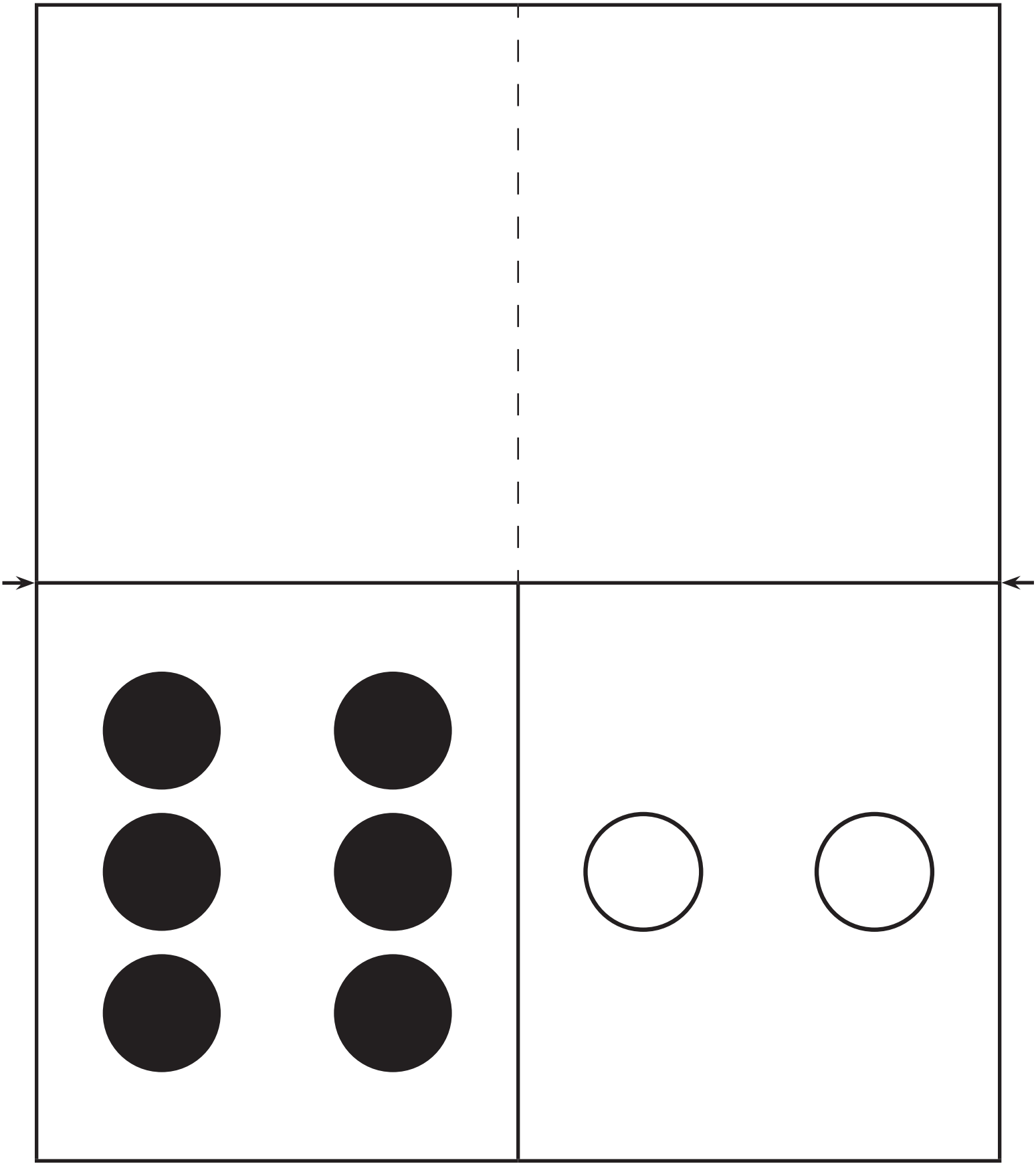
Set B1 Algebra: Properties & Relationships Blackline Run 1 copy on cardstock. Trim away the edges so you have a rectangle that measures 7½"×9". Fold the rectangle in half at the arrowheads and cut along the dotted line to create 2 flaps that cover the dotted portions of the card. Write a large numeral 8 on the back of the dotted portion.

Double Flap Dot Cards Page 1 of 3



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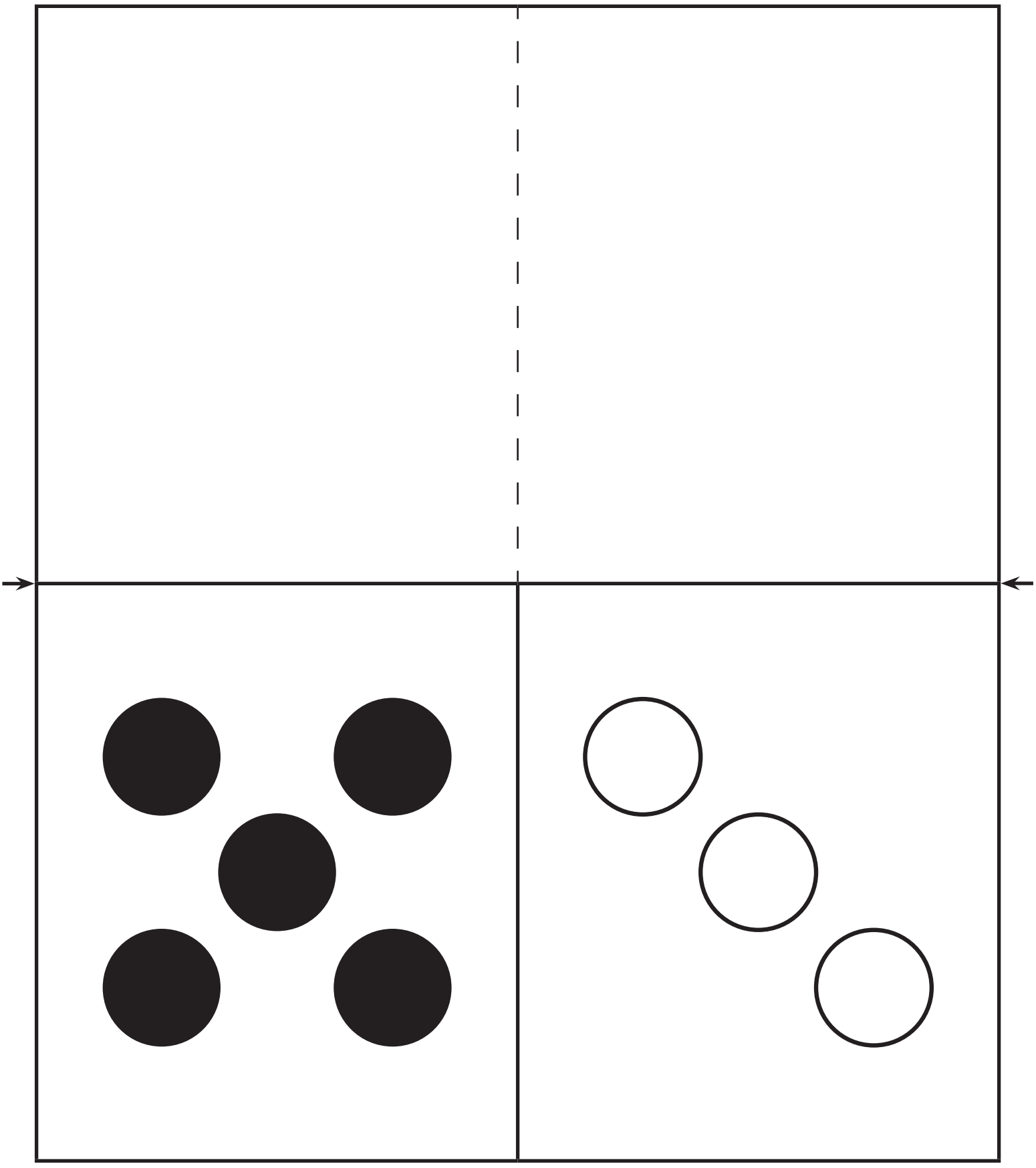
Double Flap Dot Cards Page 2 of 3



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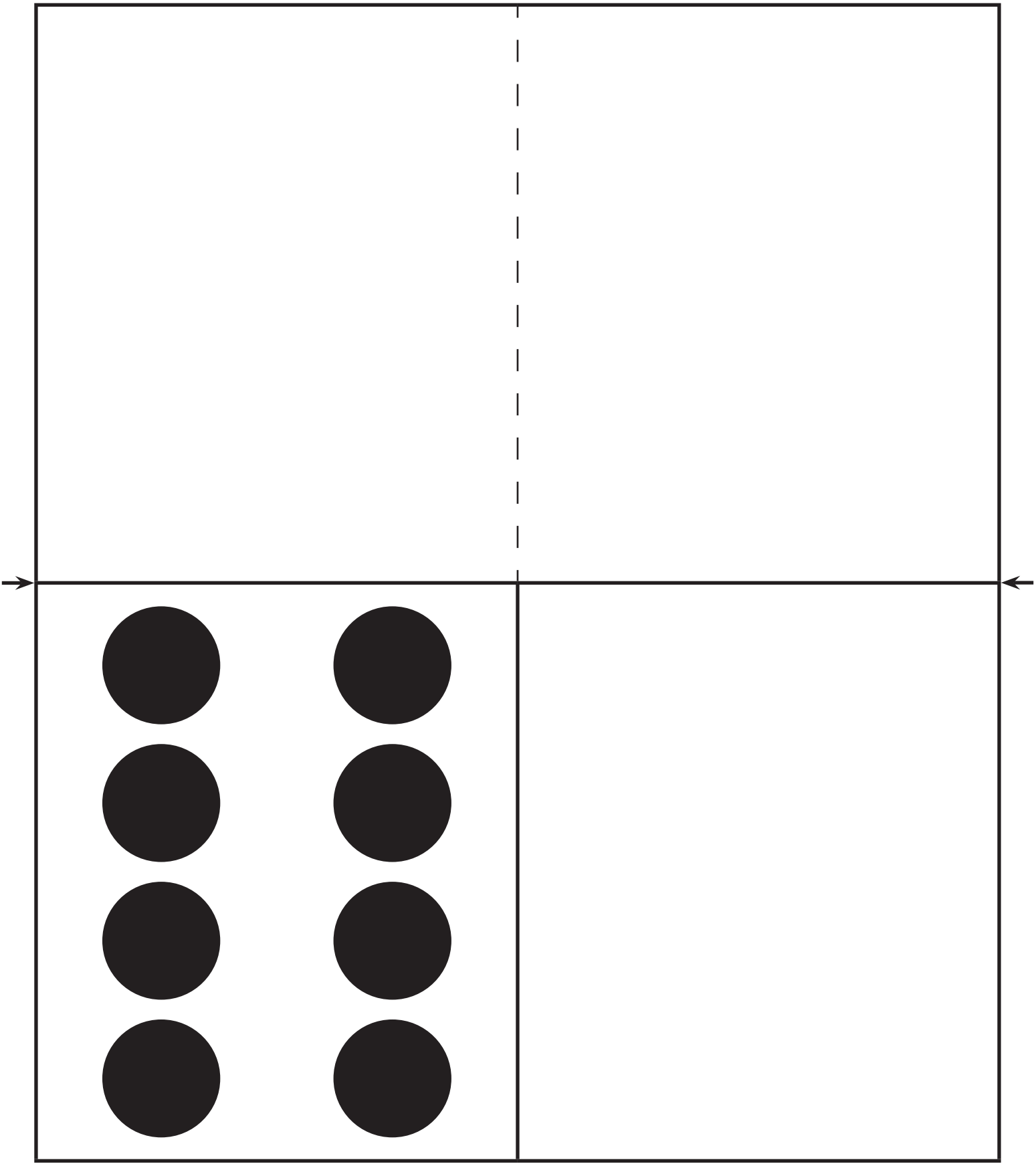
Double Flap Dot Cards Page 3 of 3



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Set B1 ★ Activity 2

ACTIVITY

Double Flap Picture Cards

Overview

Children continue to explore properties and relationships as they solve and write equations and stories to match Double Flap Picture cards.

Skills & Concepts

- ★ write and solve equations involving addition and subtraction
- ★ create problem situations from given equations involving addition and subtraction
- ★ recognize and apply the commutative and identity properties of addition
- ★ understand the inverse relationship between addition and subtraction
- ★ compose and decompose numbers to 12
- ★ practice addition and subtraction facts to 12

You'll need

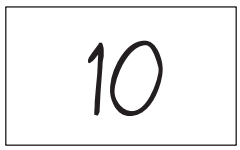
- ★ Double Flap Picture Cards (pages B.13–B.15, see Advance Preparation)
- ★ whiteboard or chart paper and marking pens near your discussion area
- ★ individual chalkboard/whiteboard, chalk/pen, and eraser for each student
- ★ manila, drawing, or copy paper (1 sheet per student plus a few extra)
- ★ lined writing paper (1 sheet per student plus a few extra)
- ★ crayons and/or felt markers (class set)
- ★ scissors (class set)
- ★ tiny stickers for student use (optional)
- ★ Unifix cubes

Advance Preparation Run 1 copy each of pages B1.13–B1.15 on cardstock. Follow the instructions at the top of the sheets to make 3 Double Flap Picture cards.

Note Consider teaching this activity over a 2-day period, steps 1–7 the first day, and steps 8–13 the second day.

Instructions for Double Flap Picture Cards

1. Ask children to join you in the discussion area, and have them sit facing you. Explain that you have some new double flap cards to share with them today. Then hold up the backside of the first Double Flap Picture card so children can see the numeral you have written: 10.



2. Next, turn the card over, but do not lift the flaps yet. Tell the students there are some ladybugs under one flap, and some more ladybugs under the other, 10 in all. Ask students to pair-share some ideas about the number of bugs under each flap. Then invite volunteers to share with the class, and record their ideas at the board or on a piece of chart paper.

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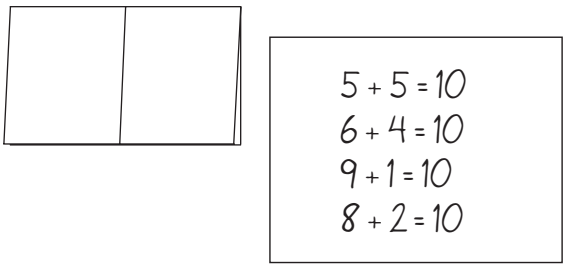
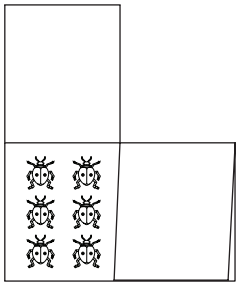
Activity 2 Double Flap Picture Cards (cont.)

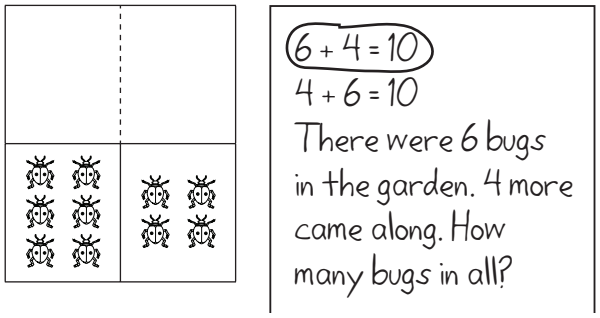


3. Then lift the first flap on the card, so they can see the bugs. Ask them to show the number on their fingers, and pair-share ideas about how many bugs are under the other flap.

> ***Teacher*** *I am going to give you a hint by lifting the first flap. Show the number of bugs you see on your fingers. Then talk with the person sitting next to you about how many bugs you think are under the other flap. Remember, you will be able to see 10 bugs in all when both flaps are up.*



4. After some discussion, lift the second flap so students can see both sets of bugs. Work with their input to record 2 addition sentences that reflect the quantities on both sides of the card and the total. Then explain that you are going to write a story to match one of the equations. Ask students to read the words as you write them and decide which equation your story matches. Work with their input to circle the matching equation.



5. Now close one flap door at a time as you work with input from the students to write 2 subtraction equations. Have students pair-share ideas for a story that matches one of the equations, and then call on a volunteer to share his/her story with the class. Ask the others to listen carefully so they can figure out which equation their classmate has chosen.

> ***Teacher*** *Kylie, do you have a story that matches one of these subtraction sentences?*

> ***Kylie*** *My brother had 10 ladybugs in a jar. 4 of them got away. How many are left?*

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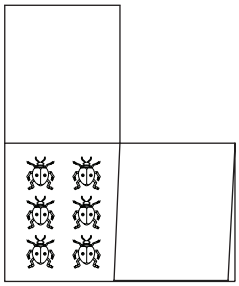
Activity 2 Double Flap Picture Cards (cont.)

Teacher *Boys and girls, which subtraction sentence did Kylie pick for her story?*

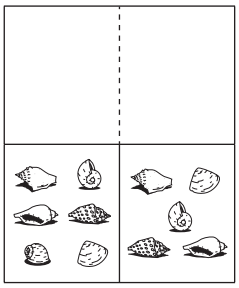
Students *It's 10 takeaway 4 because 4 of the bugs got away.*
I know the answer! It's 6!
He only had 6 bugs left because the other guys ran away.

6. Record the story problem for all to see, and ask one of the children to circle the matching equation.



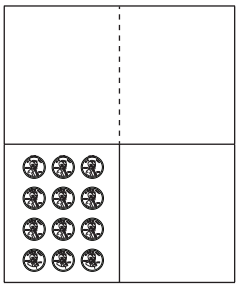
10 − 6 = 4
(10 − 4 = 6)
My brother had 10 bugs in a jar. 4 bugs got away. How many bugs were left?

7. Give students each a whiteboard/chalkboard, pen/chalk, and an eraser. Go through the steps described above with the other two picture cards, but this time, generate all 4 equations as students record them on their boards. Then have children each circle one of the 4 equations and share a story about that equation with the person sitting next to them. Choose one volunteer to share a story that matches one of the addition equations, and another to share a story that matches one of the subtraction equations. Record the stories and ask the students to help circle the matching equations.



6 + 5 = 11
(5 + 6 = 11)
Dante had 5 shells. He found 6 more on the beach. How many shells does he have in all?

(11 − 6 = 5)
11 − 5 = 6
Sara had 11 shells in her bucket. She lost 6 of them. How many does she have left?



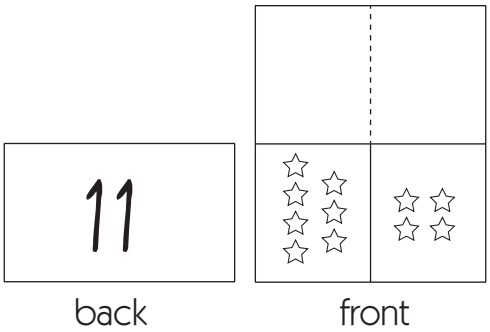
12 + 0 = 12
(0 + 12 = 12)
Maria had 0 pennies. Then she found 12 pennies in her pocket. How manypennies does she have in all?

(12 − 12 = 0)
12 − 0 = 12
Derek had 12 pennies. He bought a pencil for 12 cents. How many pennies does he have left?

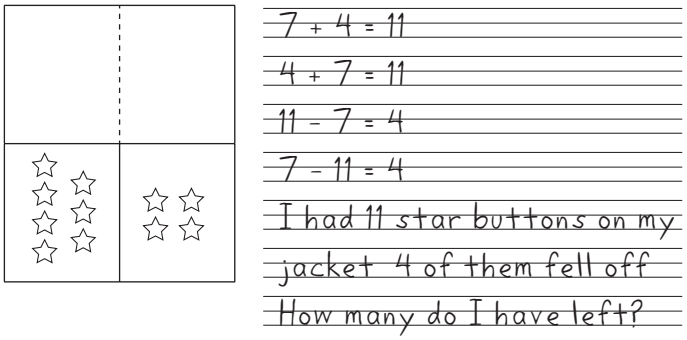
8. After you have worked through both cards, tell children they are each going to make their own Double Flap Picture card. Model the process of folding and cutting the paper as you did during the previous activity. Choose a number between 7 and 12 for your total. Write it on the back of the folded card. Draw

Activity 2 Double Flap Picture Cards (cont.)

and color two sets of simple pictures that combine to make your chosen total. You can use tiny stickers as an alternative to drawings if you have a good number and variety to offer to your children to use when they make their picture cards. Also, you might model how to use Unifix cubes in two different colors to plan the two sets before you make your pictures on the card.



9. Work with input from the class to write the fact family for your Double Flap Picture card on a piece of lined paper. Then write a story to match one of the equations. When you are finished, read the story with the class, and ask children to identify the matching equation.



Teacher *Which equation does my story match? Tell the person next to you, and explain your answer.*

Jon *I think it's 11 – 4 because 4 stars fell off.*

Stephanie *Yeah, 11 – 4 because first she had 11 stars, and then she lost 4 of them. She only has 7 left.*

10. When children understand what to do, give them each a piece of manila, drawing, or copy paper and send them back to their tables to work on their cards. Remind them that they can use Unifix cubes to help plan how many pictures (or stickers) they will put on each side of their card.

11. Circulate to talk with children as they are working. As they finish their picture cards, give them each a sheet of lined paper to record their fact family along with a story that matches one of the equations.

12. When students are finished, have them share their work with at least one other person. Have them challenge their partner to figure out which equation matches their story problem.

13. Consider posting the collection of picture cards and stories in the hall, with a sign that invites passersby to identify the equations that match the story problems on the displayed papers.

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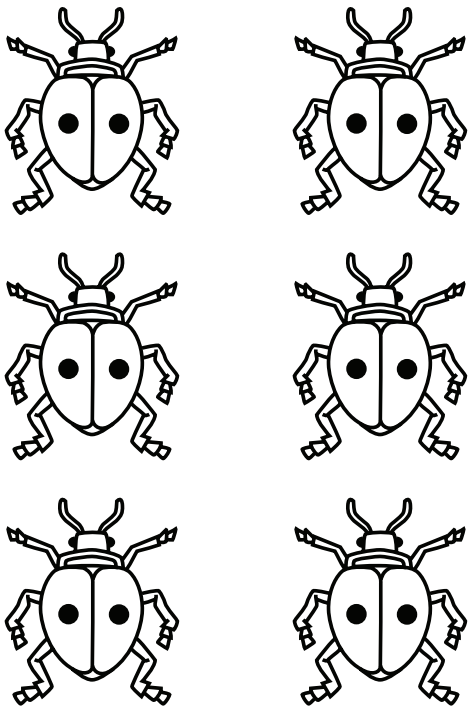
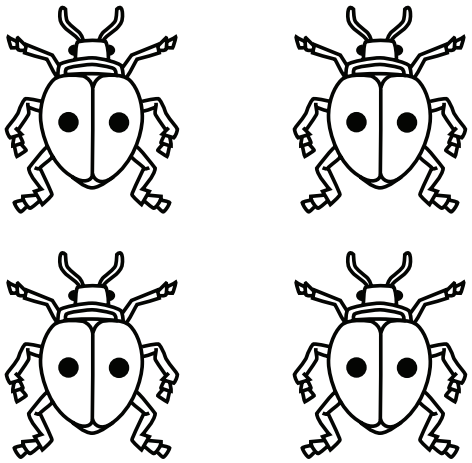
Set B1 Algebra: Properties & Relationships Blackline Run 1 copy on cardstock. Trim away the edges so you have a rectangle that measures 7½"×9". Fold the rectangle in half at the arrowheads and cut along the dotted line to create 2 flaps that cover the pictures on the lower part of the card. Write a large numeral 10 on the back of the picture portion of the card.

Double Flap Picture Cards Page 1 of 3





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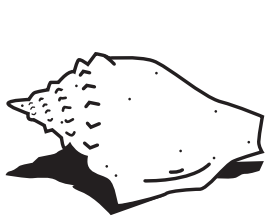
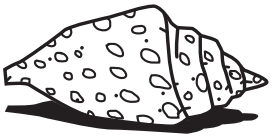
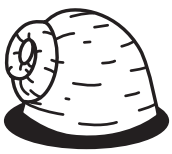
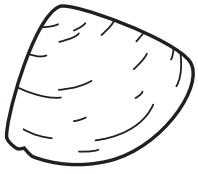
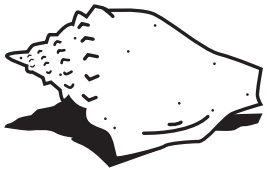
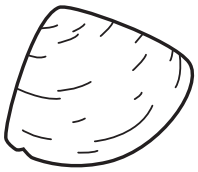
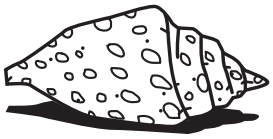
Double Flap Picture Cards Page 2 of 3





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Double Flap Picture Cards Page 3 of 3

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Set B1 ★ Activity 3

ACTIVITY

Double Flap Number Cards

Overview

Children explore properties, relationships, and missing values in equations as they solve problems using Double Flap Number Cards.

Skills & Concepts

- ★ write and solve equations involving addition and subtraction
- ★ recognize that unknowns in an addition or subtraction equation represent a missing value that will make the statement true
- ★ write and solve number sentences from problem situations involving addition and subtraction, using symbolic notation for the missing value
- ★ recognize and apply the commutative property of addition
- ★ understand the inverse relationship between addition and subtraction
- ★ work with combinations of 10

You'll need

- ★ Double Flap Number Cards (page B1.21–B1.22, see Advance Preparation)
- ★ Equations Worksheet (page B1.23, run a class set)
- ★ whiteboard or chart paper and marking pens near your discussion area
- ★ individual chalkboard/whiteboard, chalk/pen, and eraser for each student
- ★ two half sheets (5 1/2" x 8 1/2") of copy paper per student
- ★ scissors (class set)

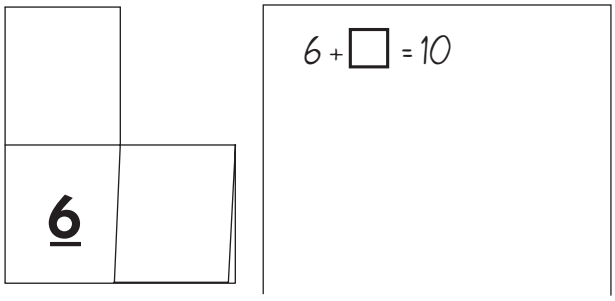
Advance PreparationRun 1 copy of page B1.21–B1.22 on cardstock. Follow the instructions at the top of the sheet to make 2 Double Flap Number cards.

Note Consider teaching this activity over a 2-day period, steps 1–9 the first day, and steps 10–12 the second day.

Instructions for Double Flap Number Cards

1. Ask children to join you in the discussion area, and have them sit facing you. Explain that you have some new double flap cards to share with them today. Then hold up the backside of the first Double Flap Number card so children can see the numeral you have written: 10.

2. Turn the card over and lift the first flap. Tell students that there is another number under the other flap, and that if you add the two numbers, their sum will be 10. Give children a few moments to pair-share ideas about the number under the second flap. Then write 6 + ❑ = 10 on the board or chart paper, and read it to the class.



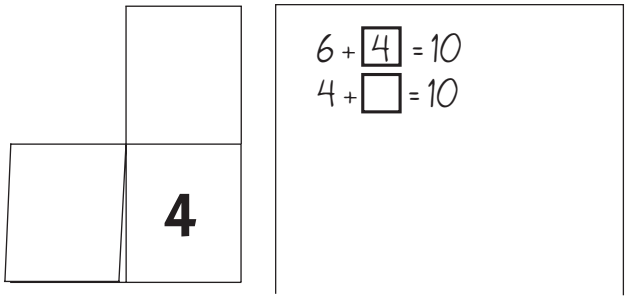
Activity 3 Double Flap Number Cards (cont.)

Teacher *This equation says, "6 plus **what** is the same as 10?" What number can we put in the box to make the equation true?*

Students *I think it's 4 because you can go 6, and then 7, 8, 9, 10.*
It can't be 1 because 6 + 1 is only 7.
It's 4 because I know that 6 + 4 makes 10.
It's 4 because 5 + 5 is 10. If you take 1 from the 5 and give it to the other 5, that's 6, so the other number must be 4.

3. Lift the second flap so students can confirm their answers. Ask a student to write 4 in the box, and then read the equation with the class. Is it true that 6 + 4 is the same as 10?

4. Now close the first flap and write 4 + ❑ = 10 on the board or chart paper. Read it to the class, and give students a few moments to pair-share. Then call on a few volunteers to share with the class. Press them to explain their thinking.



Teacher *This equation says, "What 4 plus **what** is the same as 10?" What number can we put in this box to make the equation true? Please talk with the person next to you, and then I'll call on a few people to share their thinking.*

Students *It has to be 6 because it was 6 the first time.*
But it's mixed up. The 4 is first this time.
It has to still be 6 because 4, and then 5, 6, 7, 8, 9, 10. That's 6 more.
It doesn't matter if you go 6 + 4 or 4 + 6. It's still 10.

5. When there is general agreement that the answer is 6, lift the other flap so children can see both numbers. Ask another volunteer to write the 6 in the box, and read the equation with the class. Is it true?

6. Give students each a whiteboard/chalkboard, pen/chalk, and an eraser. Explain that you are going to write another equation on the board. They will read it and decide whether it is true or false. If it is true, they will write a T on their boards. If it is false, they will write an F. Then write 10 = 6 + 4 under the other two equations. Ask students to each think privately, write their answer, and hold their board up for everyone else to see.

Teacher *I see lots of T's and lots of F's as well. Lori, can you tell you why you marked an F on your board?*

Lori *Because you can't write the answer first. It's wrong that way.*

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Activity 3 Double Flap Number Cards (cont.)

Teacher *Lori says the equation is backwards, and you can't put the 10 first. Ryan, can you tell us why you marked a T on your board?*

Ryan *Because it says, "10 is the same as 6 + 4", and that's true.*

Teacher *Is 10 really the same as 6 + 4?*

James *Well, if you add 6 and 4, it makes 10, so it's kind of the same.*

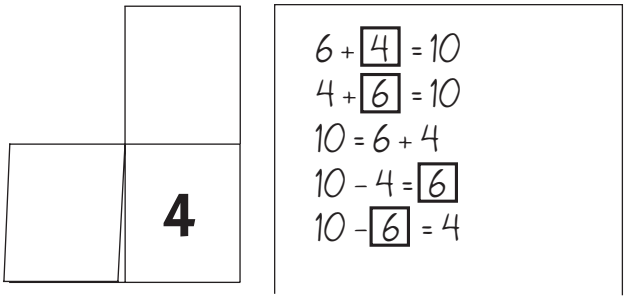
7. Reverse the card so students can see the 10 on the back, and then turn it over with both flaps lifted so they can see the 6 and 4, as you reiterate that 10 *is the same* as 6 + 4. Then write 10 – 4 = ❑ on the board, and ask students how you could use the double flap number card to help find the answer.

Reina *You know 6 + 4 is 10, right? So if you cover up the 4, you can see the answer is 6.*

8. Write 10 – ❑ = 4. Ask students to copy the equation, including the box, on their boards. Ask a volunteer to help you use the double flap card to find the answer. Then record it in the box as students do so on their boards.

Jose *If you put the flap down on the first side, you can still see 4. But we know it's 6 under the flap that's closed. If you have 10, and you take away 6, it's 4. See, I can show on my fingers too.*

Sam *If you know that 6 + 4 is 10, it's easy to know that 10 – 6 is 4.*



9. Now show students your other Double Flap Number card. Work with their input to solve the equations shown below. This time, have children record the equations on their boards, right along with you. In each case, ask volunteers to show how to use the double flap card to help find the answer.

7 + ❑ = 10

❑ + 7 = 10

10 = ❑ + 7

10 – 7 = ❑

10 – ❑ = 3

10 – ❑ = 7

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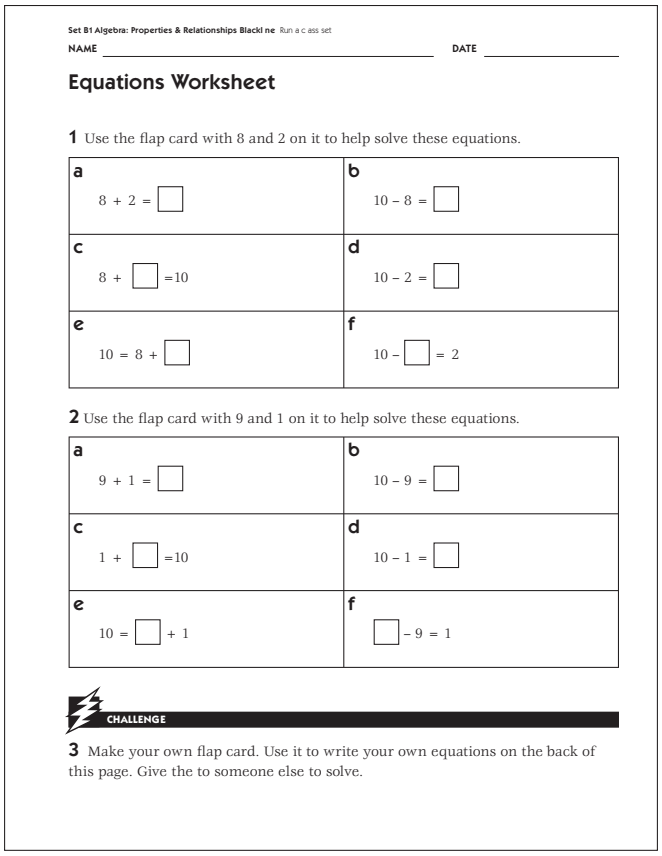
Activity 3 Double Flap Number Cards (cont.)

10. As students watch, fold and cut a piece of 5 1/2" × 8 1/2" paper to make a double flap card, and then make a second card. Label the first card with 10 on the back, 8 under the first flap, and 2 under the second flap. Label the second card with 10 on the back, 9 under the first flap, and 1 under the second flap.

11. Then show students a copy of the Equations Worksheet. Explain that they are each going to make 2 double flap number cards just like yours, and use their cards to help solve the equations on the sheet. Use your first card to model the first couple of problems on the sheet. Then give students each 2 half-sheets of copy paper and send them back to their desks to make their number cards. Post your cards where they can be seen by all the students.



Set B1 Algebra: Properties & Relationships Blackline Run a class set

NAME _____ DATE _____

Equations Worksheet

1 Use the flap card with 8 and 2 on it to help solve these equations.

a 8 + 2 = ☐	**b** 10 – 8 = ☐
c 8 + ☐ =10	**d** 10 – 2 = ☐
e 10 = 8 + ☐	**f** 10 – ☐ = 2

2 Use the flap card with 9 and 1 on it to help solve these equations.

a 9 + 1 = ☐	**b** 10 – 9 = ☐
c 1 + ☐ =10	**d** 10 – 1 = ☐
e 10 = ☐ + 1	**f** ☐ – 9 = 1

CHALLENGE

3 Make your own flap card. Use it to write your own equations on the back of this page. Give the to someone else to solve.

12. As children finish making their cards, hand out copies of the worksheet and let them go to work. Encourage them to share and compare answers as they go, and to use their cards for help. Ask students who finish early to make a third card with 11 or 12 as a total, and then write their own equations for a partner or a grown-up to solve.

INDEPENDENT WORKSHEET

See Set B1 Independent Worksheets 1–3 for more practice with all the skills addressed in Activities 1, 2, and 3.

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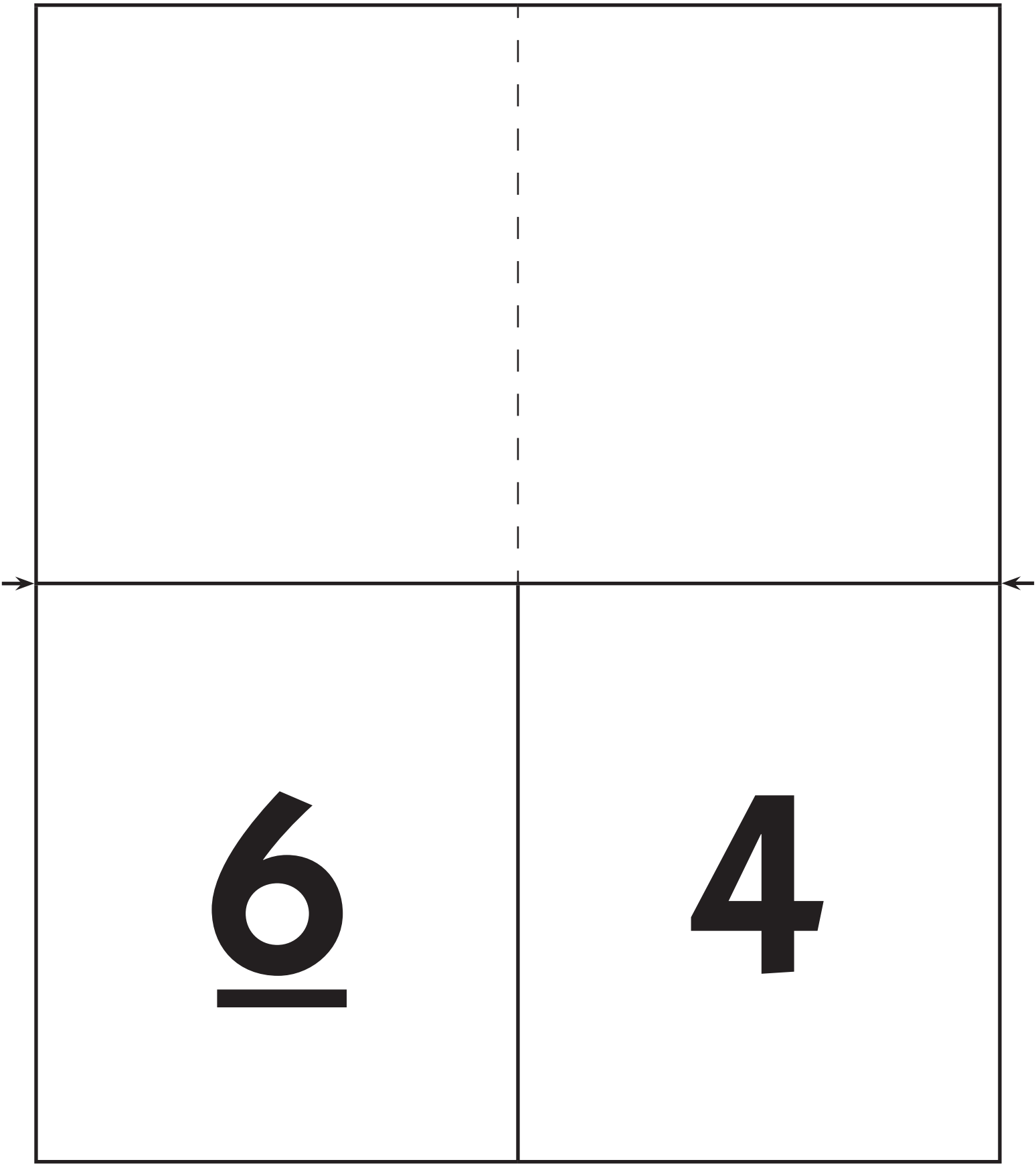
Double Flap Number Cards Page 1 of 2



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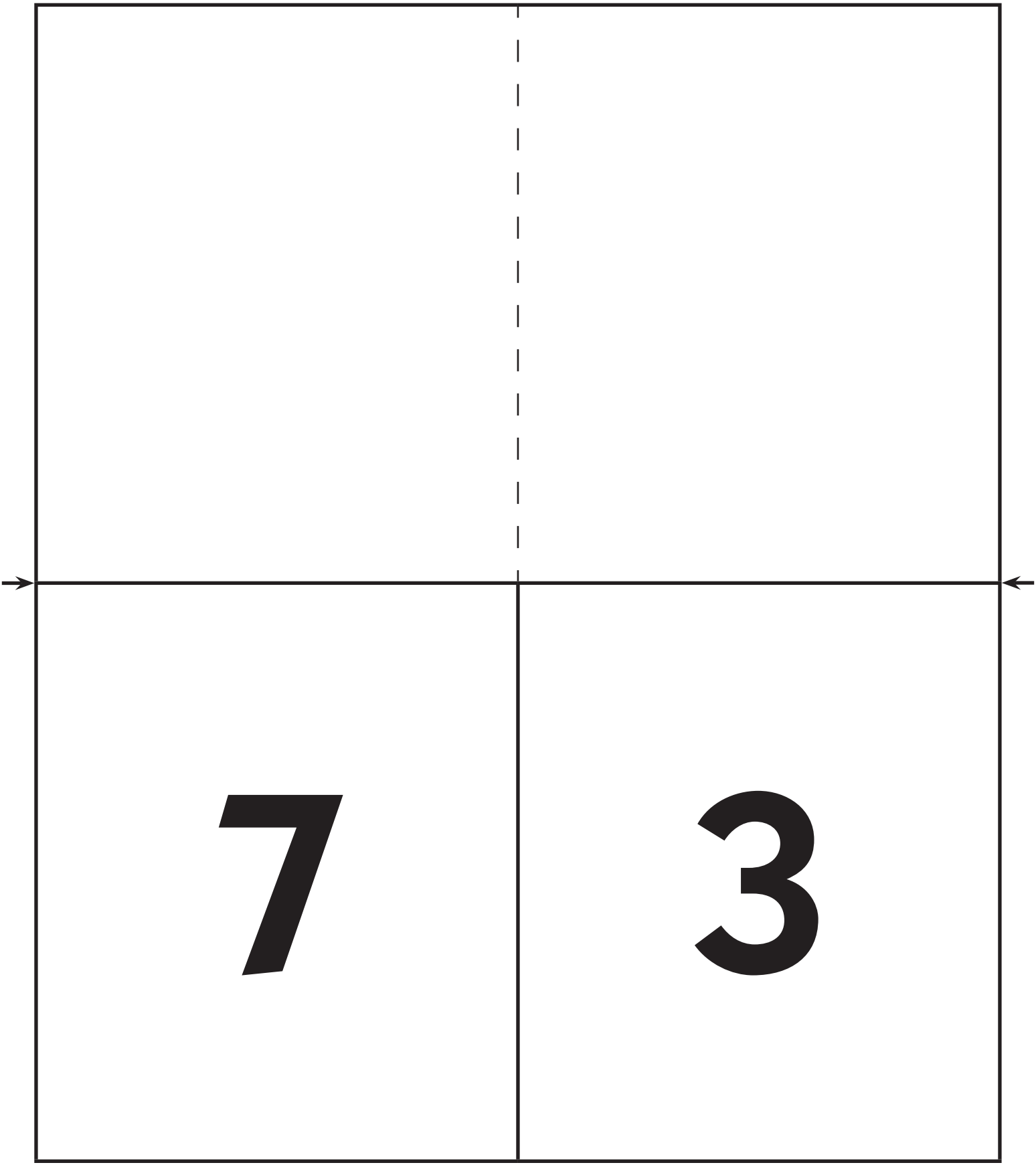
Set B1 Algebra: Properties & Relationships Blackline Run 1 copy on cardstock. Trim away the edges so you have a rectangle that measures 7½"×9". Fold the rectangle in half at the arrowheads and cut along the dotted line to create 2 flaps that cover the numbers on the lower part of the card. Write a large numeral 10 on the back of the number portion of the card.

Double Flap Number Cards Page 2 of 2



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NAME _____ **DATE** _____

Equations Worksheet

1 Use the flap card with 8 and 2 on it to help solve these equations.

a $8 + 2 = \square$	**b** $10 - 8 = \square$
c $8 + \square = 10$	**d** $10 - 2 = \square$
e $10 = 8 + \square$	**f** $10 - \square = 2$

2 Use the flap card with 9 and 1 on it to help solve these equations.

a $9 + 1 = \square$	**b** $10 - 9 = \square$
c $1 + \square = 10$	**d** $10 - 1 = \square$
e $10 = \square + 1$	**f** $\square - 9 = 1$

CHALLENGE

3 Make your own flap card. Use it to write your own equations on the back of this page. Give your equations to someone else to solve.

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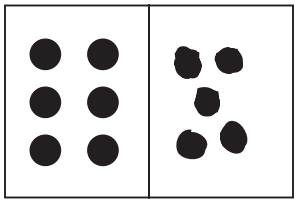
Set B1 ★ Independent Worksheet 1

INDEPENDENT WORKSHEET

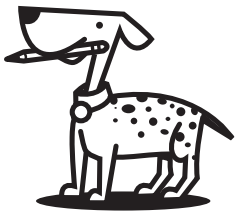
Double Dot Cards for Eleven

1 Draw the dots on the right-hand side of each card to make 11. Then write a fact family to match.

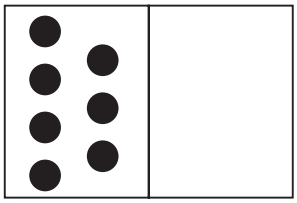
Example



6+5=11
5+6=11
11-6=5
11-5=6



a



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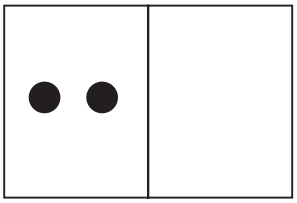

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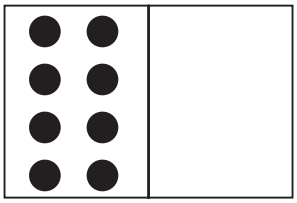

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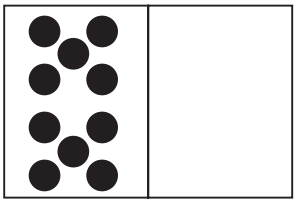

2 FIll in the missing numbers.

9 + ☐ = 11	☐ + 1 = 11	5 + 6 = ☐	11 + ☐ = 11
11 – ☐ = 6	☐ – 1 = 10	11 – 4 = ☐	11 – ☐ = 8

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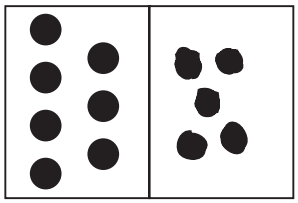
Set B1 ★ Independent Worksheet 2

INDEPENDENT WORKSHEET

Double Dot Cards for Twelve

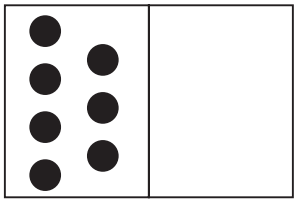
1 Draw the dots on the right-hand side of each card to make 12. Then write a fact family to match.

Example

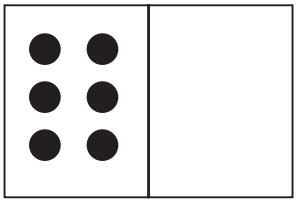


7+5=12
5+7=12
12-7=5
12-5=7

a



b



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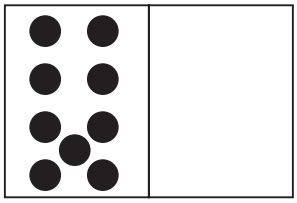

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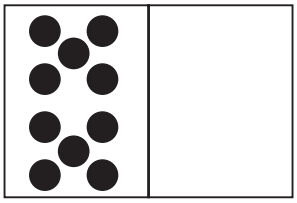

2 FIll in the missing numbers.

9 + ☐ = 12	☐ + 7 = 12	6 + 6 = ☐	12 + ☐ = 12
12 – ☐ = 0	☐ – 2 = 10	12 – 8 = ☐	12 – ☐ = 5

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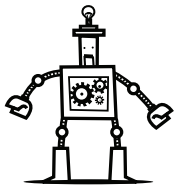
Set B1 ★ Independent Worksheet 3

INDEPENDENT WORKSHEET

True or False?



1 Circle T if the equation is true. Circle F if the equation is false.

Example 10 + 3 = 13 (T) F	**a** 6 + 6 = 12 T F
b 12 = 7 + 5 T F	**c** 12 – 8 = 4 T F
d 10 – 2 = 6 T F	**e** 10 = 6 + 4 T F
f 5 + 6 = 6 +5 T F	**g** 11 = 3 + 7 T F

2 Read the story. Circle T if it is true. Circle F if it is false.

a Sara had 8 cars. She got 7 more cars for her birthday. Now she has 15 cars in all.	T F
b Max made 13 cookies. The dog ate all the cookies. Max has 3 cookies left.	T F

3 Read the story. Circle the matching equation.

a There were 4 bugs in the garden. 9 more bugs came. How many bugs in all?			
13 – 4 = 9	10 + 3 = 13	4 + 4 = 8	4 + 9 = 13
b 14 frogs were in the pond. 6 frogs hopped away. How many frogs were left?			
14 + 6 = 20	14 – 6 = 8	14 – 4 = 10	12 – 6 = 6

4 Write a story on the back of this page to match this equation: 16 – 16 = 0

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