

Standards of Mathematical Practice Module

Presented by the
Center for Literacy and Disability Studies
University of North Carolina at Chapel Hill



DYNAMIC
LEARNING MAPS





STANDARDS OF MATHEMATICAL PRACTICE FACILITATOR GUIDE

This guide describes the workshop preparation, flow, video segment and 3 learning activities. Facilitators should use the narrated movie to facilitate learning activities with your participants. Each learning activity has an activity guide that includes a description, objective(s), materials and facilitator instructions.

The entire workshop should take approximately 60 minutes when presented to a group.

Setting up:

- ✦ Equipment:
 - Presenter's computer with movie version of the Standards of Mathematical Practice module. The movie of the module should be accessed at the Dynamic Learning Maps Professional Development web site and reviewed well before the training.
 - LCD Projector with external speakers or sound system.
 - White Board or chart paper with markers

- ✦ Training Materials (Prior to the training create the appropriate number of packets with these materials to give to participants as they arrive at the training):
 - Agenda
 - Handouts and Worksheets
 - Traits/Skills of Strong Mathematicians (Activity #1: Handout)
 - Making Connections (Activity #2-3: Handout p. 1)
 - Standard of Practice: Grouping Chart (Activity #2 -3: Handout pg. 2-3)

- ✦ Learning Objectives:
 1. Participants will discuss their perceptions of the traits/skills of strong mathematicians.
 2. Participants will recognize the 8 standards of mathematical practice outlined in the Common Core State Standards.
 3. Participants will discuss how their perceptions of the traits/skills of strong mathematicians compare to the 8 standards of mathematical practice outlined in the Common Core State Standards.



Introduction: Approximately 2-3 minutes

- Greet Participants
- **State the title of the module and briefly review the learning objectives:**

“Welcome everyone. The topic of this presentation is Standards of Mathematical Practice. During the next hour, we will be learning about the standards of mathematical practice that the Common Core was built around. We will discuss how these standards compare to your perceptions of important skills and traits for mathematics and how these standards apply to students with significant cognitive disabilities.”

- **See who is in your audience.**

“As we get started, it will be helpful to know a bit about you. Raise your hand if you are a classroom teacher. How many of you are speech-language pathologists? Are there any occupational therapists here today? Physical therapists? Teaching assistants? How about school psychologists? School administrators? Did I miss anyone? (Ask anyone who raises a hand to say what job he/she does).”

- **Review list of handouts.**

“I’m glad all of you could be here today. We will begin the presentation in a few minutes, but before that, please take a moment to review the handout packet you received. You should have a copy of the following documents:

- *Today’s agenda*
- *Traits/Skills of Strong Mathematicians Handout*
- *Making Connections Handout that includes 2 Standard of Practice Grouping Charts*

- **Make sure everyone has all of the handouts and start the presentation**

“Does everyone have a copy of each of these? (Supply extra handouts to anyone who needs them). You need these handouts for the 3 learning activities we will do during today’s session. Does anyone have any questions? (Pause to see if there are questions and respond as appropriate). If there are no (more) questions, let’s go ahead and get started.”

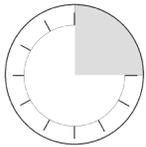
**Section 1 – Thinking about Strong Traits/Skills Related to Mathematics:**

Approximately 15 minutes

- Tell participants that you will begin by getting their input. Ask them to locate the Traits/Skills of Strong Mathematicians handout. At the same time, locate your Activity Guide #1.

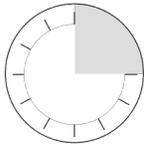
“We’re going to begin today by tapping your expertise and getting your input. Please find the handout that is titled Traits/Skills of Strong Mathematicians.”

- Activity #1: Participants brainstorm ideas about what they consider to be the traits and skills of strong mathematicians. – **Refer to the attached Facilitator’s Activity Guide #1** as participants locate their handouts.

**Section 2 – Overview of the first 3 Standards of Mathematical Practice:**

Approximately 10 minutes More info

- Start the movie and let it play to 12:11.
- Pause the video when the blue screen with that reads *Pause for Activity #2* appears and ask participants to find the Making Connections Handout. Remind participants that the Making Connections Handout has 2 sections. The first page lists the Standards of Practice and McCallum’s grouping of the standards. The additional pages include a Standard of Practice Grouping Chart.
- Activity #2: Participants work with a partner or small group to reflect on the first 3 Standards of Mathematical Practice reviewed in the video. Participants review the traits and skills they listed in activity #1 and determine which of these are related to the 3 standards of mathematical practice they have just seen described. **Refer to the attached Facilitator’s Activity Guide #2** as participants locate their handouts.

**Section 3 – Making Connections:** Approximately 15 minutes

- Play the movie to the end. Then, ask participants to find the Making Connections Handout again. Remind participants that the Making Connections Handout has 2 sections. The first page lists the Standards of Practice and McCallum’s grouping of the standards. The additional pages include a Standard of Practice Grouping Chart.
- Activity #3: Participants review the traits and skills they listed in activity #1. The goal is to determine which of the 5 Standards of Mathematical Practice that were just discussed in the video relate to group’s list of traits and skills. **Refer to the attached Facilitator’s Activity Guide #3** as participants locate their handouts.

**Section 4 – Wrap-up:** Approximately 2-3 minutes

- Finish the session. Have participants complete any final paperwork that is needed (e.g., an evaluation, sign out to document attendance, etc.)

“That completes the Standards of Mathematical Practice module. Thanks for your attention and participation.”



STANDARDS OF MATHEMATICAL PRACTICE

AGENDA

		Content	Activity
	Introduction 2-3 minutes	Review of Learning Objectives and handouts.	
Section 1	Warm-up “Thinking About Strong Traits / Skills Related to Mathematics” 15 minutes	Brainstorming key skills students should have to enable them to be the strongest mathematicians possible.	Activity 1: Small/whole group brainstorming <i>what we agree to be the traits / skills of strong mathematicians.</i>
Section 2	Overview of the 8 Standards of Mathematical Practice 15 minutes	Explanation of the first 3 Standards of Mathematical Practice used to structure the Common Core.	Activity 2: Small group review of first 3 Standards of Mathematical Practice and comparison to list generated from Activity 1.
Section 3	Making Connections 15 minutes	Explanation of the remaining 5 Standards of Mathematical Practice used to structure the Common Core.	Activity 3: Small/whole group review of the remaining 5 Standards of Mathematical Practice and comparison to list generated from Activity 1.
Section 4	Wrap-up 3-4 minutes	Closing information	Dismissal

Standards of Mathematical Practice Module

Activity Guide

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STANDARDS OF MATHEMATICAL PRACTICE FACILITATOR GUIDE

ACTIVITY 1

This activity is part of the Standards of Mathematical Practice Module



Estimated Time Needed: 15 minutes total

3 minutes to set up and explain the activity

6 minutes to brainstorm within small groups (5 or fewer)

6 minutes to share big ideas with entire group

◆ Objectives:

- 1) Participants reflect on their own teaching/students over the years.
- 2) Participants brainstorm their thoughts about the key traits/skills students should develop in order to be strong mathematicians.

◆ Materials:

- White board or chart paper and markers
- Activity Handout #1 Traits/Skills of Strong Mathematicians



- ◆ Facilitator Instructions: *NOTE: please make sure participants are in groups of five or fewer.

1. **Ask participants to locate the Traits/Skills of Strong Mathematicians Handout.**
2. **Tell the participants to break into small groups or turn to the person or people nearby to discuss what they consider to be the traits and skills of strong math students. (Give 6 minutes for this part of the activity.)**

*“Has everyone found the Traits/Skills of Strong Mathematicians handout? Now, work with the person or people near you to list some traits and skills you think a student needs to be a strong mathematician. You can use your own experiences as a student or teacher of mathematics to help generate the list. Consider the **underlying** skills that students should have in order to become the strongest mathematicians possible and write those thoughts down.”*

3. **After 6 minutes, bring the group back together. Ask the small groups to share their ideas with the entire group.**

“Everyone please wrap up what you are working on and give me your attention. Thanks. As a group, let’s discuss some of the ideas/thoughts your groups wrote down.”

4. **The facilitator should write down all of the ideas / thoughts that stem from the group.** These big ideas or key factors of mathematics understanding/learning will be used throughout the module presentation. If you see ideas that are similar – you may group these or use tally marks to reinforce the idea(s). Start by asking for volunteers, but if no one offers to share what their group wrote, call on someone.

“I am going to write down your thoughts and ideas of key factors of mathematics understanding/learning. We will be using these as we move through this module. Is anyone willing to share a couple of things from your group’s list?”



5. **Tell participants that you will now watch the first segment of the 8 Standards of Mathematical Practice Module and return to the main Facilitator’s Guide**

“Now that we’ve created our list of traits and skills of strong mathematicians, let’s watch the module to learn about the standards of mathematical practice that the Common Core was built around.”



Activity #1

Traits / Skills of Strong Mathematicians:

Take a few moments and think of the traits and skills of a strong mathematician. Write down at least 3 traits/skills that come to mind. List your thoughts/ideas below.

1.

2.

3.

4.

5.

6.

7.

8.

STANDARDS OF MATHEMATICAL PRACTICE FACILITATOR GUIDE

ACTIVITY 2

This activity is part of the Standards of Mathematical Practice Module



Estimated Time Needed: 10 minutes total

2 minutes to set up and explain the activity

3 minutes to reflect on the first 3 Standards of Mathematical Practice reviewed in the video with a partner or small group

5 minutes to brainstorm alignment of the group's list of ideas from Activity #1 with the first 3 Standards of Mathematical Practice. Participants should still be working with a single partner or with a small group.

◆ Objectives:

- 1) Participants discuss how their teaching over the years relates to the first 3 Standards of Mathematical Practice cited in the Common Core State Standards.
- 2) Participants align the items they suggested to be “the key skills students should develop in order to be strong mathematicians” from Activity #1 with McCallum’s grouping of the first 3 Standards of Mathematical practice.

◆ Materials:

- White board or chart paper and markers
- Handout– Activity #2-3, Making Connections Handout

✦ Facilitator Instructions: *NOTE: please make sure participants are in groups of five or fewer.

1. **Ask participants to locate the Making Connections, Activity #2-3 Handout. Remind them that this handout has 2 sections. The first page includes a list of the 8 Standards of Mathematical Practice and the remainder of the handout includes charts to group standards.**
2. **Tell the participants to work with a partner or a small group to reflect on the video using figures 1 and 2 on page one of the handout (this should take about 3 minutes)**

“Please find one person or a couple of people close by to work with you. Take out your Making Connections Activity #2-3 Handout. Take about 3 minutes to consider the first 3 Standards of Mathematical Practice that were just reviewed in the video. Do you think address any of these standards in your current instruction?” (Refer to Figures 1 on the handout).

3. **The participant groups should now revisit the list on the board from Activity #1.** The list includes the group’s original ideas of the “key traits/skills students should develop in order to be strong mathematicians”. Participants will now locate the skills listed on the board that align with the first 3 Standards of Mathematical Practice using page 2 of the Making Connections Activity #2 handout. (This should take about 5 minutes).

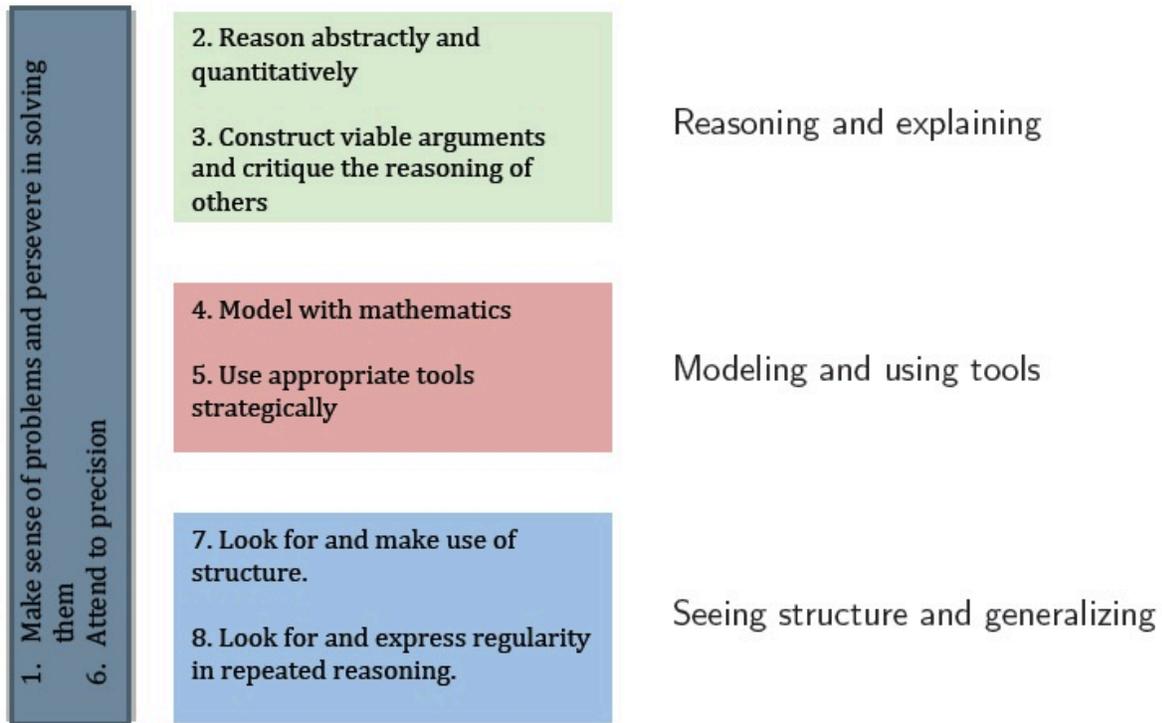
“Please turn to the second page of your Making Connections Activity #2-3 Handout. Now, take about 5 minutes and focus on our group’s original ideas of the “key skills students should develop in order to be strong mathematicians.” Do any of the skills and traits on our list align with the first 3 Standards of Mathematics Practice? Please write those down on page 2 of your handout in the appropriate column. (Figures 1 on the handout may be used to help guide you in this process).”

4. **Bring the large group back together. Tell them they will be using the information they recorded in the next activity. Start the video.**

“Please wrap up you small group discussions and let’s come back together as a large group. Did you find any connections that you could make between what we felt were strong traits/skills and the first 3 Standards of Mathematical Practice? We won’t discuss that just yet. Hang onto that information because we will be using it in just a bit. Now, let’s continue the video to learn about the remaining 5 Standards of Mathematical Practice.”

Use the figure as a reference. The standards written in the colored boxes are the 8 standards of mathematical practice described in the video.

Figure 1:
Review McCallum’s, 2011 the grouping of 8 Standards of Mathematical Practice:





Participants should categorize the collective ideas of the room (the ideas written on the board) into the McCallum’s, 2011 the grouping of the first 3 Standards of Mathematical Practice. Please use the chart on this page:

1: Sense Making and Perseverance	2&3: Reasoning and Explaining



STANDARDS OF MATHEMATICAL PRACTICE FACILITATOR GUIDE

ACTIVITY 3

This activity is part of the Standards of Mathematical Practice Module



Estimated Time Needed: 15 minutes total

2 minutes to set up and explain the activity

3 minutes to reflect on the 5 Standards of Mathematical Practice reviewed in the video with a partner or small group

5 minutes to brainstorm alignment of the group's list of ideas from Activity #1 with the 5 Standards of Mathematical Practice reviewed in the video. Participants should still be working with a single partner or with a small group.

5 minutes to share small group thoughts/realizations about the alignment activity with entire group

✦ Objectives:

- 1) Participants discuss how their teaching and learning relates to the 5 Standards of Mathematical Practice discussed in the video.
- 2) Participants align the items they suggested to be “the key skills students should develop in order to be strong mathematicians” from Activity #1 with McCallum’s grouping of the 5 Standards of Mathematical Practice just reviewed in the video.

✦ Materials:

- White board or chart paper and markers
- Handout– Activity Handout #2-3 Making Connections Handout



✦ Facilitator Instructions: *NOTE: please make sure participants are in groups of five or fewer.

1. **Ask participants to locate the Making Connections Activity #2-3 Handout. Remind them that this handout has 2 sections. The first page shows McCallum's figure and the remainder of the handout includes charts to group standards.**
2. **Tell the participants to work with a partner or a small group to reflect on the 8 Standards of Mathematical Practice just reviewed in the video using Figure 1 on page one of the handout.** (This should take about 3 minutes.)

"Please find one person or a couple of people close by to work with you. Take out your Making Connections Activity #2-3 Handout. Take about 3 minutes to consider the 8 Standards of Mathematical Practice including those that were just discussed in the video and review McCallum's grouping of the 8 Standards of Mathematical Practice (Figure 1 on the handout). Do you think your current Mathematics instruction is more concentrated in some areas than others? Do you think some of the 8 standards will be more difficult for your students to grasp than others? If so, which standards seem more difficult? Discuss your thoughts around the standards with your group?"

3. **The participant groups should now revisit the list on the board from Activity #1.** The list includes the group's original ideas of the "key traits/skills students should develop in order to be strong mathematicians". Participants will now align related skills listed on the board around the 5 Standards of Mathematical Practice that were just reviewed in the video using page 3 of the Making Connections Activity #2-3 handout. (This should take about 5 minutes.)

"Please turn to the third page of your Making Connections Activity #2-3 Handout. Now, take a few minutes and focus on how the group's original ideas of the "key skills students should develop in order to be strong mathematicians" tie into the 5 Standards of Mathematics Practice that were just reviewed in the video. Align the skills that are related on the group's chart around those 5 Standards of Mathematical Practice using page 3 of the Making Connections Activity #2-3 handout chart. (Figure 1 on the handout may be used to help guide you)."



4. **Have the entire group discuss where they felt their original ideas of student traits/skills fell in alignment with all 8 Standards of Mathematical Practice.** (This should take 5 minutes.)

“Please wrap up you small group discussions and let’s come back together as a large group. Did you find any connections that you could make between what we felt were strong traits/skills and what the developers of the Common Core 8 Standards of Mathematical Practice suggested? This includes the information you recorded on both pages 2 and 3 of your handout. Is anyone willing to share what your group discovered?”

5. **The group should have come to the discovery that they already had several ideas that fell within the 8 Standards of Mathematical Practice.** This should be a time to reinforce that the skills we want to develop in our students are the same skills that the Common Core will develop within them. Emphasize the fact that teachers already know some things about the 8 Standards of Mathematical Practice.

“I hope you can see you already had several ideas that fell within the 8 Standards of Mathematical Practice. Please know that the Common Core will help you develop these strong traits and skills within your own students. Now, let’s wrap-up today’s module.”

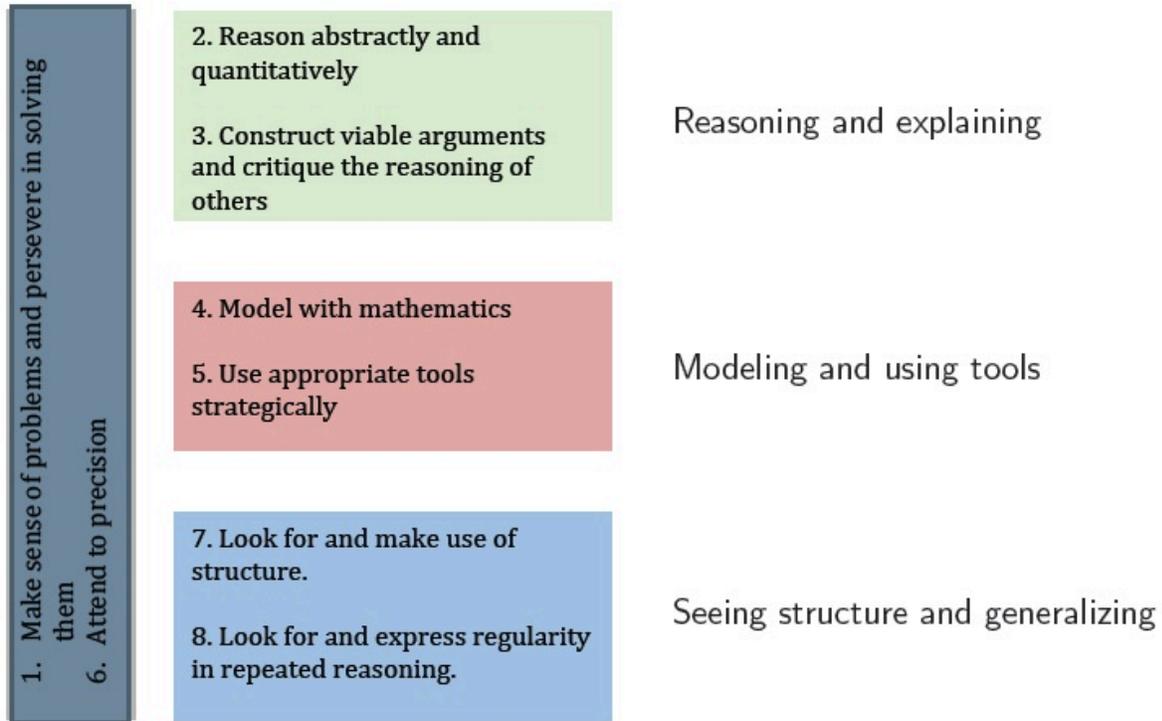


Use the figure as a reference. The standards written in the colored boxes are the 8 standards of mathematical practice described in the video.

Participants should talk / reflect with their groups about Figure 1 below.

Figure 1:

Review McCallum's, 2011 the grouping of 8 Standards of Mathematical Practice:



STANDARDS OF MATHEMATICAL PRACTICE FACILITATOR GUIDE



Participants should categorize the collective ideas of the room (the ideas written on the board) into the McCallum’s grouping of the 5 Standards of Mathematical Practice just reviewed in the video. Please use the chart on this page:

4&5: Modeling and Using Tools	6: Attend to Precision	7&8: Seeing structure and Generalizing

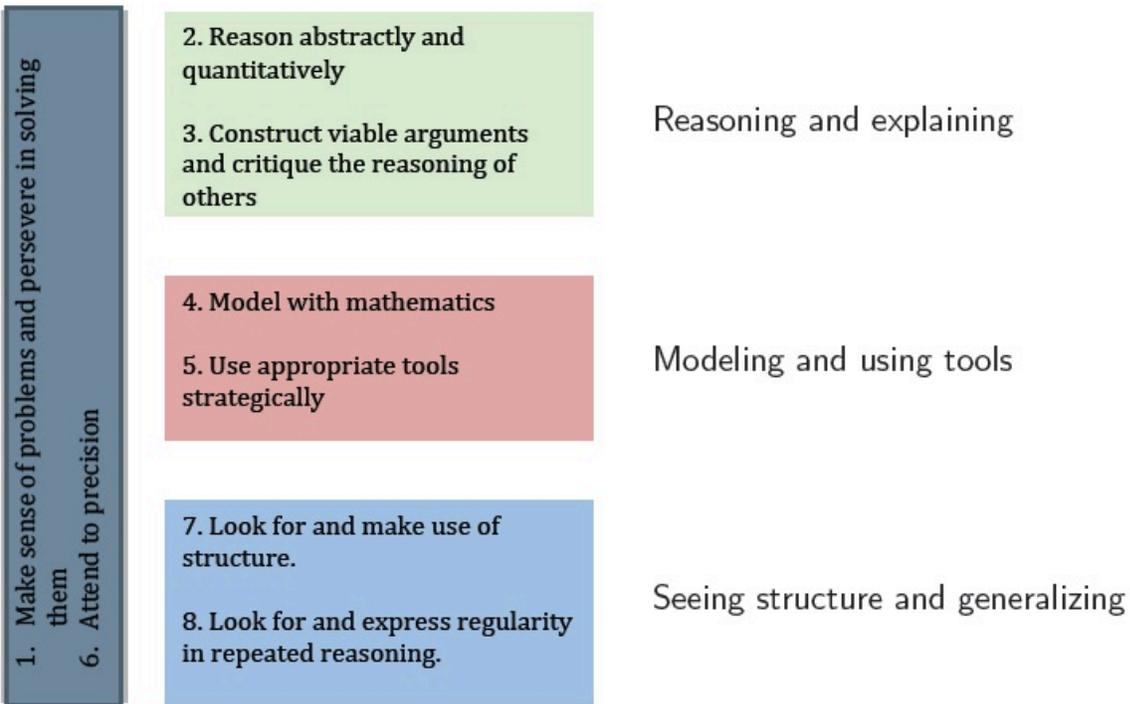
Activity #2 -3
Making Connections

You have now heard about all 8 Standards of Mathematical Practices.

1. Talk with your group about Figure 1 and McCallum’s grouping of the standards of mathematical practice.

Figure 1:

Review McCallum’s, 2011 the grouping of 8 Standards of Mathematical Practice:



2. Now categorize the ideas from Activity #1 (the ideas written on the board) into the McCallum’s grouping of the first 3 Standards of Mathematical Practice. Write your responses on this chart:

1: Sense Making and Perseverance	2&3: Reasoning and Explaining

3. Now that you have learned about all 8 standards of mathematical practice, work with your group to categorize the remaining ideas from Activity #1 (the ideas written on the board) into McCallum's final three grouping. Please record your thoughts on the chart below:

4&5: Modeling and Using Tools	6: Attend to Precision	7&8: Seeing structure and Generalizing