

## Investigations: Teaching Resources

**Introduction** This guide provides an explanation of the Investigation teacher resources.

The following are the materials discussed in this guide:

- Implementing Investigations guide
- Curriculum Unit
- Resources Binder

**Implementing Investigations** The Implementing Investigations guide provides information about the math that is taught. Parts 1 and 2 explain introductory information, such as the philosophy, organization, and components of the program. Part 2 also discusses how to arrange the classroom.

A highlight of the guide is Part 3. Here, teachers will read about the topics students learn during the year. It states the mathematical emphases or objectives, concepts taught, examples of strategies students use, and benchmarks students should reach. This part of the guide maps out what teachers need to teach during the course of a year in a manageable way.

Part 4 details the grade-specific activities that teachers facilitate outside of the math block to maintain and apply math skills. This includes Classroom Routines for Grades K–3 and Ten-Minute Math for Grades 3–5. Grade 3 uses Classroom Routines and Ten-Minute Math, so both activities are explained in the Grade 3 Implementing Investigations guide.

Classroom Routines are done regularly and offer practice and review of concepts while Ten-Minute Math is done less frequently and supports and balances the in-depth work of each Curriculum Unit.

One example of a Classroom Routine in the primary grades is Today's Question, in which students record their answer to a survey question with two possible answers on a two-column table. An example of Ten-Minute Math in the intermediate grades is Number Puzzles: students work in pairs to identify the number or numbers that fit three given clues. One type of activity both Classroom Routines and Ten-Minute Math share is Quick Images. After seeing an image for a few seconds, students either draw or build a copy of it based on the mental picture they created during the brief viewing. This activity helps students visualize patterns and geometric figures so they can express math concepts through images, words, and numbers.

After their first introduction during a lesson, these activities are intended to take place outside of math time. These tasks work well during a morning meeting, before recess, or at the end of the day.

Part 5, Technology in Investigations, explains calculator use in the

classroom as well as how to introduce and manage the student software: *Shapes* for primary grades and *LogoPaths* for intermediate.

More information is available in the Student Software tutorial on MyPearsonTraining.com.

Parts 6 and 7—the Professional Development and Working with the Range of Learners sections—provide information about how students learn. This collection of essays and grade-specific cases assist teachers in setting up their rooms and activities.

A series of reference tools is located within Parts 8 and 9 of the guide. Teachers can quickly and easily locate standards or vocabulary they may need while planning.

The Scope and Sequence section lists the math emphases and focal points for each level as well as for the preceding and upcoming grades. Understanding what students should already know and how the topics they learn are applied in a future grade helps teachers stay focused on the curriculum at their grade level.

Read the Implementing Investigations guide from cover to cover to understand the program goals and for advice on how to teach Investigations successfully.

### **Curriculum Units—Table of Contents**

There are nine units for each grade level, except Kindergarten, which has seven. The following sections are found in every Curriculum Unit for every grade:

- Introduction and Overview
- Teacher Notes
- Dialogue Boxes
- Student Math Handbook
- Index

One of the features of the Curriculum Units is that each Investigation is represented by a different color. This is one of the many ways that Investigations helps teachers stay organized. Pages are color-coded as follows:

- Investigation 1 is green
- Investigation 2 is red
- Investigation 3 is purple
- Investigation 4 is orange

Contents	
U N I T 5	
<b>Equal Groups</b>	
INTRODUCTION AND OVERVIEW	
Investigations Curriculum	6
Overview of This Unit	8
Mathematics in This Unit	10
Assessment in This Unit	14
Algebraic Connections in This Unit	16
Classroom Routines and Ten-Minute Math in This Unit	18
Practice and Review in This Unit	19
Differentiation in This Unit	29
INVESTIGATION 1	
<b>Things That Come in Groups</b>	
INVESTIGATION 1 PLANNER	22
SESSION 1.1 Many Things Come in Groups	24
SESSION 1.2 How Many in Several Groups?	28
SESSION 1.3 Solving Multiplication Problems	34
SESSION 1.4 Assessment: Solving Problems About Our Pictures	39
INVESTIGATION 2	
<b>Skip Counting and 100 Charts</b>	
INVESTIGATION 2 PLANNER	44
SESSION 2.1 Highlighting Multiples on 100 Charts	48
SESSION 2.2 More Multiples	53
SESSION 2.3 Solving Related Story Problems	59
SESSION 2.4 Patterns and Relationships	64
SESSION 2.5 Assessment: Counting Around the Class	71
SESSION 2.6 Using Multiplication Combinations	76
INVESTIGATION 3	
<b>Arrays</b>	
INVESTIGATION 3 PLANNER	80
SESSION 3.1 Arranging Chairs	82
SESSION 3.2 Investigating Arrays	87
SESSION 3.3 Finding the Number of Squares in an Array	92
SESSION 3.4 Array Games—Part 1	97
SESSION 3.5 Learning Multiplication Combinations	101
SESSION 3.6 Array Games—Part 2	107
INVESTIGATION 4	
<b>Understanding Division</b>	
INVESTIGATION 4 PLANNER	112
SESSION 4.1 Solving Division Problems	116
SESSION 4.2 Multiply or Divide?	121
SESSION 4.3 Writing Story Problems	125
SESSION 4.4 Missing Factors	129
SESSION 4.5 Solving Multiplication and Division Problems	133
SESSION 4.6 Solving Multiplication and Division Problems, continued	137
SESSION 4.7 End-of-Unit Assessment	141
Teacher Notes Dialogue Boxes	145
Student Math Handbook	176
Index	182

Each Investigation is labeled with a title, the planner page, and the Sessions (or lessons) within the Investigation.

INVESTIGATION 1	
<b>Things That Come in Groups</b>	
INVESTIGATION 1 PLANNER	22
SESSION 1.1 Many Things Come in Groups	24
SESSION 1.2 How Many in Several Groups?	28
SESSION 1.3 Solving Multiplication Problems	34
SESSION 1.4 Assessment: Solving Problems About Our Pictures	39

The *Teachers, Let's Investigate* tutorial on MyPearsonTraining.com provides further details.

### Curriculum Units—Teacher Helpers

The Introduction and Overview section is worth reading before teaching a unit. One part of this section is an Overview of This Unit chart that organizes the concepts and activities taught. There is also a suggested time frame for the unit.

Overview OF THIS UNIT		
Investigation	Session	Day
<b>INVESTIGATION 1</b> <b>Things That Come in Groups</b> Students make lists of things that come in groups. They illustrate multiplication situations and write equations to match.	1.1 Many Things Come in Groups	1
	1.2 How Many in Several Groups?	2
	1.3 Solving Multiplication Problems	3
	1.4 Assessment: Solving Problems About Our Pictures	4
<b>INVESTIGATION 2</b> <b>Skip Counting and 100 Charts</b> Students highlight multiples on 100 charts and discuss patterns and relationships. They use known multiplication combinations to solve more difficult ones.	2.1 Highlighting Multiples on 100 Charts	5
	2.2 More Multiples	6
	2.3 Solving Related Story Problems	7
	2.4 Patterns and Relationships	8
	2.5 Assessment: Counting Around the Circle	9
<b>INVESTIGATION 3</b> <b>Arrays</b> Students are introduced to arrays to represent multiplication. They use arrays to learn multiplication combinations with products up to 50 and to find factors of numbers up to 50.	3.1 Arranging Chairs	10
	3.2 Investigating Arrays	11
	3.3 Finding the Number of Squares in an Array	12
	3.4 Array Games—Part 1	13
	3.5 Learning Multiplication Combinations	14
	3.6 Array Games—Part 2	15
<b>INVESTIGATION 4</b> <b>Understanding Division</b> Students examine the inverse relationship between multiplication and division. They write story problems for a given multiplication and division problem.	4.1 Solving Division Problems	16
	4.2 Multiply or Divide?	17
	4.3 Writing Story Problems	18
	4.4 Missing Factors	19
	4.5 Solving Multiplication and Division Problems	20
	4.6 Solving Multiplication and Division Problems, continued	21
	4.7 End-of-Unit Assessment	22

Another feature of the Introduction and Overview section is Mathematics in This Unit. This is similar to Part 3 of the Implementing Investigations guide; the difference is that the information is unit specific.

### Mathematics IN THIS UNIT

Equal Groups is the third Grade 3 unit in the number and operations strand of Investigations. It begins the Grades 3 to 5 sequence of multiplication and division units. In these units, students investigate the properties of multiplication and division, examine the inverse relationship between these two operations, and develop strategies for solving multiplication and division problems.

During Grade 2, most students make the shift from working and counting primarily in ones, to working and counting by groups of ones. Students began to develop strategies for counting by equal groups. This work was set in contexts that encouraged counting by groups of 2, 5, or 10. Students found the number of legs or fingers in a group of people, used coin equivalencies to make trades, and represented quantities with tally marks. The work culminated in activities focused specifically on groups of six and on the base-ten structure of our number system (i.e., 50 is made up of 5 tens and 0 ones). Students also began working with division situations as they solved problems about sharing a variety of objects equally and making equal-size groups.

This unit focuses on 5 Mathematical Emphases:

- 1 Whole Number Operations: Understanding the meaning of multiplication**

**Math Focus Points**

  - Understanding multiplication as combining equal groups
  - Writing and solving multiplication problems in context
  - Identifying the number of groups, the number in each group, and the product in a multiplication situation
  - Understanding the relationship among skip counting, repeated addition, and multiplication
  - Using and understanding multiplication notations
- 2 Whole Number Operations: Reasoning about numbers and their factors and multiples**

**Math Focus Points**

  - Finding the multiples of the numbers 2, 3, 4, 5, 6, and 10 by skip counting
  - Describing and comparing characteristics of the multiples of a number
  - Understanding that doubling (or halving) one factor in a multiplication expression doubles (or halves) the product

At the beginning of this unit, students work focuses on developing the idea that multiplication involves some number of equal-sized groups. Students put this understanding into practice through writing and solving multiplication problems in familiar contexts. They examine and identify the three pieces of mathematical information in a multiplication situation—the number of groups, the size of each group, and the product. They are introduced to and learn to use multiplication notations.

Things That Come in 2s

eyes shoes

ears mittens

tails

As students solve problems in context, they develop their own strategies for doing multiplication and division. They learn that both operations involve equal groups. Multiplication is typically used when the size of each group and the number of groups is known and we want to find the product—the total number of items. Division is used when the total quantity is known and we want to find out either the number or the size of the groups.

Subsections called Looking Back and Looking Forward explain what students already know and what they will continue to learn about a topic. Samples of student work and dialogue are inserted throughout the section.

Assessments are represented in this section as well. There are ongoing, written, and portfolio assessment opportunities for a unit.

Assessment		
IN THIS UNIT		
<b>ONGOING ASSESSMENT: Observing Students at Work</b>		
The following sessions provide Ongoing Assessment: Observing Students at Work opportunities:		
• Session 1.1, pp. 26 and 27	• Session 2.4, p. 69	• Session 4.1, p. 118
• Session 1.2, pp. 30 and 33	• Session 2.5, p. 74	• Session 4.2, p. 122
• Session 1.3, p. 37	• Session 3.1, p. 85	• Session 4.3, p. 127
• Session 1.4, p. 41	• Session 3.2, p. 90	• Session 4.4, p. 131
• Session 2.1, pp. 50 and 52	• Session 3.4, p. 99	• Session 4.5, p. 136
• Session 2.2, p. 57	• Session 3.5, p. 105	• Session 4.7, p. 142
• Session 2.3, p. 62	• Session 3.6, p. 109	
<b>WRITING OPPORTUNITIES</b>		
The following sessions have writing opportunities for students to explain their mathematical thinking:		
• Session 1.2, p. 33 Student Activity Book, p. 3	• Session 2.5, p. 75 Student Activity Book, p. 24	• Session 4.3, p. 126 Writing Problems for the Class Book
• Session 2.3, p. 61 Student Activity Book, p. 16	• Session 3.4, p. 100 Student Activity Book, p. 33	
<b>PORTFOLIO OPPORTUNITIES</b>		
The following sessions have work appropriate for a portfolio:		
• Session 1.2, p. 33 106, Pictures of Things That Came in Groups	• Session 2.5, p. 74 1015, Assessment: Counting Around the Class	• Session 4.2, p. 122 Student Activity Book, p. 42
• Session 2.3, p. 60 Student Activity Book, p. 14	• Session 3.4, p. 98 Student Activity Book, p. 31	• Session 4.7, p. 142 M44, End of Unit Assessment

The Algebra Connections section highlights algebraic tie-ins and how students are prepared to think algebraically. Sample conversations between teachers and students give teachers an idea of what to consider when teaching and speaking with their students about math.

Other sections are Classroom Routines for Grades K–3 and Ten-Minute Math for Grades 3–5. These list the practice and review activities used in a unit.

Other unit-specific resources are the Practice and Review section, which explains where key concepts are reinforced, and the Differentiation section, which gives suggestions on how to help and engage students who require additional support, challenge, or assistance with language barriers.

Professional development resources are located toward the back of the unit. A plastic divider separates these professional resources from the teaching resources in the Curriculum Unit. The Teacher Notes offer information about the math content in a unit and how students learn, and the Dialogue Boxes give examples of how class discussions may evolve during different Sessions.

In addition, images of pages from the Student Math Handbook used in the unit and an Index provide easy reference and support.

## Resources Binder

The Resources Binder holds all the masters needed for copying, the CD-ROMs that come with the program, and the transparencies teachers use during Investigations.

The masters are organized by unit and are numbered with the unit number, then *M*, and then a page number (e.g., *Unit 1 M13*). The pages are numbered by unit, so there is more than one M13 in the binder. Look for the corresponding unit to avoid copying the wrong material before a lesson.

The CD-ROMs used in the program are in this binder as well. The CD-ROMs include the Resource Masters and Transparencies for teachers and either *Shapes* for Grades K–2 students or *LogoPaths* for Grades 3–5.

To get started using these resources, watch the software tutorials on [MyPearsonTraining.com](http://MyPearsonTraining.com).

The Transparencies sections in the Grades 1–5 binders are a time saver. These pages are labeled with a *T*. Unlike the page numbers for the master's pages, the transparencies are consecutive, so teachers do not need to look for a specific unit when searching for a page.

## Review

This guide reviewed the teaching resources used in Investigations. To summarize:

- The Implementing Investigations guide helps teachers get started with Investigations and allows them to find information they may need while planning.
- The Curriculum Unit is the Teacher's Guide. There are nine units for Grades 1–5 and seven in Kindergarten.
- The Resource Binder holds the software and all of the papers needed for copying and teaching.

These resources make teaching Investigations simple, convenient, and enjoyable!

To find out more about the products mentioned in this tutorial, visit [MyPearsonTraining.com](http://MyPearsonTraining.com).