

Investigations: Teaching Concerns Answered

Introduction This tutorial answers some of the questions teachers may have about Investigations, including whether there is differentiated instruction and how communication skills are integrated into the program.

Where is the practice? There is extensive practice throughout the Investigations units. Activities such as Classroom Routines and Ten-Minute Math, as well as materials such as the Student Activity Book and the Student Math Handbook, provide many opportunities for students to practice.

Classroom Routines and Ten-Minute Math are daily opportunities to build computational fluency and mathematical reasoning.

The Student Activity Book pages are used as classwork, homework, and ongoing review. More daily practice sheets are included in the 2nd edition. These are used during lessons, as homework, or for review.

The Student Math Handbook is a great addition to the program. The Math Words and Ideas pages provide students with visual modeling, application questions, and definitions. The Games section helps students develop, practice, and extend conceptual understanding.

The technologies in Investigations provide even more practice. The ExamView assessment software is used to create worksheets, practice tests, and tests that resemble the state-testing format. Success Tracker has additional curriculum unit tests in a multiple-choice format, pre- and posttests, and a variety of practice worksheets. It also provides students with remediation activities, tutorials, and dynamic examples.

There are many opportunities for extra practice within the program. Teachers do not need to track down supplemental worksheets or make their own tests with all of these options.

Where is the assessment? There are multiple informal and formal assessment opportunities for teachers.

Informal assessment is provided through various methods, including ongoing observations, writing opportunities, activities, and discussions.

Ongoing observations in lessons help teachers get to know their students as mathematicians: teachers observe students' thinking and learning processes.

ONGOING ASSESSMENT: Observing Students at Work

Students use factor pairs they know to help them solve and commit to memory factor pairs with which they are not yet fluent.

- Do students know most of the multiplication combinations with products to 50 (which was the focus in Grade 3)? Are they fluent with 2s, 5s, and 10s?
- Can students relate one multiplication combination to another in order to learn less familiar combinations (e.g., knowing that 3×11 is the same as adding one more 3 to 3×10)?

When appropriate, probing questions and checklists are included so teachers have sample questions to ask and so they know what to look for during an observation.

Writing opportunities in the Student Activity Books and End-of-Unit Assessments have students explain their mathematical thinking. This helps them process information and practice for state testing.

Portfolios that include tests students take and some of the practice pages they complete can be used to assess their progress. Activities such as Games pages, Math Workshops, and Ten-Minute Math or Classroom Routines are great for observing students and collecting data.

Finally, discussions and critical questioning help teachers understand if students are internalizing the concepts.

Formal assessments are used when targeted skills are meant for mastery. There are paper-and-pencil assessments, such as the End-of-Unit Assessment, or teachers can use ExamView and Success Tracker to create tests in various formats.

Is there differentiated instruction?

Throughout the program, students learn at their instructional level. Daily differentiation is provided in the curriculum units.

Differentiation

IN THIS UNIT

Sections	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	3.1	3.2	3.3
Intervention	p. xx	p. xx	p. xx	p. xx	p. xx		p. xx	p. xx	p. xx	p. xx	
Extension	p. xx	p. xx	p. xx	p. xx							
English Language Learners (ELL)			p. xx			p. xx	p. xx	p. xx	p. xx	p. xx	

Supporting the Range of Learners

Intervention
Adjustments to the activities are provided to support students who may finish early or who may benefit from alternate teaching strategies.

Extension
Adjustments to the activities are provided to support students who may finish early or who may benefit from more challenging or enriching activities.

English Language Learners (ELL)
What special challenges do English language learners face while working their way through the material covered in the Factors, Multiples, and Arrays unit? As always, they need to learn the relevant math vocabulary (array, factor, multiple, prime number, and so forth). You can use blocks or other small objects to demonstrate the meaning of the various terms. For example, draw these arrays on the board:

$1 \times 12 = 12$

$2 \times 6 = 12$

$3 \times 4 = 12$

Have students model the arrays on their desks with counters. Explain to them that an **array** is a group of objects arranged in rows and columns and that each row and each column has the same number of objects. The area of the array is the **product**, while the length and width of the rectangle are one pair of **factors** of that product.

Array models also help students visualize important multiplication relationships, such as that the solution to 2×6 is the same as the solution to 6×2 , or that the product represented by a large array can be found by breaking it apart into smaller arrays.

4×7

2×7

As you help your students build their mathematical vocabulary, give them many opportunities to use it as they describe the processes they utilize to solve multiplication problems. Have your English language learners read problems aloud to determine what information they need to find. Encourage them to begin with simpler problems as they seek to identify the relationships that will help them solve multiplication problems.

18 UNIT 1 | Factors, Multiples, and Arrays

Teachers can find these within the Sessions labeled *Intervention*, *Extension*, and *ELL*, or in the sidebars labeled *Differentiation* and *Teaching Notes*.

DIFFERENTIATION: Supporting the Range of Learners



Intervention If some students are having difficulty drawing the figures accurately, suggest that they trace the straw triangles onto a larger piece of blank paper.

ELL You may wish to meet with English Language Learners ahead of time to review vocabulary that they will need to describe the straws and the shapes they use to build triangles.

Extension Students who are ready to be challenged can explore the idea that a particular set of sides that makes a triangle cannot make a triangle with a different shape. You might ask:

The Implementing Investigations guide has a set of grade-specific case studies written by teachers that focus on meeting the range of learners in a class. Also, using the variations of math games and generating an assortment of tests for different students using ExamView will accommodate all types of learners. With Success Tracker, students take pretests that help the program prescribe remediation activities that are delivered through songs and rhymes, games, eTool workshops, worksheets, and more.

There are plenty of ways to meet the needs of the class just by using what the program offers.

How does the curriculum foster a home-school connection?

The program builds strong home-school connections through family letters as well as features in the Student Math Handbook and the Activity Book.

There are two to three family letters per unit that list the mastery skills and include examples of student work or suggested activities that can be done at home.



The Student Math Handbook models the inquiry-based mathematics thinking used in Investigations through examples, pictures, and definitions. The games that students learn in school are provided in the handbook so students can continue to play at home and develop their understanding.

The homework sheets are found in the Student Activity Book. These sheets include math notes that describe what the students learned in class and page numbers that reference the Student Math Handbook.

What kind of professional development does the program have?

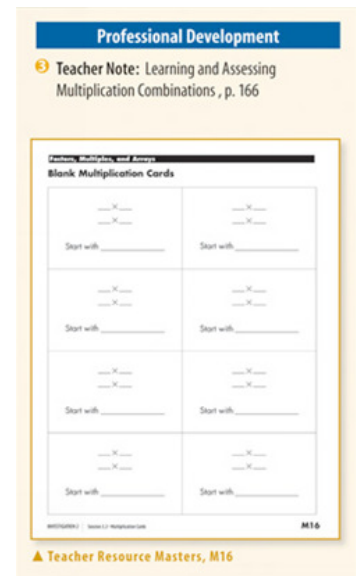
One of the main goals of Investigations is for teachers to feel prepared to teach. For this reason, professional development is built into the program. It provides teachers with the opportunity to improve their content knowledge.

In the Curriculum Unit, there are self-directed Professional Development notes within the sidebars.

Each Curriculum Unit also has Teacher Notes in the back of the unit.

The Mathematics in Your Unit section within the Introduction and Overview of a unit prepares teachers with what the students know, learn, and apply in the future.

The Implementing Investigations guide is filled with professional development resources, such as case studies and how to set up the classroom. Reading it from cover to cover helps teachers get the most out of Investigations.



How are higher-order thinking skills incorporated in Investigations?

Investigations is a problem-based curriculum, so students will develop higher-order thinking skills starting in kindergarten. The tasks, activities, games, and assessments involve problem solving and decision making.

Students reason, design, reflect, and communicate their mathematical ideas. They reason during problem solving and decision making while using the lesson objectives, Student Activity Book pages, manipulatives, and games. They design and analyze representations such as arrays or quick images. Reflecting is done through discussions or writing pages in the Student Activity Book.

Communicating and making connections between different math ideas with classmates and teachers during discussions and observations establishes higher-order thinking skills.

The algebraic tie-ins dispersed throughout the units will foster increased conceptual development as well.

How are oral and written communication integrated into the program?

Oral communication is an important part of Investigations. Discussions are interwoven in the Investigations and provide an opportunity for students to talk math. The focus points of a discussion assist teachers in staying on topic. The students benefit because they can reinforce what they learned, assist other students in understanding as they share their thinking, and make new connections.

Activities that are done in pairs or small groups allow students to collaborate. They can share strategies and progress in their mathematical thinking by reflecting on past and current problems. This helps them connect their math learning to other subjects and to various aspects of their daily lives.

Written work is done in the Student Activity Book and during assessments. Students are asked to formulate, express, and support the strategies they use as well as explain relationships.

In addition, students use various tables, charts, and graphs to represent their thinking. This is beneficial in sorting and organizing their thoughts so they can conceptualize and build upon their ideas.

Teacher Notes, Dialogue Boxes, and the What Students Might Say sections within the unit assist teachers in providing constructive responses and feedback.

Review

This tutorial explained the answers to some possible questions about Investigations. Some important things to remember are the following:

- Practice and assessment is built into the program for teachers' convenience.
- Suggestions for differentiated instruction, home-school connections, and professional development are provided.
- Growth opportunities for higher-order thinking and communication skills occur within each Investigation.

To learn about specific aspects of the program, please watch the other Investigations tutorials on this Web site.