

Foundations for Implementation – Day 2

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CPM Learning Event Series, Day 2





Sign in and make a name tag.



Pick a team sort card. Find other participants that match your card.







Foundations for Implementation Day 2



Name email@cpm.org





Housekeeping



- **Bathrooms**
- * 8:00 AM 4:00 PM
- Breaks scheduled and as needed
- + Lunch
- Parking Lot poster
- Supply/resource table



Learning Event eBook Access



Have two tabs open:

1. Professional Learning Portal



2. eBooks



Professional Learning Portal



my.cpm.org



Implementation Action Plan



Learning Log



File Cabinet



Content Modules



Instructional Modules



Inclusion Modules

Professional Learning Checklist



	Summer Session	Fall Semester	Spring Semester
Live Learning Events	Register and attend: In-Person Days 1-3 or Virtual Sessions 1-6	Register and attend: In-Person Day 4 or Virtual Sessions 7-8	Register and attend: In-Person Day 5 or Virtual Sessions 9-10
Content Modules (On-Demand)	☐ Chapter 1 ☐ Chapter 2	☐ Chapter 3 ☐ Chapter	☐ Chapter
Instructional Modules* (On-Demand)	☐ 1 - Closure and Team Assessments ☐ 2 - Review & Preview ☐ 3 - Intentional Planning	☐ 4 - Supporting Productive Struggle	☐ 5 - Assessment Practices

Icebreaker



The Art of Compromise

On a piece of paper, record your responses to the following questions:

What is your favorite ice cream flavor?

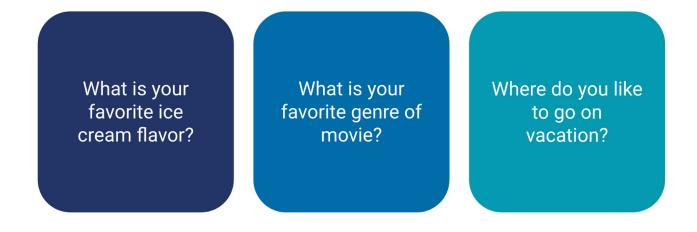
What is your favorite genre of movie?

Where do you like to go on vacation?

Icebreaker - Share out



- 1. **Take** turns sharing your responses with your team.
- 2. **Use** the art of compromise to decide on the following as a team:



Effective Mathematics Teaching Practices



Implement tasks that promote reasoning and problem solving.



Outcomes



Participants:

experience and engage in team worthy problems to emphasize how multiple modes of instruction support problem-based learning;

learn about the Launch-Explore-Closure lesson structure to identify instructional strategies that support problem-based learning; and

make connections between NCTM's Effective Mathematics Teaching Practices and the design of CPM curriculum to advance problem-based learning.

Agenda



Focus: Problem-Based Learning



- Opening
- Typical Day
- Formative Assessment
- Research Connections
- LEC and Multiple Modes of Instruction



- + Thread
- Content Module/Chapter Walkthrough
- Lesson and Chapter Closure
- + Closure

Feedback - Day 1



Questions and Wonderings...

+ Fill in from feedback forms

+

+

Fill in from feedback forms

+

+

Equity Principles



- The goal of teaching is to help all students transition from dependent to independent learners.
- Relationships are of vital importance.
- + Student uniqueness is an asset, not a deficit.
- + Reflection is a crucial part of growth.

CPM uses these principles to guide our vision and mission of More Math for More People.

Collaborative Learning Expectations



Together, work to learn mathematics.

Explain and give reasons.

Ask questions and share ideas.

Members of your team are your first resource.

Strive for understanding.



Team Roles



Assign team roles: Alphabetically by first name







Resource Manager – Alphabetically second





Recorder/Reporter – Alphabetically third

Task Manager – Alphabetically fourth

CC3 Lesson 3.1.2

Using Tables, Graphs, and Rules to Make Predictions





Math goal:

See regularity in repeated patterns to make predictions.



Team goal:

Justify the best representation for making predictions.

Debrief CC3 Lesson 3.1.2 Using Tables, Graphs, and Rules to Make Predictions



What did I
do, as the
teacher,
while you
were
working to
support all
students?

What was your experience in the role of the student?

What role did questioning play in supporting effective study teams?

How does the use of team roles and STTS provide structured support for study teams?

Managing Student Work



Things to consider...

Learning Logs



Toolkits & Math Notes



Math Work



- + Core problems
- + Resource Pages
- + Review & Preview

Teacher Tips



Use Toolkits
for Math
Notes and
Learning
Logs

Create an interactive notebook.

Have students
use a 3 ring
binder, spiral
notebook, or
folder to
organize
classwork,
resource pages,
and homework.

Use a Learning Management System.

Take a break







Reading Protocol



Go Around One

- Person 1 reports one idea that they recorded.
- While person 1 reports, other group members listen, but do not question person 1, comment, or give clues.
- When person 1 finishes, person 2 reports while the group listens.
- Repeat until all group members have reported all of their ideas.
- The group discusses ideas that were reported.

Problem-Based Learning – Why?



Synthesis of Research on Problem-Based Learning

eBook:

Click on the **Teacher Tab** on the left side.

Next choose **Program Description.**

Select the tab Research2: PBL.

Go-Around One Protocol



While **reading** the article, **think** about:

How do we <u>create and support an environment</u> for <u>effective problem-based learning</u>?

Debrief: Go-Around One Protocol



How do we <u>create and support an environment</u> for <u>effective problem-based learning</u>?

Discussion Round

- 1. Person 1 reports the idea that they recorded.
- 2. While person 1 reports, other team members listen, but do not question or comment.
- 3. When person 1 finishes, repeat until all group members have reported all of their ideas.
- The team discusses all ideas and comes to a consensus on which idea their team will share.

Three Pillars of CPM



Collaborative Learning

Problem-Based Learning

Mixed, Spaced Practice

Attaining Long-Term Knowledge



CPM's Guiding Principles





Students deepen their mathematical understanding when they are engaged with concepts over time.



Students have significantly better retention of mathematics when concepts are grounded in context.



Students'
involvement in
effective study
teams increases
their ability to
learn
mathematics.



Effective study teams are guided, supported, and summarized by a reflective, knowledgeable teacher.



Assessing what students understand requires more than one method and more than one opportunity.



When students and stakeholders embrace a growth mindset, they understand that mastery takes time, effort, and support.

Problem-Based Learning - How?



<u>How</u> do we create and support an environment for effective problem-based learning?

- Team roles
- Study Team and Teaching Strategies
- Collaborative learning agreements
- Non-routine team-worthy problems

- Circulation and Team interactions
- Purposeful questioning
- Further Guidance
- Purposeful lesson launch and closure

Lesson Plan Structure to Support Problem-Based Learning



The <u>Launch-Explore-Closure</u> (<u>LEC</u>) lesson structure is an essential part of implementing effective CPM lessons and sharing math authority with students.

Launch – Lesson opening

Explore - Structured, problem-based learning

Closure - Lesson closure

Lesson Launch to Support Problem-Based Learning







Video Reflection

What did you notice about this lesson launch?

Lesson Launch to Support Problem-Based Learning



An effective lesson launch...

Activates prior knowledge.

Has a clear math goal.

Establishes clear learning expectations.

Lesson Launch Support CCA Lesson 5.2.2 Teacher Notes



Suggested Lesson Activity:

When you introduce today's lesson, focus on the fact that the students' task is to identify and share strategies for finding equations for arithmetic sequences. As they work in their study teams, they should both articulate their own strategies and listen for the strategies that others are using. As you observe teams choosing different strategies, you may decide to interrupt their work to ask students to present to the entire class, or you may leave this until the end of the day as closure.

Consider starting the class with Reciprocal Teaching, where one partner explains what they know about an *arithmetic sequence* and the other partner then explains what they know about a *geometric sequence*.

Lesson Launch Support CCA Lesson 5.2.2



5.2.2 How do arithmetic sequences work?

Generalizing Arithmetic Sequences



In Lesson 5.2.1, you learned how to identify arithmetic and geometric sequences. Today you will solve problems involving arithmetic sequences. Use the questions below to help your team stay focused and start mathematical conversations.

What type of sequence is this? How do we know?

How can we find the equation?

Is there another way to see it?

Lesson Launch



The **Lesson Launch** should:

- connect to prior learning.
- have a clear math goal.
- establish clear learning expectations for students.



Study Team and Teaching Strategies





Dyad

- Students share—without interruption—with a partner.
- Each partner shares for an equal amount of time.
- Listening partner remains quiet and uses positive body language.

CPM Principles of Assessment





Dyad

What does formative assessment look like, feel like, and sound like in your classroom?

How is it a learning experience for both you and your students?

CPM's Fourth Principle of Assessment:

Formative assessment is a learning experience for both the student and teacher.

Lesson Closure to Support Problem-Based Learning



Effective **Lesson Closure**...

Connects to the math goal.

Provides active student reflection.

Provides feedback to both the student and teacher.

Lesson Closure Support Teacher Notes



Closure: (10 minutes)

Bring the class together and have teams share strategies for finding equations for arithmetic sequences based on multiple representations. Consider asking questions such as "How could you use a table to find the equation for an arithmetic sequence?", "Did any team use an equation? How?", and "How could you use a graph?" This could be done as a Walk and Talk.

Closure: (10 minutes)

The Learning Log entry in problem 5-5 allows students to summarize what they have learned about the kind of pattern they have modeled and generalized. Because students will continue to build an understanding of the patterns and connections among different representations of exponential functions, it is not necessary for them to have an exhaustive definition or explanation in their Learning Logs at this point.

Lesson Closure Formative Assessment



Focus Question:

How does lesson closure provide opportunities for teachers to formatively assess students?



CPM Principles of Assessment



- 1. Teachers need to be involved in the crafting of assessments.
- 2. Teachers need to read and work through all test problems.
- Students should be assessed only on content with which they have been meaningfully engaged.
- 4. Formative assessment is a learning experience for students and teachers.
- 5. While teachers are required to evaluate and assign grades, grading should be flexible.

Lesson Closure



Task: Read the lesson closure for your assigned lesson.

- Facilitator 1.#.#
- **Resource Manager** 1.#.#
- Recorder/Reporter 1.#.#
- Task Manager 1.#.#

Lesson Closure





Jigsaw (Four Corners)

Meet with your lesson team and **discuss** the following:

- 1. Summarize the key takeaways from the closure activity for your lesson.
- 2. How does the closure create opportunities for students to reflect on the lesson goal?



Whiparound

Return to your team and **share** your closure in a team whiparound.

Lesson Closure



Lesson Closure should:

- be a reflection of the math goal;and
- give students the opportunity to actively reflect.



Lesson Closure



Teacher Tips

Plan and prioritize lesson closure.

Use the suggested closure activity from the Teacher Notes.

Use a timer to establish a daily routine.

Incorporate
Study Team
and
Teaching
Strategies.

Turn and Talk





Turn and Talk

How will I ensure students experience an effective Launch and Closure?



Take a break







Lesson Explore to Support Problem-Based Learning



An effective **Lesson Explore** structures problem-based lessons through:

Team
Agreements
and Team
Roles

Effective Launch-Explore-Closure

Multiple
Modes of
Instruction

Circulating,
Listening,
and
Questioning

Multiple Modes of Instruction to Support Problem-Based Learning



"Research has shown that, in classrooms with rich mathematical tasks, supporting student success requires <u>multiple modes of instruction</u> such as <u>teamwork, whole class discussions</u>, <u>presentations</u>, and more. This is true not only in the sense of providing differentiated learning opportunities, but also in the sense of sparking and sustaining mathematical interest."

(L. Jasien, personal communication, 2021)

Teacher-Led Class Discussions





Whiparound



Teams of Four





Teammates Consult



Teams of Three







Shared Team Roles







Teacher-Led Team Discussions





Individual Work





Think-Ink-Pair-Share



Partner Work





Pairs Check





Multiple Modes of Instruction to Support Problem-Based Learning



<u>Problem-Based Learning</u> provides opportunities for teachers to engage students using multiple modes of instruction. <u>Study Team and Teaching Strategies (STTS) support the following modes of instruction and more!</u>

- Teacher-Led Discussions
- Partner Work
- + Teams
- Individual Thinking Time
- Student Presentations
- + Plus more

Lesson Explore Support

Teacher

Suggested Lesson Activity:

Suggested Lesson Activity -

Includes recommended Study Team



You can start problem 4-1 as a **Teammates Consult**. Make sure that everyone understands the task before picking up their pencils and starting the task. If students will be working from the textbook, assign each team a pattern from problem 4-1. Depending on the size of your class, you may need to give some teams the same pattern. Or distribute the Lesson 4.1.1A Resource Page ("Tile Pattern Team Challenge"), which contains the task instructions so that students do not need their books on their desks. The Lesson 4.1.1A Resource Page includes five pages in all, each with a different tile pattern. Each team should receive two copies of the resource page for their pattern.

Students should do their work on graph paper, which makes it easier to draw the tile patterns clearly. Teams will take the remainder of the class period to complete the task. Some teams may begin their poster. Remind students as you circulate that although each student will need to turn in the pattern analysis individually, students should be working in their teams and discussing each question together before moving on. This can be done as a **Huddle** by bringing one person from each team up to the front of the class to share the information.

Lesson Explore Support





Study Team and Teaching Strategies

eBook:

Click on the **Teacher Tab** on the left side.

Next choose Strategies.

Scroll through the strategies.

Lesson Explore: To Support Problem-Based Learning



An effective **Lesson Explore** structures problem-based lessons through:

Team
Agreements
and Team
Roles

Effective Launch-Explore-Closure

Multiple Modes of Instruction Circulating,
Listening,
and
Questioning

Explore-Launch-Closure

Circulation, Listening, Questioning

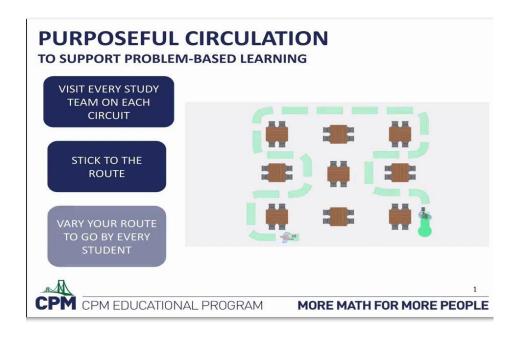


Why is circulation, listening, and questioning necessary?

- Reinforces a productive learning environment.
- Supports team interactions.
- Models expected team behavior through engagement.
- Provides differentiated support for study teams.
- Assesses the needs of individuals, teams, and the whole class.
- Gains feedback to determine necessary interventions.
- Uses observations to guide feedback and lesson closure.

Purposeful Circulation to Support Problem-Based Learning





Lesson Explore Support Teacher Notes



Materials: <u>Chapter Pocket Question Cards</u> (also under Teacher tab under Teacher Resources)

Example Pocket Questions:

Lesson 3.1.2

- How can you make a prediction?
- How can we represent doubling a value algebraically?
- How many years have gone by since the tree was planted?
- How can you write the rule without words?
- What does *x* represent?
- •

•

Example Suggested Lesson Activity:

As you circulate, ask questions that require students to think and justify their thinking, such as, "What is the pattern (rule)?", "How do you see it?", and "How can you tell your pattern is correct?"

Example Universal Access Support:

To support English Language Learners with the concept of growth take a few minutes to discuss the question, "How many years have gone by since the tree was planted?"

Student Lessons – Questioning?



CPM Lessons include:

- + Focus question in the title
- Lesson objective
- Lesson introduction
- Focus questions for teams

3.1.1 What is the rule?

Extending Patterns and Finding Rules



You have been learning how to work with variables and how to find values for variables in equations. In this section, you will learn how to extend patterns and how to generalize your pattern with a rule. As you work with your team, use these questions to focus your ideas:

How is the pattern growing?

What is the rule?

Is there another way to see it?

How can you tell if your rule is correct?

Purposeful Circulation





Learning Log Reflection





Title: Supporting Productive Struggle

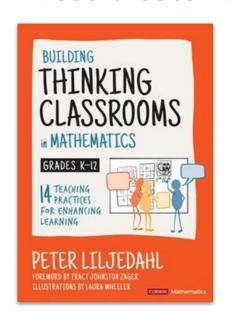
How does teacher circulation and questioning support collaborative learning with problem-based lessons?

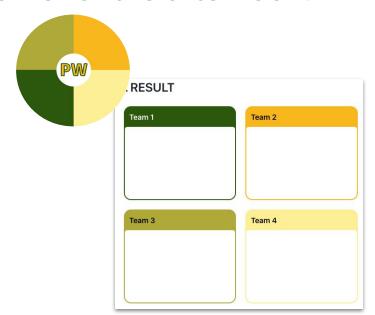
Mathematical Language Routines

Visibly Random Teams



Let's create new teams for the afternoon!





Lunch Time







Thread

Welcome Back: Icebreaker



Favorite song

- Go to tinyurl.com/Top100Billboard.
- 2. Find the top songs from the year you graduated high school.
- 3. Choose your favorite song from the list.
- 4. Share your favorite song with your team members.
- 5. Find a team compromise of a favorite song.

Thread

Thread, Part 2





Take a break







Content Module/ Chapter Walkthrough

New Teams



Please sit together with same-course teachers.

Options: All 4th year courses (Precalculus, Statistics, Calculus) at one table. Co-Teachers, join the team of the course you teach or support.

Assign team roles:





Facilitator – Highest number of states lived in

Resource Manager - Second highest number of states lived in





Task Manager – Third highest number of states lived in

Recorder/Reporter – Fewest states lived in

Content Module/Chapter Walkthrough

Chapter Walkthrough



How will you support your students in reaching the goal of the lesson?

How will you use team roles in this lesson to support student learning?

How will you use
Study Team and
Teaching
Strategies in this
lesson to
support student
status in teams?

What expectations will you set for students to maintain effective collaboration?

Chapter Closure

Closure Activities





Notice and Wonder

- Student receives a topic, picture, piece of work, math problem, sample student or teacher work, reading, etc.
- Complete the prompt: I notice _____.
- Complete the prompt: I wonder _____.

Chapter Closure

Closure Activities





Notice and Wonder

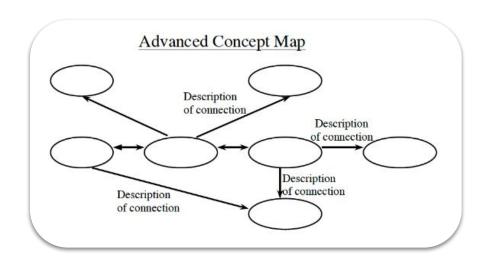
- 1. Look through the Chapter Closure for Chapter 1.
- 2. Complete the prompt: I notice _____.
- 3. Complete the prompt: I wonder _____.
- 4. Discuss with your team your notices and wonders.

Chapter Closure

Concept Map



With your team, create a Concept Map for Chapter 1.



Chapter Closure

Learning Log Reflection





Title: Formative Assessment and Chapter Closure

How does chapter closure create learning opportunities for both students and teachers?





What have we learned?



Study Team and Teaching Strategies





Math Chat

- + Display posters with one topic or concept per poster.
- Student has one writing utensil.
- Silently, student circulates to each poster, writing a brief note or explanation on each one.
- + After rotation is complete, students return to seats.

Closure Activity





Math Chat

- 1. There are posters around the room and hallway, each with a question.
- 2. Individually **complete** the activity without talking.
- 3. **Write** something about the topic, an original thought or response. (Don't forget a writing utensil.)
- After responding to each poster, go back through and read what others have written.

Implementation Action Plan





Prompts:

- 1. **My plan** to ensure <u>all students</u> experience an effective lesson launch and closure is _____.
 - At least **one actionable** step I will commit to is _____.

- My plan to effectively support problem-based lessons through circulation and questioning is _____.
 - At least **one actionable** step I will commit to is _____.

Outcomes and Feedback



Participants:

experience and engage in team-worthy problems to emphasize how multiple modes of instruction support problem-based learning;

learn about the Launch-Explore-Closure lesson structure to identify instructional strategies that support problem-based learning; and

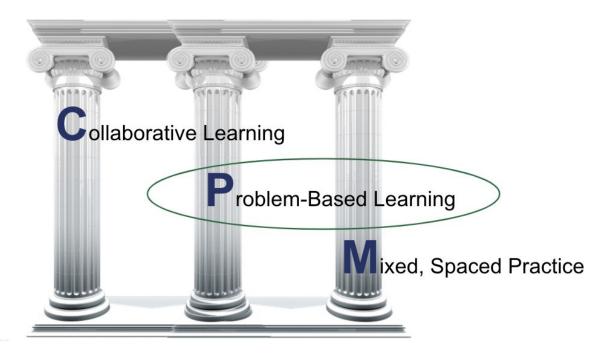
make connections between NCTM's Effective Mathematics Teaching Practices and the design of CPM curriculum to advance problem-based learning.

Learning Event Feedback:

- Open up the learning event module.
- 2. Scroll down to Event Attendance and Feedback.
- 3. Open Day 2 Feedback.
- 4. Complete the Feedback form.

Three Pillars of CPM





Research Connections

CPM's Guiding Principles





Students deepen their mathematical understanding when they are engaged with concepts over time.



Students have significantly better retention of mathematics when concepts are grounded in context.



Students'
involvement in
effective study
teams increases
their ability to
learn
mathematics.



Effective study
teams are
guided,
supported, and
summarized by a
reflective,
knowledgeable
teacher.



Assessing what students understand requires more than one method and more than one opportunity.



When students and stakeholders embrace a growth mindset, they understand that mastery takes time, effort, and support.

Teacher Tips – Implementation



Teacher Actions that Support Implementation

Use the Teacher Notes as intended.

Work all the problems in the lesson ahead of time, including the Review & Preview problems.

Create purposeful lesson plans.

Teacher Tips – Inclusion



Teacher Actions that Support *Inclusion*

Intentionally plan lessons without lowering the cognitive demand.

Use explicit agreements, team roles, and STTS to scaffold discussions and level status.

Allow time for students to shift from conceptual to procedural fluency.

Develop and assign competence to students using math-learning behaviors.

Ignite Your Classroom



Start promptly.

Peer support expected within each team.

Active learning.

Respond to the team rather than individuals.

<u>Circulate</u>. <u>Circulate</u>.

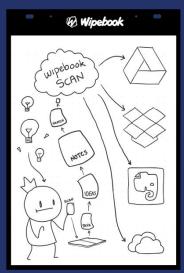
Closure. Closure.











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