

# Investigations

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

## UNIT GUIDES: KINDERGARTEN



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GRADE

K

# Investigations

In Number, Data, And Space®

## UNIT GUIDES: Grade K



The Investigations curriculum was developed by TERC, Cambridge, MA.



The *Investigations* curriculum is published by Pearson Publishing.



This material is based on work supported by the National Science Foundation (“NSF”) under Grant No. ESI-0095450. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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# Investigations

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# Investigations

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## 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 Kindergarten, Unit 1: *Who Is In School Today?* Classroom Routines and Materials



## Unit Guide for Kindergarten, Unit 1

### *Who Is In School Today?*

### Classroom Routines and Materials

#### Unit Summary:

The processes, structures, and materials that are important features of the Kindergarten math curriculum are introduced in this unit. It also introduces routines common to many Kindergarten classrooms that students will encounter regularly throughout the year. These routines include taking attendance, using the calendar to count and to keep track of time and events, counting sets of objects, and collecting and discussing data about the class. These Classroom Routines offer reinforcement of number concepts that are central to the Kindergarten curriculum. Full write-ups of all Classroom Routines can be found in *Implementing Investigations in Kindergarten* pp. 22-31.

#### Materials:

*Who Is In School Today?* (1 copy per person)  
*Implementing Investigations in Kindergarten* (optional)  
Geoblocks (one bin per 4 people)  
Pattern blocks (one bin per 4 people)  
Cubes (one bin per 4 people)  
Attribute Blocks (one set per 4 people)  
Counting Jar (1 per 4 people; see Materials to Prepare, p. 55)  
Scrap paper (1 per person)  
Buttons (1 handful per pair)

### Do the following activities from *Who is In School Today?*:

#### 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 *Assessing the Benchmarks*, p. 15.

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**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. Exploring Materials (Session 1.1)**

Throughout this unit students explore the math materials they will be using throughout the year.

- Read the Activity, *Introducing Math Workshop and Materials* pp. 26-27. Choose one material to explore: Geoblocks, pattern blocks, cubes or attribute blocks. Attribute blocks can be divided into 2 sets, thick and thin, 2 people per set. Consider the following questions as you explore the material you chose and then discuss these questions after everyone has time to explore one or two materials.

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**Discuss**

- What attributes of the material do you notice?
  - What relationships do you notice among the objects?
  - What do you think students might do with this material?
  - What might they notice or learn from exploring this material?
- Look at the Teaching Notes p. 27, “Why Free Exploration?” and “Managing Math Workshop”. Read the Teacher Note, *Supporting Students’ Free Play*, pp. 132-133. (For more ideas about setting up a mathematical community and classroom see the *Setting Up the Investigations Classroom* essay, in *Implementing Investigations in Kindergarten*, pp. 9-14.)

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**Discuss**

- How can you best support student learning as they explore materials?
- How can students’ exploration of these materials help them in their math work later in the year?
- What can you do to help students become familiar with expectations for how they should work during math time?

## **3. Attendance (Sessions 1.1, 1.2, 1.6, 2.2, and 2.5 )**

Three Classroom Routines are introduced in this unit, however, only one of them, *Attendance*, is explored in this unit guide. In the *Attendance* routine students establish the number of students present each day by counting the students and using information about who is not present that day. Different parts of the *Attendance* routine are introduced in different sessions in this unit. As for all Classroom Routines, this activity is then continued throughout the year.

- Read the Activity, *Introducing Attendance*, pp. 25-26 in Session 1.1. Take attendance with your group as described in this activity. Read the Activity, *Counting Around the Circle*, p. 33 in Session 1.2 and count around the circle as described in the activity. Read the Activity, *Introducing the Attendance Stick*, pp. 48-49 of Session 1.6 and make an attendance stick for your group as described in this activity.

- Read the Activities, *Using the Attendance Stick*, pp. 65-66 in Session 2.2 and *Attendance: Introducing a Labeled Attendance Stick*, pp. 83-86 in Session 2.5.

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<b>Discuss</b>
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- How do all the components of this routine work together?
- How will you make this part of your daily routine in your classroom?

- Read the Teaching Notes, p. 25 “The Attendance Routine”, “How Many Are We?” and the Math Note, p. 25 “Learning to Count”; the Teaching Note, “Counting Off”, p. 33, and the Teaching Note, “Attendance Over Time”, p. 85.

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<b>Discuss</b>
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- What aspects of counting are students working on in this routine?
- What other math ideas are they working on?

#### 4. Counting Jar (Sessions 2.1 and 3.2)

The Counting Jar is an activity that is introduced in this unit and continued throughout the year. The amount of objects, type of objects and composition of the set of objects placed in the jar is varied throughout the year.

- Read the Activity, *Introducing the Counting Jar*, pp. 59-60 in Session 2.1 and the Activity, *Counting Jar: Introducing Recording*, pp. 101-102 in Session 3.2. Do all the components of the Counting Jar activity in pairs or individually (depending on how many Counting Jars you have). (You might also combine this activity with the activity that follows, *Button Match-Up*, so that logistically it is easier for everyone to have a chance to do the Counting Jar. Alternatively, you can have just 3 or 4 people do the Counting Jar as an example for everyone else, then continue with the discussion.)
- Read the Teaching Notes, “Counting Jar”, “The Math of the Counting Jar”, “Handling Mistakes”, p. 59, and “Creating an Equivalent Set”, p. 60.
- Read the Dialogue Box, *You Could Use Dots*, pp. 142-143.

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<b>Discuss</b>
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- How would you expect students will show on paper how many items are in the Counting Jar?
- What is the teacher trying to highlight about recording the number of balls in the Counting Jar in this Dialogue Box?
- How can each of the components of this activity - counting the objects in the jar, creating an equivalent set of the number of objects in the jar and recording the amount in the jar - help students develop an understanding of counting and help them develop their counting skills?

- Look together at the Resource Master M5, *Assessment Checklist: Counting*, pictured in the sidebar, p. 60 and the example of a filled in *Assessment Checklist: Counting*, p. 61.



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**Discuss**

- What might you observe and record on this checklist the first time students do the Counting Jar?
- What would you expect to observe by the end of this unit? What would you expect to observe later in the year, after students have done the Counting Jar multiple times as well as other counting activities?

## 5. Button Match-Up (Session 2.3)

In this activity, *Button Match-Up*, along with *Attribute Block Match-Up*, *Sorting People* and *Sorting Attribute Blocks*, students begin some work on sorting objects by their attributes. This work is continued in the pattern and data units.

- Read the Activity, *Introducing Button Match-Up*, pp. 71-72. Play *Button Match-Up* in pairs or fours.
- Read the Teacher Note, *Sorting and Identifying Attributes*, p. 136.

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**Discuss**

- How can work with sorting and identifying attributes be useful to students in their mathematical learning?
- What challenges do you foresee Kindergarten students having in identifying attributes and sorting by attributes?

## 6. Wrap Up

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

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**Discuss**

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

### Other Key Features of *Who is Here Today?*

- Classroom Routines in This Unit, p. 16
  - Attendance*
  - Calendar*
  - Today's Question*
- Assessment
  - Counting (Introduced in Session 2.1)
    - Resource Master M5, Assessment Checklist
    - Teacher Note, Observing Kindergarteners as They Count, p. 135



# Investigations

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Unit Guide for Kindergarten, Unit 2:  
*Counting and Comparing*  
Measurement and the Number System 1



## Unit Guide for Kindergarten, Unit 2

### *Counting and Comparing*

### Measurement and the Number System 1

#### Unit Summary:

Students explore numbers through a variety of counting activities. They build knowledge of the counting sequence, use numerals to represent quantities, represent equivalent amounts, and develop skills for accurate counting. They also begin to compare quantities. As an introduction to linear measurement, students measure and compare the lengths of objects using direct comparison.

#### Materials:

*Counting and Comparing* (1 copy per person)  
Resource Masters M10-11, Counting Book (pages for the numbers 5 and 6, 1 per person)  
Student Activity Book, p. 5, Grab and Count (1 per person)  
Resource Master M25, Longer or Shorter? (1 per person)  
Student Activity Book, p. 16, Ordering Cards (1 per person)  
Markers or crayons  
Bin of connecting cubes, color tiles or teddy bear counters (1 bin per 4 people)  
Connecting cubes (10 per person)  
Measurement Collection (2 or 3 objects per person; see Materials to Prepare, p. 77)  
Primary Number Cards (1 set per pair, use manufactured decks or Resource Masters M20-M23, see Materials to Prepare, p. 25)

#### Do the following activities from *Counting and Comparing*:

##### **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. Counting Books (Session 1.1)**

Investigation 1 includes a variety of activities in which student practice counting and work on connecting number words, numerals and quantities. Students begin this Investigation with the Counting Books activity in which they create their own counting books with one page for each number, 1 through 6.

- Read the Activity, *Introducing Counting Books*, pp. 28-30. Working individually, create a page for the number 5 and a page for the number 6.
- Read the two Teacher Notes, *Counting is More Than 1, 2, 3*, p.151, and *Observing Kindergarteners as They Count*, p.152.

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**Discuss**

- What skills and ideas do students need to understand and be able to use in order to count a set of objects accurately?

- Turn to the Teacher Note, *Students' Counting Books*, pp.157-159. Look at Tammy's work, p. 157, and read the paragraph above the work labeled "Finding an Underlying Order", where you get information from Tammy's teacher.

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**Discuss**

- What do you notice in Tammy's work?
- What do you think she understands about counting?

- Look at Mitchell's work, p. 159. Read the paragraph about his work.

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**Discuss**

- What can you learn from Mitchell's work?
- What does he understand?
- What is he having difficulty with?
- What strategies might you use to help Mitchell?

## **3. Grab and Count (Session 1.2)**

In *Grab and Count* students work on developing strategies for accurately counting and keeping track of quantities and representing these quantities with pictures, numbers and/or words. There are multiple variations of this activity, two of which are also introduced in this unit.

- Read the Activity, *Introducing Grab and Count*, p. 34. Working individually complete two rounds of this activity, recording your count on Student Activity Book p. 5, Grab and Count.

- There are two variations of this activity in this unit. Read the Activity, *Introducing Grab and Count: Compare*, pp. 95 – 96 in session 2.4, and the Activity, *Introducing Grab and Count: Ordering*, p. 129 in session 2.10.

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<b>Discuss</b>
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- How do the math ideas progress from one *Grab and Count* activity to the next?

- Read the Teacher Note, *Assessing Students' Counting*, pp. 153-156. In this Teacher Note the students are doing an activity called *Inventory Bags*, which is similar to *Grab and Count*. Choose 1 or 2 students described in this Teacher Note to discuss.

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<b>Discuss</b>
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- What do you think this student understands about counting?
- What does this student not yet understand about counting?

#### **4. Measuring Table (Session 2.1)**

In Investigation 2, as part of comparing quantities, students begin work on measurement by comparing lengths. In *Measuring Table*, students directly compare the length of classroom objects to a tower of 10 cubes to determine which is longer.

- Read the Activity, *Using Towers to Compare*, pp. 83-84 and the Activity, *Introducing the Measuring Table*, pp. 84-85. Working individually, create your own measurement tower with 10 cubes. Compare your tower to three of the objects from the Measurement Collection and list them in the appropriate columns on Resource Master M25, Longer or Shorter?.
- Read the Discussions, *How Did You Measure?*, pp. 89-90 in Session 2.2, and *When It's Hard to Tell*, p. 99 in Session 2.4.
- Read the Dialogue Box, *How Did You Compare?*, pp. 168-169.

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<b>Discuss</b>
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- What are some measurement issues or confusions that may arise as students compare lengths?
- How can the discussions that follow the Measuring Table activity help students begin to think through some of the important ideas related to measurement?

#### **5. Ordering Cards (Session 2.12)**

The work students have done with comparison of quantities earlier in Investigation 2 facilitates their work in this activity, where they organize numbers from least to greatest.

- Read the Activity, *Introducing Ordering Cards*, p. 139. Work with a partner to complete Student Activity Book, p. 16, Ordering Cards.
- Read the Ongoing Assessment: Observing Students at Work and Differentiation: Supporting the Range of Learners sections, p. 140.

**Discuss**

- What will you focus on as you observe students doing this activity?
- What questions might you ask them as they do the activity?
- How could you adapt this activity for students who could go further with this activity?

**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 *Counting and Comparing***

- Algebra Connections in This Unit, pp. 16-17
- Classroom Routines in This Unit, p. 18
  - Attendance*
  - Calendar*
  - Today's Question*
- Assessment
  - Counting (Introduced in Session 1.1)
    - Resource Master M3, Assessment Checklist
    - Teacher Note, Assessing Students' Counting, pp. 153-156
  - Comparing Lengths (Introduced in Session 2.1)
    - Resource Master M26, Assessment Checklist
  - Comparing Quantities (Introduced in Session 2.4)
    - Resource Master M28, Assessment Checklist
  - End-of-Unit Assessment Interview (Sessions 2.13-2.14)
    - Teaching Notes:
      - Session 2.12, p. 141
      - Session 2.13, p. 143
      - Session 2.14, p. 146



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Unit Guide for Kindergarten, Unit 3:  
*What Comes Next?*  
Patterns and Functions



## Unit Guide for Kindergarten, Unit 3

### *What Comes Next?*

### Patterns and Functions

#### Unit Summary:

Students investigate what makes a repeating pattern. They focus on attributes of objects and think about which attributes (i.e., size, color, shape, orientation) are important in the patterns they are making. Students work with simple and complex repeating patterns. They have many opportunities to copy, create, and extend repeating patterns using a variety of materials and common objects. They use patterns to determine what comes next and focus on the part, or unit, of a pattern that repeats.

#### Materials:

*What Comes Next?* (1 copy per person)

Resource Master M18, Break the Train Recording Sheet (1 per person)

Attribute Blocks (1 set per 4 people; see Materials to Prepare, p. 23)

Attribute Cards (1 deck per pair; use manufactured set or Resource Master M2, see

Materials to Prepare, p. 23)

Connecting cubes (about 20 per person)

Color tiles (1 container per 3-4 people)

### Do the following activities from *What Comes Next?*:

#### 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. Sorting Attribute Blocks (Session 1.2)**

The main focus of Investigation 1 is on observation and on identifying attributes. The activities focused on these ideas include: an observation walk, *Button Match-Up* and *What's Missing?*. In *Sorting Attribute Blocks* students sort attribute blocks according to specific attributes.

- Read the Activity, *Reintroducing Activities about Attributes*, p. 31. Do a few rounds of *Sorting Attribute Blocks* with a partner.
- Read the Math Note, “Attributes and Patterns”, p. 31 and look at the miniature of the Math Words and Ideas, “Same and Different”, p. 166.

---

**Discuss**

- How does the work of identifying attributes and comparing objects support students as they construct and extend patterns?

## **3. Making Cube Trains (Session 1.4)**

At the end of Investigation 1, students compare cube trains, some patterns and some not, as a way of beginning to identify what makes a pattern.

- Read the Discussion, *Two Cube Trains*, pp. 41-42. Make the two cube trains described. Discuss possible responses to “What do you notice [about the two cube trains]? What is the same about them? What is different?”
- Read the Activity, *Making Cube Trains*, pp. 42-43. Work individually to make cube trains with 8 cubes as described in the activity (they do not have to be patterns).
- Read the Discussion, *Sorting Cube Trains*, pp. 43-44. Working as a group, sort the cube trains into two categories: cube trains made of 2 colors and cube trains made with more than 2 colors. Work together to think of possible responses to the series of questions asked in the text of the discussion.

---

**Discuss**

- How does the design of this session prepare students to begin thinking about patterns?
  - What might students begin to realize about patterns?
- Read the Dialogue Box, *Two Arrangements of Color*, pp. 155-156, and the Dialogue Box, *Sharing Our Cube Trains*, pp. 157-158.

---

**Discuss**

- What are the different ideas that students are working on in these Dialogue Boxes?
- How does the teacher support the students' thinking?

#### 4. One-Two Patterns (Session 2.5)

In Investigation 2 students construct, extend, and record patterns using a variety of materials including cubes, pattern blocks, two-color chips and arrows. In this activity, students construct patterns using quantity as an element.

- Read the Activity, *Introducing One-Two Patterns*, pp. 81-82. Using square colored tiles, create a one-two pattern. Share your pattern with the group.

---

**Discuss**

- What types of patterns did people in the group construct?

- Look briefly at some of the activities in the previous sessions in Investigation 2. How do the *One-Two Patterns* differ from the *Cube Train Patterns* pp. 71-72, and *Pattern Block Snake Patterns*, pp. 77-78? How are they similar?
- Read the Teacher Note, *Repeating Patterns*, pp. 147-148.

---

**Discuss**

- What understandings about patterns are students developing as they construct and extend patterns?
- What questions might you ask students as they construct patterns to learn what they understand about patterns?

- Read the following sections of the Teacher Note, *Assessment: Repeating Patterns*, pp. 149-151: the introductory paragraph, Connecting Cubes, Pattern Blocks, and the concluding paragraph. (If you have time you might choose to read more sections.)
- For each student discussed in the Connecting Cubes and Pattern Blocks sections:

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**Discuss**

- What do you think this student already understands about patterns?
- What do you think this student is figuring out about patterns?
- What do you think this student does not yet understand about patterns?

## 5. Break the Train (Session 3.1)

During Investigations 1 and 2 of this unit, students spend a great deal of time exploring, identifying, describing, and constructing repeating patterns. The activities from these Investigations provide a foundation for students as they begin the work of Investigation 3, which focuses on identifying the unit of a repeating pattern. In this game, *Break The Train*, students begin to analyze the structure of a repeating pattern by breaking it into units.

- Read the Activity, *Introducing Break the Train*, pp. 115-116.
- Using 12 connecting cubes, construct a cube train pattern. Working in groups of two, break your partner's train into units. Check each other's work and put the trains back together. Exchange your cube train with another member of the group and play another round of *Break the Train*.
- Read the Discussion, *Recording Break the Train*, pp. 117-118. Play another round of *Break the Train* with a partner. This time record your partner's train and how you broke it into cars on Resource Master M18, Break the Train Recording Sheet.
- Read the Teacher Note, *What's the Unit?*, p. 152.

---

**Discuss**

- What might be challenging for students as they work on breaking a pattern into units and constructing a pattern from a known unit?
- How might you support students as they work on identifying the unit of a pattern?

## 6. Wrap Up

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

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**Discuss**

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

## Other Key Features of *What Comes Next?*

- Algebra Connections in This Unit, pp. 16-17
- Classroom Routines in This Unit, p. 18
  - Attendance*
  - Calendar*
  - Today's Question*
  - Patterns on the Pocket Chart*
- Assessment
  - Repeating Patterns (Introduced in Session 1.5)
    - Resource Master M3, Assessment Checklist
    - Teacher Note, pp. 149-151
  - Identifying the Unit of a Pattern (Introduced in Session 3.1)
    - Resource Master M17, Assessment Checklist
  - End-of-Unit Assessment Interview, (Session 3.6-3.7)
    - Teaching Note:
      - Session 3.5, p. 137
      - Session 3.6, p. 139



# Investigations

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Unit Guide for Kindergarten, Unit 4:  
*Measuring and Counting*  
Measurement and the Number System 2



## Unit Guide for Kindergarten, Unit 4

### *Measuring and Counting*

### Measurement and the Number System 2

#### Unit Summary:

Students gain a deeper understanding of numbers and number relationships as they engage in activities in which they count, combine, and compare amounts. They develop visual images of numbers and solve problems in which they find different combinations of the same number. Students are introduced to addition and subtraction situations through story problem contexts. Work with linear measurement continues as students use nonstandard units to measure the length of objects and paths.

#### Materials:

*Measuring and Counting* (1 copy per person)

Resource Master M5, Measuring with Sticks (1 per person)

Resource Master M16, *Roll and Record 2* Recording Sheet (1 per person)

Resource Master M23, Inch Grid Paper (1 per person)

Strips of wide ribbon, adding machine tape or masking tape which are the length of classroom items (5-10 strips; see Materials to Prepare, p. 25)

Craft sticks (10-12 per pair)

1-to-3 dot cubes (1 per pair, see Materials to Prepare, p. 55)

1-to-6 dot cubes (1 per pair)

Connecting cubes (about 10 per person)

Color tiles (1 bin per 4 or 5 people)

Crayons, markers or color pencils (that match the colors of the color tiles)

#### Do the following activities from *Measuring and Counting*:

##### **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. 8-11, *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. 12-15. 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. 17, *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. Measuring with Sticks (Session 1.3)

In Investigation 1 students use multiple nonstandard units, such as craft sticks and connecting cubes to measure the length of objects. In this activity students measure the length of a variety of strips with craft sticks and record their measurements.

- Read the Activity, *Introducing Measuring with Sticks*, pp. 39-40. In partners measure 3 or 4 strips using craft sticks. Record your results on Resource Master M5, *Measuring with Sticks*.

**Discuss**

- What did you need to pay attention to in order to accurately measure the strips using craft sticks?

- Read the Discussion, *Comparing Measurements*, pp. 51-52 in Session 1.5.

- Read the Teacher Note, *Learning About Length: Lining Up Units*, p. 169

**Discuss**

- What ideas or issues about measurement may students be struggling with or working through as they measure with craft sticks?
- How might this discussion help students make sense of some important measurement ideas?

## 3. Roll and Record 2 (Session 2.4)

In Investigation 2, students do some games and activities in which they count quantities and find the total after a small amount is added to a set. In *Roll and Record 2*, students roll a 1-6 and a 1-3 dot cube and record the total.

- Read the Activity, *Introducing Roll and Record 2*, p. 77. In partners, play a round or two of *Roll and Record 2* on Resource Master M16.
- Read the Discussion, *Roll and Record 2*, pp. 78-79.
- Read the Algebra Note, “Does Order Matter When You Count?”, p. 77 and the Math Note, “Counting On”, p. 79.

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**Discuss**

- What is the range of ways you would expect students to use to figure out the total number of dots?
- What will you look for as students play this game?
- What would you hope to learn about students' counting skills and about their understanding of combining amounts as you observe them playing this game?

#### **4. Three Story Problems (Session 3.2)**

Investigation 3 focuses on combining or taking away small amounts. Towards the beginning of this Investigation students begin their work with story problems. They act out story problems about combining and separating and discuss ways to solve the problems. In Unit 6 students continue their work on story problems and begin to solve some on their own.

- Read the Activity, *Three Story Problems*, pp. 96-98. After you read each story problem stop and use cubes or other materials to act out or model what is happening in the problem. (Students will act out the problems themselves when they do this activity.) After acting out or modeling the problem, consider possible student responses to the questions that are posed in the text on pp. 96-97.
- Read the Teaching Notes, "Choosing Appropriate Problems" and "What's the Answer?", p. 96, and the Math Notes, "Presenting Story Problems" p. 96, and "Key Words" and "Building a Foundation" p. 98.

---

**Discuss**

- How does the way this activity is structured help students focus on making sense of the action in the story problems?

- Read the Dialogue Box, *How Are These Stories Different?*, p. 183.

---

**Discuss**

- What are students in this Dialogue Box beginning to figure out about addition and subtraction and about the relationship between the two operations?
- What questions does the teacher ask to help them think about these ideas?

#### **5. Six Tiles in All (Session 4.1)**

In Investigation 4 students explore different ways to compose and decompose numbers. In the Six Tiles activity, students arrange six tiles in a variety of ways and describe their arrangements. Later in Investigation 4 students arrange 5-10 tiles in different ways. They do similar activities in Unit 6 with more of a focus on using equations to describe their arrangements.

- Read the Activity, *Introducing Six Tiles in All*, pp. 129-131. Make at least three different arrangements of six tiles. Record one of your arrangements on Resource Master M23, Inch Grid Paper. Share your arrangements with the group, asking each person to describe his or her arrangement.



- Read the Discussion, *Different Arrangements of 6*, pp. 158-159 in Session 4.7.

**Discuss**

- What might students discover about the number 6 as they do this activity?
- How might doing the Six Tiles activity help students begin to explore important numerical relationships?

**6. Wrap Up**

- Look back at the unit overview, pp. 8-11.

**Discuss**

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

## Other Key Features of *Measuring and Counting*

- Algebra Connections in This Unit, pp. 18-19
- Classroom Routines in This Unit, pp. 20
  - Attendance*
  - Calendar*
  - Today's Question*
  - Patterns on the Pocket Chart*
- Assessment
  - Measuring Lengths (Introduced in Session 1.1)
    - Resource Master M3, Assessment Checklist
  - Counting (Introduced in Session 2.1)
    - Resource Master M15, Assessment Checklist
  - One More, One Fewer (Introduced in Session 3.3)
    - Resource Master M22, Assessment Checklist
    - Teacher Note, pp. 176-177
  - End-of-Unit Assessment Interview (Sessions 4.8-4.9)
    - Teaching Notes:
      - Session 4.7, p. 161
      - Session 4.8, p. 163
      - Session 4.9, p. 166



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

Unit Guide for Kindergarten, Unit 5:  
*Make a Shape, Build a Block*  
2-D and 3-D Geometry



## Unit Guide for Kindergarten, Unit 5

### *Make a Shape, Build a Block*

### 2-D and 3-D Geometry

#### Unit Summary:

Students explore geometry using a variety of materials, including Geoblocks, pattern blocks, interlocking cubes and geoboards. They describe, sort, and compose and decompose two- and three-dimensional shapes. They think about shapes in their environment and match two-dimensional shapes to three-dimensional objects.

The *Shapes* software is introduced 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:

*Make a Shape, Build a Block* (1 copy per person)

Resource Masters M1-M3, Shape Cutouts A-F (copy on colored paper, 1 or 2 shapes per person)

Resource Master M4, Text for Shape Book (1 per pair, cut apart)

Resource Masters M20-M29, Pattern Block Puzzle 1-10 (1 or 2 copies of each, enough for at least 1 per person)

Drawing materials (crayons, markers, color pencils)

Glue stick or paste

Blank Paper (1 per person)

3-inch balls of clay or playdough (1 per person)

Cardboard workmats (optional, 1 per person; see Materials to Prepare, p. 19)

Pattern blocks (1 bucket per 4-6 students)

*Shapes* software installed on computer(s)

Geoblocks (class set divided into equal subsets)

#### Do the following activities from *Make a Shape, Build a Block*:

#### 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*.

#### 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. Shape Pictures (Session 1.1)

In a few different activities in this unit students relate shapes to real world objects or look for shapes in their surrounding environment: they create a shape mural, do shape hunts and turn shapes into real world objects. In this activity they select a shape and create a picture that incorporates that shape.

- Read the Activity, *Introducing Shape Pictures*, pp. 24-25. Working individually, choose a shape cutout (Resource Masters M1-3), paste it on a blank piece of paper and create a picture that incorporates that shape. Use a sentence strip cut from Resource Master M4, Text for Shape Book to add text. Look at the student work examples on pp. 26-27.
- Read the Dialogue Box, *Ideas for a Book of Shapes*, pp. 145-146.

#### Discuss

- What do the students’ ideas about what to make out of specific shapes show about their understanding of shapes?
- How can relating 2-D shapes to real-world objects help students develop an understanding of shapes?

## 3. Clay Shapes (Session 1.4)

Throughout this unit students construct shapes themselves. They construct 2-D shapes out of clay, pattern blocks and on geoboards and construct 3-D shapes out of clay and Geoblocks. In this activity students use ropes of clay to construct outlines of familiar shapes.

- Read the Activity, *Introducing Making Clay Shapes*, p. 41. Make outlines of a few shapes out of “ropes” of clay or playdough. Save one shape to share.

#### Discuss

- What knowledge of shapes did you draw on to create the shapes you made?

- Read the Discussion, *Sharing Our Clay Shapes*, pp. 42-43. Organize your shapes into the categories suggested. Have a discussion about one of the ideas on the bulleted list.

- After students have this initial opportunity to construct clay shapes, Make-Shape Cards are made available to use as reference as students construct more shapes both with clay and on geoboards.
- Read the Discussion: *Circles and Rectangles*, pp. 30-32 in Session 1.2, and the Dialogue Box, *Circles and Ovals* (pp. 148-149). (The discussion *Circles and Rectangles* comes before the *Clay Shapes* activity.)

#### Discuss

- How will having the *Circles and Rectangles* discussion prior to doing the clay shapes activity help students as they construct clay shapes?
- How do the students in the Dialogue Box compare circles and ovals after having constructed them themselves?

### 4. Pattern Block Puzzles (Session 2.2)

In this unit students have the opportunity to decompose and compose both 3-D and 2-D shapes. In this activity students fill shape outlines with pattern block shapes.

- Read the Activity, *Introducing Pattern Block Puzzles*, p. 65. Using Resource Masters M20-29, Pattern Block Puzzles 1-10, do two or three pattern block puzzles. The puzzles range in difficulty: #1 is the easiest and #10 is the hardest.

#### Discuss

- What would you hope students might notice or figure out as they did these puzzles?

- Read the Ongoing Assessment: Observing Students at Work section under 3A, *Pattern Block Puzzles*, pp. 66-67. Look at the Assessment Checklist: Constructing (and Decomposing) 2-D and 3-D Shapes, pictured in the sidebar on p. 67.

#### Discuss

- What might you record on this assessment checklist as you observe students doing *Pattern Block Puzzles*?
- What might your observations tell you about specific students' understandings of 2-D shapes?

### 5. (Optional) Shapes Software: Solving Puzzles (Session 2.2)

Activities using the *Shapes* software are suggested throughout this unit. Using the *Shapes* software gives students the opportunity to continue and extend their work on important geometrical ideas.

If you have access to computers this is an opportunity to become familiar with this software. Install the software, found on the CD in the Kindergarten Resources Binder, on the computer you will be using.

- Look through the *Shapes Users' Guide* found on the CD to help you get started with the software.
- Click on “Puzzles” in the activity menu and select which material you want to use and the level. Do 1 or 2 puzzles with a partner.
- Read the Teacher Note, *About the Math in the Shapes Software*, p. 141.

#### Discuss

- How is solving puzzles with the *Shapes* software different from using actual pattern blocks?
- What aspects of composing and decomposing shapes can the software highlight?

### 6. Matching Faces (Sessions 3.3)

Investigation 3 focuses on 3-D shapes. Students look for 3-D shapes in their environment, describe and compare 3-D shapes, construct 3-D shapes, and combine 3-D shapes to make other 3-D shapes. In this activity students find pairs of Geoblocks that have matching (congruent) faces.

- Read the Discussion, *A Close Look at Geoblocks*, pp. 100-103 in Session 3.2, and the Activity, *Introducing Copying Cubes and Matching Faces*, p. 105. Work with a partner to find multiple pairs of Geoblocks that have matching faces.
- Read the Discussion, *Finding a Match*, pp. 114-115 in Session 3.4.

#### Discuss

- What mathematical ideas in the Matching Faces activity does this discussion highlight?

- Look at the miniatures of the Student Math Handbook Flip Chart pp. 60-64, found on pp. 154-155.

#### Discuss

- What is the range of ways that students describe 3-D shapes?
- How could you use these flip chart pages with students in a way that will support their own exploration of 3-D shapes?

### 7. 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 *Make a Shape, Build a Block*

- *Shapes Software*
  - Teacher Note, *Introducing and Managing the Shapes Software*, pp. 138-140
  - Teacher Note, *About the Math in the Shapes Software*, p. 141
- Classroom Routines in this Unit, p. 14
  - Attendance*
  - Calendar*
  - Today's Question*
  - Patterns on the Pocket Chart*
- Assessment
  - Describing Shapes (Introduced in Session 1.1)
    - Resource Master M7, Assessment Checklist
  - Constructing 2-D and 3-D Shapes (Introduced in Session 1.4)
    - Resource Master M10, Assessment Checklist
  - Constructing (and Decomposing) 2-D and 3-D Shapes (Introduced in Session 2.2)
    - Resource Master M30, Assessment Checklist
  - End-of-Unit-Assessment Interview (Sessions 3.7-3.8)
    - Teaching Notes:
      - Session 3.5, p. 120
      - Session 3.6, p. 124
      - Session 3.8, p. 130





# Investigations

in Number, Data, and Space®

Unit Guide for Kindergarten, Unit 6:  
*How Many Do You Have?*  
Addition, Subtraction and the Number System



## Unit Guide for Kindergarten, Unit 6

### *How Many Do You Have?*

### Addition, Subtraction, and the Number System

#### Unit Summary:

Students continue to work with counting and number composition as they count sets of objects and find multiple combinations of the same number as they decompose numbers to 10. They use numbers and notation to describe arrangements of tiles and number combinations. Students continue to develop an understanding of the operations of addition and subtraction as they act out, model, solve story problems, and play games that involve combining or separating small amounts.

#### Materials:

*How Many Do You Have?* (1 copy per person)  
Chart paper with Quick Images (optional, see Materials to Prepare, p. 25)  
Overhead projector (optional)  
Color tiles (about 10 per person)  
Inventory bags (at least one per pair; see Materials to Prepare, p. 65)  
Resource Master M10, Inventory Bag (1 per person)  
Student Activity Book, p. 63, *How Many Balls?* (1 per person)  
Blue and red crayons or cubes (5 of each per person)  
Student Activity Book, p. 66, *Five Crayons in All* (1 per person)  
Red and blue crayons, markers or color pencils

### Do the following activities from *How Many Do You Have?*:

#### 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. 8-11, *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. 12-15. 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. 17, *Assessing the Benchmarks*.

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**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. Quick Images: Square Tiles (Session 1.1)

In Investigation 1 students investigate combinations that make a number as they arrange tiles and explore different ways a set of two-color counters can land. They consider how notation can represent these situations. *Quick Image: Square Tiles* is the activity that begins this work. Students look at arrangements of tiles, which are shown quickly and describe the arrangements using numbers and addition notation.

- Have one person lead a few rounds of *Quick Images* using the images on pp. 29-30 (only one person should look at the images in the book). The person builds the image with square tiles on an overhead or on a table and covers it up so no one can see it. Alternately the images can be drawn on chart paper. The person shows one image/tile arrangement for a few seconds to the rest of the group and then quickly covers it up. The other people try to build it. Then the person shows it quickly again and the other can finish or change their arrangements. Finally the person uncovers the arrangement and asks; ‘How did you remember what my arrangement looked like? How many squares are there in all? How can you tell there are 6 in all?’ Follow the same sequence for each of the images on p. 30 (only one person should look at the images in the book). Everyone should read through the activity on pp. 29-30 once you have finished doing the activity.
- Read the Teacher Note *Introducing Notation in Kindergarten*, pp. 163-164 and look at the miniatures of the Student Math Handbook Flip Chart page “Five Tiles,” pictured on p. 191.

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**Discuss**

- How could you represent each of the tile arrangements you looked at using equations?
  - What other ways might students describe or represent the quantities in the tile arrangements?
- Read the Discussion, *Combinations of Six*, pp. 160-161, in Session 4.6 and the Algebra Note, “3 and 3 is 6 No Matter What,” p. 161.

---

**Discuss**

- How can this Quick Images activity begin to help students understand that numbers can be composed in different ways and become familiar with the different combinations that can make a number?
- How will knowing the different combinations that make a number help students in later grades in their work with addition and subtraction?

### 3. Inventory Bags (Session 2.2)

In Investigation 2 students count and represent quantities up to 20. Some of the activities and discussions provide opportunities for students to move from counting from one to find a total to counting on or combining quantities to find a total. In the *Inventory Bags* activity students count the number of objects in inventory bags that contain related objects and make a representation that shows how many of each kind of object are in the bag and how many total objects are in the bag.

- Read the Activity, *Introducing Inventory Bags*, p. 75. With a partner choose an Inventory Bag to work on. Complete Resource Master M10, My Inventory Bag.
- Read the Discussion, *How Did You Count?*, p. 88 in Session 2.5.

#### Discuss

- How is this Inventory Bags activity different from the one in Unit 4, *Measuring and Counting*?
- How might students' strategies for finding the total number of objects be different at this time of year?

- Read the Discussion, *Representing an Inventory*, pp. 93-94.

#### Discuss

- What are the different ways you would expect students to represent how much and what was in their inventory bag?
- What aspects of representation is this discussion highlighting?
- How can you support your students as they begin to work on making representations to communicate their thinking and strategies to others?

### 4. How Many Balls? (Session 3.5)

Investigation 3 focuses on adding and subtracting small quantities. In this Investigation students continue their work from Unit 4 on solving story problems. They first solve story problems as a whole group, modeling the action of the problems with cubes. In this activity students solve a story problem on their own and record their solutions.

- Read the Activity, *Acting Out Story Problems*, pp. 103-104 in Session 3.1, and the Activity, *Modeling Story Problems*, pp. 111-112 in Session 3.3 to see the work students do with story problems in this Investigation before they are asked to record their solutions on paper.

#### Discuss

- How could working on story problems as a whole group as described in these two activities help students once they begin to solve story problems on their own and record their solutions?

- Read the Activity, *Introducing How Many Balls?*, p. 120. Solve the problem and record your solution in a way you think a kindergartener might on Student Activity Book, p. 63, *How Many Balls?*. Share your strategies and recordings. Discuss other possible ways students might solve the problem.

- Read the Teacher Note, *Three Approaches to Story Problems in Kindergarten*, pp. 174-175.

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**Discuss**

- How are the three approaches described in the Teacher Note different?
- How can identifying the approaches your students are using to solve story problems be helpful in supporting your students' learning?

- Read the Teacher Note, *Assessing Addition*, pp. 168-169. Spend some time specifically talking about the work of Abby, Manuel, Rebecca, and Corey.

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**Discuss**

- For each student, discuss:
  - What strategy did the student use to solve the problem?
  - What do you think this student understands about addition?
  - What do you think this student is still figuring out about addition?

## 5. Five Crayons in All (Session 4.1)

In this Investigation students investigate combinations that make a number as they solve a specific type of story problem and as they play games. In this activity students solve a problem in which they have five crayons altogether, some blue and some red. They determine one or more combinations of blue and red crayons they could have to make 5 in all.

- Read the Activity, *Introducing Five Crayons in All*, p. 139. Solve the problem as you think a student might and record your solution as a student might on Student Activity Book, p. 66, *Five Crayons in All*. Share your strategies and solutions.
- Read the Math Note, “How Many of Each? Problems”, p. 139, the Algebra Note, “Using One Solution to Find Another”, p. 139 and the Teaching Note, “More Than One Solution”, p. 140. Read the Differentiation: Supporting the Range of Learners section, p. 141.

---

**Discuss**

- How are *How Many of Each?* problems different from other more straightforward addition and subtraction story problems?
- How does this problem naturally allow for a range of learners to solve it?
- How can you support students who find this problem challenging?

## 6. Wrap Up

- Look back at the unit overview, pp. 8-11.

---

**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 Do You Have?*

- Algebra Connections in This Unit, pp. 18-19
- Classroom Routines in This Unit, p. 20
  - Attendance*
  - Calendar*
  - Today's Question*
  - Patterns on the Pocket Chart*
- Assessment
  - Writing Numbers to 10 (Introduced in Session 1.3)
    - Resource Master M5, Assessment Checklist
  - Counting (Introduced in Session 1.4)
    - Resource Master M6, Assessment Checklist
  - Addition (Introduced in Session 2.6)
    - Resource Master M12, Assessment Checklist
    - Teacher Note, pp. 168-169
  - End-of-Unit Assessment Interview (Sessions 4.5-4.6)
    - Teaching Notes:
      - Session 4.3, p. 150
      - Session 4.4, p. 154
      - Session 4.6, p. 160



**Investigations**  
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Unit Guide for Kindergarten, Unit 7:  
*Sorting and Surveys*  
Data Analysis



## Unit Guide for Kindergarten, Unit 7

### *Sorting and Surveys*

### Data Analysis

#### Unit Summary:

Students sort objects according to common attributes, as well as sort data about their class. They collect, record, and represent categorical and numerical data about their class, and they carry out their own data investigation by collecting responses to their own survey questions.

#### Materials:

*Sorting and Surveys* (1 copy per person)

Student Activity Book, p. 77, “Do You Like...?” Survey Chart (1 per person)

Index cards or slips of paper, 3 x 5 (1 per person)

Index cards or slips of paper, 5 x 7 (1-3 per person)

Crayons or markers

Tape

“People and Eyes” Chart (see Materials to Prepare, p. 21)

Blank Paper (1 to 2 per person)

Materials for making data representations such as: connecting cubes, buttons, dot stickers, 1-inch squares of colored paper

### Do the following activities from *Sorting and Surveys*:

#### 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. How Many Eyes? (Session 1.3)

In Investigation 1 students count the number of people, noses and eyes in the class and represent the data in a variety of ways. They also solve a problem about whether there are enough chairs for the class. In the *How Many Eyes?* activity students count the number of eyes in the class and make a class eye chart as a way to record the data. They look at the correspondence between the number of people and the number of eyes.

- Read the Activity, *Introducing How Many Eyes?*, pp. 38-39. Discuss possible responses students might have to the questions posed in the text.
- Working individually, draw your own eyes on an index card. Post these “eye” cards, vertically on a piece of chart paper. Read through the Activity, *How Many Eyes?*, pp. 39-42. Discuss possible responses students might have to each of the questions.
- Look at the “Students Might Say” section, pp. 41-42.

---

**Discuss**

- What other responses would you expect from students?

- Read the Teacher Note, *One-to-One and Two-to-One Correspondence*, pp. 126-127.

---

**Discuss**

- What do you think Ricardo and Jennifer understand about one-to-one correspondence? What don’t they understand? What questions does the teacher ask to try to uncover their understanding?
- What is challenging about the idea of two-to-one correspondence? What might be an indication that a student is beginning to make sense of this idea?

## 3. Favorite Lunch Foods (Session 2.6)

In Investigation 2 students sort a variety of objects by their attributes. *Favorite Lunch Foods*, the last activity in this Investigation, connects the work on sorting objects to collecting data, as the students sort data about their favorite lunch foods.

- Read the Activity, *Introducing the Lunch Food Data Activity*, p. 89 and the Activity, *Generating Lunch Food Data*, pp. 89-90. Working individually, draw a favorite part of your lunch on an index card. Make at least 10 index cards with lunch foods on them. (If there are not many people in your group each of you should draw a few different parts of your lunch, each on a separate card.)

- Read the Discussion, *Sorting Favorite Lunch Food Data*, pp. 92-95. Sort your data in a few different ways.

**Discuss**

- For each way you sort the data, discuss:
  - What do you notice about your favorite lunch foods?
  - Which category of lunch foods did more people have as favorite?
  - Why do you think more people [like fruits]?

- After you have talked about your different sorts, discuss:

**Discuss**

- How did the different ways you sorted the data highlight different aspects of the data?

- Read the Dialogue Box, *Is a Peach Dessert or Not?*, p. 143.

**Discuss**

- What is challenging about sorting data into categories? How might the early work with sorting of objects by attributes help students with sorting data?
- What ideas or issues are students struggling with in this Dialogue Box?
- How do the questions the teacher asks and the statements she makes help students make sense of some of these ideas or issues themselves?
- What might be some of the benefits of students sorting data in different ways and coming up with their own categories?

#### 4. “Do You Like...?” Surveys (Sessions 3.1-3.3)

Conducting “Do You Like...?” surveys is the main focus of Investigation 3. Students choose their own survey question, collect data from their classmates in response to their question, record their classmates’ responses and then share their results to their survey with the class.

- If you have enough people in your group, do the “Do You Like...?” surveys yourselves. Follow the directions for choosing a question, collecting data, recording data and sharing data as written in Activities 1 and 2, pp. 101-104 in Session 3.1; Activity 1A pp. 107-108 in Session 3.2 and in the Discussion, pp. 112-113 in Session 3.3.

If you do not have enough people just read through the activities and discussions listed above.

- Read the Teaching Notes, “Collecting Data from Only Some Students” and “Maybe, I Don’t Know, I Can’t Decide” on p. 107.

**Discuss**

- What might students learn about data by participating in the whole data collection process?
- What issues or ideas about data might come up as students conduct their surveys?

- Read the Discussion, *What's Your Question?*, pp. 104-105 and the Discussion, *Recording Responses?* pp. 109-110.

**Discuss**

- How do these discussions address some of the issues/ideas that might come up as students conduct their surveys?

- Read the Teaching Note, "Structuring Data Collection", p. 101.

**Discuss**

- For your classroom, how do you plan to structure the data collection for the "Do You Like...?" surveys?

## 5. How Many Students Are Here Today? (Sessions 3.4-3.5)

For the End-of-Unit Assessment students solve a problem using the attendance data from their classroom. Students determine who is absent, and then use this information along with the total number of students in the class to determine how many students are in school that day. They make a model or representation to explain how they determined the number of students in school.

- Read the Activity, *Introducing the Problem*, p. 115. Solve the problem in a way you think students might, using some of the materials suggested to solve the problem and then show your work on paper.
- Read the Ongoing Assessment: Observing Students at Work section, p. 117. Read the Teacher Note, *Assessing Students as They Use Data to Solve Problems*, pp. 135-137 and look at the *Assessment Checklist: Using Data to Solve Problems* pictured on p. 116.

**Discuss**

- Choose two or three students from the Teacher Note and discuss what you would record on the assessment checklist about each student.

## 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 *Sorting and Surveys*

- Classroom Routines in this Unit, p. 16
  - Attendance*
  - Calendar*
  - Today's Question*
  - Patterns on the Pocket Chart*
- Assessment
  - Representations of Data (Introduced in Session 1.1)
    - Resource Master M3, Assessment Checklist
  - Using Data to Solve Problems (Introduced in Session 1.4)
    - Resource Master M4, Assessment Checklist
  - Sorting (Introduced in Session 2.2)
    - Resource Master M8, Assessment Checklist
  - End-of-Unit Assessment: *Solving a Problem Using Attendance Data* (Sessions 3.4-3.5)
    - Resource Master M4, Assessment Checklist
    - Teacher Note, *Assessing Students as They Use Data to Solve Problems*, pp. 135-137