Teaching:
The Load-Bearing Walls
Mathematics 6–12 | Pathway 2 | Day 4
Welcome Back!
## TEACHING: THE LOAD-BEARING WALLS (GRADES 6–12)

### This Week

<table>
<thead>
<tr>
<th>Day</th>
<th>Ideas</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>ALIGN</td>
<td>10:00–4:30</td>
</tr>
<tr>
<td></td>
<td>Should my unit of study be aligned to the standards and shifts?</td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td>ADAPT</td>
<td>10:00–4:30</td>
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<tr>
<td></td>
<td>Why adapt my unit for students who are have unfinished learning?</td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td>TASKS &amp; DISCOURSE</td>
<td>8:30–4:30</td>
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<tr>
<td></td>
<td>Why prepare for student engagement?</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>TEACH</td>
<td>10:00–4:30</td>
</tr>
<tr>
<td></td>
<td>What does standards-aligned instruction look like?</td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>MOVING FORWARD</td>
<td>10:00–2:30</td>
</tr>
<tr>
<td></td>
<td>Why prepare to implement change?</td>
<td></td>
</tr>
</tbody>
</table>
Thank You for Your Feedback!
TEACHING: THE LOAD-BEARING WALLS (GRADES 6–12)

Norms That Support Our Learning

• Take responsibility for yourself as a learner.
• Honor time frames (start, end, and activity).
• Be an active and hands-on learner.
• Use technology to enhance learning.
• Strive for equity of voice.
• Contribute to a learning environment in which it is “safe to not know.”
• Identify and reframe deficit thinking and speaking.
Teaching: Objectives & Agenda

Objectives

- Identify and prioritize key questions, activities, and interactions (“load-bearing walls”) within lessons.
- Plan lesson structures that relate new and prior learning through links to prerequisite knowledge and skills.
- Take low-inference notes while observing instruction, and provide feedback based on these notes.
- Model teaching a lesson’s load-bearing walls and receive feedback.
- Identify concrete individual commitments and team structures for continuing curricular work.

Agenda

I. Reflection & Motivation
II. Load-Bearing Walls
III. Practice
IV. Connecting to Prerequisites
V. Preparing a Lesson for Teaching
VI. Table Teaching
VII. Taking This Work Back
I. Reflection & Motivation

IN YOUR JOURNALS

What connections to the intersection of standards-aligned instruction, equity, power, and linguistic access did you make to this morning’s keynote?

What impact do these have on your practice?
Imagine that you are teaching a lesson tomorrow morning.

What steps do you complete to prepare between now and then, and why?

(Assume that the lesson is already written.)
# Reflection & Motivation

<table>
<thead>
<tr>
<th>What We Do</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Logistical stuff.” Gather materials, print things out.</td>
<td>• Pretty non-negotiable! 😊</td>
</tr>
</tbody>
</table>
| Do ALL the math. Do the problems, exercises, and activities. Especially the Exit Ticket! | • Understand the target of the lesson.  
• Preempt student misconceptions.  
• Understand levels of difficulty in problems for differentiation purposes. |
| Reference the standards addressed. *How does the lesson build to what’s described?* | • Understand the “load-bearing walls.”  
• How the lesson attends to aspects of rigor?  
• What is important?  
• What isn’t that important? |
| Consider the students in front of you. Adapt and add connections as needed. | • Meet students where they are.  
• Introduce MLRs to increase language access.  
• Include opportunities for student discourse. |

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**Some possible responses**

**Our focus today**
II. Intro: “Load-Bearing Walls”

7.EE.B.4
Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.EE.B.4.A
Solve word problems leading to equations of the form \( px + q = r \) and \( p(x + q) = r \), where \( p, q, \) and \( r \) are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
TEACHING: THE LOAD-BEARING WALLS (GRADES 6–12)

What Can Happen in Class?

Discussion (5 minutes)

Here students present the models they created based upon the given relationships, and then have the class compare different correct models and/or discuss why the incorrect models were incorrect. Some possible questions from the different models are as follows:

- How does the tape diagram translate into the initial equation?
  - Each unknown unit represents how much Julie collected, \( j \) dollars.

- The initial step to solve the equation algebraically is to collect all like terms on the left-hand side of the equation using the any order, any grouping property.

This goal is to rewrite the equation into the form \( x = a \) number by making zeros and ones.

- How can we make a zero or one?
  - Zeros are made with addition, and ones are made through multiplication and division.
  - We can make a 0 by subtracting 70 from both sides, or we can make a 1 by multiplying both sides by \( \frac{1}{7} \).

- In subtracting 70 from both sides, what do \( a, a, b, a \), and \( a \) represent in the \( a \) then move, if \( a = 0 \), then \( a = a = a = a \).

- In this specific example, \( a \) represents the left side of the equation, \( a = a = a = a \), represents the right side of the equation, \( 150.95, a = 70 \).

- Continue to simplify the new equation using the properties of operations until reaching the equation \( a = 15.95 \) can we make a zero or a one?
  - Yes, we can make a one by multiplying both sides by \( \frac{1}{7} \) since we are assuming that \( a = a = a = a \) makes the equation \( a = 15.95 \).

- Then move of multiplying both sides by \( \frac{1}{7} \) resulting equation is also true.

- Now the arithmetic approach (the tape diagram with arithmetic) similar to the algebraic approach an equation?
  - The operations performed in solving the equation algebraically are the same operations done arithmetically.

- How can the equation \( a = 15.95 \) be written so that the equation contains only integers? What would be the new equation be?
  - One can multiply each term by 100, the equivalent equation would be \( 1509.5 = 150.95 \).

- Have students that solving this problem also leads to \( a = 18.65 \).

- What if, instead, we used the amount dollar collected \( k \) dollars. Would that be okay? How would the money collected by the other people be determined?
  - Yes, that would be okay. Since Stoller has \( 14.50 \) more than Julia, then Julia would have \( 43.50 \) less than Stoller.

- The expressions defining each person's amount differ depending on who we choose to represent the other two people. Complete the chart to show how the statements vary when \( a \) changes.

<table>
<thead>
<tr>
<th>In terms of</th>
<th>Julia</th>
<th>Israel</th>
<th>Keller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Julie's amount ( (j) )</td>
<td>( j = 57.50 )</td>
<td>( j = 57.50 )</td>
<td>( j = 57.50 )</td>
</tr>
<tr>
<td>Julia's amount ( (j) )</td>
<td>( j = 57.50 )</td>
<td>( j = 57.50 )</td>
<td>( j = 57.50 )</td>
</tr>
<tr>
<td>Keller's amount ( (k) )</td>
<td>( k = 42.50 )</td>
<td>( k = 15 )</td>
<td>( k = 15 )</td>
</tr>
</tbody>
</table>

- If time, set up and solve the equation in terms of \( k \). Show students that the equation and solution are different than the equation based upon Julie's amount, but that the solution, \( 61.15 \), matches how much Stoller collected.
Seeing the “Load-Bearing Walls”

“Use variables to represent quantities . . .”

“Solve equations of these forms fluently.”

“Compare an algebraic solution to an arithmetic solution . . .”
The Load-Bearing Walls: Some “Look Fors”

7.EE.B.4
Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.EE.B.4.A
Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where $p$, $q$, and $r$ are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
The Load-Bearing Walls: Some “Look Fors”

Discussion (5 minutes)

Here are some of the models that students may create based on the given relationships, and then have the class compare different correct models and discuss why the incorrect models are incorrect. Some possible questions from the different models are as follows:

- How does the tape diagram translate into the initial equation?
- Each unknown unit represents how much was collected in dollars.
- The initial step to solve the equation algebraically is to collect all like terms on the left-hand side of the equation using any order, any grouping property.
- The goal is to rewrite the equation into the form $x = a$ by making zero and ones.

- How can we make a zero or one?
  - Zeroes are made with addition, and ones are made through multiplication and division.
  - We can make a 0 by subtracting 70 from both sides, or we can make a 1 by multiplying both sides by $\frac{1}{7}$.
  - Both are correct if they work, but point out to students that making a 1 results in an extra calculation.
  - Let $x = 15$ from both sides. The green move of subtracting 70 from both sides changes the expressions of the equation (left and right sides) to new equivalent expressions, but the new equation has the same solution as the old one did.

- In subtracting 70 from both sides, what do $x$, $a$, and $0$ represent in the $0$ then move, if $x = 0$, then $a - 70 = a - 70$.
  - In this specific example, $x$ represents the left side of the equation, $a$ = 70, $b$ represents the right side of the equation, $+150$, and $0$ = 70.

- Continue to simplify the new equation using the properties of operations until reaching the equation $x$ = $\frac{1}{7}$. Can we make a zero or one?
  - Yes, we can make a one by multiplying both sides by $\frac{7}{1}$.
  - Since we are assuming that $x$ is a number that makes the equation $x$ = $\frac{1}{7}$ true, we can apply the $0$ then move of multiplying both sides by $\frac{7}{1}$.
  - The resulting equation is also true.

- How can the equation $x$ = $\frac{1}{7}$ be written so that the equation contains only integers? What would be the new equation be?
  - You can multiply each term by 70. The equivalent equation would be $100x + 7000 = 12595$.

- Explain to students that solving this problem also leads to $x$ = $\frac{18}{8}$.
  - What if, instead, we used the amount of the tax collected in dollars of money?
  - Then the money collected by the other person has to be divided.
    - Yes, that would be okay. Since Alice has $42.50 more than Julia, then Julia would have $42.50 less than Alice. Alice’s money is $x = 42.50$. Since Alice’s money is $1600 less than Julia, her money is $x = 15$.

- The expressions defining each person’s amount differ depending on who we choose to represent the two other people. Complete the chart to show how the statements vary with $x$.

<table>
<thead>
<tr>
<th>In terms of</th>
<th>Julia’s amount ($)</th>
<th>Israel’s amount ($)</th>
<th>Keller’s amount ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Julia’s amount ($)</td>
<td>$x = 37.50$</td>
<td>$x = 45$</td>
<td>$x = 15$</td>
</tr>
<tr>
<td>Israel’s amount ($)</td>
<td>$x = 42.50$</td>
<td>$x = 15$</td>
<td>$x = 15$</td>
</tr>
</tbody>
</table>

- If time, set up and solve the equation in terms of $x$. Show that the equation and solution are different than the equation based upon Alice’s amount, but that the solution, $x = 15$, matches how much every collected.
III. Practice: “Load-Bearing Walls”

<table>
<thead>
<tr>
<th>Grade 6</th>
<th>Grade 7</th>
<th>Grade 8</th>
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<tbody>
<tr>
<td>6.RP.A.3</td>
<td>7.RP.A.2</td>
<td>8.G.A</td>
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<th>Geometry</th>
<th>Algebra II</th>
</tr>
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<tbody>
<tr>
<td>A-BF.1.A</td>
<td>G-CO.8</td>
<td>A-REI.2</td>
</tr>
</tbody>
</table>
Where did you see the “load-bearing walls” in these lessons?
Identifying Prerequisites

Connecting to load-bearing walls
IV. Intro: Connecting to Prerequisites

7.EE.B.4

Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.EE.B.4.A

Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where $p$, $q$, and $r$ are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
Prerequisites for 7.EE.B.4

- **6.EE.B.6:** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem...

- **6.EE.B.7:** Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$...

- **7.NS.A.1:** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers...

- **7.NS.A.2:** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
What Could We Ask Students to Do First?

6.EE.B.7

Samantha bought 3 candy bars and paid $10.50. How much did each bar cost?

(a) Draw a tape diagram that shows the situation.
(b) Write a *numerical expression* you could use to solve.
(c) Write an *algebraic equation* you could also use to solve.
(d) Solve your equation.

*First, we added 42.50 and 27.50 to get 70. Next, we subtracted 70 from 125.95. Finally, we divided 55.95 by 3 to get 18.65.*
SESSION 1 (111M): Rigor– Calibrating Common Core (6 – 8)

BREAK

Lunch
Welcome Back!
V. Practice: Connecting to Prerequisites

1. **Identify the prerequisite standards.** Where does your lesson extend from?

2. **Highlight/build in explicit connections to prior learning.**
   - **Example:** Write a short set of warm-up problems and two or three follow-up questions that help students draw connections to what they’ve already learned.
   - **Example:** Identify an important opening activity (if already included in the lesson) and write two or three follow-up questions.
Practice: Connecting to Prerequisites

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</thead>
<tbody>
<tr>
<td>6.RP.A.3</td>
<td>7.RP.A.2</td>
<td>8.G.A</td>
</tr>
<tr>
<td>Module 1, Lesson 25</td>
<td>Module 1, Lesson 10</td>
<td>Module 2, Lesson 2</td>
</tr>
<tr>
<td><strong>Algebra I</strong></td>
<td><strong>Geometry</strong></td>
<td><strong>Algebra II</strong></td>
</tr>
<tr>
<td>A-BF.1.A</td>
<td>G-CO.8</td>
<td>A-REI.2</td>
</tr>
<tr>
<td>Module 1, Lesson 26</td>
<td>Module 1, Lesson 22</td>
<td>Module 1, Lesson 26</td>
</tr>
</tbody>
</table>
Where did you see opportunities for connecting to prerequisites in these lessons?
I. Reflection

- **Administration and Leadership**
  - What building conditions must exist to support planning that attends to the load-bearing walls of the lesson?
  - How can you direct resources to ensure that teachers have capacity to attend to the load-bearing walls of every lesson?

- **Coaches** – What coaching moves must you implement to emphasize planning practices focused on the load-bearing walls of lessons?

- **Teachers**
  - How will you incorporate attention to load-bearing walls into your planning routine?
  - What building conditions must exist to support your planning routine to use load-bearing walls?

- **Partner Organization** – How do your organization’s activities with districts and partners support planning that focuses on the load-bearing walls of lessons?
I. Reflection: Journal Entry

Prompts:

What have you learned that you can take back to your classroom/school to ensure that all students have access to high-quality instruction?

How does teaching the load-bearing walls of each lesson relate to the Five Charges, Power, MLRs, Tasks & Discourse?
Preparing a Lesson for Teaching

Strategies for aligning instruction
IPG Indicators:

- **1A:** “…focusses on the grade-level cluster(s), grade-level content standard(s), or part(s) thereof.”
- **1B:** “…appropriately relates new content to math content within or across grades.”
- **1C:** “…intentionally targets the aspect(s) of Rigor…”
- **2A:** “…makes the mathematics of the lesson explicit through the use of explanations, representations, tasks, and/or examples.”
We will focus on some of the Core Actions to help us observe instruction around the load-bearing walls and organize our feedback.

The Core Actions are:

- 1A
- 1B
- 1C
- 2A

It addresses Standard 5.NF.3.
Video Observation

Table Discussion

• Did the instruction you observed align with the standard?
• What aspect of rigor seemed to be emphasized?
• How were students building conceptual understanding?
• Were students engaged in mathematical discourse?
• How did the teacher build access to the language of the lesson?
Video Observation & Feedback

**What Is Effective Feedback?**
- Tangible & transparent – uses data that is accessible and easy to understand
- Actionable – concrete, specific, accurate, and useful data
- Accepted by the teacher
- Specific & personalized
- Timely

**When Giving Feedback**
- Base it on effective evidence
- Reinforce with effective practices
- Be specific
- Be descriptive
- Note the impact of teacher actions on students
- Attend to teacher’s stated need/area of focus
V. Preparing a Lesson for Teaching

1. Select a 3–4 minute section from your own lesson.
2. Prepare the lesson plan: examine the standards, highlight, and/or add load-bearing walls or connections, as needed.
3. Prepare your “board” and any manipulatives you’ll need.
Break
VI. Table Teaching Protocol

Introduction: Two sentences

- Standard and objective/aim
- Brief lesson context

Go “all in” for your role:

- Use your “teacher voice”
- Stay in character the entire time
- Specify equity move

Next person in line is “coach,” who keeps time (4 minutes + 1 extra if needed) and gives feedback:

- 1 content-related “glow”
- 1 content-related “grow” for next time
VII. Reflection: Journal Entry

Prompts:

1. Why focus on Load-Bearing Walls?

2. How does the focus on Load-Bearing Walls promote equitable access to the math curriculum?
1. Click on the grey ‘Daily Survey’ link
2. Choose the appropriate link for today’s survey, i.e. Day 1, and continue to new window

Please fill out the survey located here: standardsinstitutes.org/institute/summer-2019
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