

Components of an Effective Secondary Mathematics Lesson

An effective mathematics lesson should be structured so that these elements are included:

- objectives are clearly defined and communicated**
- teaching is balanced with concept development and skill attainment which includes basic facts and algorithms**
- practice is used to reinforce concepts**
- multiple forms of assessment are frequently used**
- all students are highly engaged and redirected if necessary**
- students are expected to reason, solve problems, communicate and make connections using correct notation and vocabulary, and memorize basic facts and algorithms**
- opportunities for linkages / connections are provided**

This model for the Components of an Effective Secondary Mathematics Lesson is intended as a guide for lesson development. The lesson needs to maintain a basic structure which supports the above elements while allowing teachers the flexibility to plan lessons to meet specific needs. It should be noted that all structures should be evident in every lesson, but the elements of implementation may vary. By using this structure, teachers can use effective teaching strategies to introduce, develop, and provide opportunities for students to apply concepts / skills in mathematics. It should also be noted that before presenting a lesson, the *Backward Assessment Model (BAM)* should be implemented.

Structure	Purpose	Implementation
Introduction	<p>Set the stage. (What you will do today and how it links to previous learning).</p> <p>Present a brief outline of activities and expectations of student work and behavior.</p>	<p>Make connections with prior work. “Yesterday we ____; today we will ____.” “Today you will take notes... or participate in a group activity, etc.” “Today we will first ____, then ____, followed by ____” etc. “During the activity on ____ I expect you to ____.”</p>
Daily Review	<p>Provide opportunities for short-term memory review.</p> <p>Review and maintain concepts / skills / definitions from recently taught material.</p> <p>Provide written, mental, and / or oral... (oral recitation / drill)</p>	<p>Daily review may be utilized at different points within a lesson and can be done anytime during the class period. Daily review activities need to be kept brief.</p> <p>Provide mental math, written practice activities, drill work, games, daily oral math problems, problem of the day or week, warm-up activities. (Record work through note taking).</p>

Structure	Purpose	Implementation
<p>Daily Review (Homework) (continued)</p>	<p>Daily Review / Homework: Daily review may include reviewing the homework assignment from a previous class day.</p> <p>Checking homework in class provides immediate feedback to students for review and understanding of prior material before introducing new material.</p> <p>Homework should assess student understanding and be used for test/assessment preparation.</p>	<p>Provide immediate and meaningful feedback on previously assigned homework (or portions of it) in class.</p> <p>Ensure student accountability for doing homework.</p> <p>Keep homework checks brief!</p> <p>“Problems like... on your homework will be on your test or quiz.” “Expect to see these type of problems on a test or quiz.”</p>
<p>Introduction of Daily Objective</p>	<p>Preview lesson agenda.</p> <p>State and write mathematics objectives.</p>	<p>“We’re doing this today to learn....” “When we complete _____ you will know..... and be able to ...” Or, provide a problem-solving process.</p>
<p>Concept / Linkage / Skill Development and Application</p>	<p>Introduce lesson.</p> <p>Presentation Techniques: Consider different learning styles of students. Students need to see it, hear it, say it, do it.</p> <p>Provide opportunities to develop a variety of strategies through:</p> <ul style="list-style-type: none"> • problem solving • reasoning • communication <p>connections / linkages</p> <p>Use and learn vocabulary and notation. Notation and vocabulary are the building blocks of concepts and their correct usage is vital.</p> <p>Develop concepts appropriately with the use of linkages. Provide the “why” for rules and algorithms.</p>	<p>Record work through note taking:</p> <ul style="list-style-type: none"> • be accommodating • provide a format • hold students accountable <p>Use a variety of techniques ...visual, auditory, oral, tactile, etc.</p> <p>Use hands-on materials, tools, technology, paper-and-pencil, mathematics notebooks, and own language. Employ effective questioning techniques. Provide students sufficient thought time when asking open-ended questions.</p> <p>Use related vocabulary in context. Connect students’ informal language to precise mathematical terms and vocabulary.</p> <p>Use oral recitation/ drill, both individually and collectively with terms, identifications, definitions, and algorithms, etc.</p> <p>Develop concepts / extend skills through focused individual, group activities, tasks, or problems.</p>

Structure	Purpose	Implementation
<p>Concept / Linkage/ Skill Development and Application (continued)</p>	<p>Provide linkages (connections).</p> <p>Apply mathematical concepts and skills in new situations.</p> <p>Conduct ongoing assessment.</p>	<p>Generate new questions and make linkages to previously learned material or to future work. Apply linkages to real-life situations.</p> <p>Assess student learning and adjust lessons as necessary.</p> <p>Monitor and maintain student engagement.</p>
<p>Guided / Independent / Group Practice</p>	<p>Should be done at different times throughout a lesson.</p> <p>Provide written and / or oral...(oral recitation / drill) practice.</p> <p>Practice, reinforce, and apply concepts / skills already learned providing immediate feedback.</p> <p>Problem Solving Students need time to think, analyze, work on problems, discuss their solutions and become problem solvers instead of watching the teacher do all the work.</p> <p>Guided / independent / group practice of computation for mastery.</p> <p>Assess student learning.</p> <p>Test / Assessment Preparation</p>	<p>This can be done as an entire lesson that enhances conceptual understanding and/or applications of concepts through inquiry, investigation, discovery, lab, or problem-solving activities.</p> <p>Provide several opportunities for students to practice problems before assigning homework.</p> <p>Games, labs, activities, journals, projects, ...</p> <p>Cooperative and collaborative learning opportunities</p> <p>Real-world applications</p> <p>Monitor and maintain student engagement.</p> <p>Indicate the type of problems and questions that would be on future quizzes and tests or other forms of assessment.</p>
<p>Homework Assignment</p>	<p>Introduce homework.</p> <p>Practice, reinforce, apply concepts / skills already learned; collect data.</p> <p>Assignments should consist of what teachers value and include a variety of assessment items, including definitions, computations, explanations, applications, etc.</p>	<p>Discuss and model to make sure students understand what they are to do and what materials, tools, and resources are needed to complete homework.</p> <p>Require students to copy definitions, identifications, algorithms, and write brief explanations of the day's work.</p> <p>Refer to the Assessment Blueprint (<i>BAM</i>).</p>

Structure	Purpose	Implementation
Closure	Summarize the lesson or unit of study. Have students explain what they have learned and apply it.	Use notebook , models and recorded data to: <ul style="list-style-type: none"> • reflect on learning • make linkages with prior learning, within content area, across strands, and with real-life situations (i.e. “This is like when ...”, or “This reminds me of...”) • raise new questions for further consideration • pose additional challenges • make generalizations as appropriate
Long-term Memory Review	Provide opportunities to refresh long-term memory. Maintain skill, address deficiencies, and stress important ideas of the year.	Review those concepts and skills that all students should know at the end of the year. Review and maintain mastery of basic facts and algorithms from past course work. Keep this review brief.

Technology should be used when appropriate.

The *Backward Assessment Model (BAM)* will be implemented before teaching a unit of study and presenting a lesson.

Practice, both guided and independent, as well as daily review, may be utilized at different points within the lesson, including during the introduction, as a part of concept development and as homework. Practice should be related to previously taught, ongoing objectives, not presented in isolation, and may provide pre- and post-assessment information for the teacher.

Assessments in multiple forms should be ongoing and utilized frequently during a lesson, including during the introduction, throughout concept development and as part of the closure. Formative assessment includes, but is not limited to, observation of students as they work; student work; listening to students; interviews; application of skills and concepts as the lesson or unit develops and student self-assessment. Summative evaluation includes, but is not limited to, pre-and post-assessments (commercial or teacher-made); projects; application of skills and concepts at the end of a lesson or unit. Assessment should be used to modify and plan instruction to meet student needs.

The Components of an Effective Lesson should be used in conjunction with the *Backward Assessment Model*.