Getting Started: Establishing Routines & Procedures in Grade 5
The First Days of Math in Staunton City Schools

Overview

For students, a successful experience with math begins with the basics: how to think like an active mathematician, how to speak mathematically, and how to record and share their thinking. This guide may be extended, condensed, or modified according to students' needs. As you prepare to implement the First Days of Math during the 60 minutes of math instruction, keep in mind that it will be necessary to be flexible. These 5-15 minute lessons are to be incorporated into the daily lesson. Grade level teams may meet periodically to monitor and adjust progress. Clear statements and clear demonstrations of roles and procedures need to be established. All points and aspects need to be repeated, charts or anchors of support are to be posted and referred to again and again.

Goals

The goals of implementing the instructional strategies included in this document are to

- help students think of themselves as mathematicians who enjoy and actively participate in math;
- establish consistent classroom roles, routines and procedures that support teaching and learning;
- increase rigor by having students explore, express, and better understand mathematical content through NCTM process skills (communication, connections, reasoning and proof, representations, and problem solving) that are listed on the following page.

Background

Based on the idea of *The First 20 days of Independent Reading* by Fountas & Pinnell, these lessons have been developed to establish the roles, routines and procedures needed for effective mathematics instruction.

Principles of Learning are the foundation of this document. All students are told that they are already competent learners and are able to become even better through their persistent use of strategies and by reflecting on their efforts. Criteria for quality and work are explicit, accessible to all students, displayed publicly, and change over time to respond to level of rigor as learning deepens.

NCTM Process Standards

Problem Solving ***Instructional programs from prekindergarten through grade 12 should enable all students to—***

- Build new mathematical knowledge through problem solving
- Solve problems that arise in mathematics and in other contexts
- Apply and adapt a variety of appropriate strategies to solve problems
- Monitor and reflect on the process of mathematical problem solving

Reasoning and Proof ***Instructional programs from prekindergarten through grade 12 should enable all students to—***

- Recognize reasoning and proof as fundamental aspects of mathematics
- Make and investigate mathematical conjectures
- Develop and evaluate mathematical arguments and proofs
- Select and use various types of reasoning and methods of proof

Communication ***Instructional programs from prekindergarten through grade 12 should enable all students to—***

- Organize and consolidate their mathematical thinking through communication
- Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
- Analyze and evaluate the mathematical thinking and strategies of others;
- Use the language of mathematics to express mathematical ideas precisely.

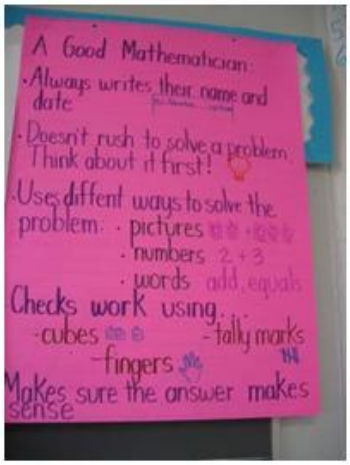
Connections ***Instructional programs from prekindergarten through grade 12 should enable all students to—***

- Recognize and use connections among mathematical ideas
- Understand how mathematical ideas interconnect and build on one another to produce a coherent whole
- Recognize and apply mathematics in contexts outside of mathematics

Representation ***Instructional programs from prekindergarten through grade 12 should enable all students to—***

- Create and use representations to organize, record, and communicate mathematical ideas
- Select, apply, and translate among mathematical representations to solve problems
- Use representations to model and interpret physical, social, and mathematical phenomena

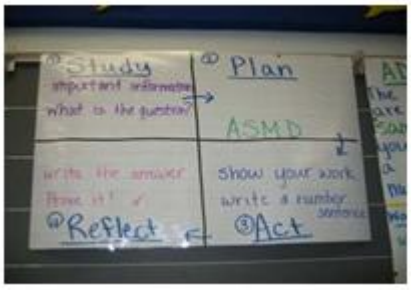
Day 1-Management

Big Ideas	• We're all mathematicians. • Mathematicians work in an organized environment with established routines and procedures for independent and/or cooperative math groups.
Learning Outcomes	• Students understand and learn that information will be posted around the classroom for them to use to make their work better, to support their learning and to help them review concepts as they are learned. • Students identify criteria to create a "Good Work" chart to post.
Anchor Experience for Students	**Focusing the Lesson** *I've been looking forward to meeting all of you, because I need your help to solve a problem. A friend of mine works at a bicycle shop. I asked him what kinds of bikes he sells. He told me that he sells bicycles and tricycles. Oh, I said. How many bicycles and tricycles do you have right now? You figure it out, he said, there are 24 wheels in my store. How many bicycles and tricycles does he have in his shop?* Have students work with a partner on the task. 5-10 minutes into students working . . . *Everyone pause in their thinking . . . Guess what I'm noticing: we're all mathematicians! Look around the room. What do you think it means to be a mathematician?* Students can share different ideas. **Work Time/Activity to Support** *This year we are continuing our work as mathematicians. Now that we are older, we can begin to determine what quality math work looks like*. The teacher will use their answers to help create a "A Good Mathematician…" process chart to which students can refer. (A good work chart should have less than 6 criteria to be effective.) Example below and on right: • Stay on Task • Speak/write mathematically • Be an active listener and participant. • Respect and organize math materials appropriately.  *Let's look back at our bicycle/tricycle problem. What are some of the solutions you and your partner found?* Have students share with the group. *Were we working like mathematicians? Let's look back to our chart and check. . .* Post the chart in the room. **Pre-assessment** Administer Part 1 of Grade 5 Pretest
Materials	• Pre-Test • Chart paper • Markers • "A Good Mathematician…" chart
Teacher Notes	Don't worry if the kids only come up with a few ideas at first. It's better if the ideas are generated slowly and meaningfully by the students. Refer to the process standards to make sure the kids include these.

Day 2—Management

Big Ideas	• Mathematicians use math tools to think about math and help them solve problems.
Learning Outcomes	• Students become familiar with the math tools in the classroom.
Anchor Experience for Students	**Focusing the Lesson** *If you had a mathematics toolkit, what tools would you want in it to help you think about math?* Have students think with a partner. Whole class shares. **Work Time** Take students on a tour of your classroom. Show them the mathematical tools they will access, as well as how they are to be used and stored. *How and why do mathematicians use tools?* **Activity to support** *What tools might have helped us with my desk problem from yesterday?* Give each pair of students a baggie containing 24 counters or Unifix cubes, but don't tell them how many they have. Let them count them themselves. *Thinking about yesterday's bicycle/tricycle problem, let's pretend that these counters represent wheels. Can you use the counters/cubes in ways that prove the numbers of bicycles and tricycles that could be in the store?* Give students work time to see how many ways they can find. Ask them to select one of their arrangements to leave on the desktop. Have everyone take a gallery walk around the room to look at the various representations. Class discussion after the gallery walk: *How did using math tools help you find your solutions? What was a solution you did not have? How many possible solutions were there? Let's list them on the board.* Add notes to the "A Good Mathematician…" chart about placing materials in their proper storage containers and location after use. **Pre-assessment** Administer Part 2 of Grade 5 Pretest
Materials	• Various classroom manipulatives students will have available for use during the year, including baggies with 24 counters or Unifix cubes per pair of students • "A Good Mathematician…" chart developed on Day 1 • Copies of Part 2 Grade 5 Pretest
Teacher Notes	Refer to the chart frequently over the first weeks of class. Use the chart to point out positive mathematical behaviors which you're seeing in individual students. Use the chart to give the class specific ways which they can improve their mathematical behaviors. Add ideas as you recognize new ways the class is working as mathematicians or as specific issues arise in the class.

Day 3—Problem Solving

Big Ideas	• Mathematicians use a process to think about and solve problems.
Learning Outcomes	• Students understand the importance of problem-solving every day. • Students learn that there is a process involved when solving problem.
Anchor Experience for Students	**Focusing the Lesson** *What do you think of when you hear the phrase "going through the process" of something? Can you give me an example? What does the word "process" mean?* *Did you know mathematicians use a process to think about math? Why do you think they do that?* Whole class conversation. Develop a problem solving model with your class which you'll use throughout the year. Perhaps you have a favorite. [One example is Polya's 4-Step Problem Solving Model. See illustration here and sample following.] Add your class's process to your "A Good Mathematician…" chart or create a separate chart you can refer to throughout the year. [You might also want to print copies of the steps for students to glue into the front of their math journals on Day 4.]  **Work Time** *We're going to use our process to think about some problems today. Remember, we're working like mathematicians, so keep in mind what we've written on our chart. Let's try out our new 4-step problem solving model to see how it works.* Project large print copies included with this lesson or write problems on the board for students to read. **Problem 1:** *Mrs. Tuffle made 72 chocolate truffles, 80 chocolate-covered caramels, and 23 chocolate-covered cherries. How many candies did Mrs. Tuffle make?* *Let's look at our 4 Steps to Problem Solving chart and ask ourselves some questions…* Guide students through the process in a "think aloud" manner and ask them the questions. Encourage students to share their thinking on how to approach this problem. Record their thinking on chart paper or the board for all to see. For problem 2, have them go through the process steps with a partner. Have them show their solutions on their own paper. **Problem 2:** *The following day Mrs. Tuffle made 33 chocolate-covered jelly candies, 16 chocolate-covered nougats, and 72 vanilla truffles. How many chocolate-flavored candies did Mrs. Tuffle have?* *How was problem 2 different from the first problem?* Accept reasonable answers, and if no one notices, be sure to point out that problem 2 has some unnecessary info. *What did you discover happened when you took the time to go through the steps? How was the problem solving process helpful?* Allow time for pairs to share solutions. **Pre-assessment** Administer Part 3 of Grade 5 Pretest with the student centered problems.
Materials	• "A Good Mathematician…" chart developed on Days 1 and 2 • 4 Step Problem Solving model chart

	• Paper • Copies of Part 3 of Grade 5 Pretest with the student centered problems
Teacher Notes	Post the chart on the wall in student-friendly language. Some of the questions can be modified so that they are easier to understand.

Problem 1: *Mrs. Tuffle made 72 chocolate truffles, 80 chocolate-covered caramels, and 23 chocolate-covered cherries. How many candies did Mrs. Tuffle make?*

Problem 2: *The following day Mrs. Tuffle made 33 chocolate-covered jelly candies, 16 chocolate-covered nougats, and 72 vanilla truffles. How many chocolate-flavored candies did Mrs. Tuffles make?*

4 Steps to Problem Solving

#1 UNDERSTANDING the PROBLEM

- Can you state the problem in your own words?
- What are you trying to find or do?
- What are the unknowns?
- What information do you obtain from the problem?
- What information, if any, is missing or not needed?

#2 DEVISING a PLAN

- Look for a pattern.
- Examine related problems, and determine if the same technique can be applied.
- Examine a simpler or special case of the problem to gain insight into the solution of the original problem.
- Make a table.
- Make a diagram.
- Write an equation.
- Use guess and check.
- Work backward.
- Identify a subgoal.

#3 CARRYING OUT the PLAN

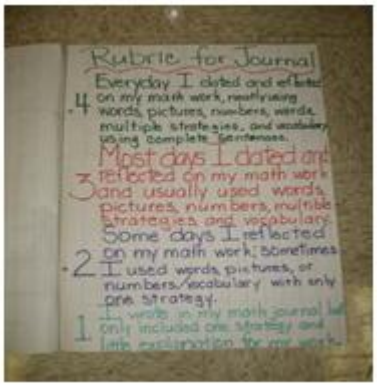
- Implement the strategy or strategies in step 2 and perform any necessary actions or computations.
- Check each step of the plan as you proceed. This may be intuitive checking or a formal proof of each step.
- Keep an accurate record of your work.

#4 LOOKING BACK

- Check the results in the original problem. (In some cases this will require a proof.)
- Interpret the solution in terms of the original problem. Does your answer make sense? Is it reasonable?
- Determine whether there is another method of finding the solution.
- If possible, determine other related or more general problems for which the techniques will work.

Billstein, Libeskind and Lott have adopted these problem solving steps in their book "A Problem Solving Approach to Mathematics for Elementary School Teachers" (The Benjamin/Cummings Publishing Co.). They are based on the problem-solving steps first outlined by George Polya in 1945.

Day 4-Writing/Representations in Math

Big Ideas	• Mathematicians use and record mathematical representations to interpret and model everyday life activities.
Learning Outcomes	• Students understand that they are expected to write about their mathematical thinking on a daily basis. • Students understand that writing about their thinking is a way to represent mathematical concepts. • Students understand that the journal is a mathematical tool for recording and summarizing their thoughts during the problem solving process.
Anchor Experience for Students	**Focusing the Lesson** *Today we're going to use a mathematical tool we haven't talked about yet: a journal. Does everyone know what a journal is?* Whole class conversation. *How could a math journal be a mathematical tool? Turn and talk to your partner.* Introduce Math Journals. Set up math journals with "Table of Contents" and "Math Words (Vocabulary)" sections. Whole class conversation. Talk to the students about how they will use their math journals this year. Model your own journal for them. Depending on your expectations, some suggestions for your consideration might include: ➢ Glue in a copy of the 4 Steps for Problem Solving ➢ Have students date all their entries ➢ Will you have students to copy problems into their journals or will you provide copies to glue in? ➢ Have students solve problems in them and show their work, drawings, etc. ➢ Have students write to explain their strategies or thinking ➢ Have students use their journals as an archive of past problems to review strategies, show growth, etc. ➢ Use journals as a formative assessment  Develop a rubric with the class regarding the expectations for their thinking in their math journal. Post the rubric in the classroom. Later, you can make smaller copies for them to glue in their math journals. [Some generic prompts and question stems are included following this lesson plan.] **Work Time** Today begins **Day One** of **Investigations Unit 1**. Please be sure you have read the teacher's manual from start to finish so that you know where the unit is headed. Follow the plan as closely as possible. Investigation Unit 1; Session 1.1 starts on page 28. A major focus of this lesson is to tap students' prior knowledge of arrays and their usefulness in modeling multiplication and division. Important vocabulary included in this session includes factors, multiples, products, quotients, and the idea of the commutative property. **Activity to Support** Students will record work for Session 1.1 in their math journals. Teachers should have students summarize their learning in their journals. Questions and journal prompts include: 1. How do dot arrangements help with multiplication? Can you write

	equations that represent the way you see the dots organized? 2. How do arrays model multiplication? 3. Contrast factors and multiples. 4. How can you determine whether one number is a factor or multiple of another? Select a few students to share their responses. Try to highlight some of the big ideas in student responses. *How did recording your work in your journal help you to understand the material?* Whole class discussion.
Materials	• Student math Journals (with a journal for the teacher to model) • Journal Questions/Prompts • Investigations Unit 1; Session 1.1 • See complete list of materials on page 28
Teacher Notes	Add anything meaningful that was discussed today to the "A Good Mathematician…" chart. Keep math journal rubric posted and refer to it so that students may learn to self-evaluate their work. Students must develop the habit of communicating their thinking in complete sentences using mathematical terms correctly—it doesn't happen automatically. As teachers we must ask for and acknowledge when they successfully communicate their thinking. Be sure you are comfortable with your math journal expectations. Be consistent in how you expect students to organize their work. Emphasize the value of the journal as another mathematical tool.

Some questions to guide students' writing:

Suggestions for a weekly math prompt:

a. This week in math I learned _____

- What I know about _____ so far is _____ .
- What I'm still not sure about _____ is _____.

b. I want to learn more about_____.

c. My favorite part of math this week was _____.

d. The hardest part of math this week was _____.

e. I need more help understanding _____.

Other generic prompts you might like to use:

- What is the most significant thing I learned this week?
- What are the steps needed to solve this type of problem?
- How is this problem similar to others I already know how to solve?
- What makes this problem different from other ones?
- What vocabulary words can I use to help me explain this procedure?

Day 5-Math Language

Big Ideas	• Mathematicians use specialized terms to discuss mathematical ideas and to build their knowledge.
Learning Outcomes	• Students will learn and apply specialized terms to discuss mathematical concepts. • Students will increase their math vocabulary.
Anchor Experience for Students	**Focusing the Lesson** *I wonder if anyone has noticed that our math word wall is blank! Can you think of words that should be included on our math wall?* Have a class conversation. *Have you ever noticed how we use special words to talk about ideas in math? Why do you think we do that?* Model how students will add new words in their journals and/or how words will be added to the classroom word wall.  **Work Time** Investigations Unit 1; Session 2 (pg. 36) focuses on prime, composite, and square numbers. Students will continue to work with open arrays and number puzzles used in Session 1. **Activity to Support** Students will work on Number Puzzles in their journals. A possible journal prompt could be - *"How do you know that a number fits the given clue?" "Can you create a clue and its possible solutions for another player?"* Once this Investigation is complete, select students to identify new math words they discovered during the investigation. Model how students will add new words in their journals and/or how words will be added to the classroom word wall.
Materials	• Investigations Unit 1; Session 1.2 • See complete list of materials on page 36 • Student math journals
Teacher Notes	As you introduce new vocabulary, make sure students record the word(s) in the "Math Words" section of their journals. Add the new words to the classroom Word Wall as well. Remind students to communicate in complete sentences in their journals.

Day 6—Collaboration

Big Ideas	• Mathematicians work collaboratively to develop good work ethics. • Mathematicians share a responsibility to the learning of other mathematicians
Learning Outcomes	• Students learn that they can work with others to both share and learn new information.
Anchor Experience for Students	**Focusing the Lesson** Prior to the lesson, decide how you will want students to partner up for this unit. It is best that they are already sitting next to each other. This will save transition time. *Mathematicians work together a lot. We'll work together as a whole class but we'll also work with partners and small groups.* *Why do you think mathematicians work together? Can we learn more when we're working with someone else? Why or why not?* *If I'm a mathematician working with another mathematician, what responsibilities do I have to my partner?* *Turn and talk to your partner about 3 ways you're going to be responsible to each other.* Allow only a few minutes for this part since you will continue with Unit 1 of Investigations. Have students share ideas. Establish rules for group work and add to a new chart entitled "Working Together". **Work Time** Investigations Unit 1; Session 1.3 continues examining prime and composite numbers as well as factors and multiples. The teacher should decide whether any whole class modeling needs to occur before breaking into groups. It is imperative that the teacher circulates among the students and ask questions during this activity. (Several example questions are embedded in the text…come up with more to extend their thinking.) **Activity to Support** Students should be able to apply their knowledge of prime, composite, square, odd, even, factors, and multiples to identify a number with certain characteristics. Students should be able to reason about whether numbers fit certain criteria. Students can solve Number Puzzles in pairs in their math journals. **Closure** *On your Report Card exit ticket give yourself a grade on the kind of math partner you've been today. Explain why you think you deserve that grade. Next, give your partner a grade and explain why you think so.* **Homework Note** Students will begin reviewing multiplication combinations up to 12x12. Emphasize the benefits number puzzles have on calculating products. Pay particular attention to present the charts and patterns on pages 45-46. This in another good journaling opportunity.

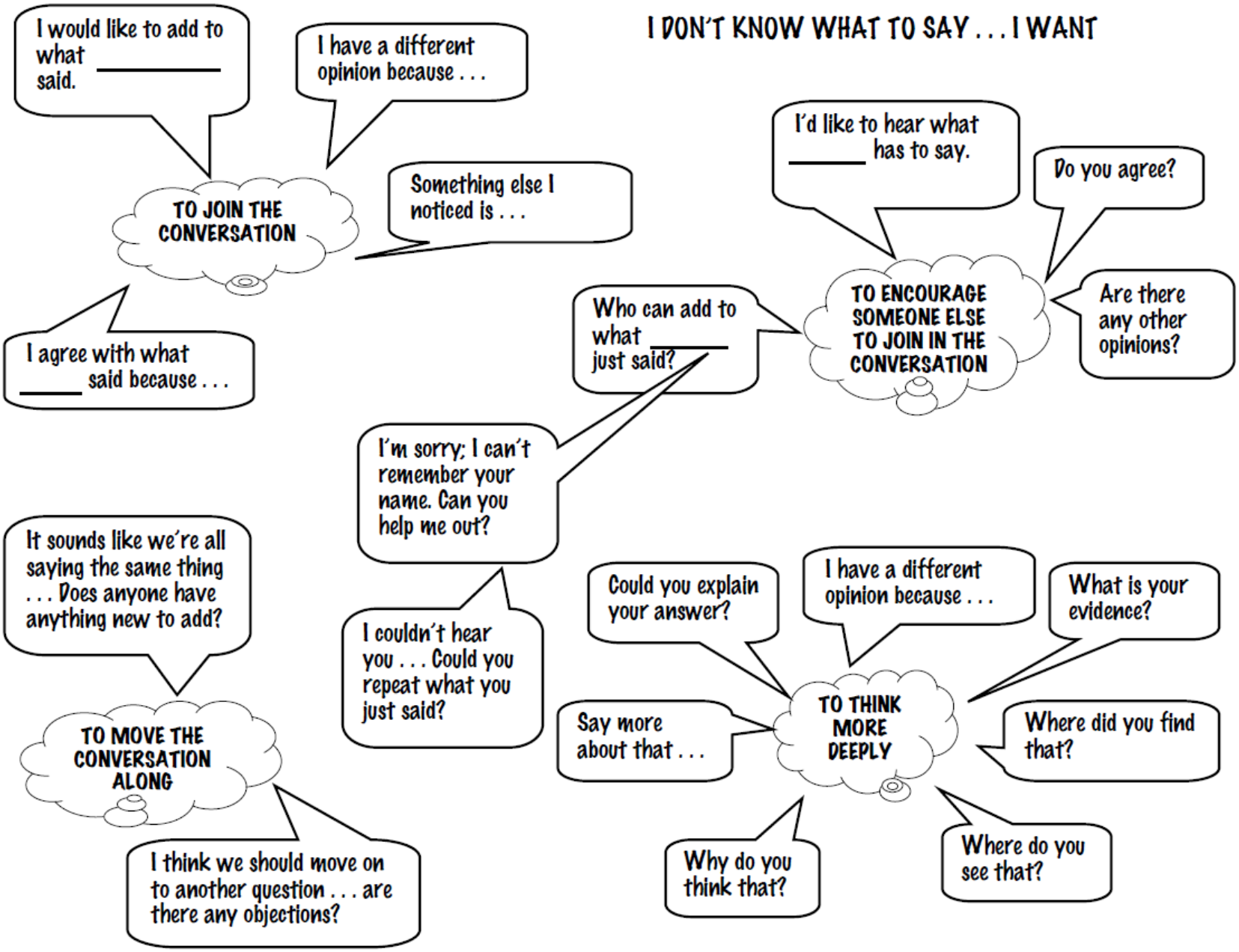
Materials	• "Working Together" chart • See complete list of materials on page 41 • Student math journals • Report Card exit ticket
Teacher Notes	As you have begun to realize, these lessons are clearly written. Yet you will still need to study them, think about your expectations, focus on the routines you are hoping to establish, and assess how individual students are responding. It will take time for this to become a routine for *you* as well as the students! Remember that you are part of a greater team—a PLC of mathematicians! Collaborate with other teachers in your grade level, your math coach or differentiation specialist. If we want the students to work together, then we must set the example.

Working Together Report Card **Prepared by _____**	
Grading Myself	**Partner's Name:**
I give myself _____	**I give my partner _____**
Comments:	**Comments:**

Working Together Report Card **Prepared by _____**	
Grading Myself	**Partner's Name:**
I give myself _____	**I give my partner _____**
Comments:	**Comments:**

Day 7—Sharing

Big Ideas	• Mathematicians share their thinking strategies, listen to other mathematicians, ask questions, and make conjectures about their findings.
Learning Outcomes	• Students understand that sharing and learning from other mathematicians is an important part of working as a mathematician.
Anchor Experience for Students	**Focusing the Lesson** *Since the first day of math, we have been sharing our thinking with each other. Why do you think mathematicians share? I want to show you an aide to help us talk as mathematicians.* [Display AND hand out the " Talk Bubbles" sheet; discuss how it can be helpful.] *When mathematicians are sharing, do the rest of us mathematicians have a job?* *What if we don't completely understand the strategy that someone is sharing? What should we do then?* *One more thing . . . every mathematician will not be called to share his or her thinking with the group every day.* [Explain that you will call on a variety of strategies so we all can learn different ways to approach a problem. Everyone called to share may not have a 100% correct solution, but everyone will be thinking like a mathematician.] *We've talked about a lot of different ideas related to sharing as mathematicians. What should we add to our chart?* **Work Time** Investigations Unit 1; Session 1.4 concentrates on finding factors of related 2- and 3-digit numbers. **Activity to Support** Students will search for various combinations of factors for a product, first for the 2-digit number and then for the related 3-digit number. (Teachers should be prepared for responses which include more than two factors, fractions, decimals, and commutative answers.) It is imperative that the teachers lead students through a purposeful share time. Questions that can guide the discussion include: • *Did you find all of the combinations with two factors? How do you know?* • *How is _____ using one solution to find solutions?* • *How do the combinations with two factors help you find combinations with more than two factors?* • *How do the combinations with more than two factors help you find combinations with two factors?* • *What relationship do you see between the two numbers (a double, power of ten, etc.)? Was the student aware of that pattern when identifying combinations?*
Materials	• "A Good Mathematician…" chart • Copies of Talk Bubbles sheet • See complete list of materials on page 48 • Student math journals
Teacher Notes	Students must develop the habit of communicating their thinking in complete sentences, using correct mathematical terminology. Remind them that vocabulary terms are on the word wall and in their journal. As teachers we must ask for and acknowledge when they successfully communicate their thinking.


I DON'T KNOW WHAT TO SAY . . . I WANT
I would like to add to what _____ said.
I have a different opinion because . . .
Something else I noticed is . . .
TO JOIN THE CONVERSATION
I agree with what _____ said because . . .
I'd like to hear what _____ has to say.
Do you agree?
Are there any other opinions?
TO ENCOURAGE SOMEONE ELSE TO JOIN IN THE CONVERSATION
Who can add to what _____ just said?
I'm sorry; I can't remember your name. Can you help me out?
I couldn't hear you . . . Could you repeat what you just said?
It sounds like we're all saying the same thing . . . Does anyone have anything new to add?
TO MOVE THE CONVERSATION ALONG
I think we should move on to another question . . . are there any objections?
Could you explain your answer?
I have a different opinion because . . .
What is your evidence?
Say more about that . . .
TO THINK MORE DEEPLY
Where did you find that?
Why do you think that?
Where do you see that?

Day 8—Justification

Big Ideas	• Mathematicians should always justify and offer proof for their thinking. • Mathematicians must push each other for accurate and appropriate evidence of their claims.
Learning Outcomes	• Students understand that justification of their thinking actually deepens their understanding of a mathematical idea.
Anchor Experience for Students	**Focusing the Lesson** *Today is an assessment day. You are going to be working on more Number Puzzles. As you are completing the Puzzles, remember to justify your thinking. Here are some words that will help you know what it means to justify your mathematical solutions:* Justify means to: • explain • describe • prove • give reasons **Work Time/Activity to Support** Unit 1; Session 1.5. Students will work independently on all workshop and assessment tasks. As the students work on the assessment Puzzles, the teacher will need to observe each student individually. Are students able to use known multiplication combinations to find combinations of related numbers? Can students find all the factors of a number? Can students use properties and relationships of numbers to solve problems? **In Summary** Let's evaluate how we're doing as mathematicians. Teacher reads over "A Good Mathematician…" chart. *What do we do really well as a class of mathematicians?* *What are some areas that are hard for us/things we can focus on to get better at during the next few weeks of math class?* *Is there anything that you think we need to add to our chart?*
Materials	• "A Good Mathematician…" chart • Student math journals • See complete list of materials on page 52
Teacher Notes	Keep charts posted for "A Good Mathematician…" Journal Rubrics, etc. and refer to them often. It is quite likely that you are also doing the First 20 Days of Reading simultaneously. Compare and contrast expectations between the subjects. What do the students notice?

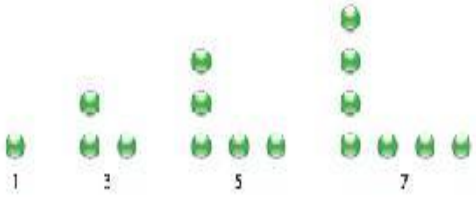
Day 9—Accountability

Big Ideas	• Mathematicians understand that they share in the responsibility for their own learning.
Learning Outcomes	• Students understand that they are accountable for the learning tasks. • Students will rely on prior learning, problem solving, and helping strategies to solve new tasks.
Anchor Experience for Students	**Focusing the Lesson** *Today we're going continue our Number Puzzles assessment and workshop on finding factors.* **Work Time** Unit 1; Session 1.6. Students will work independently on all workshop and assessment tasks. Continue to observe and assess students as you did on Day 8. Question students about how they know that they have found all of the expressions with two factors for given products. **Activity to Support** Prior to beginning Activity 2 "Finding All the Factors", remind students of all of the charts and rubrics in the classroom that are referents to help make their work better: • "A Good Mathematician…" chart • Math tools/manipulatives • 4-step problem solving model • Math journals • Word wall/bank • Talk bubbles • "Working Together" chart • Accountability rules Give students time to complete the task. After students share their answers, ask students to reflect how the aforementioned referents helped improved the quality of their work and ultimately their learning.
Materials	• Miscellaneous charts around the room (for student and teacher reference) • Student math journals • See complete list of materials on page 57
Teacher Notes	In order to learn to be accountable, students must first learn to be responsible for their own actions toward learning tasks. Much of his responsibility is taught in the classroom through classroom procedures and learning strategies. Teachers who focus their lessons on learning, rather than teaching, are by design making students more responsible for their learning. Add "accountability" to the "A Good Mathematician…" chart. Keep rubric posted and remind students to continue referring to the charts around the room as "helpers" to their work.

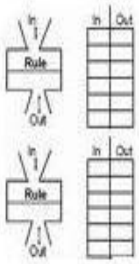
Day 10—Representation

Big Ideas	• Mathematicians can show their thinking in multiple ways.
Learning Outcomes	• Students use representations to organize, record, and communicate mathematical ideas. • Students choose, apply, and move among different representations to solve and show solutions to problems.
Anchor Experience for Students	**Focusing the Lesson** *Lately we've been working both on finding factors of particular numbers and using arithmetic properties to describe those numbers. Today I want you to think "outside the box" a little and think of all of the ways you can represent 100. First, who can tell me what the word "represent" means?* Write down the ideas/terms the class offers to revisit later. **Work Time** Make available grid paper, plain white paper, and other math manipulatives students wish to use to represent 100. Students will complete their representations and be prepared to share them with the whole class. **Activity to Support** Call on particular students to share their representations. At first, place the students' work on the white board in no particular order. Show the 5-point star. *Did you know that you can represent math concepts using pictures, words, numbers, symbols, manipulatives, tables, and/or graphs? What kinds of representations did we see with 100? Could we group our work based on the kind of representation used? Do you see some that are the same? What could we do here?* Make the 5-point star available for students to keep in their journals to remind them of various mathematic representations. Continue with Session 1.7 of Investigations.
Materials	• Math manipulatives • Poster materials • 5-point star • See complete list of materials on page 61
Teacher Notes	Emphasize that numbers are only one way to show mathematical ideas. Encourage students to represent their math work in more than one format throughout the remainder of Session 1.7.

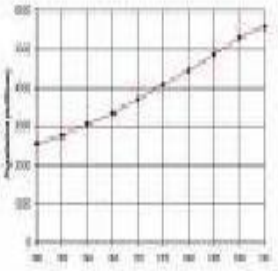
Concrete/ Pictorial



Table



Numbers & Symbols



Graph

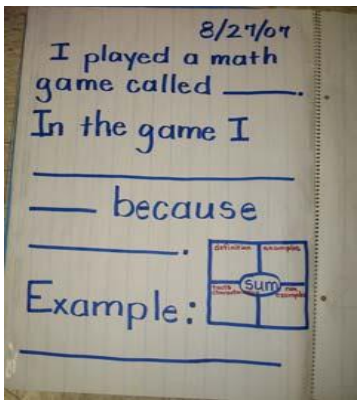
Verbal descriptions

My pattern is growing each time by3 everytime we add a table we add 3 more chairs...

Day 11—Problem Solving and Connections

Big Ideas	• Mathematicians recognize and make connections among mathematical ideas. • Mathematicians realize that mathematical ideas build on one another. • Mathematicians engage in problem solving, questioning, and reasoning.
Learning Outcomes	• Students solve problems using a variety of strategies. • Students can relate math to the world around them.
Anchor Experience for Students	**Focusing the Lesson** It is expected that 5th graders develop at least one efficient strategy for multiplying large numbers. Investigations 2 of Unit 1, Multiplication Strategies, focuses on describing and comparing strategies for solving multiplication problems. *Today you're going to make a poster showing your solution to a multiplication problem. But firs t we need to remind ourselves about ways to keep track of all of the parts in a multiplication problem, especially when the numbers get large. Let's start with a smaller problem: 18 x 14.* **Work Time** Continue with Investigation Unit 1; Session 2.1, solving 35 x 28. The warm-up problem provides an opportunity to assess what students understand about multiplication and what strategies they are comfortable using. **Activity to Support** As students continue with the main activity of solving 35 x 28, make sure students are using appropriate representations as well as clear and concise notation on their posters. Circulate and look for students using specific strategies. Call on particular students to share their strategies. Name those strategies using the relevant problem solving card. **Closure** *In your journal I want you to illustrate and explain the strategy you chose to use to solve 35 x 28. I also want you to choose one other student's strategy, illustrate and explain it, and then evaluate whether the strategy is efficient or not. What do you like about your strategy? What do you like about the other strategy? Do you think you would every try _____'s strategy? Why or why not?*
Materials	• Poster materials • Student math journals • See complete list of materials on page 70 • Problem Solving Strategy Cards
Teacher Notes	Remind students to make clear representations of their work. Watch choices of representations for the warm-up problem carefully, as they will indicate where the student is on the landscape of learning for multiplication. During 35 x 28, emphasize that there are many strategies to solve a single problem. Observe students' strategies closely, you may need to group students who are using similar strategies in hopes of moving them forward or developing another approach.

Day 12—Organizing and Recording

Big Ideas	• Mathematicians organize their work in different ways.
Learning Outcomes	• Students will understand how to use a recording sheet or guide. • Students will learn how to summarize ideas using various recording tools.
Anchor Experience for Students	**Focusing the Lesson** Compare and contrast the representations for 35 x 28 from Session 2.1. *Which of these representations are the same? Which are different? Are there any that seem particularly clear to you?* **Work Time** Continue with Investigation Unit 1; Session 2.2, solving 35 x 28 using an open array.  **Activity to Support** *Now we are going to practice multiplying 2-digit numbers, but you get to pick the strategies. Let's look at the 5 problems on page 27 of the Student Activity Book. I want you to choose 3 of them to solve on your own, in your journals.* *You must solve each problem using two different strategies. You need to show your steps, explain your strategy, and tell me why you chose that strategy. As a challenge, I would like you to solve some of the problems using an open array.*
Materials	• Student math journals • See complete list of materials on page 77 • Student Activity Book
Teacher Notes	Do students have at least one strategy for solving a multiplication problem? In Session 2.2, are students using story contexts and representations to help them solve the problem and keep track of their work? In Session 2.2, can students use a story context or a representation to show the meaning of a multiplication problem? Some students should continue working with smaller numbers. If a student needs support to keep track of the parts of a multiplication problem, help them visualize the problem by using a story context or a picture. Note how many students are facile with using an open array. This model with be used frequently during the year.

Day 13—Self Monitoring

Big Ideas	• Mathematicians make changes to and correct their work as needed.
Learning Outcomes	• Students learn to revise work to demonstrate accuracy and understanding.
Anchor Experience for Students	**Focusing the Lesson** *Sometimes we learn something that is right, but we really don't know why it is right.* Write the string of numbers from page 86 on the board: 6x4, 6x40, 6x400, 60x400. *Who can help me solve these problems? How did you know these answers so quickly?* [Likely some students will say they know to add a zero, but they will not know why doing so gives them the answer. This is what you want to focus on…do they know WHY to add a zero?] Finish this part of Session 2.3 with the class, because you want to make clear the need to make changes to their thinking as they grow as mathematicians (self-monitor their learning). **Work Time** Today we're going to play a game of Multiplication Compare, and the game has a lot do with multiplying numbers that have zeroes in them. Let them play in pairs, first without the recording sheet. **Activity to Support** As the students play, circulate among them and notice who is calculating the products exactly and who is estimating. Encourage students who are not estimating to do so. Encourage all students to prove some of their "hands" using open arrays. Have students summarize their new learning about what "adding a zero" really means in their journals.
Materials	• Student math journals or other paper (for arrays) • See complete list of materials on page 85
Teacher Notes	Some students may need more study of the patterns of multiplying by tens before they can solve the Multiplication Compare problems easily. Consider giving them related sets of problems like the ones listed on page 89. Use this activity as an opportunity to emphasize estimation.

Day 14 & 15—Strategies

Big Ideas	• Mathematicians choose from many strategies to solve problems.
Learning Outcomes	• Students will share strategies within their math community. • Students will evaluate and build a repertoire of those strategies identified during math community discussions.
Anchor Experience for Students	**Focusing the Lesson** *Over the next two days we'll be working on multiplication cluster problems. Has anyone ever heard of the word "cluster"? What do you think it means? Do you know of anything that comes in a cluster?* Whole class discussion. *Usually things in a cluster have something in common. Let's see if these multiplication problems have anything in common.* **Work Time** Day 14 - Investigations Unit 1; Session 2.4 Day 15 - Investigations Unit 1; Session 2.5 **Activity to Support** You will be using story contexts and various strategies, such as breaking apart numbers and solving simpler problems, to help students strengthen their mental math through cluster problems.
Materials	• Student math journals • See complete list of materials on page 91 (Day 14) • See complete list of materials on page 97 (Day 15) • Problem Solving Strategy Cards
Teacher Notes	Look fors: Are students able to mentally solve the cluster problems? If not, how are they solving them? Do students see and use the relationships in one problem in the cluster to solve others? Do students use the problems they have already solved to solve the final problem? It is imperative that students are exposed to cluster problems, as the Fosnot minilessons are very similar to these (across all operations) and are to continue throughout the year.

Day 16 & 17—Students as Mathematicians

Big Ideas	• Mathematics skills are learned over time. • Mathematicians learn at different rates. • Mathematicians sometimes work in groups and sometimes work independently.
Learning Outcomes	• Students understand they are accountable for their learning. • Criteria for student work are explicit, learning is accessible to all students, and expectations will increase over time as the level of rigor deepens.
Anchor Experience for Students	**Focusing the Lesson** *We have been solving multiplication problems using many different strategies. We have also looked at cluster multiplication problems.* *Over the next two days you'll be exploring connections between what is called a "starter problem" and what is called a "final problem".* **Work Time** Day 14 - Investigations Unit 1; Session 2.6 Day 15 - Investigations Unit 1; Session 2.7 **Activity to Support** *We will be looking at how the different strategies you choose, from the very first step, can influence the amount of time and the amount of work it takes for you to get your answer.* Carefully work through starter problems with the students. It will take time for them to see the connections but, when they do, it will be well worth it!
Materials	• Student math journals • See complete list of materials on page 99 (Day 16) • See complete list of materials on page 105 (Day 17) • Problem Solving Strategy Cards
Teacher Notes	Look fors: Can students see the relationship between the starter problem and the final problem? Can students finish solving a multiplication problem on the basis of a certain first step? Are students able to solve a problem in multiple ways? Can students evaluate incorrect strategies? Can students solve 2-digit multiplication problems accurately and efficiently?

1. Bonnie has six number tiles. They are:

6	4	8	2	9	3

Using 4 of the tiles, what is the largest product you can make?

	X	

Using 4 of the tiles, what is the smallest product you can make?

	X	

2. Every 5 minutes, a company makes 126 paper plates. How many paper plates does the company make in 25 minutes?

3. The Walton Candy Company had orders from forty-six stores. Each store ordered nine hundred two gumballs. How many total gumballs did Walton Candy Company send to the stores?

4. John drives from Asheville to Raleigh, and then to Miami, Florida. The distance from Raleigh to Miami is about three times farther than it is from Asheville to Raleigh. About how far will he travel in all? Use the diagram below:

Explain your answer using pictures, numbers, and/or words.

This ends the First Days of Math for grade five. Practice the routines and thinking set forth in these first lessons. Point out whenever students are "working like mathematicians." Add to the chart whenever a new idea surfaces. Keep charts up for easy reference until routines are well-established, and revisit them throughout the year.

Please refer to the Grade 5 Mathematics Curriculum Maps for the first 9 weeks. Though the majority of the focus will be on multiplication and division, the concept of volume will also be studied. Both Investigations and Fosnot units will be used during this time. You will notice that the days are not spelled out beyond that. Your math coach, DS, and PLC will support you as you move forward. This is not the time for "drill and kill" worksheets and timed tests. Help students realize that they can multiply and divide by using what they already know with the strategies presented in this unit.

Giving students multiplication charts, especially those stuck on their desks, is strongly discouraged and is in opposition to the mission of these lessons.

Should you wish to give homework, feel free to copy pages from the Student Activity Book that came with *Investigations.*

Keep student observation notes to use as formative assessments to guide your instruction. Feel free to pull a small group to the back table whenever you think it would be beneficial. On the other hand, be prepared to challenge those who are fast finishers and ready for more.

As you go through these plans, please make note of what worked and what needs to be changed. These plans will be revised as needed after this year's trial run. Your feedback is crucial to the whole process.