Pillars & Practices
A Framework to Catalyze Change at the Margins

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#CatalyzingChange
#Pillars_Practices
Implementing Equitable Instruction

“Classroom instruction should be consistent with research-informed and equitable teaching practices.” —page 25
Gholdy Muhammad

“Our Black students are not failing; it is the systems, instruction, and standards created to monitor, control, and measure a very narrow definition of achievement that are off the mark.”
Shane Safir & Jamila Dugan

“For all our talk of being student centered, we have bought into a success paradigm that robs many children of their voices, marginalizes their gifts, and prioritizes measurement and incremental improvement over learning and transformation.”
“We call the community to dive into the ongoing shift from solely prioritizing the content toward a simultaneous prioritization of context, content, and critical analysis.”
Mathematical Identity

“Developing students’ identities should be part of teachers’ daily work.”
–page 28
“Mathematical identity is the primary lens through which students engage with our classroom activities.”
Equitable Mathematics Teaching Practices (Bartell, et. al, 2017)

1. Draw on students’ funds of knowledge
2. Establish classroom norms for participation
3. Position students as capable
4. Monitor how students position each other
5. Attend explicitly to race and culture
6. Recognize multiple forms of discourse and language as a resource
7. Press for academic success
8. Attend to students’ mathematical thinking
9. Support development of a sociopolitical disposition

@FarshidSafi  #NCTM100
Confronting Some of My Implicit Biases

- My own student experience
- My own teaching experience
- My own lived experience
- Perspectives gained from my teaching colleagues
- My view of my ability to figure out solutions to challenges
“Mathematical agency is about participating in mathematics in ways that are meaningful, both personally and socially.” – page 29
Let’s Do Some Math!
What Do You See?

How do you see this pattern growing?
1 see arrows extending
- 3
- 2 + 5
- 8 + 7

1 see rectangles + a smaller rectangle
- 1x2 + 1x1
- 2x3 + 1x2
- 3x4 + 1x3

I see half
- 1 see 1 and 1 half
- 1 see 3 and 2 half's
- 1 see 6 and 3 half's
I see rows

- 1 row of 3, 1 row of 1
- 2 rows of 3, 1 row of 2
- 3 rows of 4, 1 row of 3

I see diagonals

- 1 line of 2, 1 line of 1
- 2 lines of 2, 1 line of 3, 1 line of 1
- 2 lines of 2, 2 lines of 2, 1 line of 4, 1 line of 1

I see L's

- 1 + 2
- (2 + 3) + (1 + 2)
- (3 + 4) + (2 + 3) + (1 + 2)
What aspects of the “What Do You See?” activity attend explicitly to mathematical identity and agency?
What aspects of the “What Do You See?” activity attend explicitly to mathematical identity and agency?
MP1 Make Sense of Problems & Persevere in Solving Them

Quantities & Relationships

Structure

Repetition

www.fosteringmathmathpractices.com
I see rectangles with a block on top.
I see one tall stack and lots of short stacks.
I see L-shapes that wrap around each other.
What aspects of the “What Do You See?” activity are hard to capture in your gradebook?
The act of grading actively diminishes mathematical identity and agency in all students.
Our grading practices are a non-negligible part of the work of building students’ identity and agency as learners.
The Pillars & Practices Framework

**The Four Pillars**
These are habits to guide student actions and interactions.

**The Practices**
Guidelines to align curriculum, instruction, and assessment to our values.
The Four Pillars

Engagement    Understanding    Communication    Authenticity
The Practices

Standards for Mathematical Practice

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.
Essential Concepts

**Algebra**—Expressions can be rewritten in equivalent forms... to make different characteristics visible.

**Functions**—Key features of function graphs can be associated with and interpreted in terms of equivalent symbolic representations.
What Does Pillars & Practices Look Like in Classroom Instruction?
Today’s Agenda

- Skills—Graphing from Tile Models

Supplies you need today:
- Highlighter
- Pencil/Pen
- Marker
- Algebra Tiles

\[ x^2 + 3x + 5 \]
<table>
<thead>
<tr>
<th>Learning Goals...</th>
<th>Learning Focus...</th>
</tr>
</thead>
</table>
| Let’s use **tile models** to generate **graphs** of parabolas. | Pillar—Engagement  
MP8—Look for and make use of regularity in repeated reasoning. |
Using Tile Models to Graph Parabolas

**Pillar:** Understanding

**MP8:** Look for and express regularity in repeated reasoning

**Learning Goal:** Use tile models to generate graphs of parabolas.

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**Post-Activity Process Questions**

Answer these questions after you finish the three examples.

1. Write a tip that would help someone use a tile model to find the y-intercept of the parabola.

2. Write a tip that would help someone use a tile model to find the vertex of the parabola.

3. What advice would you offer to someone looking to find the x-intercepts of the parabola with a tile model?
Example 2—Use tile models to complete the table of values and graph the parabola given $y = x^2 + 6x + 5$.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
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Analysis Questions

2a. What is the y-intercept of the graph? ____________

2b. Where is the center of the graph’s symmetry? ______________________

2c. What is the vertex of the parabola? ______________________

2d. Where are the x-intercepts of the graph? ______________________
Let's build arrangements for $x^2 + 6x + 5$

Go to [bit.ly/PillarsPolypadTask1](https://bit.ly/PillarsPolypadTask1) to play around
Build arrangements for \( x^2 + 6x + 5 \)

\[
x(x + 6) + 5
\]

\((x + 1)(x + 5)\)

Build arrangements for \( x^2 + 6x + 5 \)

\[
(x + 2)(x + 4) - 3
\]

\((x + 2)^2 - 4\)
Example 1—Use tile models to complete the table of values and graph the parabola given $y = x^2 + 5x + 4$.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-5</td>
<td>4</td>
</tr>
<tr>
<td>-4</td>
<td>0</td>
</tr>
<tr>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td>-2</td>
<td></td>
</tr>
</tbody>
</table>

$(x+1)(x+4)$

$(x+2)(x+1)$

$(x+3)(x+2) - 2$
Example 1—Use tile models to complete the table of values and graph the parabola given \( y = x^2 + 5x + 4 \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>-5</td>
<td>4</td>
</tr>
<tr>
<td>-2</td>
<td>-2</td>
</tr>
</tbody>
</table>

\( (x+1)(x+4) \)

\( (x+3)(x+2) = 2 \)
Example 1—Use tile models to complete the table of values and graph the parabola given \( y = x^2 + 5x + 4 \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>-5</td>
<td>4</td>
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<tr>
<td>-4</td>
<td>0</td>
</tr>
<tr>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>-3</td>
<td>-2</td>
</tr>
<tr>
<td>-2</td>
<td>-2</td>
</tr>
</tbody>
</table>

Analysis Questions

1a. What is the y-intercept of the graph? \((0, 4)\)

1b. Where is the center of the graph’s symmetry? \(x = -2.5\)

1c. Where are the x-intercepts of the graph? \((-4, 0) \& (-1, 0)\)

1d. Are you able to find the vertex? \(\text{No! \ it's \ at \ } (2,3,2)\)
Extending the Activity

Post-Activity Process Questions
Answer these questions after you finish the three examples.

1. Write a tip that would help someone use a tile model to find the y-intercept of the parabola.

2. Write a tip that would help someone use a tile model to find the vertex of the parabola.

3. What advice would you offer to someone looking to find the x-intercepts of the parabola with a tile model?
Example 2—Use tile models to complete the table of values and graph the parabola given \( y = x^2 + 2x \).
Example 2—Use tile models to complete the table of values and graph the parabola given $y = x^2 + 2x$.
What aspects of the “Tile Models to Graph Parabolas” activity attend explicitly to mathematical identity and agency?
What aspects of the “Tile Models to Graph Parabolas” support growth in the eight Math Practices?
What Does Pillars & Practices Look Like in Curriculum Planning?
<table>
<thead>
<tr>
<th>UNIT</th>
<th>FOCUS ON SELF AND SOCIETY</th>
<th>FOCUS ON CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity &amp; Representation</td>
<td>Who am I? What are my beliefs about myself and others? How do others view me? What familial, cultural, and historical factors contribute to my identity? Which narratives are dominant? Which are silenced or neglected?</td>
<td>Foundational geometric ideas—undefined terms, definition, postulate, theorem, prior geometric concepts formalized. Classifying triangles.</td>
</tr>
<tr>
<td>Epistemology</td>
<td>How are our belief systems formed? Why do we believe what we believe? How do we know what we know? What are truth, certainty, conjecture, opinion?</td>
<td>Formal and informal proof, logic, inductive and deductive reasoning. Formalizing definition, postulate, theorem. Applying different tools (compass, coordinates, analytical diagrams)</td>
</tr>
<tr>
<td>Proximity (Location &amp; Distance)</td>
<td>How do power, position, and privilege impact my life and the lives of others? What access is afforded or denied to me? How have these informed my understanding of my identity and the identities of others?</td>
<td>Distance (in coordinate plane), length, simple coordinate geometry, area, and connections to circles. Introduce vectors. Introduction to Spherical (Non-Euclidean) Geometry.</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>Parallels and Intersection</td>
<td>Finding common ground. Address history of groups put at odds by white culture. Rights for one are tied into rights for all. Convergence, divergence, and non-alignment (skew).</td>
<td>Angles formed by parallels with transversal. Rate of change and equations of lines. Parallel line proofs. Perpendicular theorems. Distance between lines.</td>
</tr>
</tbody>
</table>
What Does Pillars & Practices Look Like in Assessment?
Pillar 1 — Engagement

Ways I have been actively engaged this year:
I’ve talked more with my classmates and in my group. I also learn to expand my thinking.

Ways I could improve my engagement this year:
I can improve my engagement by participating more and asking question to get a better understanding of what we are learning.
I also need to focus on my independent work time and not talk to others.
Evidence of Struggle

Tell about one or two experiences so far this semester where you have really struggled with the classroom tasks.

In the lesson “The Rumor” I was quick to answer and I did not thoroughly read the prompt, my answer was rushed and I had to rethink and revise.

Write yourself a pep talk for next time reminding yourself that struggling is part of learning and one or two things you can do to persevere

No matter how tough the problem is or how little you know about the lesson, you must remember to never give up, to reread, and ask questions. Don’t be embarrassed to ask questions, everyone needs help sometimes.
Evidence of Engagement

Tell about one or two experiences so far this semester where you have impressed yourself with the way you engaged in classroom tasks

When we did the writing exponential equations from table, I understood everything. I was really set on finding the answers. And me and my tablemate Vanessa solved the problems first. We did have to ask the teacher for help but that’s a good thing.
What I know about linear patterns is that whenever the pattern changes it changes by a constant number. For example, the picture above is changing by 5 every time so like Figure 15 would have 75 and the equation would be $y = 5x + 5$. No, I don't have any questions about this topic. I think so far I'm understanding it pretty well.
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