Module 1
Participant Guide

Focus on Practice Standards

# Connecticut Core Standards for Mathematics

## Grades 6–12

***Systems of Professional Learning***

**Connecticut Core Standards Systems of Professional Learning**

The material in this guide was developed by Public Consulting Group in collaboration with staff from the Connecticut State Department of Education and the RESC Alliance. The development team would like to specifically thank Ellen Cohn, Charlene Tate Nichols, and Jennifer Webb from the Connecticut State Department of Education; Leslie Abbatiello from ACES; and Robb Geier, Elizabeth O'Toole, and Cheryl Liebling from Public Consulting Group.

The Systems of Professional Learning project includes a series of professional learning experiences for Connecticut Core Standards District Coaches in English Language Arts, Mathematics, Humanities, Science, Technology, Engineering, Mathematics (STEM), and Student/Educator Support Staff (SESS).

Participants will have continued support for the implementation of the new standards through virtual networking opportunities and online resources to support the training of educators throughout the state of Connecticut.

Instrumental in the design and development of the Systems of Professional Learning materials from PCG were: Sharon DeCarlo, Debra Berlin, Jennifer McGregor, Michelle Wade, Nora Kelley, Diane Stump, and Melissa Pierce.

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## Post-Assessment, Session Evaluation, and Wrap Up

# Introductory Activity

## Introductory Activity: Pre-Assessment–CCS-Math

**Instructions:** Check the box on the scale that best represents your knowledge or feelings about implementing the Connecticut Core Standards for Mathematics (CCS-Math) in your classroom **(5 minutes to complete the Pre-Assessment).**

| Self-Assessment Questions | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| I have an initial understanding of the CCS-Math and the embedded changes and instructional shifts. | | | | |
| I am familiar with all eight of the CCS-Math Practices and can identify how they are all related. | | | | |
| I know why Practice 1: *"Make sense of problems and persevere in solving them"* and Practice 6: *"Attend to precision"* are considered the two "umbrella" standards. | | | | |
| I can identify evidence of the eight Practices in CCS-aligned mathematics tasks. | | | | |
| I can create descriptors for all eight Practices, and develop formal grade level descriptions for Practice 1 and Practice 6. | | | | |
| I understand how instructional strategies such as questioning, engaging students in mathematical discourse, and requiring multiple representations can help students meet learning goals. | | | | |
| I can identify relevant resources for implementing the CCS-Math. | | | | |

Answer the following question:

What is one thing I am hoping to take away from this session?

# Section 1

# Section 1: Understanding the Foundations of the Connecticut Core Standards

## What Do We Know?

*As you talk with your group, use the space below to take notes on what is currently known about the CCS-Math.*

| What do we know about the CCS-Math? |
| --- |
| |

## Coherence

Coherence

### Grade 7

Analyze proportional relationships and use them to solve real-world and mathematical problems.

1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.

2. Recognize and represent proportional relationships between quantities.
a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.
d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.
3. Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. (p.48)

### Grade 8

Understand the connections between proportional relationships, lines, and linear equations.

5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b. (p.54)

### Algebra

Create equations that describe numbers or relationships

1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (p.65)

## The Impact of the Shifts

*As we discuss the impact of the shifts, use the space below to record your own notes.*

| Notes on the Impact of the Shifts |
| --- |
| |

## The Personal Journey of the CCS

*Take a moment to think about the questions that you have about implementing the CCS-Math and record those questions in the Questions column below.*

*As your questions are answered throughout the session, record the answers in the Answers column.*

| Questions | Answers |
|---|---|
| | |

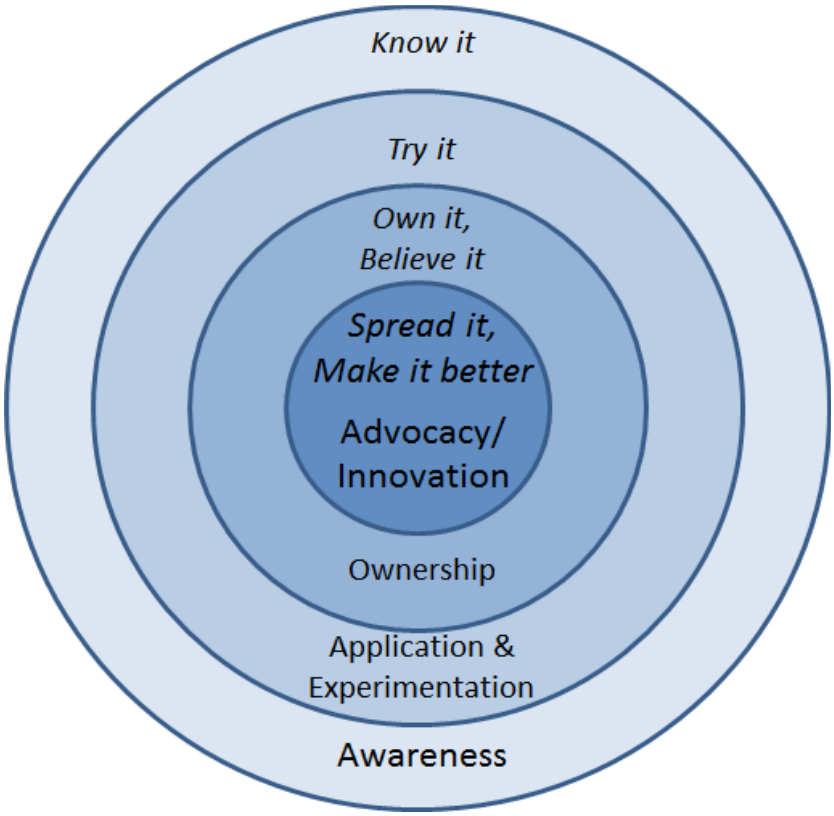
*You will now watch a video from Phil Daro, one of the major figures involved in writing the Common Core Standards and a professor at Stanford University. He discusses what mathematics instruction should look like in the era of the Common Core and the need for change in mathematics teaching and learning.*

(Phil Daro at CMC-North Ignite: http://www.youtube.com/watch?v=B6UQcwzyE1U)

# Section 2

## Section 2: Supporting Change

### Stages of Change




**Stage 1 is Awareness** – simply knowing what is being asked and what it means

**Stage 2 is Application and Experimentation** – Getting your toes wet, trying out new strategies and perspectives

**Stage 3 is Ownership** – It is the moment you get buy-in; you believe in the change and take it on personally

**Stage 4 is Advocacy and Innovation** – This is the point where you are proficient and can help others and make improvements in the work itself

*Retrieved from www.achievethecore.org*

## Creating an Environment for Personal Change

*Think about your past experiences working with your peers. As you reflect, answer the following questions.*

1. In a conversation, what is something that encourages you to speak your mind?

2. What is something that deters you from expressing your ideas?

**Additional Notes:**

# Section 3

# Section 3: Understanding the Standards for Mathematical Practice: Developing Mathematical Expertise

## Problem Set

*Solve each of the following eight problems. Think about your process for solving each as your process will be discussed as we look at each of the eight Standards for Mathematical Practice.*

| | |
|---|---|
| **Problem 1.** Find all of the ways you can divide a square in half. | **Problem 2.** How is multiplying 32x41 like multiplying (x+1) (X+3)? |
| **Problem 3.** Explain why all squares are rectangles but not all rectangles are squares. | **Problem 4.** $8^{th}$ graders are going on a field trip. There are 167 students going. How many buses are needed for the trip if each bus can hold 48 students? |

**Problem 5.**

Using the input and output below, identify the rule.

| Input | Output |
|---|---|
| -1 | 1 |
| 0 | 3 |
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

**Problem 6.** Farmer Lebowski has some chickens and some cows in her yard. Together, the animals have a total of 90 heads and 286 legs. How many chickens and how many cows are in the yard? Find a way to solve this problem **that does not involve the use of an algebraic equation.**

Hint: Cows have 4 legs, chickens have 2.

**Problem 7.**

| **XYZ School Maintenance Budget** | | |
|---|---|---|
| **Year** | **Maintenance Budget** | **Total XYZ School Budget** |
| **2009** | **$30,000** | **$500,000** |
| **2010** | **$31,200** | **$520,000** |

**Rate of inflation between 2009 and 2010: 8%**In 2010 the XYZ School received the following comments:

- From parents: The maintenance budget has increased.
- From the maintenance manager: The maintenance budget has decreased.
- From the Principal: There has been no change in spending patterns at the school.

Is it possible that all comments are valid? Why or why not? Where do you stand?

**Problem 8.** On its menu, a restaurant has three different appetizers, four different entrees, and two different desserts. How many distinct meals of one appetizer, one entrée, and one dessert could you make from this menu? Show how you know.

## Understanding the Mathematical Practices

*As each of the eight Standards for Mathematical Practices are discussed, use the following charts to record your notes on each.*

<table>
<tr><td colspan="2">SMP1:</td></tr>
<tr><td>Instructional Supports:</td><td>Example Problem:</td></tr>
<tr><td colspan="2">Additional Notes:</td></tr>
</table>

| **SMP2:** | |
|---|---|
| **Instructional Supports:** | **Example Problem:** |
| **Additional Notes:** | |

| SMP3: | |
|---|---|
| **Instructional Supports:** | **Example Problem:** |
| **Additional Notes:** | |

| SMP4: | |
|---|---|
| **Instructional Supports:** | **Example Problem:** |
| **Additional Notes:** | |

| **SMP5:** | |
|---|---|
| **Instructional Supports:** | **Example Problem:** |
| **Additional Notes:** | |

| SMP6: | |
|---|---|
| **Instructional Supports:** | **Example Problem:** |
| **Additional Notes:** | |

| SMP7: | |
|---|---|
| **Instructional Supports:** | **Example Problem:** |
| **Additional Notes:** | |

| SMP8: | |
|---|---|
| **Instructional Supports:** | **Example Problem:** |
| **Additional Notes:** | |

# Section 4

# Section 4: Supporting Students to "Make sense of problems and persevere in solving them."

## Kites Activity

*Explore the problem below using the materials provided. Work first on your own and then with your group. Be sure that everyone presents their individual thinking before the group begins to work together. Once your group has determined the instructions that need to be provided with each kit based on the shape of the kite, record your instructions on chart paper. Your instructions should include the length and number of sticks and how each stick should be positioned based on the the desired kite shape.*

A store sells kits to make kites. All the kites are quadrilaterals. Some are what we call "kite-shaped." Others are rectangles, squares, rhombi, and four sided shapes with no particular characteristics. A kit has string, paper, and two sticks to form the skeleton of the kite.

The store owner needs to know what sticks to put in the kits for each shape, and how to tell the purchaser how to put the sticks together for each shape.

Your job is to give the store owner information about making squares, rectangles, trapezoids, and typical kite shapes. For each shape, list the sticks needed and how they should be put together.

Use the paper strips as your sticks and connect them using the brads to make your kite shapes.

Retrieved from http://insidemathematics.org/index.php/classroom-video-visits/public-lessons-properties-of-quadrilaterals/300-properties-of-quadrilaterals-tuesday-group-work-part-a?

## Classroom Environment that Supports Perseverance

*Create a description of a classroom environment that supports perseverance.*

# Section 5

# Section 5: Attending to Precision in Every Lesson

## Video Observation Sheet

*Watch the video of Cathy Humphreys working on the diagonals problem with students. (The video can be found here: http://www.insidemathematics.org/index.php/standard-6. Scroll down to View the 4th video in the grade 9–10 series.)*

*Use the space below to make notes about the video.*

| Video | Notes and Observations |
|---|---|
| | |
| | |
| | |

# Section 6

# Section 6: Teaching with the Standards for Mathematical Practice

## Asking Effective Questions

*Well structured questions include three parts:*

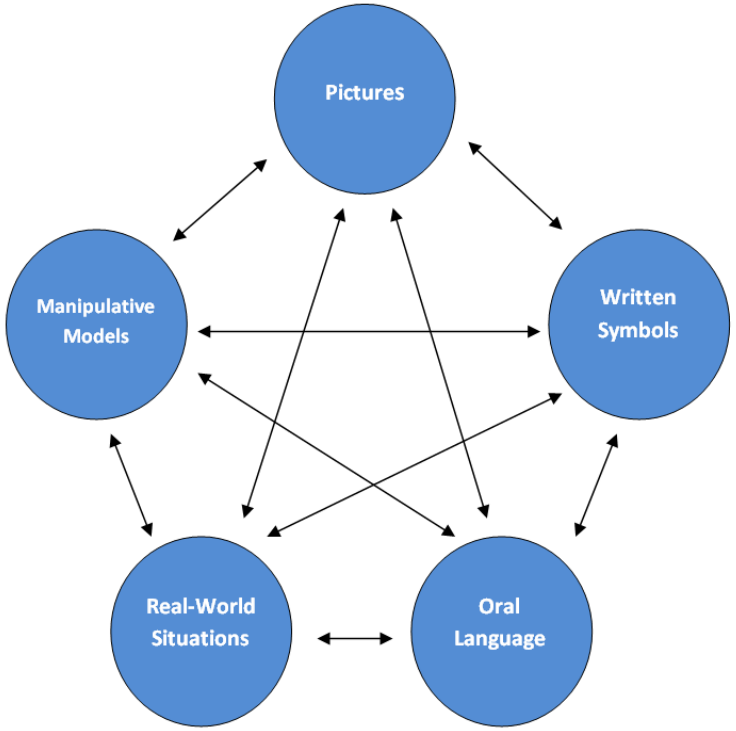
- *An invitation to think*
- *A cognitive process*
- *A specific topic*

1. **Anticipate Student Thinking.** Thinking about multiple ways that your students may solve a problem will allow you to anticipate and plan possible questions that the students might ask and that you can ask to stimulate their thinking and deepen student understanding.
2. **Link to Learning Goals.** By asking questions that relate back to the learning goals and the standards that the lesson focuses on, you are helping students to focus on the key skills and concepts. This link will then allow students to deepen their understanding and apply what they have learned in new situations.
3. **Pose Open-ended Questions.** Open-ended questions support and encourage a variety of approaches and responses. These questions also provide a manageable challenge for students as they are free to answer at their readiness level. An example of an open-ended question is: Instead of asking a student "what is 14 + 6?" you could ask "How many ways can you make 20?".
4. **Pose Questions that Actually Need to be Answered.** Rhetorical questions such as "Doesn't a square have four sides?" provide students with an answer without allowing them to engage in their own reasoning.
5. **Incorporate Verbs that Elicit Higher Levels of Bloom's Taxonomy.** Verbs such as *evaluate, justify, explain, describe, elaborate,* etc prompt students to communicate their thinking and understanding.
6. **Pose Questions that Open Up the Conversation to Include Others.** Use questions such as "How does your solution relate to _____'s solution?" or "What do you think about ____'s idea?" in order to draw more students into the discussion.
7. **Keep Questions Neutral.** Try not to qualify a question as easy or hard as some students are afraid of 'hard' questions and others are easily bored with 'easy' questions. Also, be mindful of verbal and non-verbal cues such as tone of voice and facial expressions, as these can set the tone of a question.
8. **Provide wait time.** Many students need time to process information before answering a question. Teachers that allow for a wait time of 3 seconds or more after a question tend to receive a greater quantity and quality of student responses.

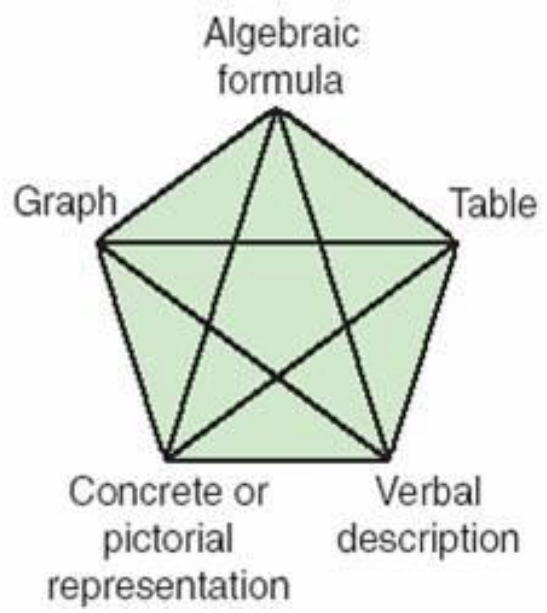
Student Achievement Division Ontario Schools (2011). *Capacity Building Series Special Edition #21 Asking Effective Questions.* Retrieved from http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/CBS_AskingEffectiveQuestions.pdf

### Additional Notes:

## Multiple Representations




Van de Walle, Karp, & Bay-Williams 2013. 24.




NCTM, 2001.

## Steps to Getting Students Talking

**Build a Community of Learners**

The community of learning is embedded in the classroom culture. Have students form community agreements for how they will work together and respect each other during the learning process.

**Encourage Students as Mathematicians**

Encourage students to believe that they can reach their goals of being effective mathematicians. Share excitement when you hear students search for meaningful mathematics rather than just getting the right answer.

**Ask Genuine Questions**

Asking genuine questions that show a desire to understand another way of thinking about mathematics is a critical aspect of getting students to the point of opening up their mathematical thinking to the rest of the class. Model this type of questioning and expect students to question each other in a positive and genuine manner.

**Press Students and Encourage Disequilibrium**

Plan for and give the time that students need to work through productive struggle. Press for justification of thoughts and strategies, knowing that these moments offer opportunities for new learning to take place.

**Promote Risk Taking**

Acknowledging stages of thinking or "partial thinking" develops risk-takers and is an important move that supports effective student discourse in the mathematics classroom

**Allow Private Think Time**

Allow individuals the time to privately think about the mathematics before engaging in discourse so that everyone comes into the conversation with some initial thinking. Then, before a full discussion ensues, have each tell what they thought about in order to get everyone's thinking heard.

**Use Protocols**

Purposefully plan the use of specific protocols to build equitable opportunities for all students to share their mathematical thinking with others.

Blanke, B. (2009). *Understanding mathematical discourse in the elementary classroom: A case study*. Retrieved from http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/11141/Dissertation_Blanke 3-29-09[Final].pdf?sequence=1

## Grades 6–8: Sample 7th Grade Lesson Plan

*Evaluate the lesson plan below using the specific criteria from the EQuIP Rubric. Then, in the space provided, provide suggestions for strengthening the lesson.*

### "Sign" your Name

**Core Standard:**

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

- **7.NS.1** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

**Standards for Mathematical Practice**:

6. Attend to precision.

8. Look for and express regularity in repeated reasoning.

**Student Outcomes:**

- I can add integers.
- I can determine the absolute value of a quantity.

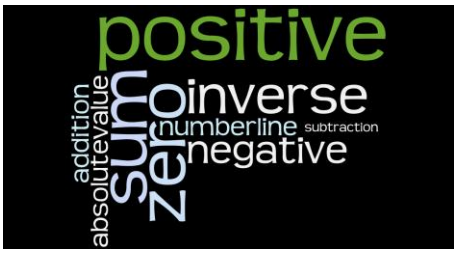
**Materials:**

- "Sign" Your Name handout
- Internet access to create a class Wordle of student names; http://www.wordle.net/

**Advance Preparation:**

- Students should be familiar with signed numbers and how to use a number line to help with signed addition.
- Students need to have an understanding that absolute value is the distance from zero on a number line.

**Directions:**




1. Show students the integer Wordle and discuss why some words appear larger and others appear smaller. Tell them that the activity today will allow them to create a class Wordle and that we will mathematically determine the size of our names in the Wordle. The Integer Wordle can be found at the following link: http://www.wordle.net/show/wrdl/5512350/Integers
2. Provide students a copy of the "Sign" Your Name handout.
3. Students should complete each question of the task to practice using a number line when adding integers.
4. At the end of the lesson, allow students to design a Wordle on the computer with the names of all students in the class (http://www.wordle.net/). Use the absolute value of each student's first name. Have each student type their first name in the Wordle the number of times that equals the absolute value of their name. Print out the class Wordle and display.

Example: JULIE = -3 + 8 + (-1) + (-4) + (-8) = -8; |-8| = 8

DAN = -9 + (-12) + 1 = -20; |-20| = 20

ALISAN = -12 + (-1) + (-4) + 6 + (-12) + 1 = -22; |-22| = 22

NANCY = 1 + (-12) + 1 + (-10) + 12 = -8; |-8| = 8

Using the example above, Julie will type her name 8 times in the Wordle program. Dan will type his name 20 times, Alisan 22 times and Nancy 8 times. The student whose name has the largest absolute value will appear the largest in the Wordle. The student whose name has the smallest absolute value will appear the smallest in the Wordle.

5. Now have the students create a Wordle that will display the true value of their first name. Student names that have negative values will be typed in backwards to represent the additive inverse value. Since we cannot type a name in Wordle a negative amount of times, the issue of negatives will be addressed by adding one more than the absolute value of the smallest valued name. Using the example above, ALISAN has the smallest valued name at -22. The absolute value of -22 is 22 then add one more to obtain a new value of 23. Adding 23 to each student's first name value will ensure that the student with the lowest name value will appear as the smallest in the Wordle which will be equal to 1. This same rule will now be applied to all students in the class. Thus, JULIE now has a value of -8 + 23 or 15; DAN will be -20 + 23 or 3; ALISAN is now -22 + 23 or 1, and NANCY is now -8 + 23 or 15. The amount added to each student's name value will depend on the smallest value in each class. The end result should be that the student with the lowest name value will enter their name in the Wordle one time. Use the same process as in the previous Wordle by having students type their name in the Wordle program with their new value. A cool twist is to have the students whose first name was originally negative (before adding 23 as in our example), type their name in backwards so that is will be clear on the Wordle that their name value was in fact negative.

**Questions to Pose:**

***Before***

- Can you predict which student's name in our class will have the highest value when we apply the given code? Can you predict who will have the lowest valued name?
- What is your reasoning for your predictions?

***During***

- What patterns did you notice when adding integers on the number line?
- Can we make some general rules for adding integers, those with like signs and those with different signs?
- Would the order of the values in a name matter when finding the total?

***After***

- How does your name size on the absolute value Wordle compare to your name size on the adjusted true value Wordle?
- What is the reasoning for the change in your name size?
- What is the reasoning for some names being typed in backwards?

**Possible Misconceptions/Suggestions:**

Students often misunderstand the value of negative numbers. For example, students often state that -1 < -10, as if the numbers were positive.

- Review with students that when comparing two positive integers, the number further to the right on the number line is always larger. The same reasoning applies to negative numbers on the number line. The larger value will always be the one further to the right.

**Special Notes:**

Some student names may require movement or result in a sum larger than the length of the provided number line. Based on the need of your students, a longer number line may be provided for assistance. The goal is for students to develop or recall the patterns when adding integers instead of relying solely on the number line.

Adapted from North Carolina Department of Public Instruction
http://maccss.ncdpi.wikispaces.net/file/view/CCSSMathTasks-Grade7.pdf/460716188/CCSSMathTasks-Grade7.pdf

**Student Handout**

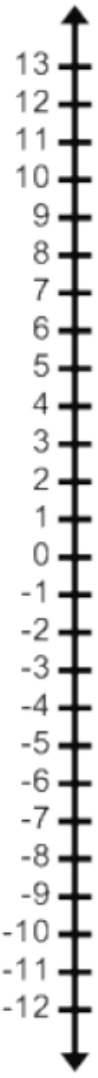
# "Sign" your Name

| Letter | Value |
|---|---|
| A | -12 |
| B | -11 |
| C | -10 |
| D | -9 |
| E | -8 |
| F | -7 |
| G | -6 |
| H | -5 |
| I | -4 |
| J | -3 |
| K | -2 |
| L | -1 |
| M | 0 |

| Letter | Value |
|---|---|
| N | +1 |
| O | +2 |
| P | +3 |
| Q | +4 |
| R | +5 |
| S | +6 |
| T | +7 |
| U | +8 |
| V | +9 |
| W | +10 |
| X | +11 |
| Y | +12 |
| Z | +13 |

Use the values for each letter in the charts above to find the amounts described below. Do not use a calculator. Use the provided number line and/or show your thinking.

1. The value of your first name:
2. The value of your middle name, if applicable:
3. The value of your last name:
4. The value of your entire name:
5. The absolute value of your first name:
6. The absolute value of your middle name, if applicable:
7. The absolute value of your last name:
8. The absolute value of your full name:
9. The value and absolute value of your teacher's last name:




NC DEPARTMENT OF PUBLIC INSTRUCTION SEVENTH GRADE

**Evaluation Notes:**

| Strengths | Recommendations |
| --- | --- |
| | |

## Grade 9-12: Sample Algebra Lesson Plan

*Evaluate the lesson plan below using the specific criteria from the EQuIP Rubric. Then, in the space provided, provide suggestions for strengthening the lesson.*

### Graphing quadratic equations:

This lesson will help students quickly graph a quadratic equation. It will also help them to understand the purpose of completing the square.

#### Core Standards:

**High School: Algebra**

*Reasoning with Equations & Inequalities*

- **ALG.REI.4** Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form (x – p)2 = q that has the same solutions. Derive the quadratic formula from this form. Solve...

**High School: Functions**

*Interpreting Functions*

- **FUN.IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. Graph linear and quadratic functions and show intercepts, maxima, and minima. Graph square root,...
- **FUN.IF.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and...

#### Learning outcomes:

Students will sketch the graph of a quadratic equation, and put a quadratic equation in general graph form y=(x-h)^2 +k by completing the square.

#### Teacher planning time:

50 minutes

#### Materials:

Classroom board, graph paper, pencils, student graphing calculators are a bonus, but not a must, overhead graphing calculator, overhead

**Pre-activities:**

- Students should be able to complete the square before beginning this lesson.
- Your warm-up on this day should be an activity on completing the square. If that was the homework from the night before, go over the homework and do a few problems. If completing the square wasn't the homework, give the students these problems as a warm-up.
    1. 0=x^2+4x+3
    2. 0=x^2+8x-5
    3. 0=2x^2+12x+4
    4. 0=x^2+5x+9
- Go over the review problems slowly so that the students get a good review of completing the square.

**Activities:**

- Start the class with the graphing calculator on the overhead.

1. Graph the line y=x^2. You are going to leave this graph on your screen for the entire lesson.
2. Enter the graph of the parabola y=x^2 + 3. Before you hit the graph key, ask the students to predict what they think will happen. Ask the students what they notice about the relationship between this graph and the previous graph. They should notice that the vertex moves to the point (0,3).
3. Now enter the equation y=x^2 -4. Again ask for a prediction, then graph to confirm the prediction.
4. Delete the last 2 graphs, leaving y=x^2.
5. Enter y=(x+2)^2. Ask for a prediction. When you graph, you should notice that the vertex of your parabola moves to the point (-2,0).
6. Enter the graph y=(x-5)^2. Again ask for a prediction, then graph.
7. Now combine what they have learned by asking the students to predict the graph y=(x+1)^2 + 4. They should be able to tell you the vertex will be at the point (-1, 4).
8. Delete all the graphs except y=x^2.
9. Now give the students the graph y=-x^2. Ask them what they think might happen. Confirm with them that the graph flips to open down instead of up.
10. Give the students the parabola y=-(x+2)^2-5. Ask students to sketch this graph on their own. Look at the results, then graph on the overhead to show them the answer.
11. Now we are going to make the connection between completing the square and graphing a parabola. Give the students the equation y=x^2+4x+4. Show them the graph on the overhead calculator. Look at the vertex of that graph. Where is it? It should be at the point (-2,0). Ask the students what equation of that parabola would look like in general graph form. They should come up with the answer y=(x+2)^2 based on the pattern you have shown them.
12. Ask the students if anyone can find an algebraic method for transforming x^2+4x+4 into (x+2)^2. If no one can, help them make the connection: Show the students that by factoring the perfect square trinomial of y=x^2+4x+4 you get y=(x+2)^2.
13. Ask them to complete the square of y=x^2+4x+5. They should get y=(x+2)^2+1. Students should now know that this means the vertex of the equation is on the point (-2, 1).

**Assessment:**
Now give the students some extra practice to do on their own. Ask them to do the following problems. The teacher should walk around and check the students work. When most students have completed the problems, ask some students to put the correct graphs on the board so all students can check their work.

**Extra Practice:**

1. y=x^2+8
2. y=(x-5)^2
3. y=(x+1)^2-3
4. y=-(x+4)^2+1
5. y=x^2+18x+81
6. y=x^2+16x+10

**Challenge Problem:**
y=3x^2+6x-2
Only give this problem to the students who are above the ability level of the rest of the class.

**Evaluation Notes:**

| Strengths | Recommendations |
|---|---|
| | |

*Examine the following task. Then, in the space provided, provide guidance to a teacher who is considering using this task within their lesson. Help the teacher to think about questions to be asked, how students may work on the task, guidance for getting students to talk if working in groups, which of the practices they may want to focus on, the precise language, notations, and symbols they want students to use, and so forth.*

## Middle School Problem: The Average Price of Jeans

The Fashion First Clothing store says that the average price of a pair of jeans in its store is $50. They sell 10 different styles of jeans. What might be the prices of the jeans?

- Develop 2 different lists of 10 prices whose average is $50.
- Develop another list that includes one style that costs $250.
- Develop another list that includes one style that costs $17 and one that costs $129
- Develop another list that includes five different styles that each cost $30.

- Make a frequency distribution of each list.
- Find the median of each group.

| Instructional Suggestions |
| --- |
| |

*Examine the following task. Then, in the space provided, provide guidance to a teacher who is considering using this task within their lesson. Help the teacher to think about questions to be asked, how students may work on the task, guidance for getting students to talk if working in groups, which of the practices they may want to focus on, the precise language, notations, and symbols they want students to use, and so forth.*

## Algebra Problem: Phone Plans

Dorothy saw advertisements for two cellular phone companies. Keeping-in-Touch offers phone service for a basic fee of $20.00 a month plus $0.10 for each minute used. ChitChat has no monthly basic fee but charges $0.45 a minute. Both companies use technology that allows them to charge for the exact amount of time used; they don't "round up" the time to the nearest minute, as many of the competitors do. Compare these two companies' charges for the time used each month. Which do you think is a better deal and why?

| Instructional Suggestions |
| --- |
| |

*Examine the following task. Then, in the space provided, provide guidance to a teacher who is considering using this task within their lesson. Help the teacher to think about questions to be asked, how students may work on the task, guidance for getting students to talk if working in groups, which of the practices they may want to focus on, the precise language, notations, and symbols they want students to use, and so forth.*

## Algebra Problem: The Warehouse Problem

In a warehouse, you obtain a 20% discount but you must pay a 15% sales tax. Which would you prefer to have calculated first, discount or tax? Explain how you know what's best.

From: Burton & Stacey (1985) *Thinking Mathematically*. Addison Wesley Publishing

| Instructional Suggestions |
| --- |
| |

*Examine the following task. Then, in the space provided, provide guidance to a teacher who is considering using this task within their lesson. Help the teacher to think about questions to be asked, how students may work on the task, guidance for getting students to talk if working in groups, which of the practices they may want to focus on, the precise language, notations, and symbols they want students to use, and so forth.*

## Geometry Problem: Exploration–Angles and Polygons

Draw some convex polygons. Make them all different. You should have a couple with 4 sides, 5, 6, and more. In each one, pick one vertex and draw all the diagonals from that vertex. Count how many triangles you have. Find the sum of all the angles in all the triangles. Make a chart showing the number of sides in the polygon, the number of triangles, and the sum of the angles of the triangles.

Find a way to use this information to make a rule for finding the sum of the angles of a polygon.

| Instructional Suggestions |
| --- |
| |

# Section 7

# Section 7: Planning for Change

## Supporting Change

*Use the space below to think through how you will communicate the Key Messages from each of the activities presented in this module. Also, think about questions that the teachers you work with may have.*

| Section 1: Understanding the Foundations of the Connecticut Core Standards |
|---|
| **Key Messages:** |
| **Method of Communication:** |
| **Possible Questions:** |

| Section 2: Supporting Change |
|---|
| **Key Messages:** |
| **Method of Communication:** |
| **Possible Questions:** |

| Section 3: Understanding the Standards for Mathematical Practice: Developing Mathematical Expertise |
|---|
| **Key Messages:** |
| **Method of Communication:** |
| **Possible Questions:** |

| Section 4: Supporting Students to "Make sense of problems and persevere in solving them." |
|---|
| **Key Messages:** |
| **Method of Communication:** |
| **Possible Questions:** |

| Section 5: Attending to Precision in Every Lesson |
| --- |
| **Key Messages:** |
| **Method of Communication:** |
| **Possible Questions:** |

| Section 6: Teaching with the Standards for Mathematical Practice |
| --- |
| **Key Messages:** |
| **Method of Communication:** |
| **Possible Questions:** |

# Closing Activities

# Closing Activities

## Post-Assessment–CCS-Math

**Instructions:** Check the box on the scale that best represents your knowledge or feelings about implementing the CCS-Math in your classroom **(5 minutes to complete the Post-Assessment).**

| Self-Assessment Questions | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| I have an initial understanding of the CCS-Math and the embedded changes and instructional shifts. | | | | |
| I am familiar with all eight of the CCS for Mathematical Practice and can identify how they are all related. | | | | |
| I know why Practice 1: *"Make sense of problems and persevere in solving them"* and Practice 6: *"Attend to precision"* are considered the two "umbrella" standards. | | | | |
| I can identify evidence of the eight Practices in CCS-aligned mathematics tasks. | | | | |
| I can create descriptors for all eight Practices, and develop formal grade level descriptions for Practice 1 and Practice 6. | | | | |
| I understand how instructional strategies such as questioning, engaging students in mathematical discourse, and requiring multiple representations can help students meet learning goals. | | | | |
| I can identify relevant resources for implementing the CCS-Math. | | | | |

## Session Evaluation

Thank you for attending today's session. Your feedback is very important to us! Please fill out a short survey about today's session. The survey is located here: **http://tinyurl.com/612Mod1MATH**

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