

## Middle School Math FOI (90 Minute Math Block)

Core Instruction of the Aim (60 minutes)	
Rationale for the Math Lesson	Non-Negotiables of the Math Lesson
<ul style="list-style-type: none"> <li>Math class is the core conceptual learning time and practice in our math block.</li> <li>The teacher focuses on a specific concept and introduces it in a clear introduction with deliberate scaffolded questioning to enable students to make connections, draw conclusions and identify the key points.</li> <li>The daily math lesson comes from an agreed upon lesson sequence that utilizes enVision, Carnegie Learning, Glencoe, Pearson, Holt, and teacher-created lessons to give students further practice with a concept using concrete, pictorial, and abstract representations.</li> </ul>	<ul style="list-style-type: none"> <li>The Math lesson is 60 minutes and occurs at the start of the block.</li> <li>S&amp;S and lesson sequence drive content decisions.</li> <li>Students are building math understandings at the concrete, pictorial, and abstract levels. This is underwritten through focus, coherence, and rigor.</li> <li>Scaffolded questioning is used in the introduction to help students make meaning by developing connections and building off of previously learned material.</li> <li>Visual anchors capture strategies students should be utilizing and CFS that they should be meeting to create top quality work.</li> <li>Students should have a minimum of 15 minutes of IP.</li> <li>Agenda:               <ul style="list-style-type: none"> <li>Opening: Think About It Problem</li> <li>INM</li> <li>Partner Practice</li> <li>Discussion and Final CFU</li> <li>Independent Practice</li> <li>Closing Discussion and Exit Ticket</li> </ul> </li> </ul>

Opening (3-5 minutes)	
What the TEACHER is doing	What the STUDENTS are doing
<p>___The Think About It problem is pre-planned to serve one of three purposes:</p> <ul style="list-style-type: none"> <li>To elicit key points for the day’s lesson by prompting students to draw upon and make connections between previously learned skills and concepts; most students should be successful in eliciting the key points;</li> <li>To allow students to work on a low-stakes, open-ended, novel problem that draws out possible strategies that will be applied during the lesson, some key points and possible misconceptions that can be addressed through review of the problem; most students should be able to attempt the problem but many will struggle;</li> <li>To review a previously learned and mastered skill or concept that will be applied to the day’s lesson.</li> </ul> <p>___The teacher circulates while students complete the Think About It problem and facilitates thinking and/or conversations between students through questioning and pushing students to continue to try different strategies. The teacher should check the work of a minimum of 80% of the class during circulation.</p> <p>___The teacher uses a sequence of, adjusted in the moment, scaffolded questioning to allow for students to share out strategies and key understandings they developed from completing the Think About It problem.</p> <p>___ The teacher uses the Think About It problem to frame the day’s learning.</p>	<p>___Students are completing the opening Think About It Problem in pairs or independently.</p> <p>___Upon completion, students are sharing the strategies that they used to complete the Think About It problem and understandings that they have (or think they have) developed while engaging in the Think About It problem.</p>

Introduction (10-15 minutes)	
What the TEACHER is doing	What the STUDENTS are doing
<p>___The introduction showcases the learning for the day. This is generally through 1-3 problems the class will tackle together. The teacher initiates conversation about “what do we know/need to know?” and facilitates discussion to help students make connections between previously learned content/skills and new content/skills.</p> <p>___The teacher uses a sequence of, adjusted in the moment, scaffolded questioning to help students figure out and articulate the strategies and key points. The teacher has pre-planned the strategies and key points to discuss and focuses the questioning to make sure those strategies and key points are shared and understood.</p> <p>___Key points are developed using definitions and a progression of concrete, pictorial and abstract representations. Additionally, non-examples are explored and discussed to reinforce understanding of key points and address common misconceptions. Through this, students’ conceptual understanding, ability to apply concepts and fluency are developed.</p> <p>___ The teacher uses pre-identified CFU strategies and scripted questions to collect data on the progress of learning for the class. CFUs must:</p> <ul style="list-style-type: none"> <li>- Enable the teacher to collect data from all scholars;</li> <li>- Assess what was taught at all appropriate levels of cognition and rigor given the aim (fluency, application and conceptual understanding);</li> <li>- Assess anticipated misunderstandings.</li> </ul> <p>___The teacher has a skeletal visual anchor prepared ahead of time and adds in the learning/strategies as students share/identify them or the teacher creates the visual anchor with the class while going through the first example.</p> <p>___ The teacher has the CFS prepared ahead of time and identifies them as they become relevant and utilized during the lesson so as to clearly set expectations for students’ work products.</p>	<p>___Students are demonstrating active engagement during the introduction by:</p> <ul style="list-style-type: none"> <li>Raising their hand to answer; sharing during a turn and talk; responding to whole group prompts; responding when cold-called</li> <li>Actively figuring out the problem posed by the teacher and/or sharing multiple strategies for the math in the game (as evidenced by oral/written participation)</li> <li>Recording notes/work/strategies on packet</li> <li>Actively engaging with the CFS to determine whether or not the work modeled on the board or the work in their notes meets the standards of top-quality work.</li> </ul>

<b>Partner Practice (8-15 minutes)</b>	
<b>What the TEACHER is doing</b>	<b>What the STUDENTS are doing</b>
<p>___ The teacher circulates for the first 1 minute to ensure all students are on-task and understand the directions.</p> <p>___ The teacher conferences with 100% of students, asking a pre-planned CFU question to gauge their level of fluency, application, and/or conceptual understanding and giving targeted feedback based on the CFS.</p> <p>___ While conferencing, the teacher decides if a student needs an intervention or extension and moves the student to the intervention/extension work. The teacher should make a note to possibly work directly with students in need of intervention during IP.</p> <p>___ The teacher leads an interruption, mid-way through the partner practice, which connects to the aim and showcases either a strategy students should be using or a common misconception.</p>	<p>___ Students are practicing the math repeatedly and writing responses to open ended questions.</p> <p>___ Students are working in partner pairs following a Kagen Cooperative Learning format. The recommended formats below ensure that there is accountability for both students in a pair to participate equally, and that students are able to support one another as they continue to develop their conceptual understanding, ability to apply concepts and skills, and fluency. In order for these structures to truly foster cooperative learning, all four elements of PIES must be met (Positive Interdependence, Individual Accountability, Equal Participation and Simultaneous Interaction).</p> <ul style="list-style-type: none"> <li>- Rally Table: Students take turns in pairs generating responses and solving problems. Students present their work to their partner and discuss until consensus is reached.</li> <li>- Rally Coach: Partners take turns, one solving a problem while the other coaches.</li> <li>- Pairs Compare: Pairs generate a list of answers. Pairs then compare their answers with another pair.</li> <li>- QuizQuiz Trade: Students quiz a partner and get quizzed by their partner.</li> <li>- Numbered Heads Together: Pairs put their "heads together" to reach consensus on their answer. Each teammate has a number and the teacher randomly calls a number to indicate who will explain the pair's response (this can also be done in groups of four).</li> </ul> <p>___ Students are thinking about and naming/discussing the strategy they are using to figure out the math.</p>

<b>Discussion and CFU (5-8 minutes)</b>	
<b>What the TEACHER is doing</b>	<b>What the STUDENTS are doing</b>
<p>___ The teacher leads a class discussion about the math concept practiced during Partner Practice. The teacher should select 1-2 problems from the PP to focus conversation on and utilize pre-planned CFU questions in the LP to drive the conversation. The discussion and work shown should reinforce the CFS, key points and clear up common misunderstandings.</p> <p>___ The teacher elicits multiple strategies from kids, based on observations during Partner Practice.</p> <p>___ Time and need depending, the teacher shares and clears up a common misunderstanding or error from partner practice.</p> <p>___ Teacher leads the class in a whole class CFU prior to starting IP. CFU must:</p> <ul style="list-style-type: none"> <li>- Enable the teacher to collect data from all scholars;</li> <li>- Assess what was taught at all appropriate levels of cognition and rigor given the aim (fluency, application and conceptual understanding);</li> <li>- Assess anticipated misunderstandings.</li> </ul> <p>___ Data from CFU should inform teacher's selection of students to provide additional (small group) instruction to during IP.</p>	<p>___ Students share strategies used during partner practice.</p> <p>___ Students help explain the misunderstandings associated with common misconceptions, and redefine their understanding.</p> <p>___ Students may use their work from partner practice to share/explain their thinking.</p> <p>___ Students agree/disagree with each other nonverbally. Students prove/disprove what each other shares by raising their hand and sharing their thoughts about what the previous student shared.</p> <p>___ Students complete the whole class CFU.</p>

<b>Independent Practice (15-20 minutes)</b>	
<b>What the TEACHER is doing</b>	<b>What the STUDENTS are doing</b>
<p>___ The teacher circulates for the first 1 minute to ensure all students are on-task and understand the directions.</p> <p>___ The teacher conferences with 100% of students, asking a pre-planned CFU question to gauge their level of fluency, application, and/or conceptual understanding and giving targeted feedback based on the CFS. Or, the teacher's conference might deal with an observed misconception noted during the final CFU or student question. Teacher should conference with all students in the first 5 minutes of IP. Then, s/he should prioritize the most struggling students identified during whole class CFU and while circulating to work with individually or in a small group (depending on the number of struggling students).</p> <p>___ If multiple students are observed with the same difficulty/misunderstanding, the teacher stops the class and addresses the difficulty/misunderstanding with the group.</p> <p>___ If a student or students are excelling with the work provided, the teacher should provide the student(s) with extension work.</p>	<p>___ Students are practicing the math repeatedly and at various levels of rigor by clearly showing their work and writing responses to open ended questions.</p> <p>___ Students are thinking about and naming/discussing the strategy they are using to figure out the math.</p> <p>___ Students are checking their work and correcting work marked by the teacher.</p>

<b>Closing and Exit Ticket (5-8 minutes)</b>	
<b>What the TEACHER is doing</b>	<b>What the STUDENTS are doing</b>
<p>___ The teacher leads a class discussion about the math concept practiced during Independent Practice. The teacher should select 1-2 problems from the IP to focus conversation on and utilize pre-planned CFU questions in the LP to drive the conversation. The discussion and work shown should reinforce the CFS, key points and clear up common misunderstandings</p> <p>___ The teacher elicits multiple strategies from kids, based on observations during Independent Practice.</p> <p>___ Time and need depending, the teacher shares and clears up a common misunderstanding from Independent Practice.</p> <p>___ Teacher leads the class in completing the Exit Ticket</p>	<p>___ Students share strategies used during Independent Practice.</p> <p>___ Students help explain the misunderstandings associated with common misconceptions, and redefine their understanding.</p> <p>___ Students may use their work from Independent Practice to share/explain their thinking.</p> <p>___ Students agree/disagree with each other nonverbally. Students prove/disprove what each other shares by raising their hand and sharing their thoughts about what the previous student shared.</p> <p>___ Students complete the Exit Ticket, which includes questions that assess what students understand and are able to do through work shown and written explanations.</p>

## Cumulative Review or Targeted Re-Teach (30 minutes)

Rationale for the Cumulative Review or Targeted Re-Teach	Non-Negotiables of Cumulative Review or Targeted Re-Teach
<p>Cumulative Review:</p> <ul style="list-style-type: none"> <li>Cumulative Review content and activities are based on specific school/class/student needs determined from analysis of Exit Ticket, Weekly Quick, Unit Assessment and Interim Assessment data.</li> <li>Cumulative Review occurs daily as a means to review and extend previously class-wide mastered skills and concepts through skill drills, problems of the day, tasks, mental math and other relevant activities. Doing this will supplement the development of fluency, application and conceptual understanding that occurs during the Core Instruction of the Aim.</li> </ul> <p>Targeted Re-Teach:</p> <ul style="list-style-type: none"> <li>Targeted Re-Teach content or skills are based on specific school/class/student needs determined from analysis of Exit Ticket, Weekly Quick, Unit Assessment and Interim Assessment data.</li> <li>Targeted Re-Teach occurs as needed to improve student mastery and understanding through instruction that hones in on a common misconception or error. Student mastery should be below 65% to warrant a re-teach.</li> </ul>	<p>Cumulative Review:</p> <ul style="list-style-type: none"> <li>Cumulative Review should be a maximum of 30 minutes during the last part of the math block Monday through Thursday (unless time is used for a targeted re-teach).</li> <li>Cumulative Review content should be based on assessment data collected from weekly quizzes, unit assessments and IAs that demonstrates class wide mastery (&gt;75%).</li> <li>Cumulative Review activities should be limited to the suggested times outlined in the next section.</li> </ul> <p>Targeted Re-Teach:</p> <ul style="list-style-type: none"> <li>Targeted Re-Teach should be a maximum of 30 minutes during the last part of the math block and should follow the agenda and pacing provided below.</li> <li>Targeted Re-Teach should focus on a specific misconception or error and not be used to re-teach an entire concept or skill; that should happen during the Core Instruction of the Aim so an entire 60 minutes can be used.</li> </ul>

### Cumulative Review (30 minutes)

What the TEACHER is doing	What the STUDENTS are doing																		
<p>___ The teacher instructs students about the day's cumulative review activity or combination of activities and provides content specific instruction as needed:</p> <ul style="list-style-type: none"> <li><b>Facts Fluency:</b> Students complete a timed drill to develop fluency with facts – 2-3 minutes</li> <li><b>Mental Math Fluency:</b> Teacher peppers students using cold calling with a variety of question types and skills/concepts – 5-8 minutes</li> <li><b>Skill Fluency:</b> Students complete a pencil/paper activity that requires students to fluently practice a skill (i.e. multiplying multi-digit whole numbers) or a variety of skills (i.e. calculating area of figures) in a given amount of time depending on number of questions (about 45-60 seconds per question) – 8-12 minutes</li> <li><b>Application of the Day:</b> Students work collaboratively or independently to complete a complex problem that requires application of concepts and skills, use of UPSC, clarity of work and often a written explanation – 8-12 minutes</li> <li><b>Application Practice:</b> Students work independently or collaboratively on problems that require them to apply concepts and skills to mathematical and real world contexts 8-12 minutes</li> <li><b>Task Application:</b> Students work collaboratively in pairs or as a class on completing a lengthy task (from Illustrative Mathematics for example) that requires application of multiple math and organization skills and math concepts – 25-30 minutes (could also be multiple days, i.e. two 30 minute sessions)</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th colspan="3" style="text-align: center;">Agendas</th> </tr> <tr> <th style="width: 33%;">2 days per week</th> <th style="width: 33%;">1 day per week</th> <th style="width: 33%;">1 day per week</th> </tr> </thead> <tbody> <tr> <td>- Facts Fluency</td> <td>- Facts Fluency</td> <td>- Facts Fluency</td> </tr> <tr> <td>- Mental Math Fluency</td> <td>- Mental Math Fluency</td> <td>- Task Application</td> </tr> <tr> <td>- Skill Fluency</td> <td>- Skill Fluency</td> <td></td> </tr> <tr> <td>- Application of the Day</td> <td>- Application Practice</td> <td></td> </tr> </tbody> </table> <p>___ During work time, the teacher:</p> <ul style="list-style-type: none"> <li>Notes struggling students and difficult questions</li> <li>Intervenes for 15-30 seconds to clarify partial misunderstandings</li> <li>Gives nonverbal praise and encouragement (compliance, hard work, specific math thinking)</li> <li>Marks student work correct/incorrect</li> <li>Gives feedback on quality of student work referring to a posted VA or CFS</li> <li>Works with a small group of students to offer additional support (after circulating for 2-3 minutes to CFU and provide quick, CFS based feedback to all students)</li> </ul> <p>___ The teacher leads a discussion after work time to review the completed work. The discussion should be about:</p> <ul style="list-style-type: none"> <li>Specific difficult problems and common errors/misconceptions s/he noted during work time.</li> <li>Students' answers, strategies and explanations of thinking.</li> </ul>	Agendas			2 days per week	1 day per week	1 day per week	- Facts Fluency	- Facts Fluency	- Facts Fluency	- Mental Math Fluency	- Mental Math Fluency	- Task Application	- Skill Fluency	- Skill Fluency		- Application of the Day	- Application Practice		<p>___ Students are practicing review math repeatedly and at various levels of rigor independently or in pairs.</p> <p>___ Students are thinking about and naming/discussing the strategy they are using to figure out the math.</p> <p>___ Students are checking their work and correcting work marked by the teacher.</p> <p>___ Students are defending their answers orally with evidence.</p> <p>___ Students are nonverbally agreeing/disagreeing with their peers' responses.</p>
Agendas																			
2 days per week	1 day per week	1 day per week																	
- Facts Fluency	- Facts Fluency	- Facts Fluency																	
- Mental Math Fluency	- Mental Math Fluency	- Task Application																	
- Skill Fluency	- Skill Fluency																		
- Application of the Day	- Application Practice																		

### Re-teach (30 minutes)

What the TEACHER is doing	What the STUDENTS are doing
<p>___ The teacher is leading students through the agenda below to target a common error or misunderstanding that was made by about 35% or more of the class.</p> <ul style="list-style-type: none"> <li>2-4 min: Framing of lesson with presentation of evidence for re-teach</li> <li>8-10 min: Instruction of the aim</li> <li>3-4 min: Check for Understanding</li> <li>8-10 min: Independent Practice</li> <li>2-4 min: Exit Ticket</li> </ul> <p>___ The teacher is presenting students with rationale for the re-teach through an explanation and presentation of the data, error or misconception that prompted the re-teach.</p> <p>___ The teacher is introducing the lesson either through error analysis of a common error or misconception that has led to student confusion or by reviewing examples that specifically target the error or misconception that caused students to not master the skill/concept the first time.</p>	<p>___ Students are engaging in the re-teach by analyzing errors in student work, explaining errors that they made previously, identify strategies to avoid similar errors and demonstrating understanding of what was previously misconceived.</p> <p>___ Students are engaging in the re-teach lesson as they would a math lesson (see above) or in a truncated version of the math lesson.</p>

\*\*See Core Instruction of the Aim sections for CFU, IP and ET.

## Intervention (45 minutes)

What the TEACHER is doing	What the STUDENTS are doing
<p>___ The teacher is pulling a group of students that match one of the following:</p> <ul style="list-style-type: none"> <li>• Holding students accountable for top quality work</li> <li>• Working with students who do not understand the concept through pre-teach or re-teach.</li> <li>• Working with students who are struggling to develop fluency with math facts and operations.</li> <li>• Working with students who are significantly below grade-level.</li> </ul> <p>___ The teacher is following the agenda below:</p> <ul style="list-style-type: none"> <li>• 2-3 minutes: Fact practice</li> <li>• 8-12 minutes: Intro to New Material</li> <li>• 3-5 minutes: CFU</li> <li>• 15-20 minutes: Independent Practice</li> <li>• 5-7 minutes: Discussion and Exit Ticket</li> </ul> <p>___ The teacher is using scaffolded questioning to help students make connections and figure out strategies and key points.</p> <p>___ The teacher is creating a VA and annotating it with CFS while going over the first example with the group. Throughout, the teacher is referring to the VA and CFS to model for students how to use the tools and to hold students accountable to producing top quality work.</p> <p>___ The teacher is giving specific individual feedback (oral and written) using the CFS.</p> <p>___ Take teacher is constantly adjusting the pace of the intervention, based on student data.</p> <p>___ The teacher is monitoring student progress with a computer-based intervention program.</p> <p>___ The teacher is assessing students at the end of the block to gauge the effectiveness of the intervention and to gather data for future interventions.</p> <p><small>**See Core Instruction of the Aim sections for CFU, IP and ET.</small></p>	<p>___ Students are demonstrating active engagement during the introduction by:</p> <ul style="list-style-type: none"> <li>• Raising their hand to answer; sharing during a turn and talk; responding to whole group prompts; responding when cold-called</li> <li>• Recording notes/work/strategies on packet</li> </ul> <p>___ Students are practicing the math repeatedly and at various levels of rigor using pencil and paper or computer-based programs.</p> <p>___ Students are thinking about and naming/discussing the strategy they are using to figure out the math.</p> <p>___ Students are checking their work and correcting work marked by the teacher or identified by computer program.</p> <p>___ Students are completing an exit ticket at the close of class.</p>

## Middle School Math Checklist: Planning

**Rationale:** In order for our teachers to successfully instruct students and optimize students' education, it is imperative that they are strong planners with a deep content knowledge. Below are the components of planning that must be considered and implemented

**Deep Content Knowledge:**

- \_\_\_ The teacher demonstrates growing content expertise through introduction of material, questioning, interventions, and extensions.
- \_\_\_ Planning is specific, detailed, and includes many SMS (students must say) statements and exemplar written responses to illustrate the teacher knowledge.
- \_\_\_ Planning builds off of previously taught content in an effort to make connections across standards, clusters and domains within and across grade levels.

**Alignment:**

- \_\_\_ Aims are standards based, bite-sized, and measurable and clearly drive the workshop
- \_\_\_ Alignment between the mini-lesson, independent practice, and assessment components is purposeful
- \_\_\_ Cumulative review is aligned to student needs as determined through data analysis, is accessible, and takes no more than the allotted time
- \_\_\_ The discussion captures evidence of student understanding of the aim, clears up misunderstandings and anchors student understanding for future lessons
- \_\_\_ The pacing of each lesson component is aligned to the aim

**Powerful Tasks:**

- \_\_\_ Operate before Calculate, every time
- \_\_\_ Tasks are designed and used to help show what students know and understand
- \_\_\_ Students are engaged in math activities that ask them to interpret, reason, and manipulate
- \_\_\_ Students do the heavy-lifting both in the work they complete and their explanation of that work
- \_\_\_ Students demonstrate an ability to "think" about a problem (void of key words)
- \_\_\_ Students justify their thinking with materials, models, numbers, and symbols (concrete, pictorial, abstract)
- \_\_\_ Students are sharing multiple strategies to approach a problem
- \_\_\_ Students are engaged in writing about strategies used, concepts applied and the reasonableness of an answer
- \_\_\_ Highly successful intervention techniques rooted in questioning and understanding are used
- \_\_\_ Assessment: checklist, exit ticket, work product, etc, all include proof of right answer for right reason

**Questioning:**

- \_\_\_ Questioning is mostly open-ended (often void of steps)
- \_\_\_ *Why* and *How do you know* are frequently asked questions
- \_\_\_ Questions are scaffolded appropriately to support students when needed
- \_\_\_ An answer to one question might be used to ask the next question

### Middle School Math Weekly Planning Template

**Rationale:** In order to be well planned and to ensure continuity of instruction on a weekly basis, it is imperative that teachers begin planning by mapping out the aims and cumulative review topics for the entire week. Below is a template that is to be utilized on a weekly basis to begin planning.

	Monday	Tuesday	Wednesday	Thursday	Friday
<b>Math Lesson (60 min)</b>	<b>Aim:</b> <i>List the day's aim here</i>	<b>Aim:</b> <i>List the day's aim here</i>	<b>Aim:</b> <i>List the day's aim here</i>	<b>Aim:</b> <i>List the day's aim here</i>	<b>Aim:</b> <i>List the day's aim here</i>
<b>Cumulative Review (30 min)</b>	<b>Facts Fluency:</b> <i>List skill(s) here</i>	<b>Facts Fluency:</b> <i>List skill(s) here</i>	<b>Facts Fluency:</b> <i>List skill(s) here</i>	<b>Facts Fluency:</b> <i>List skill(s) here</i>	<b>NA</b>
	<b>Mental Math:</b> <i>List strategy to be taught here</i>	<b>Mental Math:</b> <i>List strategy to be taught here</i>	<b>Mental Math:</b> <i>List strategy to be taught here</i>	<b>Task Application:</b> <i>List skill(s), concept(s) and strategy or strategies here</i>	
	<b>Skill Fluency:</b> <i>List skill(s) here</i>	<b>Skill Fluency:</b> <i>List skill(s) here</i>	<b>Skill Fluency:</b> <i>List skill(s) here</i>		
	<b>Application of the Day:</b> <i>List skill(s), concept(s), and strategy here</i>	<b>Application of the Day:</b> <i>List skill(s), concept(s), and strategy here</i>	<b>Application Practice:</b> <i>List skill(s) and concept(s) here</i>		

\*\*Note: Cumulative Review may be replaced entirely by a 30 minute targeted re-teach aim if the aim is adequately bite-sized.