Across Course Coherence and Instructional Practice in High School

February 2019
Welcome Back!
Thank You for Your Feedback!
ACROSS COURSE COHERENCE IN HIGH SCHOOL
Norms That Support Our Learning

• Take responsibility for yourself as a learner.

• Honor timeframes (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.
## ACROSS GRADE COHERENCE IN HIGH SCHOOL

### This Week

<table>
<thead>
<tr>
<th>Day</th>
<th>Ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Focus and Within Grade Coherence</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Rigor and the Mathematical Practices</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Across Grade Coherence and Instructional Practice</td>
</tr>
<tr>
<td>Thursday</td>
<td>Adaptation and Curriculum Study</td>
</tr>
<tr>
<td>Friday</td>
<td>Adaptation and Practice</td>
</tr>
</tbody>
</table>

---

*“Do the math”*

*Equity for all*

*Connect to our practice*
ACROSS COURSE COHERENCE IN HIGH SCHOOL

Today

• **Morning**: Across Course Coherence in High School

• **Afternoon**: Instructional Practice in High School
Morning Objectives

• Participants will understand and apply learning progressions to support students who are below course level.

  o Participants will be able to identify a sequence of prerequisite standards necessary in math understanding and learning.

  o Participants will be able to identify onramps for teaching major work to students with unfinished learning.

  o Participants will be able to adapt a lesson for students with unfinished learning by adding just-in-time scaffolds based on learning progressions.

  o Participants will be able to explain how attending to the shift of across grade coherence is an equitable practice in Standards-aligned math instruction.
ACROSS COURSE COHERENCE IN HIGH SCHOOL

Morning Agenda

I. Across Course Coherence

II. Vertical Coherence Challenge

III. Mapping the Progressions

IV. Tools for Understanding the Progressions

V. Adapting Lessons for Students with Unfinished Learning
Unpacking Equity

Equity exists when the biases derived from dominant cultural norms and values no longer predict or influence how one fares in society.

Equity systematically promotes fair and impartial access to rights and opportunities.

Equity may look like adding supports and scaffolds that result in fair access to opportunities or creating opportunities for all voices to be heard.

_Educational_ Equity ensures that all children—regardless of circumstances—are receiving high-quality, grade-level, and standards-aligned instruction with access to high-quality materials and resources.

_We become change agents for educational equity when we acknowledge that we are part of an educational system that holds policies and practices that are inherently racist and that we have participated in this system. We now commit to ensuring that all students, regardless of how we think they come to us, leave us having grown against grade-level standards and confident in their value and abilities._
I. Across Course Coherence

What does a student need to know about \textit{functions} in high school mathematics?
### What Is the Right Order?

<table>
<thead>
<tr>
<th>Standard</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Understand that a function from one set (called the domain) to another set (called the range) <strong>assigns to each element of the domain exactly one element of the range</strong>. If ( f ) is a function and ( x ) is an element of its domain, then ( f(x) ) denotes the output of ( f ) corresponding to the input ( x ).</td>
<td>Algebra 1</td>
</tr>
<tr>
<td>B. Understand that a function <strong>is a rule that assigns to each input exactly one output</strong>. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.</td>
<td>Grade 8</td>
</tr>
<tr>
<td>C. Solve an equation of the form ( f(x) = c ) for a <strong>simple function ( f ) that has an inverse</strong> and write an expression for the inverse.</td>
<td>Algebra 2</td>
</tr>
<tr>
<td>D. Represent transformations in the plane using, e.g., transparencies and geometry software; <strong>describe transformations as functions that take points in the plane as inputs and give other points as outputs</strong>. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).</td>
<td>Geometry</td>
</tr>
</tbody>
</table>
“A focused, coherent progression of mathematics learning, with an emphasis on proficiency with key topics, should become the norm in elementary and middle school mathematics curricula. Any approach that continually revisits topics year after year without closure is to be avoided. By the term focused, the Panel means that curriculum must include (and engage with adequate depth) the most important topics underlying success in school algebra. By the term coherent, the Panel means that the curriculum is marked by effective, logical progressions from earlier, less sophisticated topics into later, more sophisticated ones. Improvements like those suggested in this report promise immediate positive results with minimal additional cost.”

—National Mathematics Advisory Panel
ACROSS COURSE COHERENCE IN HIGH SCHOOL

The Progressions

Building Functions

The previous group of standards focuses on interpreting functions given by expressions, graphs, or tables. The Building Functions group focuses on building functions to model relationships, and building new functions from existing functions.

Note: Inverse of a function and composition of a function with its inverse are among the plus standards. The following discussion describes in detail what is required for students to grasp these securely. Because of the subtleties and pitfalls involved, it is strongly recommended that these topics be included only in optional courses.

Build a function that models a relationship between two quantities This cluster of standards is very closely related to the algebra standard on writing equations in two variables. Indeed, that algebra standard might well be met by a curriculum in the same unit as this cluster. Although students will eventually study various families of functions, it is useful for them to have experiences of building functions from scratch, without the aid of a host of special recipes, by grappling with a concrete context for clues.

For example, in “Lake Algae” in the margin, a solution for part (a) might involve noting that if the lake is completely covered with algae on June 30, then half of its surface will be covered on June 29 because the area covered doubles each day. This might be expressed in a table:

<table>
<thead>
<tr>
<th>date</th>
<th>29</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>percent covered</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

Finding a solution for part (b) might start from the table above. Repeatedly using the information that the algae doubles each day: one divides the amount for June 29 by 2, then divides the amount for June 28 by 2, then divides the amount for June 27 by 2. This repeated reasoning (MP8) might be suggested by the table:

A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

F-BF.1a Write a function that describes a relationship between two quantities.

a Determine an explicit expression, a recursive process, or steps for calculation from a context.

Lake Algae

On June 1, a fast growing species of algae is accidentally introduced into a lake in a city park. It starts to grow and cover the surface of the lake in such a way that the area covered by the algae doubles every day. If it continues to grow unabated, the lake will be totally covered and the fish in the lake will suffocate. At the rate it is growing, this will happen on June 30.

(a) When will the lake be covered half-way?

(b) On June 26, a pedestrian who walks by the lake every day warns that the lake will be completely covered soon. Her friend just laughs. Why might her friend be skeptical of the warning?

(c) On June 29, a clean-up crew arrives at the lake and removes almost all of the algae. When they are done, only 1% of the surface is covered with algae. How well does this solve the problem of the algae in the lake?

(d) Write an equation that represents the percentage of the surface area of the lake that is covered in algae as a function of time (in days) that passes since the algae was introduced into the lake if the cleanup crew does not come on June 29.
Across Grade Coherence: Learning is carefully connected across grades so that students can build new understanding onto foundations built in previous years.
II. Vertical Coherence Challenge

• In your groups, you have 16 standards on pieces of paper. Most standards come from the high school standards—a few come from earlier!

• The standards are not labeled!

• Determine which standards are prerequisites for other standards.

• **Note:** There is more than one vertical strand.

• **Bonus:** Can you determine which standards belong in which grade or course?
ACROSS COURSE COHERENCE IN HIGH SCHOOL

**Hint**

<table>
<thead>
<tr>
<th>Grades 5–7</th>
<th>Grade 8</th>
<th>Algebra I</th>
<th>Geometry</th>
<th>Algebra II</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>F</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Diagram showing the flow of courses from Grades 5–7 to Algebra II with intermediate steps labeled as 'F'.
ACROSS COURSE COHERENCE IN HIGH SCHOOL

A Picture of Coherence

<table>
<thead>
<tr>
<th>Grades 5–7</th>
<th>Grade 8</th>
<th>Algebra I</th>
<th>Geometry</th>
<th>Algebra II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G</strong> 5.G.2</td>
<td><strong>L</strong> 6.G.3</td>
<td><strong>O</strong> 8.G.3</td>
<td><strong>C</strong> G-CO.7</td>
<td><strong>H</strong> F-BF.1C</td>
</tr>
<tr>
<td><strong>E</strong> 7.RP.2C</td>
<td><strong>F</strong> 8.F.1</td>
<td><strong>N</strong> F-IF.2</td>
<td><strong>J</strong> 6.EE.5</td>
<td><strong>M</strong> 8.EE.8A</td>
</tr>
<tr>
<td><strong>I</strong> 8.G.5</td>
<td><strong>B</strong> 8.EE.6</td>
<td><strong>K</strong> F-LE.2</td>
<td><strong>A</strong> 8.F.3</td>
<td><strong>P</strong> A-REI.6</td>
</tr>
<tr>
<td><strong>J</strong> 6.EE.5</td>
<td><strong>M</strong> 8.EE.8A</td>
<td><strong>P</strong> A-REI.6</td>
<td></td>
<td><strong>D</strong> A-REI.7</td>
</tr>
</tbody>
</table>
How does understanding the progression of content support our understanding of course-level content?
III. Standards Mapping

Protocol:

• Identify three prerequisite standards—the standards do not have to be in three different grades.

• Identify the aspects of rigor for each prerequisite.

• Discuss with a partner:
  1. How does each prerequisite support the standard?
  2. Why is it important to pay attention to the rigor of the prerequisite standard?

The Standards:
Geometry – G-MG.A.3
Algebra I – A-REI.D.11
Algebra II – A-APR.B.2
ACROSS COURSE COHERENCE IN HIGH SCHOOL

Geometry—G-MG.A.3

Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

8-G.C.9
Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

7-G.B.6
Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

6-G.A.1
Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
Explain why the $x$-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

**A-REI.D.10**
Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

**8-EE.C.8.A**
Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

**8-EE.C.8.B**
Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.*
ACROSS COURSE COHERENCE IN HIGH SCHOOL

Algebra II—A-APR.B.2

Know and apply the Remainder Theorem: For a polynomial \( p(x) \) and a number \( a \), the remainder on division by \( x - a \) is \( p(a) \), so \( p(a) = 0 \) if and only if \( (x - a) \) is a factor of \( p(x) \).

**A-SSE.A.2**
Use the structure of an expression to identify ways to rewrite it. For example, see \( x^4 - y^4 \) as \( (x^2)^2 - (y^2)^2 \), thus recognizing it as a difference of squares that can be factored as \( (x^2 - y^2)(x^2 + y^2) \).

**F-IF.7.C**
Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

**A-SSE.B.3.A**
Factor a quadratic expression to the zeros of the function it defines.
Break
ACROSS COURSE COHERENCE IN HIGH SCHOOL

IV. Understanding the Progressions

The Progressions Documents

Building Functions

The previous group of standards focuses on interpreting functions given by expressions, graphs, or tables. The Building Functions group focuses on building functions to model relationships, and building new functions from existing functions.

Note: Inverse of a function and composition of a function with its inverse are among the plus standards. The following discussion describes in detail what is required for students to grasp these securely. Because of the subtleties and pitfalls involved, it is strongly recommended that these topics be included only in optional courses.

Build a function that models a relationship between two quantities. This cluster of standards is very closely related to the algebra standard on writing equations in two variables. A-SSE.3. Indeed, that algebra standard might well be set by a curriculum in the same unit as this cluster. Although students will eventually study various families of functions, it is useful for them to have experiences of building functions from scratch, without the aid of a host of special recipes, by grappling with a concrete context for each function. For example, in “Lake Algae” in this enigma, a solution for part (a) might involve noting that the lake is completely covered with algae on June 30, then half of its surface will be covered on June 29 because the area covered doubles each day. This might be expressed in a table:

<table>
<thead>
<tr>
<th>Date</th>
<th>20</th>
<th>30</th>
<th>60</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>percent covered</td>
<td>50</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Finding a solution for part (b) might start from the table above. Repeatedly using the information that the algae doubles each day, one divides the amount for June 29 by 2, then divides the amount for June 28 by 2, then divides the amount for June 27 by 2. This repeated division (RMD) might be supported by the table:

F-BF.1a Writes a function that describes a relationship between two quantities.

a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
Understanding the Progressions

How does understanding the progressions support instruction?
How can we leverage progressions of content to give all students access to course-level content?
V. Adapting Lessons for Students with Unfinished Learning

Protocol:

• **Review** Lesson 1 and **identify** the targeted standard.
• **Identify** the prerequisite standards from prior grades that support the targeted standard.
  - What is the aspect of rigor for each prerequisite?
• **Discuss** with a partner:
  1. How does each prerequisite support the standard?
  2. How could you strategically use these prerequisite standards to support students with unfinished learning?
  - **Annotate** the lesson with specific supports.
• With your table:
  - Each pair shares out the specific adaptations you and your partner made. **Explain** why you made these adaptations.
Lesson Adaptations

What types of adaptions could you consider at the lesson level?

• Add a warm-up activity that connects to prior learning.

• Add a section to the lesson portion to address prerequisite skills.

• Adjust the examples and/or problem set to focus on prerequisite skills.
Adapting Lessons for Students with Unfinished Learning

Protocol:

- **10 min**: Individual work time
- **15 min**: Partner work
- **10 min**: Table share out

Goals for This Activity:

I. Review Lesson 1 and identify the targeted standard(s).

II. What are the prerequisite standards from prior grades that support this standard(s)?

III. What aspects of rigor are highlighted in the prerequisite standards?
Adapting Lessons for Students with Unfinished Learning

Protocol:

- Review Lesson 1 and identify the targeted standard.
- Identify the prerequisite standards from prior grades that support the targeted standard.
  - What is the aspect of rigor for each prerequisite?
- Discuss with a partner:
  1. How does each prerequisite support the standard?
  2. How could you strategically use these prerequisite standards to support students with unfinished learning?
  - Annotate the lesson with specific supports.
- With your table:
  - Each pair shares out the specific adaptations you and your partner made. Explain why you made these adaptations.
Transition to Partner Time!
Adapting Lessons for Students with Unfinished Learning

Protocol:
- **10 min:** Individual work time
- **15 min:** Partner work
- **10 min:** Table share out

Goals for This Activity:

I. How do these prerequisite standards support the course-level standard(s)?

II. How could you strategically use these prerequisite standards to support students with unfinished learning?
   - Annotate the lesson with specific supports.
Adapting Lessons for Students with Unfinished Learning

Protocol:
• Review Lesson 1 and identify the targeted standard.
• Identify the prerequisite standards from prior grades that support the targeted standard.
  o What is the aspect of rigor for each prerequisite?
• Discuss with a partner:
  1. How does each prerequisite support the standard?
  2. How could you strategically use these prerequisite standards to support students with unfinished learning?
  o Annotate the lesson with specific supports.
• With your table:
  o Each pair shares out the specific adaptations you and your partner made. Explain why you made these adaptations.
Transition to Table Share!
ACROSS COURSE COHERENCE IN HIGH SCHOOL

Adapting Lessons for Students with Unfinished Learning

Protocol:
• **10 min**: Individual work time
• **15 min**: Partner work
• **10 min**: Table share out

Goals for This Activity:
- Each pair shares out the specific adaptations made and explains why these adaptations were made.
ACROSS COURSE COHERENCE IN HIGH SCHOOL

Adapting Lessons for Students with Unfinished Learning

Protocol:
• Review Lesson 1 and identify the targeted standard.
• Identify the prerequisite standards from prior grades that support the targeted standard.
  o What is the aspect of rigor for each prerequisite?
• Discuss with a partner:
  1. How does each prerequisite support the standard?
  2. How could you strategically use these prerequisite standards to support students with unfinished learning?
  o Annotate the lesson with specific supports.
• With your table:
  o Each pair shares out the specific adaptations you and your partner made. Explain why you made these adaptations.
### Adapting Lessons for Students with Unfinished Learning

| What course-level standard does the lesson address? What is the evidence of alignment to this standard? | What are the prerequisite standards from prior grades/courses that support this standard? | Brainstorm ways you could use these prerequisites to support students with unfinished learning in accessing the content of this lesson.  
• Annotate the lesson with specific supports. |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ACROSS COURSE COHERENCE IN HIGH SCHOOL

Summary

• What is the shift of coherence?
• How does coherence help us support students with unfinished learning?
• How does rigor help us support students with unfinished learning?
• How does this learning apply to your specific role?
Lunch 12:00–1:00
Today

• **Morning:** Across Course Coherence in High School

• **Afternoon:** Instructional Practice in High School
INSTRUCTIONAL PRACTICE IN HIGH SCHOOL

Afternoon Objectives

• Participants will be able to use the Instructional Practice Guide (IPG) as a lesson planning tool and a coaching tool.

• Participants will be able to identify where, in lessons and videos, teachers engage in Core Actions.

• Participants will be able to explain the relationship between Core Actions and equitable practices in Standards-aligned math instruction.
I. Intro to the Instructional Practice Guide (IPG)

II. Core Actions in Action!

III. Lesson Planning with the IPG

IV. Connect to Practice
...effective teaching is the non-negotiable core that ensures that all students learn mathematics at high levels...

–Principles to Actions: Ensuring Mathematical Success for All (NCTM)
The Instructional Practice Guide includes coaching and lesson planning tools to help teachers and those who support teachers to make the Key Shifts in instructional practice required by the State Standards.
INSTRUCTIONAL PRACTICE IN HIGH SCHOOL

Core Actions

1. Ensure the work of the enacted lesson reflects the Focus, Coherence, and Rigor required by college- and career-ready standards in mathematics.

2. Employ instructional practices that allow all students to learn the content of the lesson.

3. Provide all students with opportunities to exhibit mathematical practices while engaging with the content of the lesson.
Core Action 1

Ensure the work of the enacted lesson reflects the Focus, Coherence, and Rigor required by college- and career-ready standards in mathematics.

Indicators

A. The enacted lesson focuses on the course-level cluster(s), course-level content standard(s), or part(s) thereof.
   Mathematical learning goal:
   Standard(s) addressed in this lesson:

B. The enacted lesson appropriately relates new content to math content within or across grades.

C. The enacted lesson intentionally targets the aspect(s) of Rigor (conceptual understanding, procedural skill and fluency, application) called for by the standard(s) being addressed.
   Circle the aspect(s) of Rigor targeted in the standard(s) addressed in this lesson: Conceptual understanding / Procedural skill and fluency / Application
   Circle the aspect(s) of Rigor targeted in this lesson: Conceptual understanding / Procedural skill and fluency / Application
Core Action 2

Employ instructional practices that allow all students to learn the content of the lesson.

Indicators

A. The teacher makes the mathematics of the lesson explicit through the use of explanations, representations, tasks, and/or examples.

B. The teacher strengthens all students’ understanding of the content by strategically sharing students’ representations and/or solution methods.

C. The teacher deliberately checks for understanding throughout the lesson to surface misconceptions and opportunities for growth, and adapts the lesson according to student understanding.

D. The teacher facilitates the summary of the mathematics with references to student work and discussion in order to reinforce the purpose of the lesson.
INSTRUCTIONAL PRACTICE IN HIGH SCHOOL

Core Action 3

Provide all students with opportunities to exhibit mathematical practices while engaging with the content of the lesson.

Indicators

A. The teacher provides opportunities for all students to work with and practice course-level problems and exercises. Students work with and practice course-level problems and exercises.

B. The teacher cultivates reasoning and problem solving by allowing students to productively struggle. Students persevere in solving problems in the face of difficulty.

C. The teacher poses questions and problems that prompt students to explain their thinking about the content of the lesson. Students share their thinking about the content of the lesson beyond just stating answers.

D. The teacher creates the conditions for student conversations where students are encouraged to talk about each other’s thinking. Students talk and ask questions about each other’s thinking, in order to clarify or improve their own mathematical understanding.

E. The teacher connects and develops students’ informal language and mathematical ideas to precise mathematical language and ideas. Students use increasingly precise mathematical language and ideas.
INSTRUCTIONAL PRACTICE IN HIGH SCHOOL

Deeper Dive with the IPG

Small Group Protocol

- Read the indicators of the Core Action for your group.
- Discuss the following with your small group:
  1. How does this Core Action (including the indicators) support teachers and coaches in building understanding of Standards-aligned instruction?
  2. What are the essential teacher practices that support the indicators?
  3. How does this Core Action support equitable instruction for all students?
Deeper Dive with the IPG

Table Discussion Protocol

- Turn and teach.
- Discuss the following with your table group:
  1. How does this tool support teachers and coaches in building understanding of Standards-aligned instruction?
  2. What are essential teacher practices that support each Core Action?
  3. Where does each of the Standards for Mathematical Practice show up in the IPG?
  4. How does this Core Action support equitable instruction for all students?
Deeper Dive with the IPG

Whole Group Discussion Protocol

1. How does this tool support teachers and coaches in building understanding of Standards-aligned instruction?
2. Where does each of the Standards for Mathematical Practice show up in the IPG?
3. What connections did you make between the Core Actions and equitable instruction for all students?
INSTRUCTIONAL PRACTICE IN HIGH SCHOOL

IPG Summary

• Useful in both planning and coaching.

• Evidence for the indicators can come from lesson materials, teacher actions, student discussion, and student work.

• When using as a coaching tool, not all indicators may be evident in a single class period.

• **Not** to be used as an evaluation instrument.
II. Core Actions in Action!

What Core Actions are visible?
Break

mmm
III. Lesson Planning with the IPG

How can we use the Core Actions and indicators?

- Planning
- Evaluating
- Reflecting
Lesson Planning

The Core Actions should be evident in planning and observable in instruction.

- What parts of the lesson plan are vital to show evidence of Core Action 1? Annotate the lesson to show these.
- What are some of the things you could do to ensure alignment with the indicators for Core Actions 2 and 3?

What to Review:
- Algebra I, Module 1, Lesson 2
- Geometry, Module 1, Lesson 2
- Algebra II, Module 1, Lesson 2
Example: Algebra I, Module 1, Lesson 1

This activity emphasizes application, which is the aspect of rigor implied by A-CED.A.2 (CA 1.C).

Example 1 (15 minutes)
Present the following graph and question:

Here is an elevation-versus-time graph of a person's motion. Can we describe what the person might have been doing?

Have students discuss this question in pairs or in small groups. It will take some imagination to create a context that matches the shape of the graph, and there will likely be debate.

Additional questions to ask:
- What is happening in the story when the graph is increasing, decreasing, constant over time?
  - Answers will vary depending on the story: a person is “walking up a hill,” etc.
- What does it mean for one part of the graph to be steeper than another?
  - The person is climbing or descending faster than in the other part.

Choose three groups' work to share and discuss. (CA 2.C)

After each example is shared, ask students to respond to each others' thinking. (CA 3.D)
Lesson Planning

Protocol:

• **15 min:** Individual work time

• **10 min:** Small group collaboration

• **15 min:** Table share out

Goals for This Activity:

1. Read the lesson.
2. Annotate the lesson for your Core Action.
   • What parts of the lesson plan are vital to show evidence of Core Action 1?
   • What are some of the things you could do to ensure alignment with the indicators for Core Actions 2 and 3?
Transition to Small Group Time!
Lesson Planning

Protocol:
• 15 min: Individual work time
• 10 min: Small group collaboration
• 15 min: Table share out

Goals for This Activity:
1. Share how you annotated the task with your group.
Transition to Table Share!
Lesson Planning

Protocol:
• **15 min**: Individual work time
• **10 min**: Small group collaboration
• **15 min**: Table share out

Goals for This Activity:
1. Share your annotations with the people at your table.
2. Discuss and record:
   • What kinds of evidence supported the indicators for CA 1?
   • What kinds of actions did you add to support CA 2?
   • What kinds of actions did you add to support CA 3?
IV. Lesson Planning

Protocol:

Annotate your lesson for each Core Action:

1. What is the evidence of alignment to Core Action 1? How can you improve alignment to Core Action 1?
2. What are some of the things you could do to ensure alignment with the indicators for Core Action 2?
3. What are some of the things you could do to ensure alignment with the indicators for Core Action 3?
INSTRUCTIONAL PRACTICE IN HIGH SCHOOL

Summary

• How will the Core Actions impact your work with creating and/or coaching around lesson plans, and ensuring equitable instruction for all students?

• How has your thinking changed about lesson planning?

• How have the Shifts impacted your approach to instruction?
Homework

To prepare for the work we will do tomorrow and Friday:

• **Read** *Understanding Language- Principles for the Design of Mathematics Curricula: Promoting Language and Content Development.*
  – Located in materials for Thursday, on the Standards Institutes website: standardsinstitutes.org

• **Think** about a possible problem of practice that you are struggling with related to the content we have covered this week, that you would want to problem solve on Friday. **Share** this problem of practice with me today before you leave.
  – The Problem of Practice Q&A will take place Friday afternoon.
Feedback

Please fill out the survey located here: [www.standardsinstitutes.org](http://www.standardsinstitutes.org).

- Click “Winter 2019” on the top of the page.
- Click “Details” on the center of the page.
About This Deck

• Copyright © 2018 UnboundEd Learning, Inc.
• This work is licensed under a Creative Commons Attribution NonCommercial ShareAlike 4.0 International License.
• UnboundEd Learning, Inc. is the copyright holder of the images and content, except where otherwise indicated in the slide notes.
• More information on Creative Commons’ licenses can be found here: https://creativecommons.org/licenses/.
How You Can Use This Deck

The materials that we create, unless otherwise cited in the slide notes, are licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International license (CC BY-NC-SA 4.0). This means you may:

• **Share**—copy and redistribute the material in any medium or format
• **Adapt**—remix, transform, and build upon the material

As long as you follow the license terms:

• **Provide Attribution**—You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests that UnboundEd or any third party creator endorses you or your use.
• **No Commercial Use**—You may not use the material for commercial purposes.
• **ShareAlike**—If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original.
• **No Additional Restrictions**—You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.