

College and Career Readiness

Protocol #5 for Secondary Mathematics Teachers: *Progressions*

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It's not just a new list of stuff to cover

These Standards are not intended to be new names for old ways of doing business. They are a call to take the next step. It is time for states to work together to build on lessons learned from two decades of standards based reforms. It is time to recognize that standards are not just promises to our children, but promises we intend to keep.

— CCSSM (2010, p.5)

Instructional Shifts Compelled by the CCSS

1. Focus
2. Coherence
3. Rigor

Instructional Shifts Compelled by the CCSS

1. Focus

- Fewer topics
 - *“Teach Less, Learn More”*
- Critical Areas of Focus
- Developing expertise over time

Instructional Shifts Compelled by the CCSS

2. Coherence

- Learning progressions across grades
- Connections between topics within a grade

Instructional Shifts Compelled by the CCSS

3. Rigor

- Conceptual understanding
- Procedural skill and fluency
- Application

All Means All

- The CCSS articulate rigorous expectations to prepare all students to be college and career ready, including English language learners and Special Education students.
- Classroom culture, relationships, learning activities, along with our instructional and assessment practices must reflect a commitment to these expectations for all, while recognizing that some students will require additional instructional support.

Coherence in the CCSS

The CCSS should not be looked at as isolated grade level topics, but rather, as progressions of learning targets that scaffold across grades.

An example of a learning progression

6.RP.1: Understand the concept of a **ratio** and use ratio language to describe a ratio between two quantities.

6.RP.2: Understand the concept of a **unit rate** ... and use rate language in the context of a ratio relationship.

While running in the Honolulu Marathon you completed the first 20 miles in 4 hours.

$$\frac{20 \text{ miles}}{4 \text{ hours}} = \frac{5 \text{ miles}}{1 \text{ hour}} \quad \frac{4 \text{ hours}}{20 \text{ miles}} = \frac{1/5 \text{ hour}}{1 \text{ mile}}$$

An example of a learning progression

7.RP.1: Compute **unit rates** associated with ratios of fractions ...

I rode my bike 1½ miles to get to school and it took me ¼ of an hour.

Usain Bolt ran 100 meters in 9.58 seconds.

$$\frac{1\frac{1}{2} \text{ miles}}{\frac{1}{4} \text{ of an hour}} = \frac{3 \text{ miles}}{\frac{1}{2} \text{ of an hour}} = \frac{4 \text{ miles}}{\frac{2}{3} \text{ of an hour}} = \frac{6 \text{ miles}}{1 \text{ hour}} = 6 \text{ miles per hour}$$

$$\frac{100 \text{ meters}}{9.58 \text{ seconds}}$$

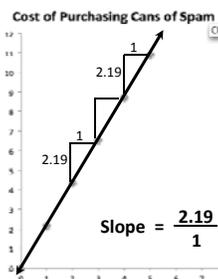
$$= \frac{10.4 \text{ meters}}{1 \text{ second}}$$

$$= 10.4 \text{ meters per second}$$

An example of a learning progression

8.EE.5: Graph proportional relationships, interpreting the **unit rate** as the slope of the graph ...

Cans of Spam	Cost
0	0
1	$0 + 2.19 = 2.19$
2	$(0 + 2.19) + 2.19 = 4.38$
3	$(0 + 2.19 + 2.19) + 2.19 = 6.57$
4	$(0 + 2.19 + 2.19 + 2.19) + 2.19 = 8.66$



An example of a learning progression

F.LE.1: Distinguish between situations that can be modeled with linear functions and exponential functions.

- Prove that linear functions grow by equal differences over equal intervals ...
- Recognize situations in which one quantity changes at a **constant rate per unit interval** relative to another.

An example of a learning progression

F.LE.1: Distinguish between situations that can be modeled with linear functions and exponential functions.

A university plans to increase tuition by \$700 each year for the next several years.

A university plans to increase tuition by 7% each year for the next several years.

Years	Cost of tuition	Years	Cost of tuition
0	20,000	0	20,000
1	$20,000 + 700 = 20,700$	1	$20,000 * 1.07 = 21,400$
2	$(20,000 + 700) + 700 = 21,400$	2	$(20,000 * 1.07) * 1.07 = 22,898$
3	$(20,000 + 700 + 700) + 700 = 22,100$	3	$(20,000 * 1.07 * 1.07) * 1.07 = 24,501$

Now let's take a step back

Grade 6: Concept of ratio and unit rates

Grade 7: Continue unit rates with reasoning about situations involving complex fractions

Grade 8: Understanding slope as a rate of change and interpreting the unit rate as the slope of a graph

High School Algebra: Distinguishing between linear growth and exponential growth by analyzing and describing rates of change.

A pretty cool (and FREE) resource

<http://learnzillion.com>

- Click on the Math button
- Select the filters for your area(s) of interest
- Browse the available lessons to gain insights about particular Common Core standards and download a slide deck that you could use in your own lesson.

Next steps

Participate in our online professional learning community

- www.edmodo.com
- Sign-up for a free account (click on "I'm a teacher")
- After you login, on the left side of the screen, look for "Groups" and click on the "Join" link.
- Type one of the following codes into the box that appears:
 - For the grades **6-8 group**, enter the code **z7cwcc**
 - For the grades **9-12 group**, enter the code **mcbkv6**

Next steps

Please feel free to use Edmodo as a venue to:

- Share resources (tasks, lessons, assessments) and ask for feedback on the resources you share.
- Share successes and/or challenges that you may have encountered with activities involving mathematical modeling.
- Ask questions and respond to other questions posted by your colleagues.

Right now

Do the "Progressions Task Template" activity.

- Form small groups (4-6 members) and as a group decide which of the following you would like to do collaboratively:
 - Option 1: analyze the progression from grade 6 to 7 and then from grade 7 to 8
 - Option 2: analyze the progression from grade 7 to 8 and then from grade 8 to high school algebra



Right now

After agreeing on one of the two options,

- Analyze the Common Core standards listed in the “Progression of Linear Relationships ...” handout. As a group, discuss the meaning of the expected learning targets at each grade level. On the template, write down the important ideas discussed in your group.
- As a group discuss the change/progression regarding what students will be expected to learn about linear relationships from one grade level to the next. On the template, write down the important ideas discussed in your group.



Keep the Momentum Going

- Finally, in your group discuss how this process can be used to inform your decision-making when planning the teaching and learning opportunities in your classroom.

Coherence in the CCSS

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