Make Your Classroom a *Math Place*!

Diane Stang

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Diane Stang has been an educator for over 40 years, working in various roles in the classroom, at the ministry level, and now as National Math Consultant and Lead Author of *Math Place*. Her tried and true classroom-tested lessons coupled with her practical approach to math empowers teachers to teach math in an authentic, meaningful way. Diane integrates professional development in every part of the resource—weaving in First Peoples Perspectives, building growth mindsets, "math talks", spatial reasoning, visualization, and a balanced math approach to meet the needs of all students.

SCHOLASTIC EDUCATION

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Math Place

CANADIAN

***Math Place* is a comprehensive math resource made up of 3 Modules per grade:**

- Number and Operations
- Spatial Reasoning
- Patterns and Relations/Data and Probability

Math Place supports British Columbia teachers through **balanced instruction**, with shared, guided, and independent problem solving in three-part lessons, **Math Talks** for purposeful class discussions, ongoing assessment, First Peoples worldviews and perspectives interwoven throughout, and integrated strategies for building **growth mindsets** and positive attitudes toward math.

Math Place aligns with B.C. Core Competencies and strongly **supports Curriculum Competencies** through a cross-strand approach, making connections to Language Arts and Science through Math, offering support for English Language Learners, and creating meaningful contexts by **making math relevant to students' lives.**

How *Math Place* Meets B.C Learning Standards and Curriculum Competencies

Welcome to *Math Place* —a Comprehensive Set of Mathematics Resources

Use all modules for a complete grade resource, or choose individual modules to support and supplement your current math program.

- **Number & Operations**
- **Spatial Sense (Measurement & Geometry)**
- **Patterns & Relations / Data & Probability**

First Peoples Perspectives

Math Place supports the First Peoples Principles of Learning and Aboriginal Worldviews and Perspectives by incorporating opportunities for students to "explore the connections between mathematics and other ways of knowing, including First Peoples knowledge and other worldviews" (British Columbia Ministry of Education, 2016).

Current Research

Math Place provides teaching support by integrating the best of current research into classroom practices to develop a balance of students' conceptual and procedural understanding and skills. Many of the lessons and activities are based on recent research that shows how spatial reasoning plays an integral role in learning math concepts across all strands. Providing opportunities for students to build concrete representations of math concepts leads to an ability to form and use mental models to solve math problems.

Teaching Approaches

Math Place adopts the belief that all students can learn math, although not necessarily in the same way. The instructional approaches are based on the "continued need for balance between conceptual and procedural understanding of foundational skills, including fluency with basic facts" (British Columbia Ministry of Education, 2016). These approaches include guided math lessons, shared and independent problem solving, games and activities that reinforce operational skills, whole-group lessons, and consolidating discussions. Together, they support conceptual learning, meaningful practice, and acquisition of the fundamental math concepts and operational skills. There is an emphasis on actively 'doing' math using a variety of concrete materials and tools, while engaging in problem-solving situations that are relevant to students' daily lives.

Linking Math to Literacy and Science

Math Place includes Read Alouds, as well as big book and little book titles with engaging visuals and supportive text to introduce various math concepts and to prompt student investigations. The texts and visuals also support literacy, science, and other curriculum areas, offering rich and meaningful contexts for learning math. As additional support, teaching plans for the integrated Read Aloud texts identify and incorporate effective literacy strategies.

Concrete Materials

Math Place effectively explains how to incorporate concrete materials, which are essential for students of all ages to conceptually understand the math. Research indicates that students learn math more effectively by using and manipulating concrete materials to make their thinking visible. These experiences eventually lead to more abstract ways of thinking.

Support of Differentiated Instruction

Math Place allows for differentiated learning with flexible groupings, and lessons and individual problems that can be tailored to meet the needs of all your students, such as by making the numbers simpler or more complex. This allows students to work on the same math concepts and engage in rich problem-solving tasks while working with numbers they understand.

Assessment to Inform Instruction

Math Place offers ongoing assessment of students' understanding to guide future instruction. Assessment Opportunities within the lessons offer prompts and suggestions on how to assess through observations and conversations. There are also Teacher Look-Fors to further support assessment and to serve as a guide for co-constructing success criteria with your students.

Growth Mindsets in Mathematics

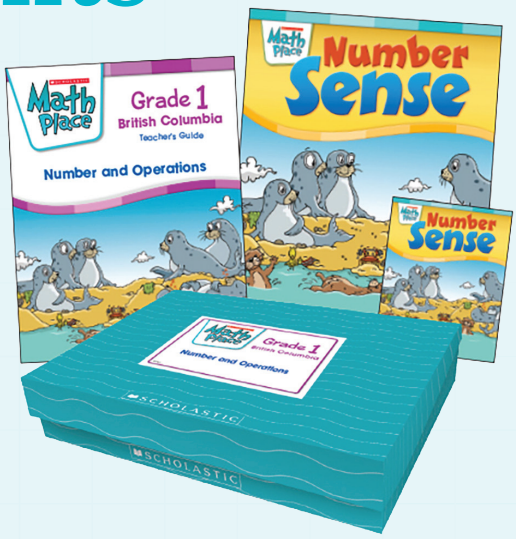
Math Place provides an introductory lesson (see Instilling a Growth Mindset Lesson on pages 37–39) that lays the foundation for developing positive growth mindsets. This can be continually reinforced throughout the year by using the Building Growth Mindsets prompts that are embedded in many of the lessons. For example, students learn to view mistakes as learning opportunities and to recognize that their efforts will be worthwhile, even if they don't understand a concept YET.

Math Talk

Math Place supports the understanding of math concepts through purposeful discussions that are embedded in every lesson. There are also additional Math Talks linked to many of the lessons to reinforce and extend the learning and offer further investigation.

Math Place B.C. Module Components

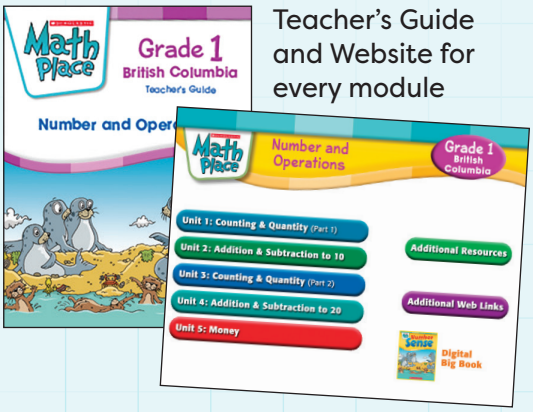
- **Each Math Place module includes:**
  - Read Aloud Texts
  - Big Book (and 8 copies of little book version)
  - 2 Math Little Books (8 copies of each)
  - Teacher's Guide
  - Overview Guide
  - Book of Reproducibles
  - Website with Additional Resources



Read Aloud texts

Math Little Books

The Teacher's Guide supports teachers in building students' conceptual understanding of math by providing hands-on learning experiences, with concrete tools and materials to solve problems. Also available online.



Teacher's Guide and Website for every module

The Overview Guide supports teachers in building students' conceptual understanding of math by providing hands-on learning experiences, with concrete tools and materials to solve problems. Overview Guide and reproducibles available in print and online through teacher website.

Benefits of using *Math Place*

This comprehensive resource can serve as a core math program or as a supplement to an existing program. The order of the lessons in each module follows a general development path, but teachers can choose lessons and order based on the ability of their students, curriculum expectations, and learning goals. Each lesson and activity can be differentiated or expanded, and can be repeated by varying numbers and contexts if a concept is not mastered. As students proceed through the activities, they will develop a positive attitude towards math, the self-confidence to persevere, and a growth mindset that helps them believe they can do math and be good at it.

Sample from Grade 1 Manipulative Kit

Grade 1 *Math Place* Math Manipulatives Kit
978-1-4430-5384-6.....$325.00

Grade 2 *Math Place* Math Manipulatives Kit
978-1-4430-5629-8.....$365.00

Grade 3 *Math Place* Math Manipulatives Kit
978-1-4430-5630-4.....$399.00

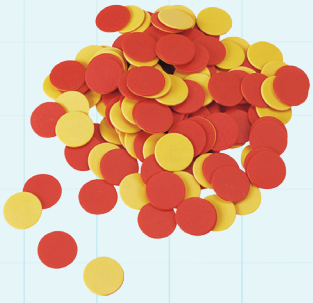
Canadian Coin Assortment,
4 Sets of 110

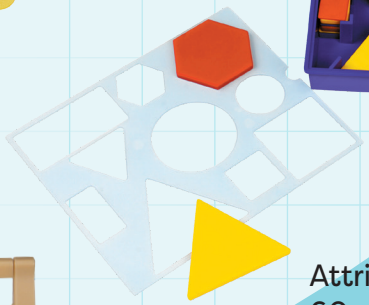
Wooden Cuisenaire® Rods
3 Groups of 155

Square Colour Tiles,
Set of 400

Plastic Pattern Blocks,
2 Sets of 250

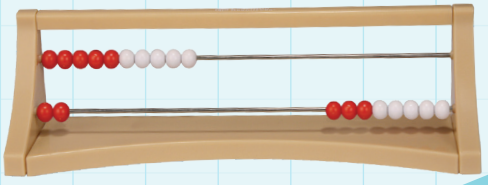
Two-Colour Counters,
4 Sets of 200

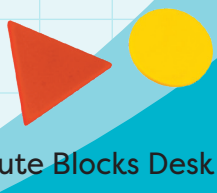




Snap Cubes®,
Set of 500

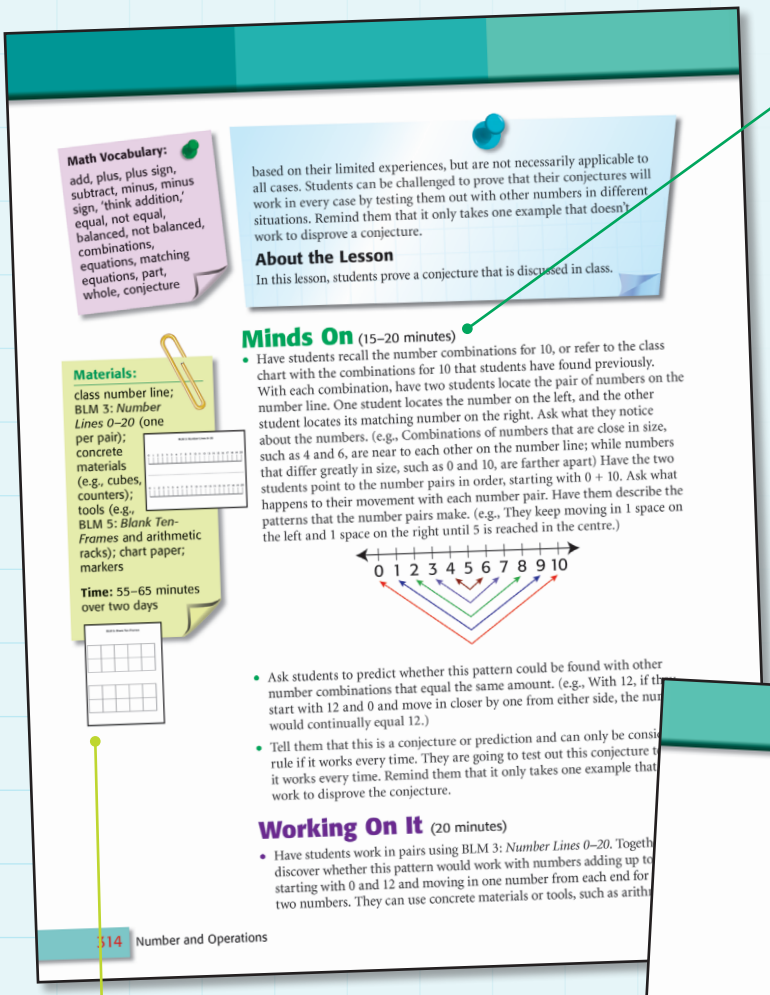
2-Row Rekenrek
Counting Frame





Attribute Blocks Desk Set,
60 pieces

Sample Grade 1 Lesson-



Math Vocabulary:
add, plus, plus sign, subtract, minus, minus sign, 'think addition,' equal, not equal, balanced, not balanced, combinations, equations, matching equations, part, whole, conjecture

based on their limited experiences, but are not necessarily applicable to all cases. Students can be challenged to prove that their conjectures will work in every case by testing them out with other numbers in different situations. Remind them that it only takes one example that doesn't work to disprove a conjecture.

About the Lesson

In this lesson, students prove a conjecture that is discussed in class.

Materials:
class number line; BLM 3: *Number Lines 0–20* (one per pair); concrete materials (e.g., cubes, counters); tools (e.g., BLM 5: *Blank Ten-Frames* and arithmetic racks); chart paper; markers

Time: 55–65 minutes over two days

Minds On (15–20 minutes)

- Have students recall the number combinations for 10, or refer to the class chart with the combinations for 10 that students have found previously. With each combination, have two students locate the pair of numbers on the number line. One student locates the number on the left, and the other student locates its matching number on the right. Ask what they notice about the numbers. (e.g., Combinations of numbers that are close in size, such as 4 and 6, are near to each other on the number line; while numbers that differ greatly in size, such as 0 and 10, are farther apart) Have the two students point to the number pairs in order, starting with 0 + 10. Ask what happens to their movement with each number pair. Have them describe the patterns that the number pairs make. (e.g., They keep moving in 1 space on the left and 1 space on the right until 5 is reached in the centre.)

0 1 2 3 4 5 6 7 8 9 10

- Ask students to predict whether this pattern could be found with other number combinations that equal the same amount. (e.g., With 12, if th start with 12 and 0 and move in closer by one from either side, the nu would continually equal 12.)
- Tell them that this is a conjecture or prediction and can only be consi rule if it works every time. They are going to test out this conjecture t it works every time. Remind them that it only takes one example that work to disprove the conjecture.

Working On It (20 minutes)

- Have students work in pairs using BLM 3: *Number Lines 0–20*. Togeth discover whether this pattern would work with numbers adding up t starting with 0 and 12 and moving in one number from each end for two numbers. They can use concrete materials or tools, such as arith

314 Number and Operations

racks, to help them with their calculations and the adjustments to their parts. Students can record their number combinations on chart paper as proof.

Differentiation

- If this is too challenging for students to complete in pairs, do the lesson with the entire class. The lesson reveals number patterns that students may be able to use in further problem solving.
- You may decide to assign a different ending number (e.g., 11 to 20) to the various pairs so the class can discover whether the conjecture works with all numbers and 0.
- For students who need more of a challenge, ask whether this pattern will work for any two numbers chosen on the number line (e.g., 2 and 14). They can decide on their own two numbers and how they will prove whether this conjecture works every time.

Assessment Opportunities

Students need to see the two parts in relation to the whole, all at the same time. For example, they keep in mind that 12 is the whole as they manipulate its two parts. With compensation, they are taking from one part and giving to the other to maintain the whole.

Observations:

- Can students select their own materials and tools to add the various number combinations?
- Do students recognize that each number combination equals the same sum? Can they predict what the sums will be once they have completed two or three of them?
- Are they recognizing that you can take away from one number and give it to another number and maintain equivalence? Can students' represent this using concrete materials?

Conversations:

Teacher: What is the whole for all of your combinations? I see that you have one part that is 5 counters and one part that is 7 counters. How much is the whole?
Student: 12.
Teacher: What happens to the whole if you take 1 away from the 5?
Student: It goes down by 1, so 11.
Teacher: Can you have a whole of 11?
Student: No, 12.
Teacher: So if you keep 4 as a part, what do you have to do with the 1 that you took away?
Student: I have to put it in the other part, so now 7 will be 8.
Teacher: How do you know that the whole will still be 12?
Student: I didn't take any counters away or add any more.
Teacher: What are the new parts?

Addition and Subtraction to 20 315

Minds On

Detailed three-part lesson plans include rich problems for students to solve and many opportunities for collaborative learning, communication of ideas, independent problem solving, and practice.

Differentiation

Suggestions are provided for how to differentiate the learning to meet the specific needs of all students.

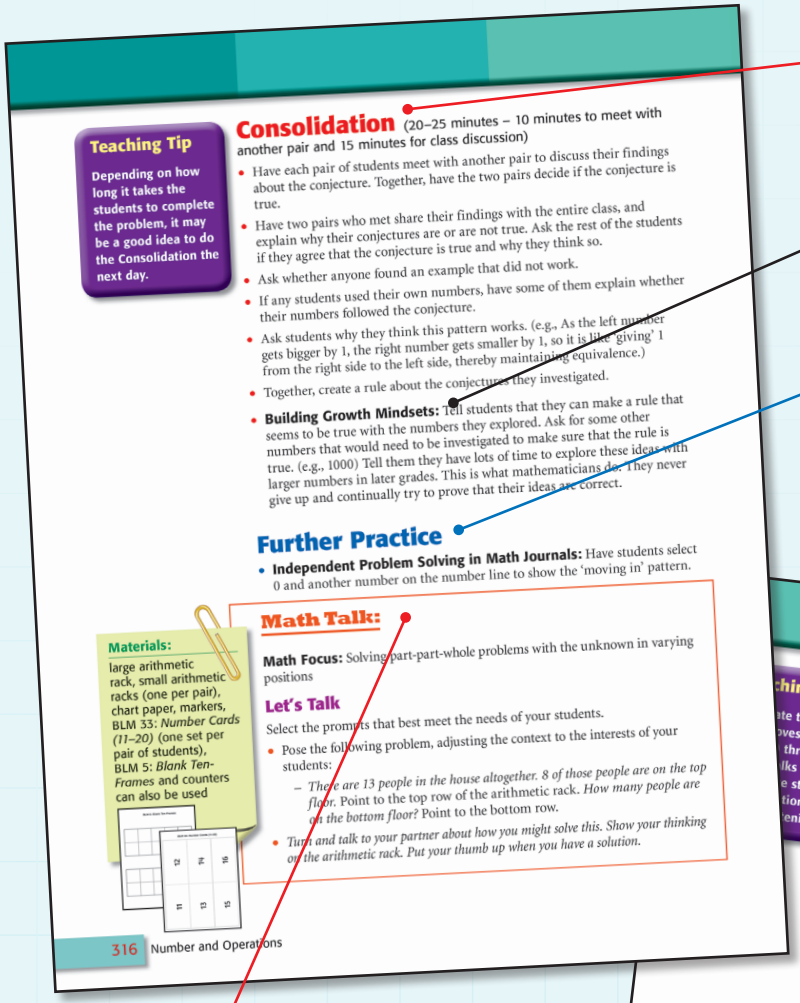
Blackline Masters

A variety of concrete materials and Blackline Masters (BLMs) support the lessons.

Assessment

Assessment for learning is supported by suggestions on how to assess through observations and conversations.

Number and Operations



Teaching Tip

Depending on how long it takes the students to complete the problem, it may be a good idea to do the Consolidation the next day.

Consolidation (20–25 minutes – 10 minutes to meet with another pair and 15 minutes for class discussion)

- Have each pair of students meet with another pair to discuss their findings about the conjecture. Together, have the two pairs decide if the conjecture is true.
- Have two pairs who met share their findings with the entire class, and explain why their conjectures are or are not true. Ask the rest of the students if they agree that the conjecture is true and why they think so.
- Ask whether anyone found an example that did not work.
- If any students used their own numbers, have some of them explain whether their numbers followed the conjecture.
- Ask students why they think this pattern works. (e.g., As the left number gets bigger by 1, the right number gets smaller by 1, so it is like 'giving' 1 from the right side to the left side, thereby maintaining equivalence.)
- Together, create a rule about the conjectures they investigated.
- **Building Growth Mindsets:** Tell students that they can make a rule that seems to be true with the numbers they explored. Ask for some other numbers that would need to be investigated to make sure that the rule is true. (e.g., 1000) Tell them they have lots of time to explore these ideas with larger numbers in later grades. This is what mathematicians do. They never give up and continually try to prove that their ideas are correct.

Further Practice

- **Independent Problem Solving in Math Journals:** Have students select 0 and another number on the number line to show the 'moving in' pattern.

Materials:
large arithmetic rack, small arithmetic racks (one per pair), chart paper, markers, BLM 33: *Number Cards (11–20)* (one set per pair of students), BLM 5: *Blank Ten-Frames* and counters can also be used

Math Talk:

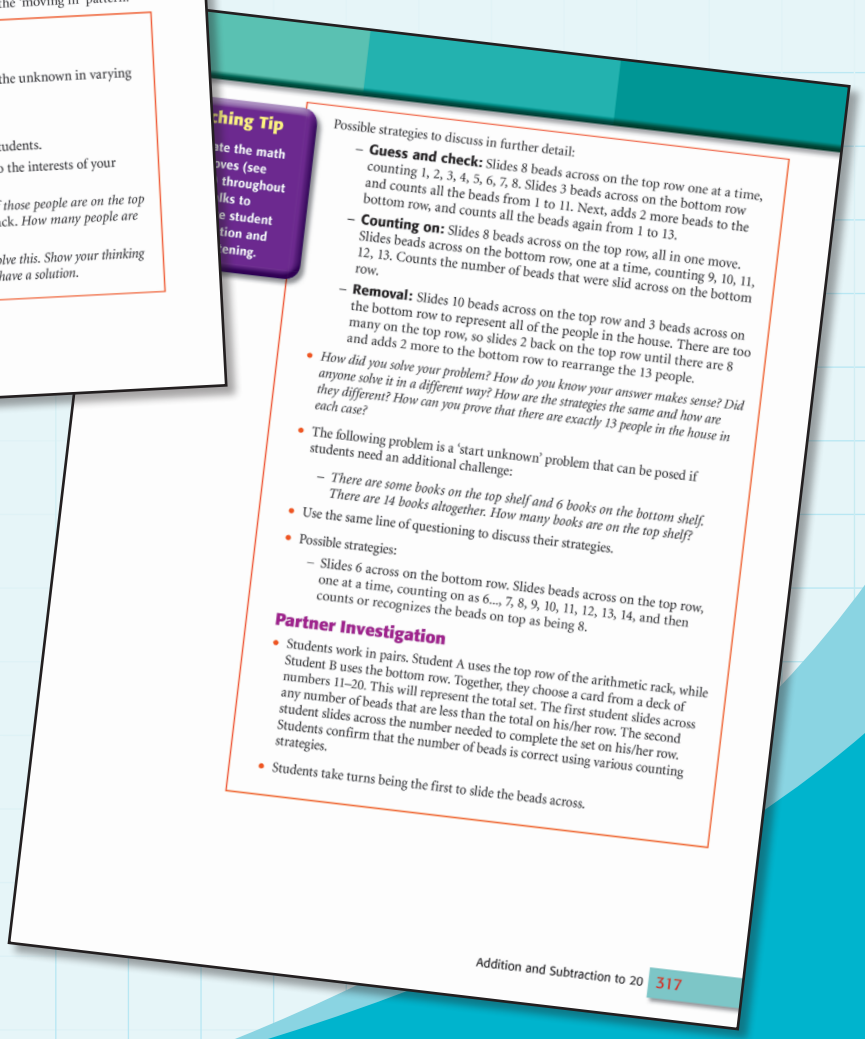
Math Focus: Solving part-part-whole problems with the unknown in varying positions

Let's Talk

Select the prompts that best meet the needs of your students.

- Pose the following problem, adjusting the context to the interests of your students:
  - *There are 13 people in the house altogether. 8 of those people are on the top floor.* Point to the top row of the arithmetic rack. *How many people are on the bottom floor?* Point to the bottom row.
- *Turn and talk to your partner about how you might solve this. Show your thinking on the arithmetic rack. Put your thumb up when you have a solution.*

316 Number and Operations



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Possible strategies to discuss in further detail:

- **Guess and check:** Slides 8 beads across on the top row one at a time, counting 1, 2, 3, 4, 5, 6, 7, 8. Slides 3 beads across on the bottom row and counts all the beads from 1 to 11. Next, adds 2 more beads to the bottom row, and counts all the beads again from 1 to 13.
- **Counting on:** Slides 8 beads across on the top row, all in one move. Slides beads across on the bottom row, one at a time, counting 9, 10, 11, 12, 13. Counts the number of beads that were slid across on the bottom row.
- **Removal:** Slides 10 beads across on the top row and 3 beads across on the bottom row to represent all of the people in the house. There are too many on the top row, so slides 2 back on the top row until there are 8 and adds 2 more to the bottom row to rearrange the 13 people.

- *How did you solve your problem? How do you know your answer makes sense? Did anyone solve it in a different way? How are the strategies the same and how are they different? How can you prove that there are exactly 13 people in the house in each case?*
- The following problem is a 'start unknown' problem that can be posed if students need an additional challenge:
  - *There are some books on the top shelf and 6 books on the bottom shelf. There are 14 books altogether. How many books are on the top shelf?*
- Use the same line of questioning to discuss their strategies.
- Possible strategies:
  - Slides 6 across on the bottom row. Slides beads across on the top row, one at a time, counting on as 6..., 7, 8, 9, 10, 11, 12, 13, 14, and then counts or recognizes the beads on top as being 8.

Partner Investigation

- Students work in pairs. Student A uses the top row of the arithmetic rack, while Student B uses the bottom row. Together, they choose a card from a deck of numbers 11–20. This will represent the total set. The first student slides across any number of beads that are less than the total on his/her row. The second student slides across the number needed to complete the set on his/her row. Students confirm that the number of beads is correct using various counting strategies.
- Students take turns being the first to slide the beads across.

Addition and Subtraction to 20 317

Consolidation

Consolidating prompts and discussions are designed to connect students' mathematical thinking and bring clarity to the big ideas.

Building Growth Mindsets

Prompts embedded in the lessons help to develop and reinforce positive growth mindsets.

Further Practice

Further Practice activities offer students the opportunity to practice newly acquired skills.

Math Talk

Math Talks provide support and practice for concepts in the lesson by providing prompts that promote probing questions and meaningful discussion.

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ISBN	B.C. Grade 1 Modules	Quantity	List Price	Amount
978-1-4430-5162-0	Number and Operations		$429.00	
978-1-4430-5165-1	Spatial Reasoning		$399.00	
978-1-4430-5164-4	Data and Probability / Patterning		$399.00	
	B.C. Grade 2 Modules			
978-1-4430-5167-5	Number and Operations		$429.00	
978-1-4430-5170-5	Spatial Reasoning		$399.00	
978-1-4430-5169-9	Data and Probability / Patterning		$399.00	
	B.C. Grade 3 Modules			
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