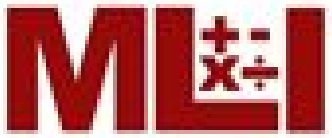
A Guide to Establishing Procedures and Roles for the First 15 Days of Math Instruction for Grades K-8



Overview

- These are not intended to be math lessons.
- They are 10-15 minute introductions of how things work in the math classroom.
- Use the activities in the order that is most appropriate for your classroom.
- These lessons will help establish a foundation for math learning throughout the year.
- With each lesson, it is important for the teacher to model the expected behavior, then have several children demonstrate it and finally have the whole class practice.
- These activities may need to be repeated and reviewed several times before students internalize them.

Goals

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

1. Help students think of themselves as mathematicians who enjoy and actively participate in math
2. Establish consistent classroom roles, routines, and procedures that support teaching and learning
3. Increase rigor by having students explore, express, and better understand mathematical content through process skills (communication, reasoning and proof, representations, and problem solving)

Common Core Mathematical Practice Standards

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

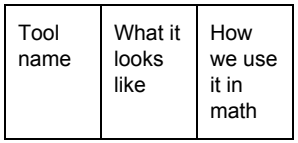
Five Step Process

1. Shared Experience
    a. A shared experience is any task, game, or problem solving activity that allows students to discover new mathematical concepts rather than having the teacher “tell or explain.”
2. Picture or Model Experience
    a. Students draw a pictorial representation about the shared experience.
3. People Talk
    a. During the third step, students write about the experience, using their own language to describe it. Students often share their work from steps 2 and 3 to facilitate group discussion.
4. Feature Talk
    a. The teacher works with students to bring out big mathematical ideas from the previous steps. It is the time where the teacher supports the students’ negotiation of understanding in a more formal mathematical language.
5. Symbolic Representation
    a. Students show the mathematical concept learned through invented or traditional symbols to represent their thinking. They need to be able to convey the mathematical understanding to others.

Table of Contents

The First 15 days of Mathematics

Kindergarten and Grade 1

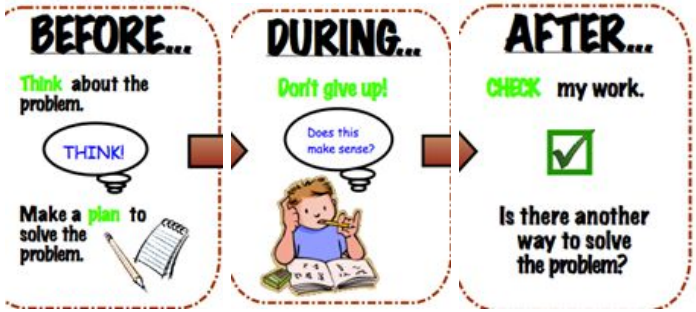
Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 1: Introduce Math Tools (two tools)	Teacher will model math tools and students will practice using the tools properly and safely.	#4: Model with mathematics #5:Use appropriate tools strategically #7:Look for and make use of structure	Start logic chart for math tools and their usage.		This is important to step 1 of the AP five step process.
Day 2: Review Procedures for Using Math Tools	Students will review and demonstrate practice of using math tools.	#4: Model with mathematics.	Add items to chart: possible math tools		Tools could include, but not limited to: pattern blocks, unifix cubes, geoblocks, geoboards, color tiles, bears, base ten blocks
Day 3: Introduce New Math Tool (tool 3)	Teacher will model the tool, the students will demonstrate the tool, the class will practice using the tool	#4: Model with mathematics.	Add new math tool to chat.		Days 1-4 can be seen as an introduction to shared experiences.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 4: Introduce New Math Tool (tool 4)	Teacher will model the tool, the students will demonstrate the tool, the class will practice using the tool	#4: Model with mathematics. #5: Use appropriate tools strategically. #7: Look for and make use of structure.	Add new math tool to chart.		Take a few minutes to review the previously introduced tools.
Day 5: Voice Level During Math Work	Teacher will model appropriate voice level for sharing in front of the class and for working with a partner.				
Day 6: Journaling	Teacher will model selecting from the shelf or choosing from materials on the table.	#6: Attend to precision.	Math journals	Students will need to use math journal to draw how math tool was used.	This introduces steps 2 and 3 of the 5 step process. (Step 2-picture or model experience, Step 3- people talk)
Day 7: Journaling (day 2)	Students will select a new math tool and follow the same objectives from day 6.	#6: Attend to precision.	Math journals	Students will need to use math journal to draw how math tool was used.	This allows the students a second opportunity to practice steps 2 and 3 of the 5 step process.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 8: Sharing and Listening to Others Math Thinking	Students will learn how to discuss work with their peers	#3: Construct viable arguments and critique the reasoning of others.	Chart showing the conversation starters for feedback.	Conversation starters: ● I like the part when you said… ● I like the way you used the math word… ● I like the part of your picture that shows… ● I would like to hear more about...	Teacher will choose students to share their work and model active listening skills and demonstrates appropriate feedback.
Day 9: Math in our Lives	Teacher and students will discuss the ways they use math in their daily lives.	#4: Model with mathematics.	Chart listing where students see and use math in their everyday lives.	Students will share ideas on how they think they use math	Teacher will give examples how they use math everyday- lunch counts, attendance, etc
Day Ten: Specialized Math Language	Teacher will model by referencing the *math tools* chart created in the first four days.		Math anchor charts, number line, calendar, pictures of shapes, labeled.	Several students can demonstrate finding math words, pictures, and number around the room.	Possible script: "*I can't remember the difference between blocks and cubes. Where can I look in our room for that?"*

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day Eleven: Taking Turns; playing games with dice	Teacher will model how to make decisions about how to start and the appropriate way to handle the dice.		Play simple game of "Fill the 10 Frame"	Students take turns rolling the dice and placing a counter on the 10 frame. Several students should demonstrate proper behavior, then students play the game in pairs.	This is not so much about counting as it is about learning to take turns and using the dice correctly.
Day Twelve: Taking Turns; playing games with cards	Teacher will model how to make decisions about how to start, who deals, who goes first, and how to deal.		Number cards or dot cards Game: Compare	Each student turns up a card. The person whose card is higher or has more dots takes the cards. Several students should demonstrate proper behavior, then students play the game in groups.	This is not about counting as much as about using the materials properly and fair game play.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day Thirteen: Problem Solving	Teacher will model solving a problem while thinking aloud through each step of the process. Teacher will model restating the problem to a partner	#1: Make sense of problems and persevere in solving them #2: Reason abstractly and quantitatively #3: Construct viable arguments and critique the reasoning of others #4: Model with mathematics #6: Attend to precision #7: Look for and make use of structure	Begin a chart of the steps for problem solving. Example: Problem Solving Steps: 1. Restate the problem 2. Visualize the problem 3. Make a plan 4. Complete the plan 5. Check your work	Script example: I have 8 cats. Some are black, some are white. How many cats of each could I have? I am going to close my eyes and try to see the problem in my head. I see some cats. Next, I need to make a plan to solve the problem. What should I do first? I should get some cubes or tiles. I should get 8 cubes, some black and some white. Now I will count to see if I have 8 cubes to show my 8 cats. Is there any other way I could solve this problem?	Check row below for an example of additional approach or chart format for problem solving.



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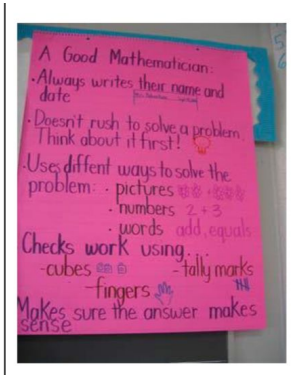
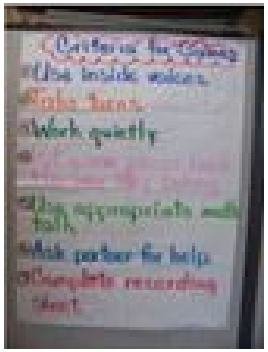
Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day Fourteen: **A. Problem Solving** **B. What do you do when you struggle?**	Teacher will walk the students through the problem solving steps: ● Restating ● Visualizing ● Making Plan ● Checking your work Teacher and students could use community writing chart ideas for what to do when you struggle.	#1: Make sense of problems and persevere in solving them #2: Reason abstractly and quantitatively #3: Construct viable arguments and critique the reasoning of others #4: Model with mathematics #6: Attend to precision #7: Look for and make use of structure	Reference charts that have been created to show students how to solve problems and struggles as they come throughout the year.		"I can look at the word wall. I can look around the room. I can ask a friend for help." Have students role play possible examples: "I can't remember what that shape is called. What should I do?"
Day Fifteen: **Symbols**	Teacher will introduce symbols we use in math.	#2: Reason abstractly and quantitatively #4: Model with mathematics	Make chart of math symbols and environmental print	Draw a target and a stop sign-"When you see them we know what they mean. We will be using symbols in our math work. Caan you think of some?"	In language we have letters. In math we have numbers. These are symbols. This introduces the last step in the 5 step process- symbolic representation.

Grades 2-3

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 1: Management	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.	#6: Attend to precision	Chart Paper Markers Post *Good Mathematicians* process chart for reference (limit to six criteria or less). <u>Examples:</u> ● Stay on task ● Speak/write mathematically ● Be an active listener and participant ● Respect and organize math materials appropriately		Establish routines and procedures for independent and/or cooperative math groups Establish student expectations during mathematics instruction Discuss the importance of using classroom references: anchor charts, student work rubrics, and instructional aides.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 2: Management	Students become familiar with the math tools in the classroom and what they are called.	#5: Use appropriate tools strategically	Add notes to a new chart, titled “Using Math Tools”.		Mathematicians use math tools to help solve problems. Discuss mathematical tools and how they are to be used and stored
Day 3: Interactive Math Journals	Students will write about their mathematical thinking on a daily basis. Students can explain that writing about their thinking is a way to represent mathematical concepts. Students can explain how the journal is a mathematical tool.	#6: Attend to precision	Post a model of the left and right side of the “Math Interactive Journal”		Mathematicians draw and write about their thinking as a way to process information. Students will be expected to share their thinking with the class.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 4: **Sharing Solutions** Step 3: People Talk	Students will be able to share their solutions to problems. Students will be able to provide constructive feedback.	#3: Construct viable arguments and critique the arguments of others.	Class discussion checklist Class discussion rubric		Students will share their independent work from days 2 and 3. Students will share their journal entries from day 3 with other students in class. Students will be able to provide feedback to a peer's journal entry from day 3. Students will use conversation starters to guide them in the process.
Day 5: Accountable Talk Step 3: People Talk	Students will respond orally and in written form using three "conversation starters": **revoicing, restating,** and **reasoning.**	#3: Construct viable arguments and critique the arguments of others.	Conversation Starter Anchor Chart		Students will learn to discuss math in a rigorous way. It involves learning how to listen to fellow students and teachers. Students must learn to: disagree with each other's ideas respectfully, how to hearwhat each other are saying, and how to ask questions and clarify ideas.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Days 6 & 7: Establishing Guidelines for Collaboration and Cooperation with Partners Step 1: Shared Experience	Students can work with others to share information and to learn new information.	#1: Make sense of problems and persevere in solving them. #3: Make viable arguments and critique the reasoning of others	Anchor Chart Game-partners Suggested Games: Make a 10 Plus 1 or 2 Bingo Close to 20 Close to 100		Mathematicians work collaboratively, developing good work ethics and maintaining a sense of responsibility.
Days 8 & 9: Establishing Guidelines for Collaboration and Cooperation with Small Groups Step 1: Shared Experience	Students can work with others to share information and to learn new information.	#1: Make sense of problems and persevere in solving them. #3: Make viable arguments and critique the reasoning of others	Anchor Chart Game-partners Suggested Games: Any simple card game	See day 6/7 chart	Mathematicians work collaboratively, developing good work ethics and maintaining a sense of responsibility.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 10: Problem Solving, Part 1 Entire 5 Step Curricular Process	Students solve a math problem using the model and process introduced by their teacher.	#1: Make sense of problems and persevere in solving them	Teacher and class develop and post a process chart of their Problem-Solving Model. Teacher should choose a problem solving model that they find effective.		Mathematicians solve problems using a process. There is a process involved when solving problems. Introduce an effective Problem-Solving Model.
Day 11 & 12: Problem Solving, Parts 2 and 3 Entire 5 Step Curricular Process	Continue using the Problem Solving Model. Students will solve appropriate problems and share their solutions using the "Class Discussion Rubric". Students will also practice the three "Conversation Starters".				

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 13-15: Establishing How Students Work During Small Group Intervention	Students will be accountable for using learning, problem solving, and helping strategies. The criteria for quality and work are explicit, accessible to all students, displayed publicly, and change over time to respond to the level of rigor as learning deepens.				Principles of Learning: Clear Expectations, Cooperative Learning, Self-management of Learning, Academic Rigor in a thinking curriculum. Mathematical skills are developed over time and students learn in different ways at different rates.

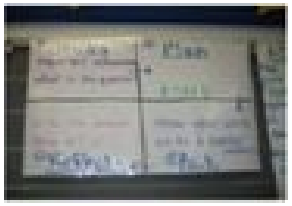
Grades 4-6

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 1: What is a Mathematician? Mathematicians work in an organized environment with established routines and procedures for independent and cooperative math groups.	Students understand that information will be posted around the classroom for them to make their work better, to support their learning, and to help them review concepts as they are being learned.	#1: Make sense of problems and persevere in solving them. #6: Attend to precision.	Ask the students, "What does a good mathematician do?" Have the students write their ideas in their math journals. Chart ideas: -stay on task -speak/write mathematically -be an active listener -do not rush to solve a problem -make sure your answer makes sense	Chart paper Markers Math journal	Post the chart on the wall in student friendly language.
Day 2: Noise Management Establish noise level expectations during cooperative math groups.	Students will understand noise level procedures when working in groups.	#6: Attend to precision	Different noise levels: Silent- for test taking Quiet- individual work Mild- partner talk Moderate- group work Elevated- whole class Outdoor- never to be used in the classroom	Construction paper Cups	To help monitor noise, teachers should use a visual system to help with the implementation of noise level expectations.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 3: Mathematical Tools How and why do mathematicians use tools?	Students will become familiar with the math tools in the classroom.	#5: Use appropriate tools strategically.	Distribute math tools so that all students have some. Have each group brainstorm possible mathematical uses for how the manipulative could be used. Give the groups about three minutes to brainstorm. Have the groups share their ideas. Rotate and repeat activity with different manipulatives.	Manipulatives: Base ten blocks Tangrams Pattern blocks Link cubes Color tiles Color cubes	
Day 4: Class Climate What are the class norms needed to establish a productive/ learning mathematical environment?	The students will develop a list of classroom norms.	#1: Make sense of problems and persevere in solving them #3: Construct viable arguments and critique the reasoning of others #6: Attend to precision	Ask the students, "What is needed to have a productive math class?" Give them time to brainstorm their ideas in their math journals. Make a class chart with norms. Have 3-5 norms listed on the chart.	Chart paper Markers Math Journal	Post the chart on the wall in student friendly language. Examples: Active listening Safe, risk free Raise hand Noise level Agree to disagree Helpful Thoughtful No violence

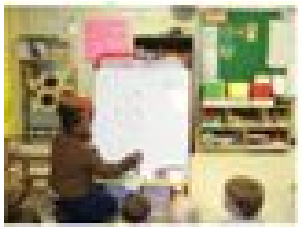
Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 5: Group Conversations (Accountable Talk) Mathematicians communicate with each other about their thinking and work. Mathematicians learn from one another. Accountable talk teaches students how to respond orally.	Students will learn to communicate effectively when expressing their thoughts. Students will be able to disagree with each other respectfully, hear what each other is saying, and how to ask questions for clarification. Students will understand that they adopt other student's ideas.	#3. Construct viable arguments and critique the reasoning of others.	Students are given the prompt: "Jon had a lemonade stand. He sold each cup of lemonade for 20¢. A man gave Jon 50¢ and said that he wanted to buy 1 cup of lemonade. Jon gave the man 20¢ in change. You think Jon gave the man the wrong change, but your partner thinks that Jon gave the man the correct change. Write in your math journal about how you could talk to your partner. You can use the conversation starters." Give them about 5 minutes to come up with an answer. Have the students share their responses with a partner and then pick some to share with the class.	Chart paper Markers Math Journal	

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 6: Small Group Collaboration Mathematicians work collaboratively, developing good work ethics, and maintaining a sense of responsibility	Students will learn that they can work with others to share information and to learn new information.	#1: Make sense of problems and persevere in solving them #3: Construct viable arguments and critique the reasoning of others #7: Look for and make use of structure	Establish norms for working in small groups with the class. Have the students brainstorm ideas in their math journals that they feel are needed to work well in a small group. Then, share and discuss ideas.	Chart paper Markers Math Journal	Post the chart on the wall in student friendly language.
Day 7: Student Accountability Classroom practice holds all students accountable for using learning, problem solving, and helping strategies	Students understand that they share in the responsibility for their own learning.	#1: Make sense of problems and persevere in solving them #3: Construct viable arguments and critique the reasoning of others #5: Use appropriate tools strategically #6: Attend to precision	Emphasize that the classroom resources are there as references to make their work better. Activity: The purpose behind this activity is to teach the students that their independent work is just one small piece of the collective classwork. Begin the lesson by dividing the students into pairs. Give each pair of students 24 tiles. Instruct them to arrange the tiles into only one array. After they have made their array, they record a model of their array on graph paper and post it on the board. Take the students models and build a factor rainbow. A factor rainbow cannot be created using only one array. Each student is accountable for contributing to everyone's learning outcomes. A factor rainbow is an example of a collective piece of classwork.	Color tiles Graph paper Markers Place to display answers	In order to learn to be accountable, students must first learn to be responsible for their own actions toward learning tasks. Much of this 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

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 8: Problem Solving Procedure There is a process involved in solving problems.	Students understand the importance of problem solving every day. Students will learn that there is a process involved when solving problems.	#1: Make sense of problems and persevere in solving them #2: Reason abstractly and quantitatively #3: Construct viable arguments and critique the reasoning of others #4: Model with mathematics #5: Use appropriate tools strategically #6: Attend to precision #7: Look for and make use of structure #8: Look for and express regularity and repeated reasoning	Develop and display a process chart of the mathematician's (Polya) 4-step problem solving model. Discuss with your students the following four steps used when problem solving: 1. Understand the problem 2. Devise a plan 3. Carry out the plan 4. Look back 	Chart paper Markers	Post the chart on the wall in student friendly language. These steps help students take time to reflect on what they have done so they can think about what worked and what did not work. Doing this will enable students to predict what strategy to use to solve future problems.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 9: Problem Solving Strategies Mathematicians solve problems using a variety of strategies.	Students share and recognize multiple strategies used to solve a problem	#1: Make sense of problems and persevere in solving them #2: Reason abstractly and quantitatively #3: Construct viable arguments and critique the reasoning of others #4: Model with mathematics #5: Use appropriate tools strategically #6: Attend to precision #7: Look for and make use of structure #8: Look for and express regularity and repeated reasoning	Assign a multiplication problem to your students. Ask them to solve the problem in their math journal. Teacher selects work samples that show multiple strategies that can be used to solve the problem. This work will be used to create a class chart.  	Chart paper Markers Math Journal	You could use any problem that matches your students' needs. Post the chart on the wall in student friendly language.

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 10: Collaborative Problem Solving Think-Pair-Square Mathematicians solve problems using a variety of strategies.	Students will be able to use the Think-Pair-Share strategy	#3: Construct viable arguments and critique the reasoning of others #5: Use appropriate tools strategically	This strategy builds on partner talk. We use this when posing questions that require more conversations. After partners discuss a question, they join another set of partners to extend their ideas. Once four students have met, the groups share to the whole class.	Sample questions: How would you spend $1,000? If you could do anything you want for one day, what would you do?	This strategy is an extension to Think-Pair-Share
Day 11: Collaborative Problem Solving Numbered Heads Together Mathematicians solve problems using a variety of strategies.	Students will be able to use the Numbered Heads strategy	#1: Make sense of problems and persevere in solving them #3: Construct viable arguments and critique the reasoning of others #7: Look for and make use of structure #8: Look for and express regularity and repeated reasoning	Students work in small groups, with each member numbered off (student #1, student #2, etc.). After discussing the question posed, the teacher reminds them to check for understanding of all group members, clarifying any misconceptions within their group. The teacher chooses a number (example: student #1) and the person with the corresponding digit answers for their group.		This strategy requires students to work in groups to make sure that all members know the information. Sample questions: Decide if it is better to receive $300 a week or to be paid hourly at a rate of $7.50 per hour. What factors could affect your decision? Four families each brought the same number of chairs to a party. Three more chairs are needed to seat all 27 family members. How many chairs did each family bring?

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 12: Justification Mathematicians justify their thinking The teacher and students press for accurate and appropriate evidence of their claims, including references to the text or prior classroom experiences.	Students understand that when they justify their thinking they deepen their understanding of the topic.	#1: Make sense of problems and persevere in solving them #2: Reason abstractly and quantitatively #3: Construct viable arguments and critique the reasoning of others #4: Model with mathematics #5: Use appropriate tools strategically #6: Attend to precision #7: Look for and make use of structure #8: Look for and express regularity and repeated reasoning	Show models/ examples of quality work such as journal entry, student work products, etc that reinforce students' justification of their thinking. Students use pictures, numbers, and words to justify their work. 		During math instruction, make sure that the students are explaining thoughts in complete sentences when speaking and writing. This practice will reinforce and develop the skill or reasoning and proof. Justify means: ● Explain ● Describe ● Prove ● Give reasons ● Show you understand

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 13: Representation Mathematicians use multiple ways to represent ideas.	Students understand that in math there are multiple ways to represent mathematical ideas.	#4: Model with mathematics	Create a chart and explain that students can represent math concepts using pictures, words, numbers, symbols, manipulatives and in relevant situations. 	Chart paper markers	Discuss how students can represent concepts using manipulatives, pictures, numbers, words, etc
Day 14: Self-Monitoring Mathematicians modify and adjust their work as needed	Students will revise their work to meet quality criteria on a systematic basis as appropriate.	#6: Attend to precision	Ask the students, "If your math was published, how would you want it to look?" Students respond to prompt in math journals. Share out ideas in class. Create a chart with no more than five criteria. Examples: Correct grammar and spelling Symbols have a specific math meaning Work is organized and neat Someone else can understand my work Shows ownership and	Chart paper markers	Discuss how students can represent concepts using manipulatives, pictures, numbers, words, etc

			original thought		
Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 15: Math Journals Mathematicians write about their thinking as a way to process information Mathematicians use and record mathematical representations to interpret and model everyday life activities	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	#1: Make sense of problems and persevere in solving them	Pose the question to your class, “Why do we write about our math learning?” Record the solutions to math problems along with strategies and thought processes used to arrive at the solution Record information Reflect on math learning Reference book for math learning Study guide Portfolio of work	Chart paper markers	While the students learn to “do” math, they must also learn to articulate what they are learning. It is important to provide opportunities to organize and record their work without the structure of a worksheet.

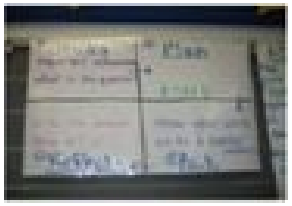
Grades 7-8

Mini Lesson	Learning Outcomes	Mathematical Practices	Classroom Resources	Resource Notes	Teacher Notes
Day 1: What is a Mathematician? Mathematicians work in an organized environment with established routines and procedures for independent and cooperative math groups.	Students understand that information will be posted around the classroom for them to make their work better, to support their learning, and to help them review concepts as they are being learned.	#1: Make sense of problems and persevere in solving them. #6: Attend to precision.	Ask the students, "What does a good mathematician do?" Have the students write their ideas in their math journals. Chart ideas: -stay on task -speak/write mathematically -be an active listener -do not rush to solve a problem -make sure your answer makes sense	Chart paper Markers Math journal	Post the chart on the wall in student friendly language.
Day 2: Noise Management Establish noise level expectations during cooperative math	Students will understand noise level procedures when working in groups.	#6: Attend to precision	Different noise levels: Silent- for test taking Quiet- individual work Mild- partner talk Moderate- group work Elevated- whole class	Construction paper Cups	To help monitor noise, teachers should use a visual system to help with the implementation of noise level expectations.

groups.			Outdoor- never to be used in the classroom		
Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 3: Mathematical Tools How and why do mathematicians use tools?	Students will become familiar with the math tools in the classroom.	#5: Use appropriate tools strategically.	Distribute math tools so that all students have some. Have each group brainstorm possible mathematical uses for how the manipulative could be used. Give the groups about three minutes to brainstorm. Have the groups share their ideas. Rotate and repeat activity with different manipulatives.	Manipulatives: Base ten blocks Tangrams Pattern blocks Link cubes Color tiles Color cubes	
Day 4: Class Climate What are the class norms needed to establish a productive/ learning mathematical environment?	The students will develop a list of classroom norms.	#1: Make sense of problems and persevere in solving them #3: Construct viable arguments and critique the reasoning of others #6: Attend to precision	Ask the students, "What is needed to have a productive math class?" Give them time to brainstorm their ideas in their math journals. Make a class chart with norms. Have 3-5 norms listed on the chart.	Chart paper Markers Math Journal	Post the chart on the wall in student friendly language. Examples: Active listening Safe, risk free Raise hand Noise level Agree to disagree Helpful

					Thoughtful No violence
Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 5: Group Conversations (Accountable Talk) Mathematicians communicate with each other about their thinking and work. Mathematicians learn from one another. Accountable talk teaches students how to respond orally.	Students will learn to communicate effectively when expressing their thoughts. Students will be able to disagree with each other respectfully, hear what each other is saying, and how to ask questions for clarification. Students will understand that they adopt other student's ideas.	#3. Construct viable arguments and critique the reasoning of others.	Students are given the prompt: "Jon had a lemonade stand. He sold each cup of lemonade for 20¢. A man gave Jon 50¢ and said that he wanted to buy 1 cup of lemonade. Jon gave the man 20¢ in change. You think Jon gave the man the wrong change, but your partner thinks that Jon gave the man the correct change. Write in your math journal about how you could talk to your partner. You can use the conversation starters." Give them about 5 minutes to come up with an answer. Have the students share their responses with a partner and then pick some to share with the class.	Chart paper Markers Math Journal	

Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 6: Small Group Collaboration Mathematicians work collaboratively, developing good work ethics, and maintaining a sense of responsibility	Students will learn that they can work with others to share information and to learn new information.	#1: Make sense of problems and persevere in solving them #3: Construct viable arguments and critique the reasoning of others #7: Look for and make use of structure	Establish norms for working in small groups with the class. Have the students brainstorm ideas in their math journals that they feel are needed to work well in a small group. Then, share and discuss ideas.	Chart paper Markers Math Journal	Post the chart on the wall in student friendly language.
Day 7: Student Accountability Classroom practice holds all students accountable for using learning, problem solving, and helping strategies	Students understand that they share in the responsibility for their own learning.	#1: Make sense of problems and persevere in solving them #3: Construct viable arguments and critique the reasoning of others #5: Use appropriate tools strategically #6: Attend to precision	Emphasize that the classroom resources are there as references to make their work better. Activity: The purpose behind this activity is to teach the students that their independent work is just one small piece of the collective classwork. Begin the lesson by dividing the students into pairs. Give each pair of students 24 tiles. Instruct them to arrange the tiles into only one array. After they have made their array, they record a model of their array on graph paper and post it on the board. Take the students models and build a factor rainbow. A factor rainbow cannot be created using only one array. Each student is	Color tiles Graph paper Markers Place to display answers	In order to learn to be accountable, students must first learn to be responsible for their own actions toward learning tasks. Much of this 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

			accountable for contributing to everyone's learning outcomes. A factor rainbow is an example of a collective piece of classwork.		learning
Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 8: Problem Solving Procedure There is a process involved in solving problems.	Students understand the importance of problem solving every day. Students will learn that there is a process involved when solving problems.	#1: Make sense of problems and persevere in solving them #2: Reason abstractly and quantitatively #3: Construct viable arguments and critique the reasoning of others #4: Model with mathematics #5: Use appropriate tools strategically #6: Attend to precision #7: Look for and make use of structure #8: Look for and express regularity and repeated reasoning	Develop and display a process chart of the mathematician's (Polya) 4-step problem solving model. Discuss with your students the following four steps used when problem solving: 5. Understand the problem 6. Devise a plan 7. Carry out the plan 8. Look back 	Chart paper Markers	Post the chart on the wall in student friendly language. These steps help students take time to reflect on what they have done so they can think about what worked and what did not work. Doing this will enable students to predict what strategy to use to solve future problems.

Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 9: Problem Solving Strategies Mathematicians solve problems using a variety of strategies.	Students share and recognize multiple strategies used to solve a problem	#1: Make sense of problems and persevere in solving them #2: Reason abstractly and quantitatively #3: Construct viable arguments and critique the reasoning of others #4: Model with mathematics #5: Use appropriate tools strategically #6: Attend to precision #7: Look for and make use of structure #8: Look for and express regularity and repeated reasoning	Assign a multiplication problem to your students. Ask them to solve the problem in their math journal. Teacher selects work samples that show multiple strategies that can be used to solve the problem. This work will be used to create a class chart.  	Chart paper Markers Math Journal	You could use any problem that matches your students' needs. Post the chart on the wall in student friendly language.

Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 10: Collaborative Problem Solving Think-Pair-Square Mathematicians solve problems using a variety of strategies.	Students will be able to use the Think-Pair-Share strategy	#3: Construct viable arguments and critique the reasoning of others #5: Use appropriate tools strategically	This strategy builds on partner talk. We use this when posing questions that require more conversations. After partners discuss a question, they join another set of partners to extend their ideas. Once four students have met, the groups share to the whole class.	Sample questions: How would you spend $1,000? If you could do anything you want for one day, what would you do?	This strategy is an extension to Think-Pair-Share
Day 11: Collaborative Problem Solving Numbered Heads Together Mathematicians solve problems using a variety of strategies.	Students will be able to use the Numbered Heads strategy	#1: Make sense of problems and persevere in solving them #3: Construct viable arguments and critique the reasoning of others #7: Look for and make use of structure #8: Look for and express regularity and	Students work in small groups, with each member numbered off (student #1, student #2, etc.). After discussing the question posed, the teacher reminds them to check for understanding of all group members, clarifying any misconceptions within their group. The teacher chooses a		This strategy requires students to work in groups to make sure that all members know the information. Sample questions: Decide if it is better to receive $300 a week or to be paid hourly at a rate of $7.50 per hour. What factors could affect your decision?

		repeated reasoning	number (example: student #1) and the person with the corresponding digit answers for their group.		Four families each brought the same number of chairs to a party. Three more chairs are needed to seat all 27 family members. How many chairs did each family bring?
Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 12: Justification Mathematicians justify their thinking The teacher and students press for accurate and appropriate evidence of their claims, including references to the text or prior classroom experiences.	Students understand that when they justify their thinking they deepen their understanding of the topic.	#1: Make sense of problems and persevere in solving them #2: Reason abstractly and quantitatively #3: Construct viable arguments and critique the reasoning of others #4: Model with mathematics #5: Use appropriate tools strategically #6: Attend to precision #7: Look for and make use of structure #8: Look for and express regularity and repeated reasoning	Show models/ examples of quality work such as journal entry, student work products, etc that reinforce students' justification of their thinking. Students use pictures, numbers, and words to justify their work. 		During math instruction, make sure that the students are explaining thoughts in complete sentences when speaking and writing. This practice will reinforce and develop the skill or reasoning and proof. Justify means: ● Explain ● Describe ● Prove ● Give reasons ● Show you understand

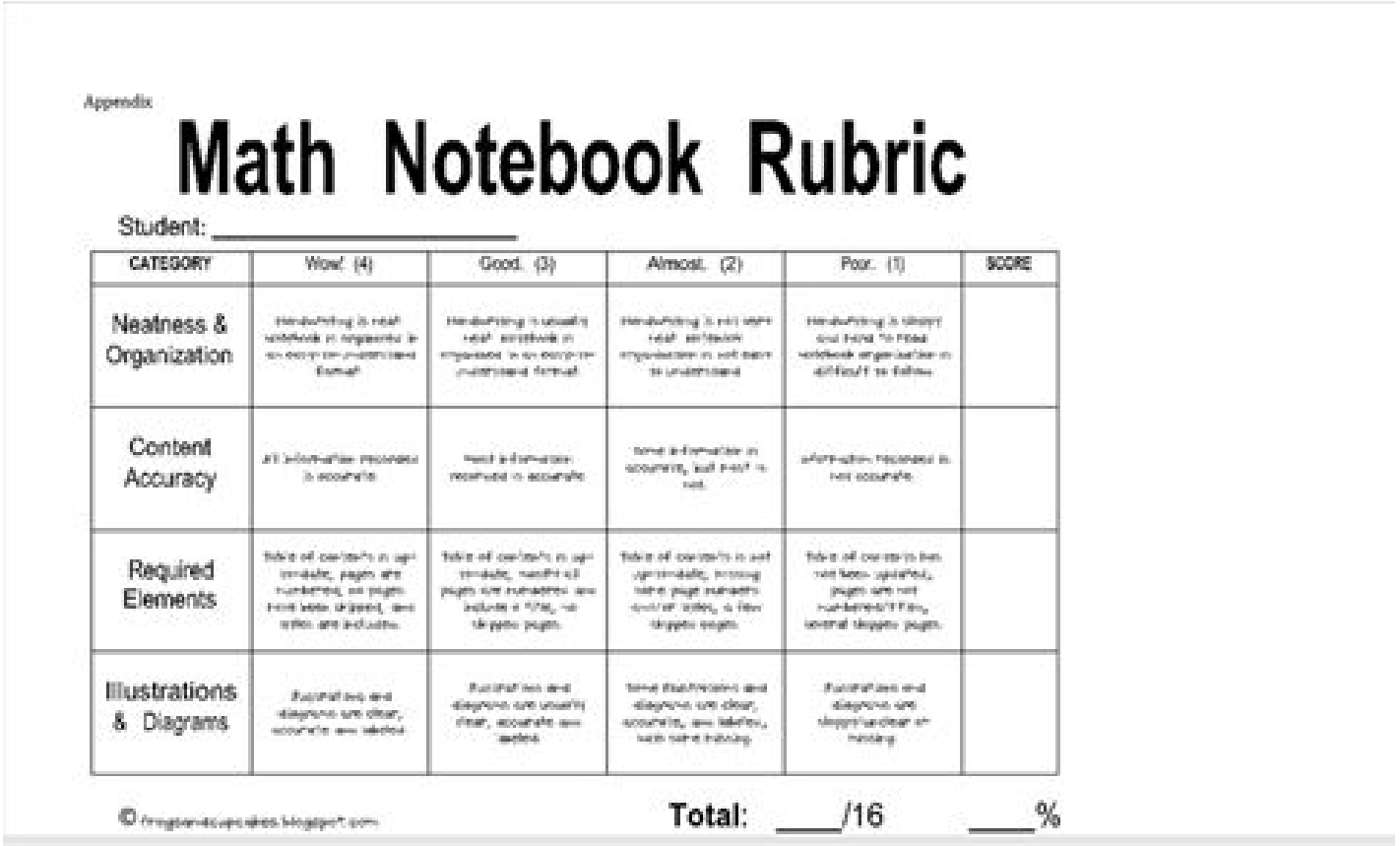
Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 13: Representation Mathematicians use multiple ways to represent ideas.	Students understand that in math there are multiple ways to represent mathematical ideas.	#4: Model with mathematics	Create a chart and explain that students can represent math concepts using pictures, words, numbers, symbols, manipulatives and in relevant situations. 	Chart paper markers	Discuss how students can represent concepts using manipulatives, pictures, numbers, words, etc
Day 14: Self-Monitoring Mathematicians modify and adjust their work as needed	Students will revise their work to meet quality criteria on a systematic basis as appropriate.	#6: Attend to precision	Ask the students, "If your math was published, how would you want it to look?" Students respond to prompt in math journals. Share out ideas in class. Create a chart with no more than five criteria. Examples:	Chart paper markers	Discuss how students can represent concepts using manipulatives, pictures, numbers, words, etc

			Correct grammar and spelling Symbols have a specific math meaning Work is organized and neat Someone else can understand my work Shows ownership and original thought		
Mini Lesson	**Learning Outcomes**	**Mathematical Practices**	**Classroom Resources**	**Resource Notes**	**Teacher Notes**
Day 15: Math Journals Mathematicians write about their thinking as a way to process information Mathematicians use and record mathematical representations to interpret and model everyday life activities	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	#1: Make sense of problems and persevere in solving them	Pose the question to your class, “Why do we write about our math learning?” Record the solutions to math problems along with strategies and thought processes used to arrive at the solution Record information Reflect on math learning Reference book for math learning Study guide	Chart paper markers	While the students learn to “do” math, they must also learn to articulate what they are learning. It is important to provide opportunities to organize and record their work without the structure of a worksheet.

			Portfolio of work		

Tools

Math Rubric Notebook



Appendix

Math Notebook Rubric

Student: _____

CATEGORY	Wow! (4)	Good. (3)	Almost. (2)	Poor. (1)	SCORE
Neatness & Organization					
Content Accuracy					
Required Elements					
Illustrations & Diagrams					

Total: ____/16 ____%

Suggested Guidelines of Math Journal

Suggested guidelines:

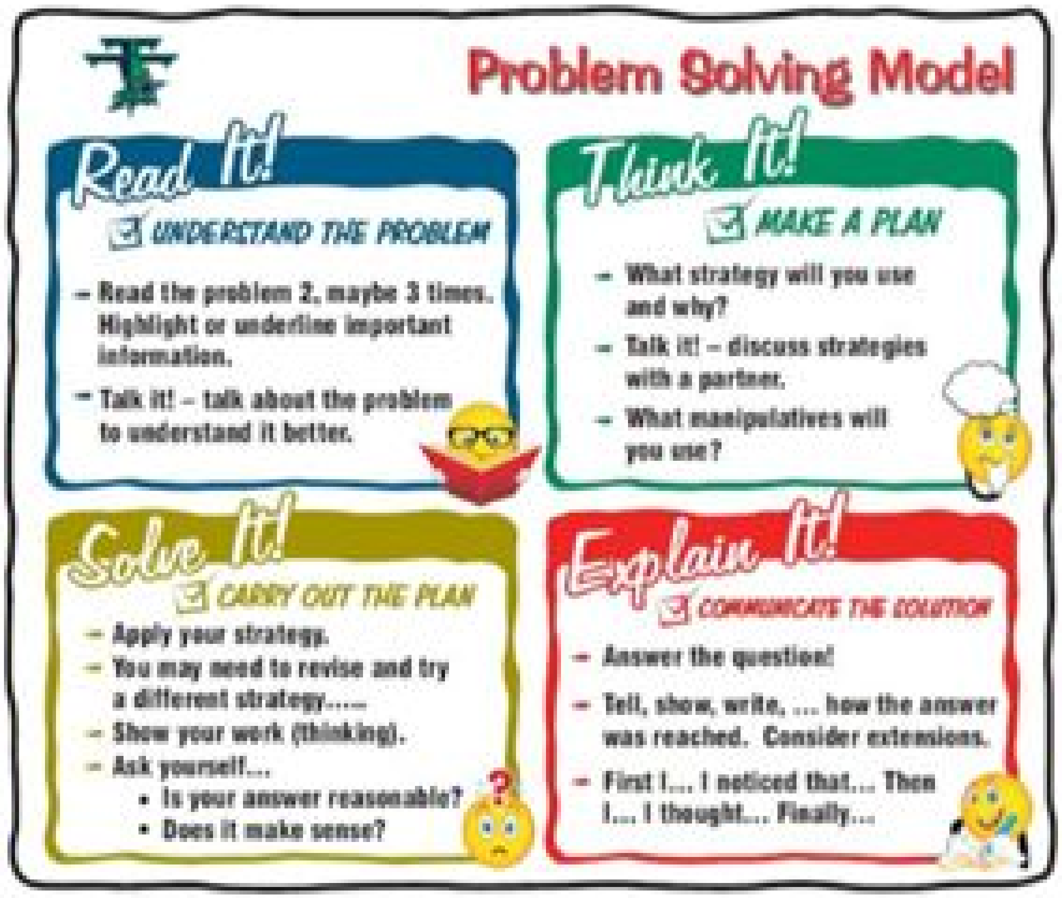
- Write neatly and legibly
- Do not erase
- Do not tear out pages
- Label drawings graphs and charts
- Use sentences to communicate observations, plans, explanations, conclusions and applications

Suggested journal organization:

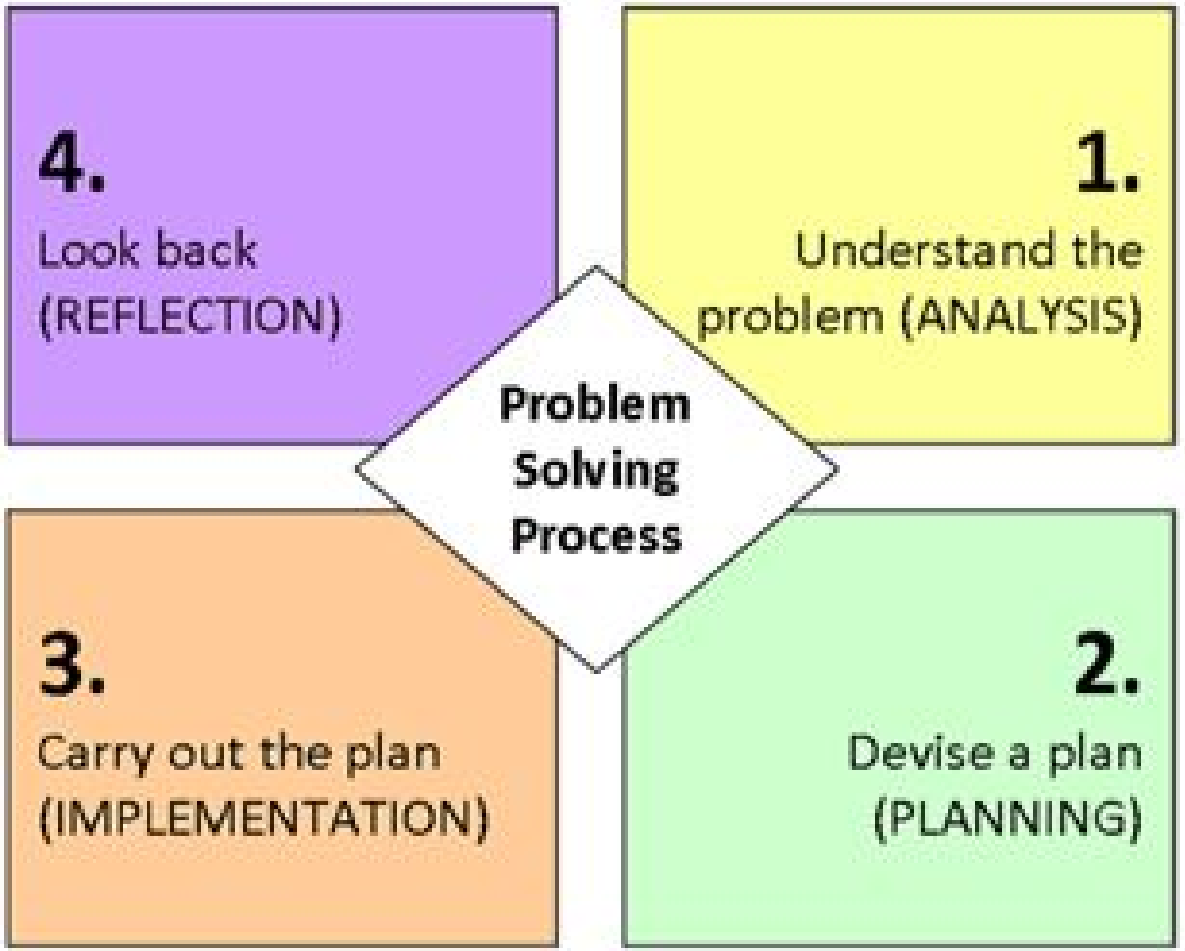
Left side – Teacher Input	Right Side – Student Output
Lesson notes Group discussion Handouts Sample problems vocabulary	Restate ideas in your own words Pose questions about information Connect ideas Write a reflection Glue in foldable Respond to journal prompt Create an acronym to help remember information covered Draw a picture to represent information Create original problems Practice examples Brainstorm ideas Write a poem or a song to help you remember math vocabulary Create a thinking map to organize and clarify information

Problem Solving Model (1)

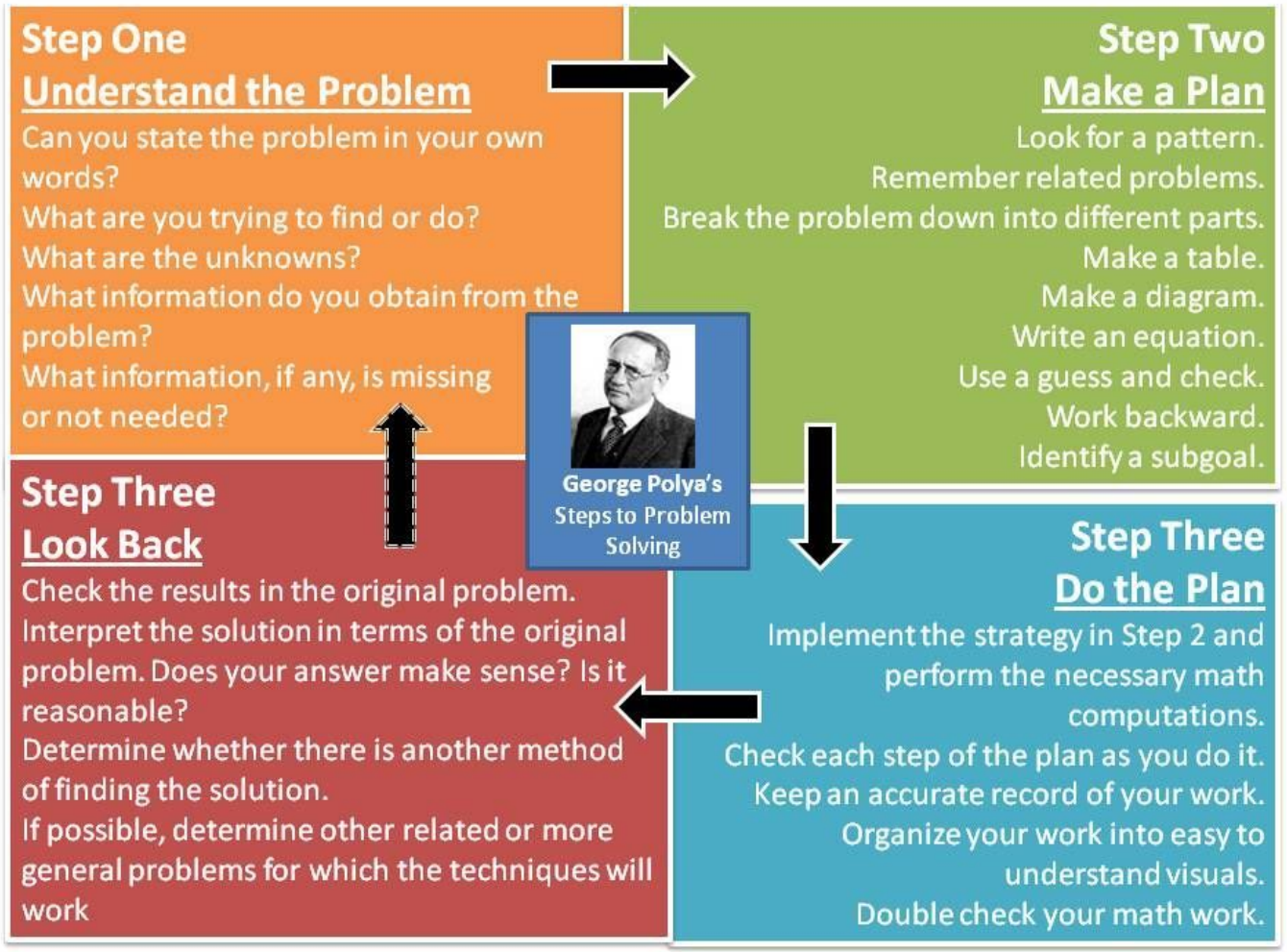
Total: ____/16 ____%



Problem Solving Model (2)



Polya's 4 Step Problem Solving Method



Conversation Starters…

Agreement

"I agree with _____ because _____."
"I like what _____ said because _____."

Disagreement

"I disagree with _____ because _____."
"I'm not sure I agree with what _____ said because _____."

Clarifications

"Could you please repeat that for me?"
"Could you explain a bit more, please?"
"What I think I heard you say was…"
"What's your evidence?"

Confirmation

"I think _____." "I believe _____."

Confusion

"I don't understand _____."
"I am confused about _____."

Extension

"I was thinking about what ___ said, and I was wondering what if __."
"This makes me think _____."
"I want to know more about _____."
"Now I am wondering _____."
"Can you tell me more about _____?"

Review

"I want to go back to what _____ said."

This guide was adapted by Mansfield City Schools, Mansfield, Ohio, Math Teacher Leaders from:

The First 20 days of Independent reading by Fountas & Pinnell
Austin Independent School System, Austin, Texas
Staunton City Schools, Staunton, Virginia
Engaging the Adolescent Learner by Douglas Fisher and Nancy Frey
How to Solve It by George Polya
Using Interactive Notebooks in the Mathematics Classroom by Sherry Olivares

Edited and adapted by Math Literacy Initiative at The Ohio State University, Mansfield, Ohio