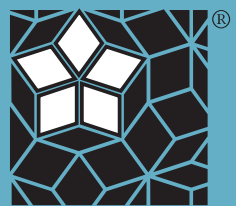


# Investigations

In Number, Data, And Space<sup>®</sup>

## UNIT GUIDES: GRADE 1



TERC

**GRADE**

**1**

# Investigations

In Number, Data, And Space®

## UNIT GUIDES: Grade 1



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# Investigations

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# Investigations

in Number, Data, and Space®

## Unit Guides: Introduction

### Preparation to teach individual units in *Investigations*

The Unit Guides for *Investigations in Number, Data and Space* are designed as study guides to help teachers become familiar and comfortable with the mathematical content, the activities, and the overall structure of each unit. The Unit Guides provide a structure for working through student activities, reading support material, looking at student work that is embedded in the materials, and discussing critical issues about mathematics and pedagogy. The expectation is that groups of teachers will work together on these Guides in preparation to teach a unit in their classroom. Below are some suggestions of how best to incorporate these Unit Guides into your professional development program.

- In order to get the most use from these Guides, it is important that groups of teachers from the same grade level work on a Guide together. This way, teachers can do the activities together and respond to the discussion questions.
- The Unit Guides are written with the assumption that teachers will read the “Mathematics in This Unit” essay before attending the Unit Guide session.
- A list of suggested materials and photocopied handouts for each unit is found at the beginning of each guide and should be prepared before the session begins.
- Unit Guides may be used independently by groups of teachers, with one teacher taking on the lead role, or you may have a Teacher Leader/Coach who can contribute some guidance or experience. The leader’s role during the session is to act as a resource: answering questions, clarifying instructions, and prompting discussion when appropriate.
- In order to gain a real sense of the preparation, effort, and mathematics in the activities, it is imperative that teachers not just read through but actually *do* all of the activities suggested in the Unit Guides.
- As a follow up to a Unit Guide session, it is helpful for teachers to meet periodically while the unit is ongoing in their classrooms to support each other, seek and offer advice, and work together to evaluate sets of student work.

Each Unit Guide is designed to take three hours, but could also be adapted and used flexibly in a variety of different settings.



**Investigations**  
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Unit Guide for Grade 1, Unit 1:  
*How Many of Each?*  
Addition, Subtraction, and the Number System 1



## Unit Guide for Grade 1, Unit 1

### *How Many of Each?*

### Addition, Subtraction, and the Number System 1

#### Unit Summary:

Students count, order, compare quantities, and work with the operation of addition. Students also work on finding addition combinations up to 10 and learn to make sense of and solve story problems. They are introduced to several of the classroom routines that practice and reinforce work with counting, developing visual images of number, collecting data, and working with concepts of time (calendar/clock).

#### Materials:

*How Many of Each?* (1 copy per person)

Student Activity Book p. 14, Ordering Numbers (1 per person)

Primary Number Cards (1 deck per pair, use manufactured set or Resource Masters M13-M16, see Materials to Prepare, p. 51)

Connecting cubes (about 40 per pair)

Student Activity Book p. 21, How Many Pencils? (1 per person)

Student Activity Book p. 33, Seven Peas and Carrots (1 per person)

Cubes or counters in two colors (7 of each color per person)

Paper plates (1 per person)

Crayons or markers in the same colors as cubes or counters (1 of each color per pair)

#### Do the following activities from *How Many of Each?*:

##### **1.** Identify the mathematics in the unit

To get an overview of the mathematics students will be doing in this unit, refer to these sections in the unit front matter. As you look at these sections, begin thinking about the main mathematical ideas students work on in this unit.

- Turn to pp. 8-9, *Overview of This Unit*. Look at the title of each Investigation and read the summary for each Investigation.
- Review the *Mathematics in This Unit* essay, pp. 10-13. Look at the Mathematical Emphases and Math Focus Points. (The emphases are numbered, and can be found above bulleted lists of Math Focus Points.)
- Read the “Benchmarks in This Unit” in the table on p. 15, *Assessing the Benchmarks*.

---

**Discuss**

- What mathematical ideas and skills are students working on in this unit?
- What mathematics are students expected to know at the beginning of the unit? At the end?

## **2. Introducing Start With/Get To (Session 2.1)**

Throughout Investigation 1 of this unit, students are introduced to the yearlong *Morning Meeting Classroom Routine*. During this session, students are introduced to another yearlong routine, *Start With/Get To*, which uses the number line as a mathematical tool for counting.

- Read the Activity, *Introducing Start With/Get To*, pp. 55-56.
- Read the Dialogue Box, *Start With/Get To*, p. 225.

---

**Discuss**

- As students do the *Start With/Get To* activity, what information can you attain about their understanding of the counting sequence, number names, written numbers, and/or the distance between numbers?
- How might this activity benefit students as they work on other math activities?

## **3. Ordering Numbers (Session 2.7)**

Students order four numbers or quantities and discuss the notation that mathematicians use to compare numbers.

- Read the Activities, *Introducing Ordering Numbers*, pp. 89-90 and *Ordering Numbers*, pp. 90-91. Complete Student Activity Book p. 14, Ordering Numbers.

---

**Discuss**

- As you observe students working on this activity, what information about their understanding of numbers and sequencing can you collect?

- Read the Discussion, *Comparing and Ordering Numbers*, pp. 91-93, and the Teacher Note, *Introducing Notation, Part 1* pp. 198-199.

---

**Discuss**

- Why is it important to match your recording to what the students say?
- What is the purpose of modeling standard notation in Grade 1?

## **4. Solving an Addition Story Problem and Sharing Strategies (Session 3.3)**

During this Investigation, students have been playing several games about combining two quantities. For this session, students are introduced to, and solve, addition story problems.

- Read the Activity, *Solving an Addition Story Problem*, pp. 113-116 and the Discussion, *Sharing Strategies*, pp. 116-118. As you read the text, discuss the importance of connecting the context of the story to understanding the operation of addition.

**Discuss**

- Examine the sample student work on pp. 115-116. How are these students making sense of this addition story problem?

- Read the Teacher Note, *Recording Strategies for a Combining Problem*, pp. 204-205.

**Discuss**

- How does the teacher help each student to clearly describe their strategy and a way for the student to record their work?

## 5. Seven Peas and Carrots (Session 4.1)

In this session, students are introduced to a new type of problem in which they determine one or more combinations they could have to make 7 in all. This is the first of several *How Many of Each?* problems students will solve over the course of the year.

- Complete Student Activity Book p. 33, Seven Peas and Carrots. Discuss with a partner how you know you have found all the combinations.
- Read the Activities, *Introducing Seven Peas and Carrots*, p. 149, and *Solving Seven Peas and Carrots*, pp. 150-151.
- Read the Teacher Note, *About How Many of Each? Problems*, pp. 211-212.

**Discuss**

- What math ideas are students working on as they solve *How Many of Each?* problems?
- How do these problems help meet a range of learners within a classroom?

- Read the Teacher Note, *When the Teacher Records Students' Solutions* p. 215.

**Discuss**

- During class discussions, why is it important to vary the recording method and to record solutions in the order that students give them?

## 6. Wrap Up

- Look back at the unit overview, pp. 8-9.

**Discuss**

- How do the activities done during this unit study fit into the mathematics of the rest of the unit?



## Other Key Features of *How Many of Each?*

- Algebra Connections in This Unit, pp. 16-19
- Classroom Routines in This Unit, p. 20
  - Morning Meeting*
  - Start With/Get To*
  - Quick Images*
- Assessment
  - Assessment: Counting 20 (Sessions 1.2-1.4)
    - Resource Master M3, Assessment Checklist
  - Assessment: Counting 20 (Session 2.6)
    - Teacher Note, pp. 194-197
  - Assessment: Double Compare (Session 3.6)
    - Teacher Note, pp. 208-210
  - End-of-Unit Assessment (Session 4.7)
    - Teacher Note, pp. 216-223

Unit Guide for Grade 1, Unit 2:  
*Making Shapes and Designing Quilts*  
2-D Geometry



## Unit Guide for Grade 1, Unit 2

### *Making Shapes and Designing Quilts*

#### 2-D Geometry

##### Unit Summary:

Students observe, describe, compare, classify, represent, and compose and decompose 2-D shapes. Students learn to use geometric language to describe and identify important features of familiar 2-D shapes. As they sort and describe groups of shapes they begin to distinguish specific attributes of triangles and quadrilaterals. As a final project, students create paper quilts by repeating combinations of triangles and squares.

The *Shapes* software is introduced in this unit as a tool for extending and deepening this work. This tool is designed for K-2 students to explore how different shapes go together, experiment with different sorts of geometric transformations (rotations, translation, reflection), explore patterning, and investigate symmetry.

##### Materials:

*Making Shapes and Designing Quilts* (1 copy per person)

Student Activity Book pp. 21-23, Filling With More or Fewer (1 per person)

Resource Masters M44-45, End-Of-Unit Assessment, pp. 2-3 of 3 (1 per person)

scissors and glue

Pattern blocks (1 set, divided among groups)

Power Polygons™ (1 set, divided among groups)

*Shapes* Software, c.d. or installed on computers

#### Do the following activities from *Making Shapes and Designing Quilts*:

##### 1. Identify the mathematics in the unit

To get an overview of the mathematics students will be doing in this unit, refer to these sections in the unit front matter. As you look at these sections, begin thinking about the main mathematical ideas students work on in this unit.

- Turn to pp. 8-9, *Overview of This Unit*. Look at the title of each Investigation and read the summary for each Investigation.
- Review the *Mathematics in This Unit* essay, pp. 10-13. Look at the Mathematical Emphases and Math Focus Points. (The emphases are numbered, and can be found above bulleted lists of Math Focus Points.)
- Read the “Benchmarks in This Unit” in the table on p. 15, *Assessing the Benchmarks*.

---

**Discuss**

- What mathematical ideas and skills are students working on in this unit?
- What mathematics are students expected to know at the beginning of the unit? At the end?

## 2. Filling with More and Fewer (Session 1.6)

In this activity, students fill in a shape outline, first with a few pattern blocks and then with many pattern blocks. In earlier sessions students fill in shape outlines and count the number of each type of block they used, then they fill in one shape outline in three different ways. After doing the activity *Filling with More and Fewer* students have a discussion about how they could fill a shape with the most and fewest pattern blocks.

- Read the Activity, *Filling With More and Fewer*, pp. 57-59. Complete Student Activity Book pp. 21-23, Filling With More and Fewer.

---

**Discuss**

- What knowledge of shapes did you use to complete this activity?
- What strategies might students use to fill in the same outline in two different ways: one with more blocks and one with fewer blocks?

- This is an activity for which only looking at what students' recorded on paper might not give much information about what the students are thinking or the strategies they are using. Look at the Ongoing Assessment section on p. 58 for what to look for as students do this activity.
- Read the Discussion, *Finding More or Fewer Blocks*, pp. 63-64 in Session 1.7.

---

**Discuss**

- What math ideas are highlighted for students in this discussion that they will use in their continuing work with shapes?

## 3. Looking at Power Polygons™: Triangles (Session 2.2)

In Investigation 2, students describe, sort and classify shapes. They describe and construct triangles and quadrilaterals. In this activity students sort the Power Polygons™ into two groups: shapes they think are triangles and shapes they think are not triangles.

- Spend a few minutes in partners or small groups examining the Power Polygons™. Discuss what you notice about the Power Polygons™. How are they different from pattern blocks?
- Read the Activity, *Looking at Power Polygons™: Triangles*, pp. 78-80. Read the Teacher Note, *Learning to Classify and Name Shapes*, p. 132 and the Dialogue Box, *What Is a Triangle?* pp. 152-153.

---

**Discuss**

- Based on what you read in the Teacher Note and Dialogue Box and from your own experience, what understandings about triangles are students likely to have before doing this activity?
- How does this work help deepen student understanding about triangles? What ideas will they continue to work on?

#### **4. End-of-Unit Assessment: Sort the Shapes (Session 3.4)**

In this assessment students are again asked to sort a set of shapes and label the groups they create.

- Read through the description of the assessment pp. 118-119. Do Problem 2 of the assessment using Resource Masters M44-M45, End-of-Unit Assessment Problem 2. Discuss with a partner how you chose to sort and name the polygons.
- Read the Problem 2 section of the End-of-Unit Assessment Teacher Note pp. 137-141.

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**Discuss**

- What distinguishes the work of students who meet the benchmark, partially meet the benchmark and don't meet the benchmark?

#### **5. (Optional) Shapes Software: Quilt Squares**

This is one of three Software activities that students are introduced to in this unit. This activity is used to support the work students do in Investigation 3, in which they create quilts out of patterns of triangles and squares.

- Read the Activity, *Shapes Software: Introducing Quilt Squares*, pp. 106-107 and the Teacher Note, *Introducing and Managing the Shapes Software*, pp. 125-127.
- Do *Quilt Squares* on the computer. Read the Teacher Note, *About the Mathematics in the Shapes Software*, p. 128.

---

**Discuss**

- How does the *Shapes Software* support the work students are doing in the unit?

#### **6. Wrap Up**

- Look back at the unit overview, pp. 8-9.

---

**Discuss**

- How do the activities done during this unit study fit into the mathematics of the rest of the unit?

## Other Key Features of *Making Shapes and Designing Quilts*

- *Shapes Software*  
Teacher Note, *Introducing and Managing the Shapes Software*, pp. 125-127  
Teacher Note, *About the Math in the Shapes Software*, p. 128
- Classroom Routines in This Unit, p. 16  
*Morning Meeting: Calendar*  
*Start With/Get To*  
*Quick Images*
- Assessment  
Assessment: Many Ways to Fill a Hexagon (Session 1.7)  
Teacher Note, pp. 129-131  
Assessment: What is a Triangle? (Session 2.5)  
Resource Master M35, Assessment Checklist  
End-of-Unit Assessment (Session 3.4)  
Teacher Note, pp. 134-141

Unit Guide for Grade 1, Unit 3:  
*Solving Story Problems*  
Addition, Subtraction, and the Number System 2



## Unit Guide for Grade 1, Unit 3

### *Solving Story Problems*

### Addition, Subtraction, and the Number System 2

#### Unit Summary:

Students revisit familiar addition activities with variations that encourage counting on, and they are introduced to the operation of subtraction. Through games and story problems, students' work focuses on developing an understanding of addition and subtraction, using numbers and notation to represent these operations, and developing strategies for solving addition and subtraction problems.

#### Materials:

*Solving Story Problems* (1 copy per person)

Cubes or counters in two colors (9 of each color per person)

Crayons or markers in the same colors as cubes or counters (1 of each color per pair)

Square (color) tiles (30-40 per pair)

Student Activity Book, p. 1, Nine Toys: How Many of Each? (1 per person)

Horizontal Counting Strip 1-100 (see Materials to Prepare, p. 137 and the photo, p. 158)

Scissors

Tape

Student Activity Book, pp. 27-28, Story Problems (1 per person)

#### Do the following activities from *Solving Story Problems*:

#### 1. Identify the mathematics in the unit

To get an overview of the mathematics students will be doing in this unit, refer to these sections in the unit front matter. As you look at these sections, begin thinking about the main mathematical ideas students work on in this unit.

- Turn to pp. 8-9, *Overview of This Unit*. Look at the title of each Investigation and read the summary for each Investigation.
- Review the *Mathematics in This Unit* essay, pp. 10-13. Look at the Mathematical Emphases and Math Focus Points. (The emphases are numbered, and can be found above bulleted lists of Math Focus Points.)
- Read the "Benchmarks in This Unit" in the table on p. 15, *Assessing the Benchmarks*.

<b>Discuss</b>
----------------

- What mathematical ideas and skills are students working on in this unit?
- What mathematics are students expected to know at the beginning of the unit? At the end?



## 2. How Many of Each? (Session 1.1)

First grade students will be familiar with *How Many of Each?* problems from their work in Unit 1, *How Many of Each?* In this unit they are faced with the new challenges of finding all of the two-addend combinations of a given number and explaining how they know that they have them all.

- Read the Activity, *How Many of Each?*, pp. 30-32, the Math Note, “All Possible Combinations” and the Algebra Note, “Finding Combinations,” p. 31. Working individually, complete Student Activity Book p. 1, Nine Toys: How Many of Each? Share your work with the group. Use the questions below, derived from the Ongoing Assessment: Observing Students at Work questions, p. 31, to guide the discussion about your work.

### Discuss

- How did you model and solve the problems?
- How did you go about finding more than one solution?
- How did you decide whether you had all of the solutions?
- How did you record your solutions?

- Read the Dialogue Box, *Do We Have All the Combinations?*, pp. 216-217.

### Discuss

- How might this added challenge of finding *all* of the combinations for a *How Many of Each?* problem be difficult for your students?
- How does the teacher structure the discussion to help students organize their work?

## 3. Solving a Subtraction Story Problem on Paper and Strategies for Subtraction (Session 2.2)

In this unit, students are introduced to the operation of subtraction. The major focus of this work is on making sense of subtraction situations through games, activities, and story problems and developing strategies to solve these problems.

- Read the Activity, *Solving a Subtraction Story Problem on Paper*, pp. 87-90, and the Discussion, *Strategies for Subtraction*, pp. 90-92.

### Discuss

- Examine the sample student work on pp. 89-91. What do the students understand about the story problem? About the relationship of addition and subtraction?

- Read the Dialogue Box, *Naming and Comparing Strategies for Subtracting*, pp. 229-230.

### Discuss

- What moves does the teacher make to encourage students to consider how solution strategies are similar and different? Why is this important?

#### 4. Strategies for Adding (Session 3.4)

Throughout this unit, students continue to develop strategies for combining two or more numbers. In the first number unit and Investigation 1 of this unit, most students used the strategy of counting all to add two numbers. As this unit progresses, more students will begin to use the strategy of counting on from a number and/or numerical reasoning to solve addition problems.

- Read the Discussion, *Strategies for Adding*, pp. 124-125.
- Solve problems 2, 3, and 4 on Student Activity Book pp. 27-28, Story Problems (from session 3.1). Use a different strategy (counting all, counting on, or using a number relationship) to solve each problem.

##### Discuss

- Working as a group, use the bulleted list on p. 125 as a guide for modeling and discussing each strategy.

- Read the Teacher Note, *Supporting Students as They Solve Story Problems*, pp.190-191.

##### Discuss

- What are some challenges students might face as they work to solve story problems and record their solution strategies? In what ways can you support or extend this work for students?

#### 5. Counting to 100: Making a 100 Chart (Session 4.5)

Over the course of this unit students practice counting larger quantities and develop strategies for accurate counting. This activity provides an opportunity for students to make observations about the number line and 100 chart.

- Read and do the Activity, *Counting to 100: Making a 100 Chart*, pp. 158-159. Answer the questions as they come up in the text. Read the Math Note, “Representations of the Number System” p. 158, and the Teaching Notes, “Make Connections,” and “Questioning Strategies,” p. 159.

##### Discuss

- How do the different arrangements of the number line and 100 chart highlight different aspects of our number system? During this activity, what student ideas should you be looking for or pay attention to?

- Read the Dialogue Box, *Exploring the 100 Chart*, pp. 235-236.

##### Discuss

- What patterns do students see on the 100 Chart?
- How does the 100 Chart support students in understanding the base-ten number system?

## 6. Wrap Up

- Look back at the unit overview, pp. 8-9.

### Discuss

- How do the activities done during this unit study fit into the overall mathematical storyline of the unit?

### Other Key Features of *Solving Story Problems*

- Algebra Connections in This Unit, pp. 16-19
- Classroom Routines in This Unit, p. 20
  - Morning Meeting*
  - Start With/Get To*
  - Quick Images*
- Assessment
  - Eleven Fruits: How Many of Each? (Session 1.9)
    - Teacher Note, pp. 194-196
  - How Many Books? (Session 3.5)
    - Teacher Note, Assessment, pp. 200-202
  - Covering and Counting (Sessions 4.2-4.5)
    - Resource Master M39, Assessment Checklist
    - Teacher Note, Observing Students As They Count, p. 204
  - Counting Strips (Session 4.7)
    - Teacher Note, pp. 205-209
  - End-of-Unit Assessment (Session 4.8)
    - Teacher Note, pp. 210-215



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Unit Guide for Grade 1, Unit 4:  
*What Would You Rather Be?*  
Data Analysis



## Unit Guide for Grade 1, Unit 4

### *What Would You Rather Be?*

#### Data Analysis

##### Unit Summary:

Students pose questions and collect and sort information about data. They make representations of their findings and share them with others. Students sort a group of objects according to a given attribute.

##### Materials:

*What Would You Rather Be?* (1 copy per person)

Shapes, buttons, or another material with multiple attributes (an assortment per pair or group)

Resource Master M5, Guess My Rule (1 per pair/group)

Resource Master M6, These Fit My Rule (1 per pair/group)

Resource Master M7, These Don't Fit My Rule (1 per pair/group)

Resource Master M12, Ages from a Grade 1 Class (1 per person)

#### Do the following activities from *What Would You Rather Be?*:

##### 1. Identify the mathematics in the unit

To get an overview of the mathematics students will be doing in this unit, refer to these sections in the unit front matter. As you look at these sections, begin thinking about the main mathematical ideas students work on in this unit.

- Turn to pp. 8-9, *Overview of This Unit*. Look at the title of each Investigation and read the summary for each Investigation.
- Review the *Mathematics in This Unit* essay, pp. 10-13. Look at the Mathematical Emphases and Math Focus Points. (The emphases are numbered, and can be found above bulleted lists of Math Focus Points.)
- Read the “Benchmarks in This Unit” in the table on p. 15, *Assessing the Benchmarks*.

<b>Discuss</b>
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- What mathematical ideas and skills are students working on in this unit?
- What mathematics are students expected to know at the beginning of the unit? At the end?

## 2. *Guess My Rule* (Session 1.3)

In this Investigation, students sort collections of objects according to specific attributes, and make representations that show how they are sorted. Students also collect, record, and discuss data collected through a recurring activity, *Quick Surveys*. In this session, students learn and play *Guess My Rule* with sets of objects.

- Play *Guess My Rule* with a partner or small group, using an assortment of objects and the mats on Resource Masters M6, *These Fit My Rule*, and M7, *These Don't Fit My Rule*. The directions for the game are on Resource Master M5, *Guess My Rule*.

### Discuss

- What mathematical ideas do this game focus on?
- Were there any challenges that came up as you worked to choose or guess a rule?
- What would you expect to see and hear as your students played this game?

- Read the Teacher Note, *Guess My Rule*, pp. 117-118, and the Dialogue Box, *Guess My Rule with Partners*, p. 137-138.

### Discuss

- What mathematical issues are likely to arise as your students learn and play this game?
- What logistical or management issues are likely to arise?

## 3. *Representing Survey Data* (Session 2.4)

In this Investigation, students participate in teacher-led surveys, and also carry out a data collection project using questions they develop. In this session, pairs finish collecting their data and then work together to represent it.

- Read the Activity, *Representing Survey Data*, pp. 76-78, and the Discussion, *Sharing Survey Results*, pp. 81-82 in Session 2.5.

### Discuss

- Examine the sample student work on p. 77 and pp. 81-82. What do you notice about the representations?
- What type of representations would you expect your students to create?

- Read the Teacher Note, *Grade 1 Students' Representations of Data*, pp. 119-121, and the Dialogue Box, *Sharing Survey Findings*, pp. 141-142.

### Discuss

- What is the goal of making a representation of a given set of data?
- What is the benefit of looking at different representations of the same set of data?
- What is the teacher's role in helping students develop their own ways of representing data? In helping students learn to describe and interpret their own and others' representations?

#### 4. Ages of Another Class (Session 3.2)

In this Investigation, students use data about their ages and those of their siblings as they focus on collecting, representing, and comparing numerical data. In this session, students look at several different representations that show the ages of students in the class and then represent the data from another first grade class.

- Make a representation of the data on Resource Master M12, *Ages from a Grade 1 Class*. Compare your representation, and what it tells you about the data, with your partner/group.

##### Discuss

- What mathematical ideas did you call upon while making your representation?
- What features of the data do the different representations highlight?

- Read: the Activity, *Ages of Another Class*, pp. 101-103.

##### Discuss

- What is the mathematical work students are engaged in as they make representations of numerical data?
- How is this work the same as or different from making representations of categorical data that they did in Investigations 1 and 2?

#### 5. Wrap Up

- Look back at the unit overview, pp. 8-9.

##### Discuss

- How do the activities done during this unit study fit into the mathematics of the rest of the unit?

#### Other Key Features of *What Would You Rather Be*

- Classroom Routines in This Unit, p. 16
  - Morning Meeting*
  - Quick Images: Coins*
  - Start With/Get To*
- Assessment
  - Assessment: Sorting (Introduced in Session 1.3)
    - Resource Master M8, Assessment Checklist
  - Assessment: “Deep Sea or Outer Space?” Representations (Session 2.5)
    - Teacher Note, pp. 124-128
  - End-of-Unit Assessment (Session 3.4)
    - Teacher Note, pp. 129-134



# Investigations

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Unit Guide for Grade 1, Unit 5:  
*Fish Lengths and Animal Jumps?*  
Measurement





## Unit Guide for Grade 1, Unit 5

### *Fish Lengths and Animal Jumps*

### Measurement

#### Unit Summary:

Students develop ideas about linear measurement, which includes understanding what length is and developing a foundation of skills for accurate linear measurement using nonstandard and standard units. As students measure with a variety of units, they investigate the idea that different-sized units result in different measurements. Using a real-world context, students measure with inch tiles and grapple with the idea of partial units and “at least as long as,” ideas that are important in both measurement and number and operations. They also solve story problems, which involve comparing length.

#### Materials:

*Fish Lengths and Animal Jumps* (1 copy per person)

Fish Set 1: Perch, Fish A-D (1 set per pair, see manufactured set, or Resource Masters M11-M13, see Materials to Prepare, p. 19)

Color tiles (15 per pair)

### Do the following activities from *Fish Lengths and Animal Jumps*:

#### 1. Identify the mathematics in the unit

To get an overview of the mathematics students will be doing in this unit, refer to these sections in the unit front matter. As you look at these sections, begin thinking about the main mathematical ideas students work on in this unit.

- Turn to pp. 8-9, *Overview of This Unit*. Look at the title of each Investigation and read the summary for each Investigation.
- Review the *Mathematics in This Unit* essay, pp. 10-11. Look at the Mathematical Emphases and Math Focus Points. (The emphases are numbered, and can be found above bulleted lists of Math Focus Points.)
- Read the “Benchmarks in This Unit” in the table on p. 13, *Assessing the Benchmarks*.

<b>Discuss</b>
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- What mathematical ideas and skills are students working on in this unit?
- What mathematics are students expected to know at the beginning of the unit? At the end?

## 2. Measuring Fish (Session 1.3)

In this Investigation, students use a variety of different units as they develop accurate techniques for measuring length. In this session, they use inch tiles to determine if fish are long enough to qualify as “keepers”.

- With a partner, use color tiles (which are one inch) to measure the length of each fish in Fish Set 1: Perch (Fish A-Fish D). Record the measurement of each fish in inches. Compare measurements with the whole group.

### Discuss

- Did each pair get the same measurement? Why or why not?
- What do you need to know about measurement to accurately measure the fish? Consider both procedures and understanding.

- Read the Activity, *Measuring Fish*, pp. 39-40, and the Teacher Note, *Learning about Length*, pp. 87-88.

### Discuss

- What mathematical ideas are students working on as they do this activity?
- What issues or areas of confusion may arise for students as they measure a given length? As they compare that length to a target length? About partial lengths?

## 3. Big Steps, Little Steps, and Craft Sticks (Session 2.2)

### What Did We Find? (Session 2.3), and Different Units, Different Counts (Session 2.3)

In this Investigation, students measure lengths with different-sized units. In Session 2.2, they use baby steps, basketball player steps, and craft sticks to measure strips of adding machine tape. In Session 2.3, each group works to summarize the data about one strip for the class discussion.

- Read the Activity, *Big Steps, Little Steps, and Craft Sticks*, pp. 70-72, the follow-up Activity, *What Did We Find?*, pp. 75-76 in Session 2.3, and the Discussion, *Different Units, Different Counts*, pp. 76-77 in Session 2.3.

### Discuss

- What are the mathematical ideas that underlie these activities?
- Imagine students who expect a bigger number when they measure with basketball player’s feet than with baby feet. What might these children be thinking? ... How might others explain why they expect the opposite?

## 4. Measuring Jumps (Session 2.4) and Jumping Distances (Session 2.5)

In Session 2.4, students use the same unit—craft sticks or baby steps—to measure the jumps of different animals.

- Read the Activities, *Introducing Animal Jumps*, p. 79, and *Jumping Story Problems*, pp. 80-81. Read the Discussion *Jumping Distances*, pp. 84-86 in Session 2.5.

---

**Discuss**

- What are the mathematical ideas that underlie these activities? How are they the same as or different from the mathematical ideas in *Big Steps*, *Little Steps*, and *Craft Sticks* in Sessions 2.2 and 2.3?

- Read the Teacher Note, *Strategies to Solve Comparison Problems*, pp. 90-91, and the Dialogue Box, *Understanding Comparison Problems*, p. 98.

---

**Discuss**

- What strategies would you expect your students to use as they solve the comparison problems throughout this unit?
- How does this unit on measurement also support student thinking and learning about number and operations?

## 5. Wrap Up

- Look back at the unit overview, pp. 8-9.

---

**Discuss**

- How do the activities done during this unit study fit into the mathematics of the rest of the unit?

### Other Key Features of *Fish Lengths and Animal Jumps*

- Classroom Routines in This Unit, p. 14
  - Morning Meeting*
  - Start With/Get To*
  - Quick Images*
  - Quick Survey*
- Assessment
  - Assessment: How Long Is This Fish? (Session 1.6)
    - Teacher Note, pp. 92-94
  - Assessment: Measurement Techniques (Session 1.6)
    - Resource Master M29, Assessment Checklist
  - End-of-Unit Assessment (Session 2.5)
    - Teacher Note, pp. 95-96

Unit Guide for Grade 1, Unit 6:  
*Number Games and Crayon Puzzles*  
Addition, Subtraction, and the Number System 3



## Unit Guide for Grade 1, Unit 6

### *Number Games and Crayon Puzzles*

### Addition, Subtraction, and the Number System 3

#### Unit Summary:

Students work on composing numbers with two and three addends, and in a variety of contexts, they work with combinations that equal 10 and explore relationships among those combinations. The addition and subtraction work of this unit continues to focus on making sense of the operations of addition and subtraction, practicing adding and subtracting single-digit numbers, and solving addition and subtraction story problems. There is a focus on naming and comparing different strategies used for solving problems such as counting all, counting on or back, and using known-number combinations. Students also discuss how different tools such as objects, the number line, and 100 chart can be used to model and solve problems.

#### Materials:

*Number Games and Crayon Puzzles* (1 copy per person)

Resource Master M24, Tens Go Fish (1 per pair)

Primary Number Cards (1 deck per pair, use manufactured decks or Resource Masters M13-M16, see Materials to Prepare, p. 23)

Student Activity Book pp. 17-18, Crayon Puzzles About More (1 per person)

#### Do the following activities from *Number Games and Crayon Puzzles*:

#### 1. Identify the mathematics in the unit

To get an overview of the mathematics students will be doing in this unit, refer to these sections in the unit front matter. As you look at these sections, begin thinking about the main mathematical ideas students work on in this unit.

- Turn to pp. 8-9, *Overview of This Unit*. Look at the title of each Investigation and read the summary for each Investigation.
- Review the *Mathematics in This Unit* essay, pp. 10-13. Look at the Mathematical Emphases and Math Focus Points. (The emphases are numbered, and can be found above bulleted lists of Math Focus Points.)
- Read the “Benchmarks in This Unit ” in the table on p. 15, *Assessing the Benchmarks*.

#### Discuss

- What mathematical ideas and skills are students working on in this unit?
- What mathematics are students expected to know at the beginning of the unit? At the end?

## 2. Today's Number: 10 (Session 1.1)

In this Investigation, students focus on combinations of 10 as they practice routines, play games, and solve story problems. In this activity, students generate expressions that equal 10.

- On Student Activity Book p. 1, Today's Number: 10, students are asked to show how many ways they can make 10. Write at least ten different expressions that equal 10 (e.g.  $5 + 5 = 10$ ,  $4 + 4 + 2 = 10$ ). Try using different operations.
- Read the Activity, *Today's Number: 10*, pp. 28-31.

### Discuss

- Do you notice any patterns among your solutions? Did you use any patterns to generate several solutions?

- Read the Algebra Note, "Patterns Among Solutions" and the Math Note, "Writing Equations", p. 31, and the Dialogue Box, *Today's Number: 10*, p. 173.

### Discuss

- In what ways can you encourage students to think about the relationship among combinations of a number? Why is this work important?

## 3. Playing Tens Go Fish (Session 1.6)

Students learn, play and discuss *Tens Go Fish*, which is a game that involves making combinations of 10 with two addends.

- Read the Activity, *Introducing Tens Go Fish*, pp. 56-57, and the directions on Resource Master M24, *Tens Go Fish*. Play a round of *Tens Go Fish* with a partner.

### Discuss

- How did you reason about what cards the other player had?
- What strategies do you expect students will use when playing this game? How can you help them think about strategies?

- Read the Discussion, *Strategies for Tens Go Fish*, pp. 58-60. Read the Algebra Note from Session 1.3, "Relating Adding and Subtraction," p. 43, and the Algebra Note on p. 60.

### Discuss

- How might this discussion be an opportunity to talk about the relationship between addition and subtraction?
- What strategies might students use to prompt such a discussion?

## 4. Solving a Crayon Puzzle About More (Session 2.2)

In previous units, students have been solving *How Many of Each?* problems. In this session, students are introduced to *Crayon Puzzles*, which are a variation of the *How Many of Each?* problems.

- Complete Student Activity Book, pp. 17-18, Crayon Puzzles About More. Read the Activity *Solving a Crayon Puzzle About More*, pp. 78-79.

- Read the Dialogue Box, *Introducing Crayon Puzzles*, p. 176.

**Discuss**

- How are these problems different from the *How Many of Each?* problems? What challenges do you think students will have with these problems?

- Read the Teacher Note, *About Crayon Puzzles*, pp. 147-148.

**Discuss**

- Considering the sample student work from the Teacher Note, what strategies do these students use to solve these problems?
- What can you do to make these problems more or less challenging for your students?

## 5. Strategies for Subtraction and Strategies for Addition (Session 3.5)

Students continue to solve addition and subtraction story problems and record their work. Class discussion focuses on strategies for adding and subtracting.

- Look at the “mini” of Student Activity book p. 34, Story Problems (p. 1 of 4) on p. 118 in Session 3.4. With a partner, discuss what strategies 1<sup>st</sup> graders might use to solve these problems.

- Read the Discussion, *Strategies for Subtraction*, pp. 121-124 and the Discussion, *Strategies for Addition*, pp. 125-126.

**Discuss**

- As teacher, how can you structure/guide discussions to help students deepen understanding? Consider both math ideas and student work.
- Examine the sample student work on pp. 122-123. How are these students making sense of this story problem?

- Read the Teacher Note, *Three Approaches to Story Problems*, pp. 156-158.

**Discuss**

- Which of these addition and subtraction strategies have you observed your students using?

## 6. Wrap Up

- Look back at the unit overview, pp. 8-9.

**Discuss**

- How do the activities done during this unit study fit into the overall mathematical storyline of the unit?

## Other Key Features of *Solving Story Problems*

- Algebra Connections in This Unit, pp. 16-17
- Classroom Routines in This Unit, p. 18
  - Morning Meeting*
  - Start With/Get To*
  - Quick Images,*
  - Quick Surveys*
- Assessment
  - Ten Crayons in All (Session 2.5)
    - Teacher Note, pp. 151-153
  - Counting On (Sessions 3.3, 3.6, and 3.7)
    - Resource Master M48, Assessment Checklist
    - Teacher Note, pp. 154-155
  - End-of-Unit Assessment (Session 3.8)
    - Teacher Note, pp. 164-170



Unit Guide for Grade 1, Unit 7:  
*Color, Shape, and Number Patterns*  
Patterns and Functions



## Unit Guide for Grade 1, Unit 7

### *Color, Shape, and Number Patterns*

### Patterns and Functions

#### Unit Summary:

Students make, describe, and extend repeating patterns. As they analyze the regularities of these patterns and identify the unit of the pattern that repeats, they build an understanding of what makes patterns predictable. They use this information to determine what comes next or what comes several steps ahead in a repeating pattern. Students also work on constructing, describing, and extending number sequences with a constant increase generated by various problem contexts.

#### Materials:

*Color, Shape, and Number Patterns* (1 copy per person)

Resource Master M5, What Comes Here? Part 1 (1 per person)

Connecting cubes (20 per pair, roughly equal number of 4 different colors)

Crayons or markers

*Make a Train* Game Bags (1 per pair; See the Teaching Note on p. 53 for directions on how to prepare the Game Bags)

Resource Masters M9-M10, Make a Train Game Directions (1 per person)

Resource Masters M11-M12, Make a Train Sample Game (1 per person)

Student Activity Book p. 17, Penny Jar Problems A (1 per person)

Student Activity Book p. 26, Staircase Towers C (1 per person)

Resource Masters M21-M22, Two Shapes (1 per person)

Pattern blocks (1 bucket per group of 4)

### Do the following activities from *Color, Shape, and Number Patterns*:

#### 1. Identify the mathematics in the unit

To get an overview of the mathematics students will be doing in this unit, refer to these sections in the unit front matter. As you look at these sections, begin thinking about the main mathematical ideas students work on in this unit.

- Turn to pp. 8-9, *Overview of This Unit*. Look at the title of each Investigation and read the summary for each Investigation.
- Review the *Mathematics in This Unit* essay, pp. 10-13. Look at the Mathematical Emphases and Math Focus Points. (The emphases are numbered, and can be found above bulleted lists of Math Focus Points.)
- Read the “Benchmarks in This Unit” in the table on p. 15, *Assessing the Benchmarks*.

---

**Discuss**

- What mathematical ideas and skills are students working on in this unit?
- What mathematics are students expected to know at the beginning of the unit? At the end?

## 2. What Comes Here? (Session 1.3)

At the beginning of this Investigation, students work with repeating cube patterns and body movement patterns and determining what comes next if the pattern were to continue. In this session students determine the color of a cube several cubes beyond the part of the pattern that is visible and consider what the elements of the pattern are, how they are arranged, and how they repeat.

- Read the Activity, *Introducing What Comes Here?* pp. 40-41, and then use Resource Master M5, *What Comes Here? Part 1*, to complete the Activity, *What Comes Here?*, pp. 41-43.

---

**Discuss**

- How did you decide what the color of a cube later in the sequence would be?

- Read the Math Note, “Other Repeating Patterns” p. 41, and the Dialogue Box, *Do We Need Two or Three Movements?* p. 139.

---

**Discuss**

- How do different patterns (abab, abbabb) challenge students?
- How does this work lay the foundation for understanding the unit of a repeating pattern?

## 3. Make a Train (Session 1.5)

In the work leading up to this activity students considered what the elements of a pattern are, how they are arranged, and how they repeat. In the activity *Make a Train*, students begin to think more specifically about these elements by constructing cube trains from given units.

- Read Resource Masters M9-M10, *Make a Train*, and M11-12, *Make a Train Sample Game*. With a partner, play *Make a Train*. Read the Activity, *Make a Train*, pp. 54-55.

---

**Discuss**

- While playing *Make a Train*, how did you plan how to use the cubes in the depot? How did you choose a color when you rolled a star?
- How will you help students understand the rules of the game?

- Read the Teacher Note, *Repeating Patterns*, pp. 115-116.

---

**Discuss**

- How does the activity *Make a Train* extend students’ understanding of repeating patterns in general and the unit of a repeating pattern specifically?

#### 4. The Penny Jar and Staircase Towers (Session 2.3)

The work in this Investigation focuses on number sequences. *The Penny Jar* and *Staircase Towers* are two contexts that illustrate constant rates of increase. In these activities, students determine and record number sequences to describe these contexts.

- Use Student Activity Book p. 17, Penny Jar Problems, Set A, and p. 26, Staircase Towers C, to complete the Activity, *The Penny Jar* pp. 87-88, and the Activity, *Staircase Towers* pp. 88-89. (Refer to the Activities, *The Penny Jar* pp. 76-77 in Session 2.1, and *The Basic Staircase Tower* pp. 81-83 in Session 2.2, for descriptions of these activities.)

---

**Discuss**

- How did you determine what number would be next in the Penny Jar sequence?
- How did you determine the height of the next tower in your staircase?

- Read the Dialogue Box, *I Can't Explain It, But We're Skipping Numbers*, pp. 146-147.

---

**Discuss**

- What are the mathematical issues that students are working on during this discussion?

#### 5. An Alternating Shape Pattern (Session 2.4)

For this activity students make AB patterns with the pattern blocks on a number strip and describe the resulting number sequences.

- Read the Activity, *Introducing Shape Patterns*, pp. 93-94, and do the Activity, *An Alternating Shape Pattern*, pp. 94-96. (Rather than prepare the pattern block cutouts, as suggested in the text for students, draw the shapes in your pattern on Resource Masters M21-M22, Two Shapes.)

---

**Discuss**

- What strategies did you use to determine what shape is associated with a number later in the sequence?

- Read the Dialogue Box, *1, 4, 7, 10 What's the Same about the Penny Jar, Staircase Towers, and Shape Patterns?* pp. 148-149.

---

**Discuss**

- What mathematical ideas are these students working on during this discussion?
- What moves does the teacher make to encourage discussion of these ideas?

## 6. Wrap Up

- Look back at the unit overview, pp. 8-9.

### Discuss

- How do the activities done during this unit study fit into the overall mathematical storyline of the unit?

### Other Key Features of *Color, Shape, and Number Patterns*

- Algebra Connections in This Unit, pp. 16-17
- Classroom Routines in This Unit, p. 18
  - Morning Meeting*
  - Start With/Get To*
  - Tell a Story*
  - Quick Survey*
- Assessment
  - Assessment: Make a Repeating Pattern (Session 1.8)  
Teacher Note, pp. 120-124
  - End-of-Unit Assessment (Session 2.7)  
Teacher Note, pp. 129-137

Unit Guide for Grade 1, Unit 8:  
*Twos, Fives, and Tens*  
Addition, Subtraction, and the Number System 4



## Unit Guide for Grade 1, Unit 8

### *Twos, Fives, and Tens*

### Addition, Subtraction, and the Number System 4

#### Unit Summary:

Students revisit the number sequence as they count and write numbers to 100 and beyond. Students work on achieving fluency with the two-addend combinations of ten; they are introduced to ideas about equivalence ( $8 + 5 = 10 + 3$ ); and they engage in activities that highlight the importance of ten in our Base-10 number system. As students work with contexts that provide opportunities to count by groups of 2s, 5s, and 10s, they think about ways to organize objects so that they are easier to count and combine, and they begin to make sense of what it means to count by equal groups.

#### Materials:

*Twos Fives, and Tens* (1 copy per person)  
Resource Master M1, Ten Turns Recording Sheet (1 per person)  
Resource Master M2, Ten Turns (1 per person)  
Counters or connecting cubes (60 per pair)  
Number cube (1 per pair, see Materials to Prepare, p. 23)  
Resource Masters M42-M43, Ten Plus Recording Sheet 1 and 2 (1 per person)  
Resource Master M44, Ten Plus (1 per person)  
Primary Number Cards (1 deck per pair, use manufactured decks or Resource Masters M31-M34, see Materials to Prepare, p. 93)

#### Do the following activities from *Twos, Fives, and Tens*:

#### 1. Identify the mathematics in the unit

To get an overview of the mathematics students will be doing in this unit, refer to these sections in the unit front matter. As you look at these sections, begin thinking about the main mathematical ideas students work on in this unit.

- Turn to pp. 8-9, *Overview of This Unit*. Look at the title of each Investigation and read the summary for each Investigation.
- Review the *Mathematics in This Unit* essay, pp. 10-13. Look at the Mathematical Emphases and Math Focus Points. (The emphases are numbered, and can be found above bulleted lists of Math Focus Points.)
- Read the “Benchmarks in This Unit” in the table on p. 15, *Assessing the Benchmarks*.

---

**Discuss**

- What mathematical ideas and skills are students working on in this unit?
- What mathematics are students expected to know at the beginning of the unit? At the end?

## 2. Playing Ten Turns (Session 1.1)

In this session, students learn and play *Ten Turns*, a game that involves rolling a number cube, collecting counters, and keeping track of the total. The class then discusses efficient strategies for counting, particularly counting on.

- Read the Activity, *Introducing Ten Turns*, pp. 27-28, and do the Activity, *Playing Ten Turns*, pp. 28-29.

---

**Discuss**

- How does this activity encourage the counting on strategy? Why is this important?

- Read the Discussion, *Ten Turns*, pp. 29-31, including the Teaching Notes “Counting All” and “Organizing Strategy” on p. 30.

---

**Discuss**

- What would you do if one of your students continued to count all for this activity?
- How does this discussion encourage students to use the strategy of counting on?

## 3. How Many Hands? (Session 2.1)

In this Investigation, students move from counting by 1s to counting by equal groups. During this session, students figure out how many hands a group of students has.

- Read the Activity, *Introducing How Many Hands?*, p. 55, and do the Activity, *How Many Hands?*, pp. 55-56. Solve the problem (How many hands are there in a group of 8 children?) in two ways.

---

**Discuss**

- Share strategies with each other, including how you recorded your work. How would you expect students to solve this problem?
- What representations (materials, drawings, equations, etc.) do you expect students to use to solve this problem?

- Read the Dialogue Box, *Helping Students Record Their Strategies*, pp. 161-162.

---

**Discuss**

- Why do students sometimes need help recording their strategies?
- What moves does the teacher make to help students record their strategies?



#### 4. How Many Squares? (Session 2.5)

Students continue their work of counting by equal groups during this activity as they figure out the total number of squares in a set that includes a combination of singles, pairs, and groups of 5s.

- Read the Activity, *Introducing How Many Squares?* p. 76 and the Activity, *How Many Squares?* pp. 77-78.

##### Discuss

- How might students find the total of squares?
- How might they organize the squares to help them count? How might they record their work?

- Read the Dialogue Box, *Finding Ways to Count*, pp. 163-164.

##### Discuss

- What does the teacher do to help students think of different ways to count the squares?

#### 5. Playing Ten Plus (Session 3.3)

In Investigation 3, students play games that develop fluency with combinations of 10. They count groups of 10 and think about how numbers can be expressed as 10s and 1s. In this activity, students combine two single-digit numbers (e.g.  $7 + 8$ ) and then record that total in terms of its relationship to 10 (e.g.  $10 + 5$ ).

- Read the Activity, *Introducing Ten Plus*, pp. 110-111, and do the Activity, *Playing Ten Plus*, pp. 112-113.

##### Discuss

- How did you figure out where to record a given equation?
- How does this activity support students in learning addition combinations? In learning place value concepts?

- Read the Dialogue Box, *Ten Plus*, pp. 167-168.

##### Discuss

- What is the primary focus of *Ten Plus*?
- What aspects of this game do you anticipate to be challenging for your students?

#### 6. Wrap Up

- Look back at the unit overview, pp. 8-9.

##### Discuss

- How do the activities done during this unit study fit into the overall mathematical storyline of the unit?

## Other Key Features of *Twos, Fives, and Tens*

- Algebra Connections in This Unit, pp. 16-17
- Classroom Routines in This Unit, p. 18
  - Morning Meeting*
  - Start With/Get To*
  - Tell a Story*
  - Quick Survey*
- Assessment
  - Assessment: Counting Strips to 105 (Session 1.4)
    - Teacher Note, pp. 133-135
  - Assessment: How Many Squares? (Session 2.8)
    - Teacher Note, pp. 142-145
  - Assessment: Combinations of 10 (Sessions 3.4-3.6)
    - Resource Master M48, Assessment Checklist
  - End-of-Unit Assessment (Session 3.6)
    - Teacher Note, pp. 150-157



**Investigations**  
in Number, Data, and Space®

Unit Guide for Grade 1, Unit 9:  
*Blocks and Boxes*  
3-D Geometry

Unit Guide for Grade 1, Unit 9  
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## Unit Guide for Grade 1, Unit 9

### *Blocks and Boxes*

### 3-D Geometry

#### Unit Summary:

Students observe, describe, compare, classify, represent, and build with 3-D shapes. They develop vocabulary for naming and describing 3-D shapes and explore the relationship between 2-D and 3-D shapes. Students focus on the attributes of rectangular prisms. As a final project, they use 3-D shapes to construct a town and work with directions and paths as they plan routes through the town.

#### Materials:

*Blocks and Boxes* (1 copy per person)

Geoblocks (1 subset per pair/group)

A sock or paper bag (1 per pair/group)

Resource Master M11, Geoblock Pictures: Sheet C (1 per pair/group)

Resource Master M12, Geoblock Pictures: *Sheet D* (1 per pair/group)

Box Pieces, Set A (1 set per person or pair) (See p. 52 for how to prepare materials)

Tape

### Do the following activities from *Blocks and Boxes*:

#### 1. Identify the mathematics in the unit

To get an overview of the mathematics students will be doing in this unit, refer to these sections in the unit front matter. As you look at these sections, begin thinking about the main mathematical ideas students work on in this unit.

- Turn to pp. 8-9, *Overview of This Unit*. Look at the title of each Investigation and read the summary for each Investigation.
- Review the *Mathematics in This Unit* essay, pp. 10-11. Look at the Mathematical Emphases and Math Focus Points. (The emphases are numbered, and can be found above bulleted lists of Math Focus Points.)
- Read the “Benchmarks in This Unit” in the table on p. 13, *Assessing the Benchmarks*.

<b>Discuss</b>
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- What mathematical ideas and skills are students working on in this unit?
- What mathematics are students expected to know at the beginning of the unit? At the end?

## 2. Blocks in a Sock (Session 1.4)

In this Investigation, students construct and describe the characteristics of 3-D shapes, match the faces of 3-D shapes to 2-D outlines, and make 3-D shapes from 2-D pieces. In this session, students try to find a specific 3-D block, hidden in a sock with one or two other blocks, based on a 2-D picture of that block.

- In your set of Geoblocks, find the six blocks pictured on Resource Masters M11 and M12, Geoblock Pictures: Sheet C and Sheet D and place them in a sock or paper bag. In partners or small groups, play *Blocks in a Sock* as described in the Activity, *Introducing Blocks in a Sock*, p. 40. Be sure to ask people to describe what they are feeling for, how they are deciding whether they have found the right block, and why they are sure. (For examples of what to ask and watch for, see the Activity, *Assessment: Blocks in a Sock*, particularly the Ongoing Assessment: Observing the Students at Work, pp. 41-42.)

### Discuss

- What mathematical ideas were you working on as you played this game?
- What features or characteristics of shapes came up as you played? What vocabulary was used to describe those features?
- What would you expect to see and hear from first graders who were playing this game?

## 3. Making Boxes with Cards (Session 1.6)

In this Session, students discuss the characteristics of real boxes, and then use 2-D pieces to construct 3-D boxes.

(Note that one set of Box Pieces, Set A requires seven 3x5 index cards and four 5x8 index cards, cut into pieces as described on p. 52. Because you will need one set per pair in the unit, consider disassembling your boxes when you are finished and storing them in an envelope for students' use.)

- Each person or pair should get Set A of the Box Pieces: (four 3 x 5 pieces, two 2 x 5 pieces, two 3 x 2 pieces, two 5 x 8 pieces, and two 3 x 8 pieces). Use all of these pieces to make two different boxes.

### Discuss

- What is the mathematics of this activity?
- What strategies did you use to construct two boxes from 12 rectangular pieces?
- What strategies would you expect your students to use?

- Read the Activity, *Making Boxes with Cards*, pp. 52-55, focusing in particular on the Differentiation: Supporting the Range of Learners.
- Read the Teacher Note, *Students Make Their Own Boxes*, pp. 111-112.

---

**Discuss**

- What strategies are described in these sections?
- What accommodations and challenges are suggested to help teachers with the range of learners in their classrooms?

#### **4. More Building and Drawing (Session 2.2)**

In this Investigation, students move between 2-D and 3-D representations, and give directions from one location to another using a combination of turns and steps. In this session, students draw pictures of buildings made with Geoblocks, then try to build Geoblock buildings from someone else's drawing.

- Using no more than 6-10 Geoblocks, make a building. Then, make as accurate a drawing as possible of your building. Try to make it look 3-D. Once you're finished, disassemble your building, trade pictures with a partner. Using their drawing, try to build their building with Geoblocks.

---

**Discuss**

- What was this experience like for you?
  - What strategies did you use to draw your building? To assemble your partner's building? What math is involved in these activities?
  - How would you expect your students to approach these activities?
- Read the Activity, *More Building and Drawing*, pp. 75-76, the Teacher Note, *Students Draw in 3-D*, pp. 113-114, and the Dialogue Box, *Making It Look 3-D*, pp. 121-122.

---

**Discuss**

- What is the mathematical goal of these activities?
- What information do the Teacher Note and Dialogue Box provide to support you in thinking about focusing on the math goals of the activity, as well as dealing with other issues such as fine-motor skills, wide range of abilities, etc.?

#### **5. Wrap Up**

- Look back at the unit overview, pp. 8-9.

---

**Discuss**

- How do the activities done during this unit study fit into the mathematics of the rest of the unit?

## Other Key Features of *Blocks and Boxes*

- Classroom Routines in This Unit, p. 14
  - Morning Meeting*
  - Quick Images*
  - Quick Survey*
  - Tell a Story*
- Assessment
  - Assessment: Blocks in a Sock (Session 1.4)
    - Resource Master M14, Assessment Checklist
  - Assessment: Matching Blocks to Outlines (Session 1.5)
    - Teacher Note, pp. 109-110
  - End-of-Unit Assessment (Session 2.8)
    - Teacher Note, p. 115